

*Message Length Error Response Data (4200H)*

| Message Length Error Response Data | Data Payload |
|------------------------------------|--------------|
| Expected Message Length            | XXXXH        |
| Received Message Length            | XXXXH        |

*Command Sequence Error Response Data (4201H)*

| Command Sequence Error Response Data | Data Payload |
|--------------------------------------|--------------|
| Expected Command Sequence Number     | XXH          |
| Received Command Sequence Number     | XXH          |

*Command Group Error (4203H)*

| Command Group Error Response Data | Data Payload |
|-----------------------------------|--------------|
| Invalid Command Group             | XXXXH        |

*Command Time-out Error (4204H)*

| Command Time-out Error Response Data | Data Payload |
|--------------------------------------|--------------|
| N/A                                  |              |

*Command Failed Error (4206H)*

| Command Failed Error Response Data       | Data Payload |
|------------------------------------------|--------------|
| Mode Command Group Command (sub-command) | XXXXH        |

*System Command Error (4207H)*

| System Command Error Response Data | Data Payload |
|------------------------------------|--------------|
| N/A                                |              |

### *Sub-Command Error (4208H)*

| Sub-Command Error Response Data | Data Payload |
|---------------------------------|--------------|
| Sub-command                     | XXXXH        |

### *Invalid Control Word Error (420AH)*

| Invalid Control Word Error Response Data | Data Payload |
|------------------------------------------|--------------|
| N/A                                      |              |

### *Invalid Command Data Error (420BH)*

| Invalid Command Data Error Response Data | Data Payload |
|------------------------------------------|--------------|
| N/A                                      |              |

---

## **Set Mode**

This command sets the Encompass reader to mode 88. [Table 6-204](#) and [Table 6-205](#) list the command and response data.

**Table 6-204 Set Mode Command (0001H)**

| Set Mode Command Data  | Data Payload |
|------------------------|--------------|
| <b>Bits 7–0</b>        |              |
| Set Mode Command (MSB) | 00H          |
| Set Mode Command (LSB) | 01H          |
| Mode Number            | 58H          |

**Table 6-205 Set Mode Response**

| Set Mode Command Response Data | Data Payload |
|--------------------------------|--------------|
| <b>Bits 7–0</b>                |              |
| Set Mode Command (MSB)         | 00H          |
| Set Mode Command (LSB)         | 02H          |
| Mode Number                    | 58H          |

**Mode Number** — This field identifies mode as 88.

*Note: RESET READER command required for changes to take effect.*

---

## Get Mode

This command gets the Encompass reader mode. [Table 6-206](#) and [Table 6-207](#) list the command and response data.

**Table 6-206 Get Mode Command (0002H)**

| Get Mode Command Data  | Data Payload |
|------------------------|--------------|
| Bits 7–0               |              |
| Get Mode Command (MSB) | 00H          |
| Get Mode Command (LSB) | 02H          |

**Table 6-207 Get Mode Command Response**

| Get Mode Command Response Data | Data Payload |
|--------------------------------|--------------|
| Bits 7–0                       |              |
| Get Mode Command (MSB)         | 00H          |
| Get Mode Command (LSB)         | 02H          |
| Mode Number                    | 58H          |

**Mode Number** — This field identifies mode as 88.

## Set Protocol

This command configures the Encompass reader to enable specified protocols. [Table 6-208](#) and [Table 6-209](#) list the command and response data.

**Note:** Reset the Encompass reader after setting the protocol. See [“Reset Reader” on page 6-25](#) for command information.

**Table 6-208 Set Protocol Command (0003H)(**

| Set Protocol Command Data  |      |     |        |          |               |                |          | Data Payload |
|----------------------------|------|-----|--------|----------|---------------|----------------|----------|--------------|
| Bits 7–0                   |      |     |        |          |               |                |          |              |
| Set Protocol Command (MSB) |      |     |        |          |               |                |          | 00H          |
| Set Protocol Command (LSB) |      |     |        |          |               |                |          | 03H          |
| Reserved                   |      |     |        |          |               | CVISN          | IAG Rsvd | 0XH          |
| IAG Read                   | SeGo | eGo | IT2200 | Title 21 | ATA 1/2-Frame | ATA Full-Frame | Reserved | XXH          |

**Table 6-209 Set Protocol Response**

| Set Protocol Response Data |  |  |  |  |  |  | Data Payload |
|----------------------------|--|--|--|--|--|--|--------------|
| Bits 7–0                   |  |  |  |  |  |  |              |
| Set Protocol Command (MSB) |  |  |  |  |  |  | 00H          |
| Set Protocol Command (LSB) |  |  |  |  |  |  | 03H          |

**Protocols** — These fields specify the protocol to enable. The example shows three enabled protocols.

All protocols off                      00H

Enabling three protocols:

eGo                                              20H

ATA                                              02H

Title 21                                              08H

2AH

**Note:** RESET READER command required for changes to take effect.

---

## Get Protocol

This command retrieves the Encompass reader specified protocols. [Table 6-210](#) and [Table 6-211](#) list the command and response data.

**Table 6-210 Get Protocol Command (0004H)**

| Set Protocol Command Data  | Data Payload |
|----------------------------|--------------|
| Bits 7–0                   |              |
| Get Protocol Command (MSB) | 00H          |
| Get Protocol Command (LSB) | 04H          |

**Table 6-211 Get Protocol Response**

| Set Protocol Response Data |      |     |        |          |               |                |          | Data Payload |
|----------------------------|------|-----|--------|----------|---------------|----------------|----------|--------------|
| Bits 7–0                   |      |     |        |          |               |                |          |              |
| Get Protocol Command (MSB) |      |     |        |          |               |                |          | 00H          |
| Get Protocol Command (LSB) |      |     |        |          |               |                |          | 04H          |
| Reserved                   |      |     |        |          |               | CVISN          | IAG Rsvd | 0XH          |
| IAG Read                   | SeGo | eGO | IT2200 | Title 21 | ATA 1/2-Frame | ATA Full-Frame | Reserved | XXH          |

**Protocols** — These fields specify the protocol to enable. The example shows three enabled protocols.

All protocols off                      00H

Enabling three protocols:

eGo                                              20H

ATA                                              02H

Title 21                                        08H

2AH

## Set IT2200 Read Request Configuration

This command sets the reader to read data from the specified memory area of the chosen tag. [Table 6-212](#) and [Table 6-213](#) list the command and response data.

**Note:** *READER must be in STOP Mode for changes to take effect.*

**Table 6-212 Set IT2200 Read Request Configuration Command (0043H)**

| Set IT2200 Read Request Configuration Command Data  | Data Payload |
|-----------------------------------------------------|--------------|
| <b>Bits 7–0</b>                                     |              |
| Set IT2200 Read Request Configuration Command (MSB) | 00H          |
| Set IT2200 Read Request Configuration Command (LSB) | 43H          |
| Protocol                                            | 00H          |
| Command Action                                      | 00H          |
| Command Action                                      | 00H          |
| Tag Request Code                                    | C0H          |
| Tag Request Code                                    | 03H          |
| Bit Count (MSB)                                     | 00H          |
| Bit Count (LSB)                                     | 50H          |
| Options                                             | XXH          |
| Starting Page Number                                | XXH          |
| Starting Page Number                                | XXH          |
| Page Count                                          | 01H          |
| Reserved                                            | 00H          |
| Reserved                                            | 00H          |
| Op-type                                             | 0XH          |
| Retry (MSB)                                         | XXH          |
| Retry (LSB)                                         | XXH          |
| Antenna Number                                      | XXH          |

**Table 6-213 Set IT2200 Read Request Configuration Response**

| Set IT2200 Read Request Configuration Response Data | Data Payload |
|-----------------------------------------------------|--------------|
|-----------------------------------------------------|--------------|

**Table 6-213 Set IT2200 Read Request Configuration Response**

| Bits 7–0                                            |     |
|-----------------------------------------------------|-----|
| Set IT2200 Read Request Configuration Command (MSB) | 00H |
| Set IT2200 Read Request Configuration Command (LSB) | 43H |

**Protocol** — A one-byte value that is used to set the intended tag type data for the IT2200 protocol – 00H.

**Command Action** — This configuration parameter is sent into the flash memory. The command action for Mode 88 is set to 0.

**Tag Request Code** — This field identifies the message as a read request. The field is set to C003.

| Value | Definition   |
|-------|--------------|
| C003  | Read Request |

**Bit Count** — This field indicates the number of bits in a message. The bit count includes the number of bits in all fields after the bit count including the CRC.

**Options** — This field contains subfields that identify options for the message. Subfields and definitions are specified in [Table 6-214](#).

**Table 6-214 Options**

| Bit 7  | Bit 6    | Bit 5–4              | Bit 3        | Bit 2                 | Bit 1–0        |
|--------|----------|----------------------|--------------|-----------------------|----------------|
| Unused | Tag type | Page/password select | BIST request | Anti-playback request | Tag addressing |

**Tag Type** — This subfield indicates the tag type that should respond. The tag type includes toll tags and check tags.

| Value | Description |
|-------|-------------|
| 0     | Toll tags   |
| 1     | Check tags  |

**Page/Password Select** — This subfield indicates the tag data area selected and the specific data contained in the command for that tag data area. Valid values and corre-

sponding definitions are specified in [Table 6-215](#).

**Table 6-215 Definition of Page/Password Select Values**

| Value | Definition                                               |
|-------|----------------------------------------------------------|
| 00    | General data page area selected, no password specified   |
| 01*   | General data page area selected, user password specified |
| 11*   | Owner area selected with a global password specified     |

\*For future use, not currently supported.



**BIST Request** — This subfield indicates whether the tag should return a built-in self test (BIST) code in the read response. The BIST code is returned by the tag and displays the results of the BIST test that was run the last time the tag entered idle mode. The definitions for this subfield are listed in [Table 6-216](#).

**Table 6-216 Definition of BIST Request Values**

| Value | Definition             |
|-------|------------------------|
| 0     | BIST code not returned |
| 1     | BIST code returned     |

**Anti-Playback Request** — This subfield indicates whether the tag should return an anti-playback code in the read response. The anti-playback code indicates whether a tag has been tampered with. The anti-playback code is returned by the tag and is incremented each time the tag is read. This function may be used for post-validation of tags at the system level by monitoring the sequencing of this field for a given tag. The definitions for this field are listed in [Table 6-217](#).

**Table 6-217 Definition of Anti-Playback Request Values**

| Value | Definition                      |
|-------|---------------------------------|
| 0     | Anti-playback code not returned |
| 1     | Anti-playback code returned     |

**Tag Addressing** — This subfield specifies which tags should respond to the read request. The valid values and corresponding definitions for this subfield are listed in [Table 6-218](#).

**Table 6-218 Definitions of Tag Addressing Value**

| Value | Definition                                                                                                                              |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 00    | All tags respond to this request. The response contains the Title 21 ID.                                                                |
| 01    | All tags respond to this request. The response contains the tag serial number.                                                          |
| 10    | Only tags with the specified Title 21 ID respond. The response contains the specified Title 21 ID in the tag ID field.                  |
| 11    | Only tags with the specified tag serial number will respond. The responses contain the specified tag serial number in the tag ID field. |

**Starting Page Number** — This field is a binary integer corresponding to the tag page

number to be read.

**Page Count** — This functionality is for multipage reads only and is not implemented in the IT2221 and IT2235 tags, and should be set to 01H.

**Reserved** — This field is saved for future use.

**Op-Type** — This is a one-byte field that is used to indicate whether the associated command should be considered for auto send (mode-based). The values and definitions are listed in [Table 6-219](#).

**Table 6-219 Definition of Op-Type Values**

| Value | Definition       |
|-------|------------------|
| 0     | Normal operation |
| 1     | Auto send        |

**Retry** — This two-byte field specifies the number of transmission attempts to be made for the given transaction.

**Antenna Number** — This two-byte field represents the antenna channel field and indicates which channel-associated command to configure.

---

## Get IT2200 Read Request Configuration

This command sets the reader to read data from the specified memory area of the chosen tag. [Table 6-220](#) and [Table 6-221](#) list the command and response data.

**Table 6-220 Get IT2200 Read Request Configuration (0044H)**

| Get IT2200 Read Request Configuration Command Data  | Data Payload |
|-----------------------------------------------------|--------------|
| Bits 7–0                                            |              |
| Get IT2200 Read Request Configuration Command (MSB) | 00H          |
| Get IT2200 Read Request Configuration Command (LSB) | 44H          |

**Table 6-221 Get IT2200 Read Request Configuration Response Data**

| Get IT2200 Read Request Configuration Response Data | Data Payload |
|-----------------------------------------------------|--------------|
| Bits 7–0                                            |              |
| Get IT2200 Read Request Configuration Command (MSB) | 00H          |

**Table 6-221 Get IT2200 Read Request Configuration Response Data**

|                                                     |     |
|-----------------------------------------------------|-----|
| Get IT2200 Read Request Configuration Command (LSB) | 44H |
| Protocol                                            | 00H |
| Command Action                                      | 00H |
| Command Action                                      | 00H |
| Tag Request Code                                    | C0H |
| Tag Request Code                                    | 03H |
| Bit Count (MSB)                                     | 00H |
| Bit Count (LSB)                                     | 50H |
| Options                                             | XXH |
| Starting Page Number                                | XXH |
| Starting Page Number                                | XXH |
| Page Count                                          | 01H |
| Reserved                                            | 00H |
| Reserved                                            | 00H |
| Op-Type                                             | 0XH |
| Retry (MSB)                                         | XXH |
| Retry (LSB)                                         | XXH |
| CRC                                                 | XXH |
| CRC                                                 | XXH |
| Antenna Number                                      | XXH |

See “Set IT2200 Read Request Configuration” on page 6-131 for field definitions.

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### ***Set IT2200 Configuration With Gen Ack***

This command sets the reader to inform a tag not to respond to any commands from the reader for a specified time. This command also provides the capability to control the audio/visual (A/V) and liquid-crystal display (LCD) functions of IT2200-series tags. [Table 6-222](#) and [Table 6-223](#) list the command and response data.

**Note:** Command number (0043H) has the capability and is used to configure all tag

*protocols.*

**Table 6-222 Set IT2200 Configuration with Gen Ack Command (0043H)**

| Set IT2200 Configuration with Gen Ack Command Data  | Data Payload |
|-----------------------------------------------------|--------------|
| <b>Bits 7–0</b>                                     |              |
| Set IT2200 Configuration with Gen Ack Command (MSB) | 00H          |
| Set IT2200 Configuration with Gen Ack Command (LSB) | 43H          |
| Protocol                                            | 00H          |
| Command Action                                      | 00H          |
| Command Action                                      | 00H          |
| Command Code                                        | F0H          |
| Command Code                                        | 0FH          |
| Bit Count (MSB)                                     | 00H          |
| Bit Count (LSB)                                     | 50H          |
| Options                                             | XXH          |
| Tag ID (MSB)                                        | XXH          |
| Tag ID                                              | XXH          |
| Tag ID                                              | XXH          |
| Tag ID (LSB)                                        | XXH          |
| Time-out                                            | XXH          |
| Condition Code                                      | XXH          |
| LCD Message Page Pointer                            | XXH          |
| Reserved                                            | 00H          |
| Reserved                                            | 00H          |
| Send Option                                         | 0XH          |
| Retry (MSB)                                         | XXH          |
| Retry (LSB)                                         | XXH          |
| Antenna Number                                      | XXH          |

**Table 6-223 Set IT2200 Configuration with Gen Ack Response**

| Set IT2200 Configuration with Gen Ack Response Data | Data Payload |
|-----------------------------------------------------|--------------|
| <b>Bits 7–0</b>                                     |              |
| Set IT2200 Configuration with Gen Ack Command (MSB) | 00H          |
| Set IT2200 Configuration with Gen Ack Command (LSB) | 43H          |

**Protocol** — This one-byte value that is used to set the intended tag type data for the IT2200 configuration command to the IT2200 protocol.

**Command Action** — This configuration parameter is sent into the flash memory. The command action for Mode 88 is set to 0.

**Command Code** — This field identifies the message as a general acknowledge (Gen Ack) request message. The field contains the value: F00FH = Gen Ack Req.

**Bit Count** — This field indicates the number of bits in a message. The bit count includes the number of bits in all fields after the bit count. This field is a binary-coded integer.

**Send option** — This one-byte field indicates whether the associated command should be configured for normal operation or *auto send*.

| Send Option | Definition       |
|-------------|------------------|
| 0           | Normal operation |
| 1           | Auto send        |

**Antenna Number** — This two-byte field ranges from 0 to 0FH.

### **General Acknowledge Options**

This field contains subfields that identify options for the message. Subfields and definitions are specified in [Table 6-224](#).

**Table 6-224 Gen Ack Options**

| Bit 7    | Bit 6                 | Bit 5     | Bit 4     | Bit 3     | Bit 2     | Bit 1     | Bit 0            |
|----------|-----------------------|-----------|-----------|-----------|-----------|-----------|------------------|
| Reserved | Reserved for ACK type | A/V bit 4 | A/V bit 3 | A/V bit 2 | A/V bit 1 | A/V bit 0 | All tags respond |

**Reserved** — This bit is set to 1.

**Reserved for ACK type** — This subfield is reserved for ACK type decoding and is not interpreted by the tag. This subfield should be set to 0 when using this command.

**A/V bits 0-4** — These subfields decode which A/V combinations will execute ([Table](#)

6-225).

**Table 6-225 A/V Options Bit Decoding**

| Bit 4                                                                                                                  | Bit 3 | Bit 2 | Bit 1 | Bit 0 | LED Sequence    | Audio Sequence |
|------------------------------------------------------------------------------------------------------------------------|-------|-------|-------|-------|-----------------|----------------|
| 0                                                                                                                      | 0     | 0     | 0     | 0     | None            | None           |
| 0                                                                                                                      | 0     | 0     | 0     | 1     | *Long GREEN     | HI-HI-HI-HI    |
| 0                                                                                                                      | 0     | 0     | 1     | 0     | *Long RED       | LO-LO-LO-LO    |
| 0                                                                                                                      | 0     | 0     | 1     | 1     | *Flash GREEN    | LO-HI          |
| 0                                                                                                                      | 0     | 1     | 1     | 1     | *Long RED       | Long LO        |
| 0                                                                                                                      | 1     | 0     | 1     | 1     | *Long Yellow    | HI-LO-HI-LO    |
| 0                                                                                                                      | 1     | 1     | 1     | 1     | *Flash RED      | LO-LO-LO       |
| 1                                                                                                                      | 0     | 0     | 1     | 1     | *Long GREEN     | HI-HI-HI       |
| 1                                                                                                                      | 0     | 1     | 1     | 1     | *Flash GREEN    | HI-HI          |
| 1                                                                                                                      | 1     | 0     | 1     | 1     | *Long Green     | Long HI        |
| 1                                                                                                                      | 1     | 1     | 0     | 1     | Short RED       | LO             |
| 1                                                                                                                      | 1     | 1     | 1     | 0     | Short GREEN     | HI             |
| 1                                                                                                                      | 1     | 1     | 1     | 1     | **GREEN-YEL-RED | HI             |
| *Denotes that the LED stays on for 1 second longer than the audio<br>**Denotes that this sequence is used for testing. |       |       |       |       |                 |                |

**All Tags Respond** — When set, this subfield allows all tags in the Encompass reader view to accept this command.

**LCD Message Page Pointer** — This one-byte field points to the page where the LCD message to display is stored in ASCII. If this field is a value other than zero, the tag, upon receipt of a general ACK command, displays this ASCII data to the LCD display from the page specified in this field. The A/V sequence specified in the A/V options bits is associated with this action. Valid range for this LCD message page pointer is 02H to 0FH. This pointer is retained over a power loss in the tag.

**Tag ID** — This field is a four-byte tag request ID.

**Time-out** — This field contains a binary-coded integer with a range of 0 to 127 representing the amount of time in seconds that the tag ignores commands from the Encompass reader. The time-out value is set to the integer value in seconds as specified by the 7 bits (6-0) of the time-out field.

**Condition Code** — Each condition code bit represents a condition applicable to a tolling environment. There are eight different conditions that can occur and multiple

conditions can occur concurrently. The condition with the highest priority is the sequence that is displayed upon receipt of a General ACK Request. The other set conditions can be accessed by cycling to them using the push button switch on the tag. Conditions are shown in [Table 6-226](#) and [Table 6-227](#). These codes are retained over a power loss in the tag.

**Table 6-226 Condition Code**

| Bit 7    | Bit 6        | Bit 5    | Bit 4               | Bit 3       | Bit 2   | Bit 1     | Bit 0     |
|----------|--------------|----------|---------------------|-------------|---------|-----------|-----------|
| Neg list | Insuff funds | Low Batt | Conv to cash/ticket | Acct replen | Low Bal | Good read | Pass used |

**Table 6-227 Condition Code Descriptions**

| Bit                                                                                                                                                                                                                                                                                             | Condition                 | LCD                   | Priority |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-----------------------|----------|
| 7                                                                                                                                                                                                                                                                                               | Negative list             | Invalid               | 1        |
| 6                                                                                                                                                                                                                                                                                               | Insufficient funds        | Insuff Bal            | 2        |
| **5                                                                                                                                                                                                                                                                                             | Low battery               | Low Battery           | 3        |
| *4                                                                                                                                                                                                                                                                                              | Conversion to cash/ticket | Cur Bal= $\pm$ XXX.XX | 4        |
| *3                                                                                                                                                                                                                                                                                              | Account replenishment     | New Bal= $\pm$ XXX.XX | 5        |
| 2                                                                                                                                                                                                                                                                                               | Good read-low balance     | Low Balance           | 6        |
| *1                                                                                                                                                                                                                                                                                              | Good read                 | Toll= $\pm$ XXX.XX    | 7        |
| 0                                                                                                                                                                                                                                                                                               | Pass used                 | Pass used             | 8        |
| <p>*Denotes that the data to be inserted in <math>\pm</math>XXX.XX is pulled from the balance/tolling page specified in page 0000H configuration.</p> <p>** Denotes that this bit is set or reset from the internal tag BIST. This bit may change independently from a General ACK command.</p> |                           |                       |          |

---

## Get IT2200 Configuration With Gen Ack

This command gets the reader to inform a tag that the tag should not respond to any commands from the reader for a specified time. [Table 6-228](#) and [Table 6-229](#) list the command and response data.

**Table 6-228 Get IT2200 Configuration with Gen Ack Command (0044H)**

| Get IT2200 Configuration with Gen Ack Command Data  | Data Payload |
|-----------------------------------------------------|--------------|
| <b>Bits 7–0</b>                                     |              |
| Get IT2200 Configuration with Gen Ack Command (MSB) | 00H          |
| Get IT2200 Configuration with Gen Ack Command (LSB) | 44H          |

**Table 6-229 Get IT2200 Configuration with Gen Ack Response**

| Get IT2200 Configuration with Gen Ack Response Data | Data Payload |
|-----------------------------------------------------|--------------|
| <b>Bits 7–0</b>                                     |              |
| Get IT2200 Configuration with Gen Ack Command (MSB) | 00H          |
| Get IT2200 Configuration with Gen Ack Command (LSB) | 44H          |
| Protocol                                            | 00H          |
| Command Action                                      | 00H          |
| Command Action                                      | 00H          |
| Command Code                                        | F0H          |
| Command Code                                        | 0FH          |
| Bit Count (MSB)                                     | 00H          |
| Bit Count (LSB)                                     | 50H          |
| Options                                             | XXH          |
| Tag ID (MSB)                                        | XXH          |
| Tag ID                                              | XXH          |
| Tag ID                                              | XXH          |
| Tag ID (LSB)                                        | XXH          |
| Time-out                                            | XXH          |
| Condition Code                                      | XXH          |
| LCD Message Page Pointer                            | XXH          |



**Table 6-229 Get IT2200 Configuration with Gen Ack Response**

|                |     |
|----------------|-----|
| Reserved       | 00H |
| Reserved       | 00H |
| Send Option    | 0XH |
| Retry          | XXH |
| Retry          | XXH |
| Antenna Number | XXH |

See “Set IT2200 Configuration With Gen Ack” on page 6-136 for field definitions.

## Set SeGo/eGo Configuration Data

**Pre-firmware version 16:** For SeGo/eGo configuration, the command action is 0000H. The tag responds to the Group Select Equals command if the tag’s data stored in the location designated by the address field matches the byte data. The starting address field specifies the starting address of the data to be read for a streamlined read command. Because Mode 88 does not use streamlined reads, the starting address always is 00H.

**Post-firmware version 16:** This command is a Group Select Equals and does not support a streamlined read and therefore is not configurable. This command automatically sends all zeros--Group Select All. Any setting changes applied to eGo/eGo Plus in Mode 88 will not take effect. If configuration of the parameters is required, contact TransCore Technical Support for additional instructions.

The Read Verify Page starting address also must match the starting address (50H) used in the Streamlined Write command. [Table 6-230](#) and [Table 6-231](#) list the command and response data.

**Table 6-230 Set SeGo/eGo Configuration Data Command (0043H)**

| Set SeGo/eGo Configuration Data Command Data  | Data Payload      | Byte Number |
|-----------------------------------------------|-------------------|-------------|
| <b>Bits 7–0</b>                               |                   |             |
| Set SeGo/eGo Configuration Data Command (MSB) | 00H               | 0           |
| Set SeGo/eGo Configuration Data Command (LSB) | 43H               | 1           |
| Protocol                                      | 0XH               | 2           |
| Command Action                                | XXXXH             | 3-4         |
| Command Code                                  | XXH               | 5           |
| Tag ID                                        | 0000000000000000H | 6-13        |

**Table 6-230 Set SeGo/eGo Configuration Data Command (0043H)**

|                  |                     |       |
|------------------|---------------------|-------|
| Address          | XXH                 | 14    |
| Byte Mask        | XXH                 | 15    |
| Starting Address | XXH                 | 16    |
| Page Data        | XXXXXXXXXXXXXXXXXXH | 17-24 |
| Command Depth    | XXH                 | 25    |
| Antenna Number   | 0XH                 | 26    |

**Table 6-231 Set SeGo/eGo Configuration Data Response**

| Set SeGo/eGo Configuration Data Command Response Data | Data Payload | Byte Number |
|-------------------------------------------------------|--------------|-------------|
| <b>Bits 7–0</b>                                       |              |             |
| Set SeGo/eGo Configuration Data Command (MSB)         | 00H          | 0           |
| Set SeGo/eGo Configuration Data Command (LSB)         | 43H          | 1           |

**Protocol** — This field is a one-byte value that indicates the intended tag type data for the SeGo/eGo Configuration Command.

| Protocol | Definition |
|----------|------------|
| 1        | SeGo       |
| 6        | eGo        |

**Command Action** — This field is a configuration parameter that is sent to the flash memory. The Command Action for Mode 88 is set to 0.

**Command Code** — This field sets the Group Select or Group Unselect for Equals, Not Equals, Greater Than, and Less Than relationships.

*Note: Mode 88 only uses GSE, therefore the Command Code is set to 00H.*

**Tag ID** — This field is an eight-byte tag request ID.

*Note: Tag ID is not used in Mode 88, therefore the Data Payload is set to 0.*

**Address** — This field is the tag memory address for the byte mask.

**Byte Mask** — This field is used to extract and/or compare information stored in the Page Data/Byte Data. When set to 1, the specific bit is switched on and the information is extracted and/or compared. When set to 0, the information is masked and/or left alone.

**Starting Address** — This field is the starting address of the comparison data.

*Note: This field is not used in Mode 88, therefore the Data Payload is set to 0.*

**Page Data (Byte Data)** — This field is eight bytes of comparison data.

*Note: This field is not used in Mode 88, therefore the Data Payload is set to 0.*

**Command Depth** — This field allows the access of specific information within a sequence. That is, (1) to read byte 8, set the command depth to 9; (2) to access/read the third sequence of a specific read/write sequence, set the command depth to 3.

**Note:** The command depth for Mode 88 is 0 because the only command being performed are direct reads.

**Antenna Number** — This two-byte field ranges from 0 to 0FH. For Mode 88, the Antenna Number is 0.

**Note:** RESET READER command required for changes to take effect.

---

## Get SeGo/eGo Configuration Data

This command gets the SeGo/eGo configuration data settings only. Applicable SeGo/eGo ASIC commands are Streamlined Read (80H) and Read Verify Page (92H).

[Table 6-232](#) and [Table 6-233](#) list the command and response data.

**Table 6-232 Get SeGo/eGo Configuration Data Command (0044H)**

| Get SeGo/eGo Configuration Data Command Data  | Data Payload | Byte Number |
|-----------------------------------------------|--------------|-------------|
| <b>Bits 7–0</b>                               |              |             |
| Get SeGo/eGo Configuration Data Command (MSB) | 00H          | 0           |
| Get SeGo/eGo Configuration Data Command (LSB) | 44H          | 1           |
| Protocol                                      | 0XH          | 2           |
| Command Action                                | XXXXH        | 3-4         |
| Command Code                                  | XXH          | 5           |
| Command Depth                                 | XXH          | 6           |
| Antenna Number                                | 0XH          | 7           |

**Table 6-233 Set SeGo/eGo Configuration Response**

| Get SeGo/eGo Configuration Data Response Data | Data Payload      | Byte Number |
|-----------------------------------------------|-------------------|-------------|
| <b>Bits 7–0</b>                               |                   |             |
| Get SeGo/eGo Configuration Data Command (MSB) | 00H               | 0           |
| Get SeGo/eGo Configuration Data Command (LSB) | 44H               | 1           |
| Protocol                                      | 0XH               | 2           |
| Command Action                                | XXXXH             | 3-4         |
| Command Code                                  | XXH               | 5           |
| ID                                            | 0000000000000000H | 6-13        |
| Address                                       | XXH               | 14          |

**Table 6-233 Set SeGo/eGo Configuration Response**

|                  |                     |       |
|------------------|---------------------|-------|
| Byte Mask        | XXH                 | 15    |
| Starting Address | XXH                 | 16    |
| Page Data        | XXXXXXXXXXXXXXXXXXH | 17-24 |
| Command Depth    | XXH                 | 25    |
| Antenna Number   | 0XH                 | 26    |

---

## CVISN Seen Frame Counter Report

This message reports the seen count value when the seen frame counter times out if the seen count is greater than zero for a tag listed in the table. The seen frame counter report is populated with a minimum of one tag and a maximum of eight tags. The report is always the same size. Active tags are packed in ascending order; the first active tag and associated seen count read from the FPGA firmware seen count table is placed in the report at tag ID 0. The first seen count field in the report (MSB and LSB) that is set to zero indicates the end of the active tag list in the report ([Table 6-234](#)).

**Table 6-234 CVISN Seen Frame Counter Report (5012H)**

| CVISN Seen Frame Counter Report Data | Data Payload |
|--------------------------------------|--------------|
| <b>Bits 7–0</b>                      |              |
| Record Type (MSB)                    | 50H          |
| Record Type (LSB)                    | 12H          |
| Protocol                             | 0XH          |
| Seen Count (MSB)                     | XXH          |
| Seen Count (LSB)                     | XXH          |
| Tag ID 0 (32 bits)                   | XXXXXXXXXH   |
| Seen Count (MSB)                     | XXH          |
| Seen Count (LSB)                     | XXH          |
| Tag ID 1 (32 bits)                   | XXXXXXXXXH   |
| Seen Count (MSB)                     | XXH          |
| Seen Count (LSB)                     | XXH          |
| Tag ID 2 (32 bits)                   | XXXXXXXXXH   |
| Seen Count (MSB)                     | XXH          |
| Seen Count (LSB)                     | XXH          |
| Tag ID 2 (32 bits)                   | XXXXXXXXXH   |
| Seen Count (MSB)                     | XXH          |
| Seen Count (LSB)                     | XXH          |
| Tag ID 3 (32 bits)                   | XXXXXXXXXH   |
| Seen Count (MSB)                     | XXH          |
| Seen Count (LSB)                     | XXH          |

**Table 6-234 CVISN Seen Frame Counter Report (5012H)**

|                    |            |
|--------------------|------------|
| Tag ID 4 (32 bits) | XXXXXXXXXH |
| Seen Count (MSB)   | XXH        |
| Seen Count (LSB)   | XXH        |
| Tag ID 5 (32 bits) | XXXXXXXXXH |
| Seen Count (MSB)   | XXH        |
| Seen Count (LSB)   | XXH        |
| Tag ID 6 (32 bits) | XXXXXXXXXH |
| Seen Count (MSB)   | XXH        |
| Seen Count (LSB)   | XXH        |
| Tag ID 7 (32 bits) | XXXXXXXXXH |

---

## ***CVISN Read Response***

This message is the CVISN tag response ([Table 6-235](#)).

**Table 6-235 CVISN Read Response (5014H)**

| <b>CVISN Read Response Data</b>                            | <b>Data Payload</b> |
|------------------------------------------------------------|---------------------|
| <b>Bits 7–0</b>                                            |                     |
| Record Type (MSB)                                          | 50H                 |
| Record Type (LSB)                                          | 14H                 |
| Valid Tag 1                                                | 0000H/0001H         |
| Valid Tag 2                                                | 0000H/0001H         |
| Valid Tag 3                                                | 0000H/0001H         |
| Valid Tag 4                                                | 0000H/0001H         |
| Transponder Message and Message Type Tag 1 (not used)      | XXH                 |
| Transponder ID Tag 1                                       | XXXX.XXXXH          |
| CRC Tag 1                                                  | XXXXH               |
| Tag Type Indicator (Enforcement Tag = 00H, Toll Tag = 01H) | XXH                 |
| Transponder Message and Message Type Tag 2 (not used)      | XXH                 |
| Transponder ID Tag 2                                       | XXXX.XXXXH          |





**Table 6-236 Set SeGo SGSPR Data Command (0054H)**

|                  |     |
|------------------|-----|
| Address          | XXH |
| Byte Data        | XXH |
| Starting Address | XXH |

**Table 6-237 Set SeGo SGSPR Data Response**

| Set SeGo SGSPR Data Response Data |       |       |       |       |       |       |             | Data Payload |
|-----------------------------------|-------|-------|-------|-------|-------|-------|-------------|--------------|
| Bit 7                             | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0       |              |
| Set SeGo SGSPR Data Command (MSB) |       |       |       |       |       |       |             | 00H          |
| Set SeGo SGSPR Data Command (LSB) |       |       |       |       |       |       |             | 54H          |
| Reserved                          |       |       |       |       |       |       | SeGo Enable | 0XH          |

## Get SeGo SGSPR Data

This command gets the read data used for the SeGo read transaction. [Table 6-238](#) and [Table 6-239](#) list the command and response data.

**Table 6-238 Get SeGo SGSPR Data Command (0055H)**

| Get SeGo SGSPR Data Command Data  |       |       |       |       |       |       |             | Data Payload |
|-----------------------------------|-------|-------|-------|-------|-------|-------|-------------|--------------|
| Bit 7                             | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0       |              |
| Get SeGo SGSPR Data Command (MSB) |       |       |       |       |       |       |             | 00H          |
| Get SeGo SGSPR Data Command (LSB) |       |       |       |       |       |       |             | 55H          |
| Reserved                          |       |       |       |       |       |       | SeGo Enable | 0XH          |

**Table 6-239 Get SeGo SGSPR Data Response**

| Get SeGo SGSPR Data Response Data |       |       |       |       |       |       |       | Data Payload |
|-----------------------------------|-------|-------|-------|-------|-------|-------|-------|--------------|
| Bit 7                             | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |              |
| Get SeGo SGSPR Data Command (MSB) |       |       |       |       |       |       |       | 00H          |
| Get SeGo SGSPR Data Command (LSB) |       |       |       |       |       |       |       | 55H          |

**Table 6-239 Get SeGo SGSPR Data Response**

|                  |              |     |
|------------------|--------------|-----|
| Reserved         | SeGo Enable  | 0XH |
| Reserved         | SGSPR Enable | 0XH |
| Command Code     |              | 80H |
| Address          |              | XXH |
| Byte Data        |              | XXH |
| Starting Address |              | XXH |

## Set Title 21 Read Data

This command specifies the parameters for the Title 21 read transaction. [Table 6-240](#) and [Table 6-241](#) list the command and response data.

**Table 6-240 Set TitTable 6-240le 21 Read Data Command (005AH)**

| Set Title 21 Read Data Command Data  |       |       |       |       |       |       |             | Data Payload |
|--------------------------------------|-------|-------|-------|-------|-------|-------|-------------|--------------|
| Bit 7                                | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0       |              |
| Set Title 21 Read Data Command (MSB) |       |       |       |       |       |       |             | 00H          |
| Set Title 21 Read Data Command (LSB) |       |       |       |       |       |       |             | 5AH          |
| Reserved                             |       |       |       |       |       |       | Read Enable | 0XH          |
| Transaction Record Type (MSB)        |       |       |       |       |       |       |             | 80H          |
| Transaction Record Type (LSB)        |       |       |       |       |       |       |             | 00H          |
| Agency Code (MSB)                    |       |       |       |       |       |       |             | XXH          |
| Agency Code (LSB)                    |       |       |       |       |       |       |             | XXH          |

**Table 6-241 Set Title 21 Read Data Response**

| Set Title 21 Read Data Response Data |       |       |       |       |       |       |       | Data Payload |
|--------------------------------------|-------|-------|-------|-------|-------|-------|-------|--------------|
| Bit 7                                | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |              |
| Set Title 21 Read Data Command (MSB) |       |       |       |       |       |       |       | 00H          |
| Set Title 21 Read Data Command (MSB) |       |       |       |       |       |       |       | 5AH          |

---

## Set Seen Count

This command records the number of times the Encompass reader reads a tag after the system has finished the complete transaction. [Table 6-242](#) and [Table 6-243](#) list the command and response data.

**Table 6-242 Set Seen Count Command (0066H)**

| Set Seen Count Command Data            |       |       |       |       |       |       |       | Data Payload |
|----------------------------------------|-------|-------|-------|-------|-------|-------|-------|--------------|
| Bit 7                                  | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |              |
| Set Seen Count Command (MSB)           |       |       |       |       |       |       |       | 00H          |
| Set Seen Count Command (LSB)           |       |       |       |       |       |       |       | 66H          |
| Protocol                               |       |       |       |       |       |       |       | 0XH          |
| Seen Frame Counter in TDM Frames (MSB) |       |       |       |       |       |       |       | XXH          |
| Seen Frame Counter in TDM Frames (LSB) |       |       |       |       |       |       |       | XXH          |
| Uniqueness Counter in TDM Frames (MSB) |       |       |       |       |       |       |       | XXH          |
| Uniqueness Counter in TDM Frames (LSB) |       |       |       |       |       |       |       | XXH          |

**Table 6-243 Set Seen Count Response**

| Set Seen Count Response Data |       |       |       |       |       |       |       | Data Payload |
|------------------------------|-------|-------|-------|-------|-------|-------|-------|--------------|
| Bit 7                        | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |              |
| Set Seen Count Command (MSB) |       |       |       |       |       |       |       | 00H          |
| Set Seen Count Command (LSB) |       |       |       |       |       |       |       | 66H          |
| Protocol                     |       |       |       |       |       |       |       | 0XH          |

**Protocol** — This field specifies the protocol for the counters.

| Protocol | Definition     |
|----------|----------------|
| 0        | IT2200         |
| 1        | SeGo           |
| 2        | IAG            |
| 3        | CVISN          |
| 4        | Title 21       |
| 5        | ATA Full-Frame |



**Protocol** — This field specifies the protocol for the counters.

| Protocol | Definition     |
|----------|----------------|
| 0        | IT2200         |
| 1        | SeGo           |
| 2        | IAG            |
| 3        | CVISN          |
| 4        | Title 21       |
| 5        | ATA Full-Frame |
| 6        | eGo            |
| 7        | ATA Half-Frame |
| 8        | Reserved       |

**Seen Frame Counter** — Length of Seen Frame Counter in number of frames. Counts the specified number of TDM frames, then reports the Seen Count to the host. This field is used to vary the time interval between seen count messages.

**Uniqueness Counter** — Length of Uniqueness Counter in number of frames. This field removes a tag from the seen table when that tag has not been read for the specified number of TDM frames.

## ***Diagnostic Command Group Commands (0200H)***

---

Table 6-246 lists the Diagnostic Command Group commands that are used in the Encompass multiprotocol reader.

**Table 6-246 Diagnostic Command Group Commands**

| <b>Diagnostic Command</b>       | <b>Command Code</b> |
|---------------------------------|---------------------|
| Get Diagnostic Status           | 0001H               |
| Get Diagnostic Interface Status | 0002H               |
| Get Error Log                   | 0003H               |
| Get Number of Error Logs        | 0004H               |
| Clear Error Logs                | 0005H               |
| Reserved                        | 0006H               |
| Reserved                        | 0007H               |

---

## ***Diagnostic Command Group Responses***

Table 6-247 lists the responses and codes for the Diagnostic Command Group.

**Table 6-247 Diagnostic Command Group Responses**

| <b>Diagnostic Response</b>         | <b>Response Code</b> |
|------------------------------------|----------------------|
| Synchronous OK Status Responses    | 88XXH                |
| Reserved                           | 8800H                |
| Reserved                           | 8801H                |
|                                    |                      |
| Asynchronous OK Status Responses   | 48XXH                |
| Command Complete                   | 4800H                |
| Command In Progress                | 4801H                |
|                                    |                      |
| Unsolicited OK Status Responses    | 28XXH                |
| Diagnostic Status Change OK Report | 2810H                |

**Table 6-247 Diagnostic Command Group Responses**

| Diagnostic Response                 | Response Code |
|-------------------------------------|---------------|
|                                     |               |
| Reserved                            | 84XXH         |
|                                     |               |
| Reserved                            | 44XXH         |
|                                     |               |
| Reserved                            | 24XXH         |
| Reserved                            | 2410H         |
|                                     |               |
| Synchronous Error Status Responses  | 82XXH         |
| Message Length Error                | 8200H         |
| Message Sequence Error              | 8201H         |
| Reserved                            | 8202H         |
| Command Group Error                 | 8203H         |
| Reserved                            | 8204H         |
| Reserved                            | 8205H         |
| Reserved                            | 8206H         |
| Reserved                            | 8207H         |
| Reserved                            | 8208H         |
| Data Acknowledge Response Error     | 8209H         |
| Reserved                            | 820AH         |
|                                     |               |
| Asynchronous Error Status Responses | 42XXH         |
| Message Length Error                | 4200H         |
| Command Sequence Error              | 4201H         |
| Reserved                            | 4202H         |
| Command Group Error                 | 4203H         |
| Command Time-out Error              | 4204H         |

**Table 6-247 Diagnostic Command Group Responses**

| Diagnostic Response                            | Response Code |
|------------------------------------------------|---------------|
| Reserved                                       | 4205H         |
| Command Failed Error                           | 4206H         |
| System Command Error                           | 4207H         |
| Sub-Command Error                              | 4208H         |
| Reserved                                       | 4209H         |
| Invalid Control Word Error                     | 420AH         |
|                                                |               |
| Unsolicited Error Status Responses             | 22XXH         |
| Diagnostic Status Change Error Report          | 2210H         |
|                                                |               |
| Synchronous Control Status Responses           | 81XXH         |
| Data Acknowledge (Ack), data valid             | 8100H         |
| Data Negative Acknowledge (Nack), data invalid | 8101H         |
| Reserved                                       | 8102H         |
| Reserved                                       | 8104H         |
|                                                |               |
| Asynchronous Control Status Responses          | 41XXH         |
|                                                |               |
| Unsolicited Control Status Responses           | 21XXH         |

***Diagnostic Command Group Response Data***

***Asynchronous OK Status Responses***

The following diagnostic command group asynchronous OK status responses use the specified data payload.



*Command Complete (4800H)*

| Command In Progress Response Data              | Data Payload |
|------------------------------------------------|--------------|
| Diagnostic Command Group Command (sub-command) | XXXXXH       |

*Command In Progress (4801H)*

| Command In Progress Response Data              | Data Payload |
|------------------------------------------------|--------------|
| Diagnostic Command Group Command (sub-command) | XXXXXH       |

### ***Synchronous Error Status Responses***

The following diagnostic command group synchronous error status responses use the specified data payload.

#### ***Message Length Error Response Data (8200H)***

| <b>Message Length Error Response Data</b> | <b>Data Payload</b> |
|-------------------------------------------|---------------------|
| Expected Message Length                   | XXXXH               |
| Received Message Length                   | XXXXH               |

#### ***Message Sequence Error Response Data (8201H)***

| <b>Message Sequence Error Response Data</b> | <b>Data Payload</b> |
|---------------------------------------------|---------------------|
| Expected Message Sequence Number            | XXH                 |
| Received Message Sequence Number            | XXH                 |

#### ***Command Group Error Response Data (8203H)***

| <b>Command Group Error Response Data</b> | <b>Data Payload</b> |
|------------------------------------------|---------------------|
| Invalid Command Group                    | XXXXH               |

#### ***Data Acknowledge Response Error Response Data (8209H)***

| <b>Data Acknowledge Response Error Response Data</b> | <b>Data Payload</b> |
|------------------------------------------------------|---------------------|
| Invalid Data Acknowledge Response                    | XXXXH               |

### ***Asynchronous Error Status Responses***

The following diagnostic command group asynchronous error status responses use the specified data payload.

*Message Length Error Response Data (4200H)*

| Message Length Error Response Data | Data Payload |
|------------------------------------|--------------|
| Expected Message Length            | XXXXH        |
| Received Message Length            | XXXXH        |

*Command Sequence Error Response Data (4201H)*

| Command Sequence Error Response Data | Data Payload |
|--------------------------------------|--------------|
| Expected Command Sequence Number     | XXH          |
| Received Command Sequence Number     | XXH          |

*Command Group Error (4203H)*

| Command Group Error Response Data | Data Payload |
|-----------------------------------|--------------|
| Invalid Command Group             | XXXXH        |

*Command Time-out Error (4204H)*

| Command Time-out Error Response Data | Data Payload |
|--------------------------------------|--------------|
| N/A                                  |              |

*Command Failed Error (4206H)*

| Command Failed Error Response Data             | Data Payload |
|------------------------------------------------|--------------|
| Diagnostic Command Group Command (sub-command) | XXXXH        |

*System Command Error (4207H)*

| System Command Error Response Data | Data Payload |
|------------------------------------|--------------|
| N/A                                |              |

### *Sub-Command Error (4208H)*

| Sub-Command Error Response Data | Data Payload |
|---------------------------------|--------------|
| Sub-command                     | XXXXH        |

### *Invalid Control Word Error (420AH)*

| Invalid Control Word Error Response Data | Data Payload |
|------------------------------------------|--------------|
| N/A                                      |              |

---

## ***Unsolicited Diagnostic Status Reports***

Diagnostics supports the generation of the following unsolicited status message reports as defined by the response code ([Table 6-248](#)).

***Table 6-248 Diagnostic Unsolicited Status Reports***

| Diagnostic Unsolicited Status Reports | Response Code |
|---------------------------------------|---------------|
| Diagnostic Status Change OK Report    | 2810H         |
| Reserved                              | 2410H         |
| Diagnostic Status Change Error Report | 2210H         |

---

## ***Get Diagnostic Status***

This command gets the current diagnostic status of the Encompass reader as defined by the Diagnostic Status Bit definitions that include FRAM test status, FPGA1/ FPGA2 test status, digital board power supply status, RF transceiver status, GPS status, TDM status, communication link status, reset count, CPU firmware fault status, buffered tag transaction entries status, and error log entries status. [Table 6-249](#) and [Table 6-250](#) list the command and response data.

***Table 6-249 Get Diagnostic Status Command (0001H)***

| Get Diagnostic Status Command Data | Data Payload |
|------------------------------------|--------------|
| Get Diagnostic Status Command      | 0001H        |

**Table 6-250 Get Diagnostic Status Response**

[illegible]

## ***Diagnostic Status Bit Definitions***

Table 6-251 lists the bit definitions for the diagnostic status response.

**Table 6-251 Diagnostic Status Bit Definitions**

| Bit | Diagnostic Status Bit Definition                                            |
|-----|-----------------------------------------------------------------------------|
| 63  | Reserved                                                                    |
| 62  | Reserved                                                                    |
| 61  | Reserved                                                                    |
| 60  | Reserved                                                                    |
| 59  | Reserved                                                                    |
| 58  | FRAM test status, where 0 = OK, 1 = error                                   |
| 57  | FRAM data storage test status, where 0 = OK, 1 = error                      |
| 56  | Reserved                                                                    |
| 55  | Reserved                                                                    |
| 54  | Reserved                                                                    |
| 53  | Reserved                                                                    |
| 52  | Reserved                                                                    |
| 51  | Reserved                                                                    |
| 50  | FPGA1 test status, where 0 = OK, 1 = error                                  |
| 49  | FPGA2 test status, where 0 = OK, 1 = error                                  |
| 48  | Power supply status, where 0 = OK, 1 = error                                |
| 47  | Digital board overvoltage error, where 0 = no error, 1 = error              |
| 46  | Digital board undervoltage error, where 0 = no error, 1 = error             |
| 45  | Reserved                                                                    |
| 44  | Reserved                                                                    |
| 43  | RF transceiver ADC above maximum error, where 0 = no error, 1 = error       |
| 42  | RF transceiver ADC below minimum error, where 0 = no error, 1 = error       |
| 41  | RF transceiver ATTN DAC1 above maximum error, where 0 = no error, 1 = error |
| 40  | RF transceiver ATTN DAC1 below minimum error, where 0 = no error, 1 = error |
| 39  | RF transceiver ATTN DAC2 above maximum error, where 0 = no error, 1 = error |
| 38  | RF transceiver ATTN DAC2 below minimum error, where 0 = no error, 1 = error |

**Table 6-251 Diagnostic Status Bit Definitions**

| Bit   | Diagnostic Status Bit Definition                                           |
|-------|----------------------------------------------------------------------------|
| 37    | RF transceiver DOM DAC above maximum error, where 0 = no error, 1 = error  |
| 36    | RF transceiver DOM DAC below minimum error, where 0 = no error, 1 = error  |
| 35    | RF transceiver source1 PLL unlocked error, where 0 = no error, 1 = error   |
| 34    | RF transceiver source2 PLL unlocked error, where 0 = no error, 1 = error   |
| 33    | RF transceiver uncalibrated error, where 0 = no error, 1 = error           |
| 32    | RF transceiver 5VDC overvoltage error, where 0 = no error, 1 = error       |
| 31    | RF transceiver 5VDC undervoltage error, where 0 = no error, 1 = error      |
| 30-23 | Reserved                                                                   |
| 22    | GPS T-RAIM alarm set, where 0 = alarm not set, 1 = alarm set               |
| 21    | GPS self-test fault, where 0 = no fault, 1 = fault                         |
| 20    | GPS power-on fault, where 0 = no fault, 1 = fault                          |
| 19    | TDM two masters error, where 0 = no error, 1 = error                       |
| 18    | TDM master-slave error, where 0 = no error, 1 = error                      |
| 17    | TDM clock error, where 0 = no error, 1 = error                             |
| 16    | GPS window error, where 0 = no error, 1 = error                            |
| 15    | GPS one-PPS error, where 0 = no error, 1 = error                           |
| 14    | GPS communication link status, where 0 = link up, 1 = link down            |
| 13    | Serial communication link status, where 0 = link up, 1 = link down         |
| 12    | UDP/IP communication link status, where 0 = link up, 1 = link down         |
| 11    | Serial debug communication link status, where 0 = link up, 1 = link down   |
| 10    | RF transceiver communication link status, where 0 = link up, 1 = link down |
| 9     | Reserved                                                                   |
| 8     | Reserved                                                                   |
| 7     | Reset count (MSB)                                                          |
| 6     | Reset count                                                                |
| 5     | Reset count                                                                |
| 4     | Reset count (LSB)                                                          |
| 3     | CPU firmware fault, where 0 = no fault, 1 = fault                          |

**Table 6-251 Diagnostic Status Bit Definitions**

| Bit | Diagnostic Status Bit Definition                                    |
|-----|---------------------------------------------------------------------|
| 2   | Reserved                                                            |
| 1   | Buffered tag transaction entries, where 0 = no entries, 1 = entries |
| 0   | Error log entries, where 0 = no entries, 1 = entries                |



---

## Get Diagnostic Interface Status

This command gets the reader's current diagnostic interface software status. [Table 6-252](#) and [Table 6-253](#) list the command and response data.

**Table 6-252 Get Diagnostic Interface Status Command (0002H)**

| Get Diagnostic Interface Status Command Data | Data Payload |
|----------------------------------------------|--------------|
| Get Diagnostic Interface Status Command      | 0002H        |

**Table 6-253 Get Diagnostic Interface Status Response**

| Get Diagnostic Interface Status Response Data | Data Payload |
|-----------------------------------------------|--------------|
| Get Diagnostic Interface Status Command       | 0002H        |
| Module Number                                 | XXXXH        |
| Error Number                                  | XXXXH        |

---

## Get Error Log

This command gets the error log. The error log lists the errors in chronological order. [Table 6-254](#) and [Table 6-255](#) list the command and response data.

**Table 6-254 Get Error Log Command (0003H)**

| Get Error Log Command Data | Data Payload |
|----------------------------|--------------|
| Get Error Log Command      | 0003H        |
| Error Log Number           | XXXXH        |

**Table 6-255 Get Error Log Response**

| Get Error Log Response Data | Data Payload |
|-----------------------------|--------------|
| Get Error Log Command       | 0003H        |
| Error log number            | XXXXH        |
| Module number               | XXXXH        |
| Error number                | XXXXH        |
| Time stamp: hours           | XXH          |
| Time stamp: minutes         | XXH          |

**Table 6-255 Get Error Log Response**

| Get Error Log Response Data       | Data Payload |
|-----------------------------------|--------------|
| Time stamp: seconds               | XXH          |
| Time stamp: hundredths of seconds | XXH          |
| Time stamp: month                 | XXH          |
| Time stamp: day                   | XXH          |
| Time stamp: year                  | XXH          |

---

## **Get Number of Error Logs**

This command gets the number of error logs. The error log overflow status is returned as 0 for no overflow or 1 for overflow. [Table 6-256](#) and [Table 6-257](#) list the command and response data..

**Table 6-256 Get Number Error Logs Command (0004H)**

| Get Number of Error Logs Command Data | Data Payload |
|---------------------------------------|--------------|
| Get Number of Error Logs Command      | 0004H        |

**Table 6-257 Get Number Error Logs Response**

| Get Number of Error Logs Response Data                         | Data Payload |
|----------------------------------------------------------------|--------------|
| Get Number of Error Logs Command                               | 0004H        |
| Number of error logs                                           | XXXXH        |
| Error log overflow status, where 0 = no overflow, 1 = overflow | XXH          |

---

## **Clear Error Logs**

This command clears entries from the error log. [Table 6-258](#) and [Table 6-259](#) list the command and response data

**Table 6-258 Clear Error Logs Command (0005H)**

| Clear Error Logs Command Data | Data Payload |
|-------------------------------|--------------|
| Clear Error Logs Command      | 0005H        |
| Clear Error Logs Control Word | A5A5H        |

**Table 6-259 Clear Error Logs Response**

| Clear Error Logs Response Data | Data Payload |
|--------------------------------|--------------|
| Clear Error Logs Command       | 0005H        |

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## Configuring and Operating the Encompass Reader Using AI1200- Emulation Commands



# Configuring and Operating the Encompass Reader Using AI1200-Emulation Commands

*This chapter describes the Encompass<sup>®</sup> Reader AI1200-emulation commands that are used to configure and operate the reader. This chapter also contains commands and responses that are useful in developing host software for the AI1200 command set.*

## Chapter Organization

The Encompass Reader is controlled through mode settings, which configure the reader for specific applications. The Encompass Reader starts in Mode 0, Stop Mode, and must be changed to another mode as needed for a specific application.

This chapter first lists the operating modes to show what operations are available with this Encompass Reader application.

The remainder of the chapter provides a complete listing of system commands and responses that are required to develop host interface software for the Encompass Reader.

## Encompass Reader Operational Mode 88

The Encompass Reader uses operational mode 88 to perform its processes. This mode contains specific parameters that are needed to do the required processes.

### Working with Mode 88

The Encompass Reader powers up in Mode 0, Stop Mode. You must issue the commands (Table 7-1), via the host computer, to configure the reader.

**Table 7-1 Commands Used to Configure the Encompass Reader**

| Sequence #                                               | Command | Definition                          |
|----------------------------------------------------------|---------|-------------------------------------|
| 1 <sup>a</sup>                                           | #01     | Set the reader to command mode      |
| 2 <sup>a</sup>                                           | #4700   | Set the reader to stop mode, RF off |
| The following commands are required to configure Mode 88 |         |                                     |

**Table 7-1 Commands Used to Configure the Encompass Reader (continued)**

| Sequence #     | Command                                                      | Definition                                                                                                                                                                            |
|----------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3 <sup>a</sup> | #4ANNNN, where NNNN = protocol enable bits                   | Sets the protocols and sets the reader to <i>universal tag</i> mode                                                                                                                   |
| 4 <sup>a</sup> | #4B[AP]                                                      | Sets the secondary tag sequences                                                                                                                                                      |
| 5 <sup>a</sup> | #641N                                                        | Sets the RF to on continuously.                                                                                                                                                       |
| 6 <sup>a</sup> | #493PPAAAACCTTTTTTTTTT<br>TTTTTAAMSSDDDDDDDD<br>DDDDDDDDTTAA | If using the SeGo or eGo protocol, this command is needed to configure the group select equals parameters per channel.                                                                |
| 7              | #487N                                                        | Sets the IAG slot number if applicable                                                                                                                                                |
| 8              | #63                                                          | Resets the reader                                                                                                                                                                     |
| 9              | #9FNNNNN                                                     | Sets the reader downlink frequency in MHz. The reader must be in Stop Mode (0).                                                                                                       |
| 10             | #9CNNNNN                                                     | Sets the reader uplink frequency in MHz. The reader must be in Stop Mode (0).                                                                                                         |
| 11             | #984NYY                                                      | Sets the TDM as master or slave and switches TDM on.                                                                                                                                  |
| 12             | #94PS                                                        | Sets the uplink source control when the SeGo RF uplink needs to use the RF downlink                                                                                                   |
| 13             | #920N                                                        | Sets the downlink and uplink attenuations. Repeat this sequence step for all enabled protocols.                                                                                       |
| 14             | #921NRR                                                      | Sets the range adjust. Repeat this sequence step for all enabled protocols.                                                                                                           |
| 15             | #493PPAAAQQQQBBBBOO<br>PPPPNNCCCCSSRRRRRAA                   | If using the IT2200 protocol, this command is needed to configure IT2200 read request per antenna channel. The reader must be in Stop Mode (0).                                       |
| 16             | #960N                                                        | Sets the line loss value of up to 3 decibels (dB) in 1-dB increments via the command interface port. The line loss command must be set after the RF Attenuation command has been set. |
| 17             | #642N                                                        | Sets the antenna multiplexer mode (if needed)                                                                                                                                         |
| 18             | #410N                                                        | Sets the ID separation                                                                                                                                                                |
| 19             | #311                                                         | Sets the auxiliary information, that is, reader ID, antenna number, number of previous tag reads, status of digital input/output input bits, and so on.                               |
| 20             | #30                                                          | Append time and date, optional                                                                                                                                                        |
| 21             | #813YX                                                       | Sets the time interval for the periodic system check tag test and activates the check tag                                                                                             |
| 22             | #4788                                                        | Sets the reader to Mode 88                                                                                                                                                            |

**Table 7-1 Commands Used to Configure the Encompass Reader (continued)**

| Sequence # | Command | Definition |
|------------|---------|------------|
|------------|---------|------------|

**Note** <sup>a</sup>Set these commands in the order shown.

**Note** TransCore recommends that you set Command Group 5 commands after entering #63 RESET READER to verify all configuration settings.



# Operating Modes

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The Encompass Reader has two modes of operation: data mode and command mode.

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## Data Mode

The Encompass Reader powers up in data mode. When in the data mode, the Encompass Reader sends all communications as data messages, such as tag IDs and reports, to the host computer. Reports provide information on input status changes and presence without tag report. The host computer can send only one command to the Encompass Reader while in data mode:

*Command #01 SWITCH TO COMMAND MODE changes the Encompass Reader from the data mode to the command mode.*

**Note:** The Encompass Reader transmits ID codes to the host computer when the Encompass Reader is in data mode. If the Encompass Reader remains in the command mode with tags passing through the read zone, the reader will buffer up to 10,000 tags.

---

## Command Mode

When the Encompass Reader is in the command mode, the host computer sends commands to the Encompass Reader that can be used to control the operation and configuration of the reader. After the Encompass Reader receives a command, it transmits a command response message. Typically, the command message contains **DONE**, **ERROR**, or data relating specifically to the command request. These messages may be of variable length because some commands require information as part of the message, for example, **DISPLAY READER ID NUMBER**.

Communications can be lost if the host computer attempts to send certain commands under marginal communications conditions. For example, if the host computer transmits the command request to change the baud rate and the Encompass Reader properly receives the request and transmits the **DONE** message, one of the two following conditions may occur:

- If the host computer receives the **DONE** message, then both the host and the Encompass Reader switch to the new baud rate, and communications are maintained.
- If the host computer does not receive the **DONE** message transmitted by the Encompass Reader, the host assumes that the command was not properly sent and does not switch to the new baud rate, causing a loss of communications.

**Note:** In many applications, the host must be set to the new baud rate as it will not change automatically.

**Note:** You must reset the Encompass Reader before the baud rate change takes effect.

## ***Encompass Reader Operational Mode 88***

---

The Encompass Reader operates in Mode 88 to perform specific tag processes. The Encompass Reader has been configured at the factory for most needed operations. Some parameters require commands for application-specific settings. These commands are listed in this chapter.

*Note: Throughout this chapter, host or host system refers to a host personal computer (PC) or lane controller.*

## ***Reader Command Groups***

---

Reader commands are divided by primary function into 10 groups. An additional ASCII command group follows the 10 primary command groups.

### ***“Command Group 0 – Reader Mode Control”***

Command group 0 controls reader mode.

*Data mode* is the Encompass Reader startup mode and the factory setting. When the reader is in data mode, you can enter #01 SWITCH TO COMMAND MODE only.

*Command mode* is the mode in which the reader can accept commands from a host computer. Tag ID data transmission from the reader is suspended while the reader is in command mode. You must enter #00 SWITCH TO DATA MODE to resume transmissions of IDs to the host computer.

### ***“Command Group 1 – Communications Port Control”***

Group 1 commands configure the communications parameters.

### ***“Command Group 2 – Real-Time Clock Control”***

Group 2 commands control the real-time clock. The real-time clock is supported by an capacitor so that the time and date are preserved in case of power outage. The real-time clock maintains the time and date for approximately seven days after power-off.

### ***“Command Group 3 – Transmission Formats”***

Group 3 commands control appended information to reader transmissions, such as IDs, authority information, error messages, and sensor input reports.

### ***“Command Group 4 – ID Filter Parameters”***

Group 4 commands control tag uniqueness, tag time-out, consecutive valid tag ID, and tag types.

### ***“Command Group 5 – Reader Status”***

Group 5 commands provide reader status and configuration.

### ***“Command Group 6 – Reader Control Functions”***

Group 6 commands configure the reader operating parameters, including control of the multiple antennas used with this reader.

### ***“Command Group 7 – Search Control Functions”***

Not used at this time.

### ***“Command Group 8 – Auxiliary Reader Control”***

Group 8 commands control reader functions, such as the system check tag.

### ***“Command Group 9 – Reader System Configuration”***

Group 9 commands control the reader system configuration, such as RF attenuation, frequency setting, and time-division multiplexing (TDM) control.

### ***“ASCII Extended Command Set”***

An additional ASCII extended command supplements the standard AI1200 Reader protocol used by the Encompass Reader.

## ***Reader Command List***

---

In this chapter, reader commands are described with the following identifiers:

- #<COMMAND GROUP> NAME
- Full description of command
- ***Format*** of the command string with parameters
- ***Pre-condition*** describes the system before command was executed
- ***Post-condition*** describes the system after command was executed
- ***Default*** parameter values
- #<Response> to the command
- ***See Also*** lists commands or system behavior that are impacted as a result of executing this command.
- ***Notes*** provide information that further clarifies the current discussion.

In the case when a command identifier does not contain information, a sentence stating this fact occurs in the text.

Factory-default reader settings are shown in **bolded command numbers**.

---

## **Command Group 0 – Reader Mode Control**

Group 0 commands determine whether the reader is operating in data or command mode. These commands also lock and unlock the **COM1** port on the reader.

### **#00 SWITCH TO DATA MODE**

This command switches the reader to data mode, which allows transmission of ID codes to the host computer. Data mode is the mode in which the reader powers up; it is the factory setting. When in this mode, you can enter the following command only: #01 SWITCH TO COMMAND MODE. The reader supports XON/XOFF protocol while in data mode. However, transmission of reader output, for example, IDs, is not suspended until the current ID has been completely transmitted. The reader also supports hardware flow control via RTS and CTS lines.

#### **Format**

#00

#### **Parameters**

There are no parameters associated with this command.

#### **Pre-condition**

The reader must be in COMMAND MODE to switch to DATA MODE. The reader cannot be in #6161 BUFFER CONTROL MODE and be switched to DATA MODE.

#### **Post-condition**

This command takes effect immediately.

#### **Default**

#00 DATA MODE is the default mode following the sign-on message after boot up.

#### **Response**

#DONE, when switching from Command Mode to Data Mode. When the reader is in #6161 BUFFER CONTROL MODE, and if the reader receives a #00 SWITCH TO DATA MODE request, then the reader responds with #ERROR. When the reader is already in Data Mode, and if the reader receives a #00 SWITCH TO DATA MODE request, then the reader responds with #ERROR.

#### **See Also**

#01 SWITCH TO COMMAND MODE

#616N BUFFER CONTROL MODE SETTINGS

## **#01 SWITCH TO COMMAND MODE**

This command switches the reader to command mode, which allows the reader to receive commands from a host computer or terminal. While in this mode, the reader does not transmit IDs to the host computer but instead stores up to 10,000 tags in its output buffer for later transmission. If the buffer becomes full, new IDs are lost. The SWITCH TO DATA MODE (#00) command must be issued to resume transmissions of IDs to the host computer.

### ***Format***

#01

### ***Parameters***

There are no parameters associated with this command.

### ***Pre-condition***

Not applicable

### ***Post-condition***

The Encompass Reader is ready to receive commands after #01 is entered.

This command takes effect immediately.

### ***Default***

This command does not have a default condition.

### ***Response***

#DONE

### ***See Also***

#00 SWITCH TO DATA MODE

## **#06 TRANSMIT BUFFER ENTRY**

This command allows the host to request data (tag IDs and reports) from the reader one at a time, first-in-first-out (FIFO) when all IDs and reports are transferred, responds with #DONE.

### **Format**

#06

### **Parameters**

There are no parameters associated with this command.

### **Pre-condition**

The reader must be in command mode. This command is supported if ECP is selected (#611) and buffer control has been enabled (#6161)

### **Post-condition**

A response is sent, see “Response.”

This command takes effect immediately.

### **Default**

This command does not have a default condition.

### **Response**

If the reader receives command #06 and it has data in its message buffer, then it transmits the buffered messages in FIFO order. If the reader's message buffer is empty, then it transmits the #DONE message. If the reader receives command #06 when ECP and/or the buffer control have not been enabled, it transmits the #ERROR message.

| Response                | Meaning                         |
|-------------------------|---------------------------------|
| #DONE                   | Buffer empty                    |
| #ERROR                  | Buffer control mode not enabled |
| #<Tag Response>         | Messages in buffer              |
| #<Sensor Input Reports> | Messages in buffer              |
| #<Sensor Status Change> | Messages in buffer              |

### **See Also**

#61N SELECT COMMUNICATION PROTOCOL

#616N BUFFER CONTROL MODE SETTINGS

---

## **Command Group 1 – Communications Port Control**

Group 1 commands configure the communication links between the reader and the host computer or local terminal.

Reader response to Group 1 commands is at the pre-command setting. For example, when changing the baud rate in bits per second (bps) from 9600 baud to 19200 baud, the reader responds with **#DONE** . The reader must be reset by sending a **#63** for the settings to take effect. After the reader has been reset, the host computer or terminal must be changed to the new baud rate, in this case, 19200 baud, to communicate with the reader.

### **#100N SET BAUD RATE**

Sets the baud rate of the COM1 RS–232 serial link.

#### **Format**

#100N

#### **Parameters**

B can be a value from 0 to 9

| <b>B</b>                                         | <b>Baud Rate (bps)</b> |
|--------------------------------------------------|------------------------|
| 0                                                | 300                    |
| 1                                                | 600                    |
| 2                                                | 1200                   |
| 3                                                | 2400                   |
| 4                                                | 4800                   |
| <b>5</b>                                         | <b>9600</b>            |
| 6                                                | 19200                  |
| 7                                                | 38400                  |
| 8                                                | 57600                  |
| 9                                                | 115200*                |
| *Requires the use of a high-quality RS–232 cable |                        |

#### **Pre-condition**

The reader must be in command mode with the previously set baud rate or the factory default.

#### **Post-condition**

System ready to change baud rate to new setting

***Note:** #63 RESET READER command required for changes to take effect.*

**Default**

**#1005**                9600 baud

**Response**

#DONE                Valid baud rate

#ERROR               Invalid baud rate

**See Also**

#522 DISPLAY COM1 PORT COMMUNICATION PARAMETERS



## **#101N SET COM1 PORT STOP BITS**

This command specifies the number of stop bits for COM1 port character transmission.

### **Format**

#101N

### **Parameters**

N can be either 0 or 1

| N | Stop Bits   |
|---|-------------|
| 0 | 1 stop bit  |
| 1 | 2 stop bits |

### **Pre-condition**

The reader must be in command mode.

### **Post-condition**

System must be ready to change stop bit setting.

*Note: #63 RESET READER command required for changes to take effect.*

### **Default**

#1010            1 stop bit

### **Response**

#DONE            Valid entry  
#ERROR           Invalid entry

### **See Also**

#522 DISPLAY COM1 PORT COMMUNICATION PARAMETERS

## **#102N SET COM1 PORT PARITY**

This command selects the COM1 port parity setting. The factory setting is parity disabled.

### **Format**

#1020 provides eight data bits and parity disabled.

#1021 provides seven data bits and even parity.

#1022 provides seven data bits and odd parity.

### **Parameters**

N can be a value from 0 to 2

| N | Parity             |
|---|--------------------|
| 0 | Disable parity     |
| 1 | Enable even parity |
| 2 | Enable odd parity  |

### **Pre-condition**

The reader must be in command mode.

### **Post-condition**

System ready to change parity setting

*Note: #63 RESET READER command required for changes to take effect.*

### **Default**

#1020            Disable parity

### **Response**

#DONE            Valid entry

#ERROR          Invalid entry

### **See Also**

#522 DISPLAY COM1 PORT COMMUNICATION PARAMETERS

## **#103N SET END OF LINE DELAY**

This command adds a delay to the COM port prior to a handshake response. The factory setting is end of line delay of 0 ms.

### **Format**

#1030 provides a 0 ms delay (factory default)

#1031 provides a 100 ms delay

#1032 provides a 200 ms delay

#1033 provides a 300 ms delay

### **Parameters**

N can be a value from 0 to 3

| N | Delay        |
|---|--------------|
| 0 | 0 ms delay   |
| 1 | 100 ms delay |
| 2 | 200 ms delay |
| 3 | 300 ms delay |

### **Pre-condition**

The reader must be in command mode.

### **Post-condition**

System ready to change delay setting

*Note:* #63 RESET READER command required for changes to take effect.

### **Default**

#1030            0 ms delay

### **Response**

#DONE            Valid entry

#ERROR           Invalid entry

### **See Also**

#522 DISPLAY COM1 PORT COMMUNICATION PARAMETERS

---

## **Command Group 2 – Real-Time Clock Control**

Group 2 commands control the real-time clock, which maintains the time and date. This time and date can be appended to IDs, error messages, and sensor input reports.

The real-time clock is supported by a capacitor so that the time and date are preserved in case of power outage. The real-time clock maintains the time and date for approximately seven days after power-off.

### **#20 SET TIME**

This command sets the time.

#### **Format**

The entry format is: #20HH:MM:SS

The time must be entered exactly as shown, as two-digit decimal entries with no spaces between characters and using colons (:) as delimiters.

#### **Parameters**

HH, MM, and SS represent hours, minutes, and seconds, respectively.

Values for HH (hours) range from 00 to 23. Values for MM (minutes) and SS (seconds) range from 00 to 59.

#### **Pre-condition**

The reader must be in command mode. Real-time clock holds the previously set time.

#### **Post-condition**

Time entered sets the time on the real-time clock.

This command takes effect immediately.

#### **Default**

This command does not have a default condition.

#### **Response**

|        |               |
|--------|---------------|
| #DONE  | Valid entry   |
| #ERROR | Invalid entry |

#### **See Also**

#22 DISPLAY TIME AND DATE

#30N APPEND TIME AND DATE SELECTION

## **#21 SET DATE**

This command sets the date on the real-time clock.

### ***Format***

#21MM/DD/YY

The date must be entered exactly as shown, as two-digit entries with no spaces between characters and with forward slashes (/) as delimiters.

### ***Parameters***

MM, DD, and YY represent the month, day, and year, respectively. Values for MM (month) range from 01 to 12. Values for DD (day) range from 01 to 31. Values for YY range from 00 to 99.

### ***Pre-condition***

The reader must be in command mode. The real-time clock holds the previously set date.

### ***Post-condition***

Time entered sets the date on the real-time clock.

This command takes effect immediately.

### ***Default***

This command does not have a default condition.

### ***Response***

|        |               |
|--------|---------------|
| #DONE  | Valid entry   |
| #ERROR | Invalid entry |

### ***See Also***

#22 DISPLAY TIME AND DATE

#30N APPEND TIME AND DATE SELECTION

## **#22 DISPLAY TIME AND DATE**

This command displays the reader's current time and date.

### ***Format***

#22

### ***Parameters***

There are no parameters associated with this command.

### ***Response***

#HH:MM:SS.hh MM/DD/YY. There are two spaces between the time and the date output.

HH, MM, SS, and hh represent time as hours, minutes, seconds, and hundredths of seconds, respectively. MM, DD, and YY represent the month, day, and last two digits of the year, respectively.

### ***Pre-condition***

The reader must be in command mode.

### ***Post-condition***

Time and date are displayed.

This command takes effect immediately.

### ***Default***

This command does not have a default condition.

### ***See Also***

#20 SET TIME

#21 SET DATE

#30N APPEND TIME AND DATE SELECTION

---

## **Command Group 3 – Transmission Formats**

Command Group 3 commands determine what, if any, information is appended to IDs, error messages, sensor input reports, and modem connect and disconnect messages. This information includes time, date, and auxiliary information. Auxiliary information consists of reader number, antenna number, number of reads of the previous tag, and sensor input status.

### **#30N APPEND TIME AND DATE SELECTION**

This command selects the options of appending time and date to transmitted IDs, error messages, and sensor input reports. The factory setting is time and date appended.

#### **Format**

#30N

#### **Parameters**

N can be a value from 0 to 2

| <b>N</b> | <b>Time/Date</b>          |
|----------|---------------------------|
| 0        | No time and date appended |
| 1        | Time only appended        |
| 2        | Time and date appended    |

#### **Pre-condition**

The reader must be in command mode. The previously selected option is in effect.

#### **Post-condition**

Enabling Time or Time and Date Stamp has the following effect on Tag Response, Sensor Status Change, and Sensor Input Report Messages:

Time only: #<string>&HH:MM:SS.hh<%aux>

Time and date: #<string>&HH:MM:SS.hh MM/DD/YY<%aux>

String is the tag response, sensor status change, or sensor input report.

& separates the string from the time and provides a means for the host computer to determine if time or time and date are appended.

% separates any auxiliary information aux defined by the #31N commands and provides a means for the host computer to determine if auxiliary information is appended.

: are time delimiters

/ are date delimiters

Two spaces separate the time from the date. HH, MM, SS, and hh represent time as hours, minutes, seconds, and hundredths of seconds, respectively.

MM, DD, and YY represent the month, day, and the last two digits of the year, respectively.

This command takes effect immediately.

***Default***

**#302**                      time and date appended

***Response***

#DONE                      Valid entry

#ERROR                    Invalid entry

***See Also***

#20 SET TIME

#21 SET DATE

#22 DISPLAY TIME AND DATE



### **#31N APPEND AUXILIARY INFORMATION SELECTION**

This command selects the options of appending auxiliary information to the tag response, sensor status change, and sensor input report outputs.

#### **Parameters**

N can be either 0 or 1

| <b>N</b> | <b>Meaning</b>                    |
|----------|-----------------------------------|
| <b>0</b> | No auxiliary information appended |
| <b>1</b> | Auxiliary information appended    |

#### **Pre-condition**

The reader must be in command mode. The previously selected option is in effect.

#### **Post-condition**

This command takes effect immediately.

Enabling Aux Info Append has the following effect on tag responses, sensor status change, and sensor input report messages:

#<string><&time date>%xx-y-zz-q

<string> is the tag ID code, error message, or sensor input report. Brackets are not included.

& separates the string from any optional time and date information time date appended by the #30N commands and provides a means for the host computer to determine if time or time and date are appended.

% separates the auxiliary information and provides a means for the host computer to determine if auxiliary information is appended.

#### **Tag ID Report**

<xx-y-zz-q>

xx: Reader ID value from 00 to FF hex

y: Antenna number from 0–3

zz: The number of reads of the previous tag per antenna from 00 to FF hex

q: The logical value of the sensor input status when the tag read occurred from 0 to F hex.

#### **Sensor Input Report**

<xx-y-zz-q>

xx: Reader ID value from 00 to FF hex

y: The I/O channel where an input was detected, debounced, and met the minimum true period from 0–3.

Presence True Criteria: An input completed a de-bounced false-to-true transition, minimum true period, followed by a de-bounced true-to-false transition.

zz: The number of reads of the previous tag per antenna from 00 to FF hex.

q: The logical value of the input event, true =1, false = 0, from 0 to F hex.

### **Sensor Status Change Report**

<xx-y-zz-q>

xx: Reader ID value from 00 to FF hex

y: The I/O channel that detected a change in input status from 0–3.

zz: The number of reads of the previous tag per antenna from 00 to FF hex.

q: The value of the sensor input status when the input event occurred from 0 to F hex.

### **Default**

**#300**            No auxiliary information appended

### **Response**

#DONE            Valid entry

#ERROR          Invalid entry

### **See Also**

#524 DISPLAY APPENDED INFORMATION STATUS

#690N SENSOR INPUT REPORTS

#82X SET SENSOR STATUS CHANGE MODE

---

## **Command Group 4 – ID Filter Parameters**

Group 4 commands set criteria for buffering or discarding ID codes, such as filtering. These commands are useful for eliminating duplicate ID codes and filtering unwanted IDs obtained from fringe areas of the antenna reading range.

Please note that these commands use a *comparison register*. The comparison register manages IDs for filtering purposes. When an ID passes all of the filtering tests, it is stored in the reader's main buffer prior to transmission to the host computer.

### **#40 TRANSMIT ALL ID CODES**

This command transmits to the host computer all IDs received by the antenna. This command bypasses some tag data processing that is normally performed when a tag is read. The bypassed processing includes the following:

- Uniqueness testing
- Tag buffering
- Removing old tag IDs from buffer
- Pulsing of Outputs 2 and 3 upon tag read, if #621 SET PREDEFINED OUTPUT CONTROL command is used
- RF and time-out are disabled when #641 SET RF BY SENSOR command is combined with #6921 SELECT PRESENCE RF CONTROL ALGORITHM command.
- Handshake counts for #590 and #311 are set to 0.

#### **Format**

#40

#### **Parameters**

There are no parameters associated with this command.

#### **Pre-condition**

The reader must be in command mode. Previously Selected #410N or #40 Uniqueness Option is in effect.

#### **Post-condition**

This command bypasses some tag data processing that is normally performed when a tag is read. The bypassed processing includes the following:

- Uniqueness testing
- Tag buffering
- Removing old tag IDs from buffer
- Pulsing of Outputs 2 and 3 upon tag read (if #621 SET PREDEFINED OUTPUT

CONTROL command is used)

- RF and time-out are disabled when #641 SET RF BY SENSOR command is combined with #6921 SELECT PRESENCE RF CONTROL ALGORITHM command.
- Handshake counts for #590 and #311 are set to 0.

This command takes effect immediately.

### **Default**

This command does not have a default condition.

### **Response**

|        |               |
|--------|---------------|
| #DONE  | Valid entry   |
| #ERROR | Invalid entry |

### **See Also**

#410N SELECT UNIQUE ID CODE CRITERIA

***Note:** There is no #6XX display command that indicates that #40 is in effect. The command #410N must be sent to restore a verifiable uniqueness state (i.e., display command reflects the state).*

## **#410N SELECT UNIQUE ID CODE CRITERIA**

This command directs the reader to select, buffer, and transmit ID codes according to the following test:

- A tag response is buffered, if in the time interval since the new ID was last received, the previously decoded IDs have changed values at least N+1 times or the uniqueness time-out has been achieved or reset.
- Tag responses that do not pass the test are lost.

Each time the reader receives an ID, the uniqueness filter compares it with the contents of a comparison register(s).

This register contains two items. The first item is the most recently acquired ID, but only if it differs from the second item. The second item is the second most recent ID.

### **Comparison Register**

Item 1                      Most recently acquired ID (different from Item 2)

Item 2                      Second most recent ID (different from Item 1)

When the uniqueness filter is set to separation of one ID, the newly acquired ID is transmitted only if it differs from the first item. Separation of two IDs allows transmission if the new ID is different from Items 1 and 2 in the comparison register.

A new ID can fail the filter test and not be transmitted; however, it is stored in the comparison register for comparison if it differs from Item 1.

### **Format**

#410N

### **Parameters**

N can be either 0 or 1

| N | Meaning             |
|---|---------------------|
| 0 | Separation of 1 ID  |
| 1 | Separation of 2 IDs |

### **Pre-condition**

The reader must be in command mode.

Previously selected #410N or #40 uniqueness option in effect.

The previously set #410N or #40 was in effect.

The uniqueness test has a time limit imposed by the #44N SET VARIABLE TIME-OUT commands. Expiration of the time-out clock effectively erases the comparison register. In effect, the first ID that the reader acquires after the clock expires always appears to be new and is buffered and transmitted. Newly acquired IDs are only tested against IDs that are registered after the clock expires. This time-out clock can be reset

with the #440 RESET UNIQUENESS ON ALL CHANNELS command.

The validation procedure is executed before the unique ID test (#420N SELECT VALID ID CODE CRITERIA commands). IDs that do not pass the validation test are lost.

***Post-condition***

This command takes effect immediately.

Command #40 will be disabled, if it was in effect, upon executing #410N. The command affects all four RF antenna channels' uniqueness settings.

***Default***

**#4100**                      Separation of 1 ID

***Response***

|        |               |
|--------|---------------|
| #DONE  | Valid entry   |
| #ERROR | Invalid entry |

***See Also***

#530 DISPLAY FILTER PARAMETER STATUS

## **#420N SELECT VALID ID CODE CRITERIA**

This command directs the reader to validate an ID received only after it has been obtained a specified number of times in sequence. The validation procedure is executed before the unique ID test (#410N SELECT UNIQUE ID CODE CRITERIA commands). IDs that do not pass the validation test are lost. For example, command #4204 specifies that the same ID must be obtained from the antenna/RF module five times in succession before it is considered for the uniqueness test. This feature is useful in installations where RF reflections may cause a single tag to be read multiple times or where an occasional ID might be read from fringe areas.

### **Format**

#420N

### **Parameters**

N can be a value from 0 to 4

| <b>N</b> | <b>Meaning</b>                       |
|----------|--------------------------------------|
| <b>0</b> | 1 response acquisition before valid  |
| 1        | 2 response acquisitions before valid |
| 2        | 3 response acquisitions before valid |
| 3        | 4 response acquisitions before valid |
| 4        | 5 response acquisitions before valid |

### **Pre-condition**

The reader must be in command mode. The previous #420N command executed is in effect.

### **Post-condition**

This command takes effect immediately.

The command affects all four RF antenna channel's validation settings.

### **Default**

#4200                      1 response acquisition before valid

### **Response**

#DONE                      Valid entry  
#ERROR                     Invalid entry

### **See Also**

#530 DISPLAY FILTER PARAMETER STATUS

## **#440 RESET UNIQUENESS ON ALL CHANNELS**

This command causes the ID filtering process set by #410N SELECT UNIQUE ID CODE CRITERIA to restart. It is used in conjunction with the #44N SET VARIABLE TIME-OUT commands.

### **Format**

#440

### **Parameters**

There are no parameters associated with this command.

### **Pre-condition**

The reader must be in command mode.

### **Post-condition**

This command takes effect immediately.

Unique tags that are in the compare register(s) are cleared on all four RF antenna multiplexer channel uniqueness tests.

This command provides a one-time reset of the uniqueness time-out at which point the previously set time-out interval resumes on all four RF antenna multiplexer channels.

The value of the last handshake count is cleared by this command on all four RF antenna multiplexer channels.

### **Default**

This command does not have a default condition.

### **Response**

|        |               |
|--------|---------------|
| #DONE  | Valid entry   |
| #ERROR | Invalid entry |

### **See Also**

|       |                                         |
|-------|-----------------------------------------|
| #44N  | SET VARIABLE TIME-OUT                   |
| #410N | SELECT UNIQUE ID CODE CRITERIA          |
| #590  | DISPLAY HANDSHAKE COUNT ON ALL CHANNELS |
| #31N  | APPEND AUXILIARY INFORMATION SELECTION  |

**Note:** See #590 DISPLAY HANDSHAKE COUNT ON ALL CHANNELS.



## **#440N RESET UNIQUENESS PER CHANNEL**

This command causes the ID filtering process set by #410N SELECT UNIQUE ID CODE CRITERIA to restart on a per RF antenna multiplexer channel basis. Each RF antenna multiplexer channel has a separate tag uniqueness test.

### **Format**

#440N

### **Parameters**

N can be a value from 0 to 4

| N | Meaning                                                          |
|---|------------------------------------------------------------------|
| 0 | Antenna multiplexer channel 0<br>(used for single-channel modes) |
| 1 | Antenna multiplexer channel 1                                    |
| 2 | Antenna multiplexer channel 2                                    |
| 3 | Antenna multiplexer channel 3                                    |

### **Pre-condition**

The reader must be in command mode.

### **Post-condition**

The uniqueness compare registers are cleared on the selected RF multiplexer channel. The value of the last tag's handshake count is cleared by this command on the selected RF antenna multiplexer channel basis. (Each multiplexed channel has a last tag handshake count.)

This command takes effect immediately.

### **Default**

This command does not have a default condition.

### **Response**

#DONE            Valid entry  
#ERROR         Invalid entry

### **See Also**

#31N APPEND AUXILIARY INFORMATION SELECTION  
#410N SELECT UNIQUE ID CODE CRITERIA  
#44N SET VARIABLE TIME-OUT  
#590 DISPLAY HANDSHAKE COUNT ON ALL CHANNELS  
#590N DISPLAY HANDSHAKE COUNT PER CHANNEL  
#642N RF ANTENNA MULTIPLEXER MODE

## **#44N SET VARIABLE TIME-OUT**

This command sets a time limit on the uniqueness criteria set by #410N SELECT UNIQUE ID CODE CRITERIA.

### **Format**

#44N

### **Parameters**

The parameter N sets the number of minutes on the time-out clock. Each RF channel has an independent timer. These commands set the time-out period for all channels, that is, all channels are set to 2 or 20 minutes.

| N | Time-out Clock              |
|---|-----------------------------|
| 1 | 2 minutes (factory setting) |
| 2 | 20 minutes                  |

### **Pre-condition**

The reader must be in command mode. The previous #44N setting is in effect.

### **Post-condition**

Entering these commands effectively expires the time-out clock, which erases all current IDs in the comparison register. In effect, the first ID that is acquired after the clock expires always appears to be new and is stored. Newly acquired IDs are only tested against IDs that are registered after the clock resets. The reader restarts the time-out clock for an RF channel when a new ID is buffered from that RF channel. The time-out clock is continually reset (does not expire) as long as the reader receives the same tag ID.

This command takes effect immediately.

### **Default**

#441                      2 minutes

### **Response**

#DONE                      Valid entry  
#ERROR                     Invalid entry

### **See Also**

#410N SELECT UNIQUE ID CODE CRITERIA  
#440 RESET UNIQUENESS ON ALL CHANNELS  
#440N RESET UNIQUENESS PER CHANNEL  
#527 DISPLAY RF STATUS

## **#47NN SELECT TAG TYPE MODE**

This command selects the tag processing mode for the Encompass Reader.

### **Format**

#47NN

### **Parameters**

The NN parameter specifies tag read mode.

| NN | Tag Mode           |
|----|--------------------|
| 00 | Stop Mode (RF off) |
| 88 | Set Mode 88        |

### **Pre-condition**

The reader must be in command mode.

### **Post-condition**

The reader must be in command mode.

**Note:** #63 RESET READER command required for changes to take effect.##

### **Default**

#### ***Factory Default Scenario: First time to configure tag mode***

(Powers up in mode 00)

#01 (command mode)

#DONE

#4788 (Set desired tag mode)

#DONE

(Perform setup configuration)

#63 (Restart — to get mode 4788 to take effect)

#### ***Scenario 1: Toggle between Stop Mode and Mode 88***

(#4788 pre-existing tag mode)

#01 (command mode)

#DONE

#4700 (Stop tag mode processing, RF off)

#DONE

#4788 (Restart tag mode processing, RF on, no reset required)

#DONE

#00

#DONE (system running in mode 4788)

### **Default**

**#4700** STOP TAG MODE (RF OFF)

***Response***

|        |               |
|--------|---------------|
| #DONE  | Valid entry   |
| #ERROR | Invalid entry |

***See Also***

#565 DISPLAY TAG MODE SETTING

## **#487N SET IAG SLOT NUMBER**

Sets the IAG trigger pulse slot, which allows multiple readers to have non-overlapping timeslots.

### **Format**

#487N

### **Parameters**

N = IAG Trigger Slot Number with a range from 1 to 3

### **Pre-condition**

Adjacent readers using this configuration require synchronization using the TDM cable and synchronization pulse.

### **Post-condition**

This command takes effect immediately.

### **Default**

N = 1

### **Response**

#DONE

### **See Also**

#587 DISPLAY IAG SLOT NUMBER

***Note:** Lane Setup: Adjacent readers are configured with different slots in order, that is, Reader 1 (N = 1), Reader 2 (N = 2), Reader 3 (N = 3), Reader 4 (N = 1), and so on.*

## #493 IT2200 GENERAL COMMAND REQUEST CONFIGURATION

This command sets a specified IT2200 command configuration per antenna channel. The configuration is saved to nonvolatile memory upon completion.

### Format

```
#493<Protocol><Command Action>[<Tag Request Data>]<Otype><Antenna>
#493PPAAAAQQQQBBBBOOPPPNCCCCSSRRRRRAA
#493000000C0030030010007010000000000000
```

### Parameters

**PP Protocol**  
Set to 00 for IT2200. This determines the request structure.

**AAAA Command Action**  
Set to 0000.

**QQQQ Request Code**  
C003 Read Request

**BBBB Bit Count**  
This field indicates the number of bits in the message. The bit count includes the number of bits in all fields after the bit count, including the CRC.

**OO Options**

### Read Request Options

#### Option Bits

| Bit 7  | Bit 6    | Bit 5–4                     | Bit 3           | Bit 2                        | Bit 1–0        |
|--------|----------|-----------------------------|-----------------|------------------------------|----------------|
| Unused | Tag type | Page/<br>password<br>select | BIST<br>request | Anti-<br>playback<br>request | Tag addressing |

**Tag Type** — This field indicates the type of tag that has responded. The types include standard toll tags and check tags.

| Value | Description |
|-------|-------------|
| 0     | Toll tags   |
| 1     | Check tags  |

**Page/Password Select** — This field indicates the tag data area selected and the specific data contained in the command for that tag data area. Valid values and corresponding definitions are specified in [Table 7-2](#).

**Table 7-2 Definition of Page/Password Select Values**

| Value                                     | Definition                                               |
|-------------------------------------------|----------------------------------------------------------|
| 00                                        | General data page area selected, no password specified   |
| 01*                                       | General data page area selected, user password specified |
| 11*                                       | Owner area selected with a global password specified     |
| *For future use, not currently supported. |                                                          |

The owner and user areas contain user and global passwords that cannot be read.

**BIST Request** — This field indicates whether the tag should return a built-in self test (BIST) code in the read response. The BIST code is returned by the tag and displays the results of the BIST test that was run the last time the tag entered idle mode.

| Value | Definition             |
|-------|------------------------|
| 0     | BIST code not returned |
| 1     | BIST code returned     |

**Anti-playback Request** — This field indicates whether the tag should return an anti-playback code in the read response. The anti-playback code indicates whether a tag has been tampered with. The anti-playback code is returned by the tag and is incremented each time the tag is read. This function may be used for post-validation of tags at the system level by monitoring the sequencing of this field for a given tag.

| Value | Definition                      |
|-------|---------------------------------|
| 0     | Anti-playback code not returned |
| 1     | Anti-playback code returned     |

**Tag Addressing** — This field specifies which tags should respond to the read request. [Table 7-3](#) lists the valid values and corresponding definitions.

**Table 7-3 Definitions of Tag Addressing Value**

| Value | Definition                                                                     |
|-------|--------------------------------------------------------------------------------|
| 00    | All tags respond to this request. The response contains the Title 21 ID.       |
| 01    | All tags respond to this request. The response contains the tag serial number. |

**Table 7-3 Definitions of Tag Addressing Value (continued)**

|    |                                                                                                                                              |
|----|----------------------------------------------------------------------------------------------------------------------------------------------|
| 10 | Only tags with the specified Title 21 ID respond. The response contains the specified Title 21 ID in the tag ID field (serial number field). |
| 11 | Only tags with the specified tag serial number will respond. The responses contain the specified tag serial number in the tag ID field.      |

**PPPP**

**Starting Page Number**

This field is a binary integer corresponding to the tag page number to be read.

**NN**

**Count**

This field is for multipage reads only and is not implemented in the IT2200-series tags. It should be set to a 01H.

**(SSSSSSSS)**

**Tag ID (serial number or Title 21 ID)**

This field is optional for read requests without passwords, and contains a Title 21 tag serial number. It is required for requests with passwords. The contents of this data field are indicated by the tag addressing field in the option bits.

**(PPPPPPPP)**

**User Password**

This field is optional and contains a user password. The contents of this data field are indicated by the page/password select subfield. A user password consists of four bytes of data.

**(PPPPPPPP)  
(PPPPPPPP)**

**Global Password**

This field is optional and contains a global password. The contents of this data field are indicated by the page/password select subfield. A global password consists of eight bytes of data.

**CCCC**

**Reserved**

CRC placeholder

**SS**

**OpType**

This one-byte field indicates whether the associated command should be configured for auto send (mode-based).



| Setting | Description      |
|---------|------------------|
| 00      | Normal operation |
| 01      | Auto send        |

**TTTT**

### ***Tries***

This two-byte data field specifies the number of transmission attempts to be made for the given transaction.

**AA**

### ***Ant***

This antenna channel field indicates the channel-associated command to configure.

### ***Example***

```
#493<Protocol><Command Action>[<Tag Request Data>]<Otype><Antenna>
#493PPAAAAQQQBBBB00PPPNCCCCSSRRRAA
#4930000000C003003001000701000000000000
```

where

|      |                   |                                         |                              |
|------|-------------------|-----------------------------------------|------------------------------|
| PP   | (protocol)        | = 00                                    | = IT2200                     |
| AAAA | (cmd action)      | = 0000                                  | = Command action             |
| QQQQ | (request code)    | = C003                                  | = IT2200 read request        |
|      |                   | = 8000                                  | = Title 21 read request      |
| BBBB | (bit count)       | = 0030                                  | = Bit count                  |
| OO   | (options)         | = 01                                    | = Option                     |
| PPPP | (starting page #) | = 000x, where x corresponds to tag type | = Starting page number       |
| NN   | (page count)      | = 01                                    | = Page count                 |
| CCCC | (reserved - CRC)  | = 0000                                  | = Reserved (CRC placeholder) |
| SS   | (op type)         | = 00                                    | = OpType (normal operation)  |
| RRRR | (retry)           | = 0000                                  | = Retry                      |
| AA   | (antenna)         | = 00                                    | = Antenna number             |

### ***Pre-condition***

The reader must be in stop mode (#4700).

### ***Post-condition***

This command takes effect immediately.

***Default***

This command does not have a default condition.

***Response***

#DONE — Valid Parameters

#ERROR — Invalid Parameters

***See Also***

#5493 DISPLAY IT2200 CONFIGURATION

This command sets the eGo/SeGo Group Select Equals configuration per antenna channel. Using the group select equals operation the reader can select tags that match the mask and data in the command. Using this command, the reader transmits the group select equals command code <CMDCDE>, byte mask <MASK>, byte address <ADDR>, and eight data bytes <DATA> to the tag. The tag applies the mask to the data. Each bit set to a 1 in the mask enables the associated data byte to be compared with eight data bytes in the tag memory offset by the address. If any enabled bytes do not match the memory, the tag does not respond.

```
#493<PROT><CMDACT><CMDUDE><TAGID><ADDR><MASK><STRADR><DATA><DEPTH><ANT>  
#493PPAAAACCTTTTTTTTTTTTTTTTTTAAAMSSDDDDDDDDDDDDDDTTAA
```

|       |            |                |        |                                           |
|-------|------------|----------------|--------|-------------------------------------------|
| PP    | <PROT>:    | Protocol       | Range: | 03 - eGo      05 - SeGo                   |
| AAAA  | <CMDACT>:  | Command Action | Range: | 0000 - FFFF hex                           |
| CC    | <CMDCDE>:  | Command Code   | Range: | 00 - FF hex                               |
| T...T | <TAGID>:*  | 8_Bytes_Tag ID | Range: | 0000000000000000 - FFFFFFFFFFFFFFFFFF hex |
| AA    | <ADDR>:    | Byte_Address   | Range: | 00 - FF hex                               |
| MM    | <MASK>     | Byte_Mask      | Range: | 00 - FF hex                               |
| SS    | <STRADR>:* | Start_Address  | Range: | 00 - FF hex                               |
| D...D | <DATA>:    | 8_Bytes_Data   | Range: | 0000000000000000 - FFFFFFFFFFFFFFFFFF hex |
| TT    | <DEPTH>:   | Command Depth  | Range: | 00 - FF hex                               |
| AA    | <ANT>:     | Nibble_Antenna | Range: | 0 - 3                                     |
|       |            |                |        |                                           |
| PP    | Protocol   |                |        |                                           |
| 03    | eGo        |                |        |                                           |
| 05    | SeGo       |                |        |                                           |

### ***Post-condition***

**Note:** #63 RESET READER command required for changes to take effect.

### **Defaults**

The defaults equal a Group Select All (all tags respond)

|           |          |                                          |
|-----------|----------|------------------------------------------|
| <PROT>:   | Default: | 03 and 05 both protocols                 |
| <CMDACT>: | Default: | 0000                                     |
| <CMDCDE>: | Default: | 00                                       |
| <MASK>:   | Default: | 00                                       |
| <ADDR>:   | Default: | 00                                       |
| <DATA>:   | Default: | 0000000000000000 hex                     |
| <ANT>:    | Default: | Defaults applied to all antenna channels |

### **Response**

#DONE — Valid Parameters

#ERROR — Invalid Parameters

### **See Also**

#5493 DISPLAY eGo/SeGo CONFIGURATION

***Note:** Group select settings are based on the tags deployed in specific markets and locations. MASK, DATA, and ADDR settings should be chosen to work with the market and site-specific requirements. Group Select parameters should be kept in a script file due to the large number of parameters.*

## #4ANNNN SET PROTOCOLS — UNIVERSAL TAG MODE

This command sets the Encompass Reader protocols.

### Format

#4ANNNN

Where NNNN specifies the tag read mode

Range NNNN Hex: 0000–03FF Hex

(0000 0000 0000 0000–0000 0011 1111 1111 binary)

| Binary | MSB  |      |       |      |     |      |     |        |          |         |          | LSB  |
|--------|------|------|-------|------|-----|------|-----|--------|----------|---------|----------|------|
|        | Rsvd | Rsvd | CVISN | Rsvd | IAG | SeGo | eGo | IT2200 | Title 21 | ATA 1/2 | ATA Full | Rsvd |
| 0NNN   | X    | X    | X     | X    | X   | X    | X   | X      | X        | X       | X        | X    |

10 bits used, 16 allocated

The first 4 bits are reserved (Rsvd) as indicated by 0. Where X is a bit.

### Example

|         |     |      |      |      |      |                                                       |
|---------|-----|------|------|------|------|-------------------------------------------------------|
| 0000HEX | --> | 0000 | 0000 | 0000 | 0000 | binary = No protocols enabled                         |
| 003FHEX | --> | 0000 | 0000 | 0011 | 1111 | binary = eGo, IT2200, Title 21, ATA 1/2, ATA full     |
| 003EHEX | --> | 0000 | 0000 | 0011 | 1110 | binary = eGo, IT2200, Title 21, ATA 1/2, ATA full *** |
| 03FFHEX | --> | 0000 | 0011 | 1111 | 1111 | binary = All protocols enabled                        |

### Pre-condition

*Note:* The Encompass Reader must be in COMMAND MODE (#01)

### Post-condition

*Note:* #63 RESET READER command required for changes to take effect.

### Default

#4700 STOP TAG MODE (RF OFF)

### Response

#DONE — Valid entry

#ERROR — Invalid entry

### See Also

#566 DISPLAY PROTOCOLS

*Note:* The Encompass Reader skips the reserved fields, which are indicated by \*\*\*. If the reserved bit is enabled, then the bit field does not change the transaction state machine.

## #4B [APN] SECONDARY TAG SEQUENCES

This command supplies the options to set the Encompass Reader to Mode 88 operation by allowing the user to select from a set of predefined tag operations per protocol.

### Format

#4B [APN]

where

A = Antenna Number

Range: 0-3

P = Tag Protocol

0 IT2200

1 Title 21

2 ATA full-frame

3 eGo

4 IAG

5 SeGo

6 CVISN

7 ATA half-frame

N = Sequence per Protocol

Range: 0-F

### Parameters

Sequence Matrix

| P/N | 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | A  | B  | C  | D  | E  | F  |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 0   | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 0A | 0B | 0C | 0D | 0E | 0F |
| 1   | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 1A | 1B | 1C | 1D | 1E | 1F |
| 2   | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 2A | 2B | 2C | 2D | 2E | 2F |
| 3   | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 3A | 3B | 3C | 3D | 3E | 3F |
| 4   | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 4A | 4B | 4C | 4D | 4E | 4F |
| 5   | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 5A | 5B | 5C | 5D | 5E | 5F |
| 6   | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 6A | 6B | 6C | 6D | 6E | 6F |
| 7   | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 7A | 7B | 7C | 7D | 7E | 7F |

| PN | Sequence                     | Description                                     |
|----|------------------------------|-------------------------------------------------|
| 00 | IT2200 read-only             | Restores normal operation                       |
| 01 | IT2200 read w/Gen Ack        | Read followed by a Gen Ack configured with #493 |
| 10 | Title 21 read-only           | Restores normal operation                       |
| 11 | Title 21 read w/Title 21 Ack | Read followed by a Title 21 Ack                 |

**Note:** Order changed for symmetry with the Display Tag Sequence command

***Post-condition***

***Note:*** #63 *RESET READER* command required for changes to take effect.

***See Also***

#54B[AP] *DISPLAY SECONDARY TAG SEQUENCE*



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## **Command Group 5 – Reader Status**

Group 5 commands provide status reports on the parameters and operation of the reader. Thus, each command has a different response. Reader response characters may be shown in brackets <>. The brackets indicate that the response is a value in the range of numbers in the brackets; the brackets are not part of the response. For example, the #521 DISPLAY READER ID NUMBER command responds with a hex value ranging between 00 and FF. In the command discussion, the response is

#RDID <00-FF>

If the reader ID number is 7, for example, the actual response is

#RDID 07

All spaces shown in the response are actual spaces sent from the reader. In the previous example, there is one space between #RDID and 07.

### **#505 DISPLAY FIRMWARE VERSION AND SERIAL NUMBER**

This command displays the primary microcontroller firmware version number and serial number.

#### **Format**

#505

#### **Parameters**

There are no parameters associated with this command.

#### **Pre-condition**

The reader must be in command mode.

#### **Post-condition**

This command takes effect immediately.

The firmware version displays.

#### **Default**

This command does not have a default condition.

#### **Response**

#Model E5 AI1200 Ver X.XX SNXXXXXXX

The displayed line contains the current version of the microcontroller firmware and reader-assigned serial number (SN). The SN is a seven-digit decimal value (0 through 9), with the first 2 digits representing the year. Refer to the firmware version number when contacting TransCore about the firmware.

## **#506 DISPLAY HARDWARE CONFIGURATION INFORMATION**

This command displays hardware configuration information stored in the reader memory by the user. Hardware configuration information is empty by default until you set the information to any 20-character ASCII string desired using command #696S...S STORE HARDWARE CONFIGURATION. The reader responds with an ASCII string from 1 to 20 characters long.

### ***Format***

#506

### ***Parameters***

There are no parameters associated with this command.

### ***Pre-condition***

The reader must be in command mode.

### ***Post-condition***

This command displays hardware configuration information.

This command takes effect immediately.

### ***Default***

This command does not have a default condition.

### ***Response***

#<1 to 20 Character ASCII string>

### ***See Also***

#696S...S STORE HARDWARE CONFIGURATION

## **#520 DISPLAY POWER OUTAGE AND RESTORE BITS**

This command displays the value of the reader's power outage and restore bits. The power outage bit value changes from 0 to 1 when power to the reader is interrupted. To reset the bit, use the #63 RESET READER command or the #65 RESET POWER OUTAGE BIT. On initial power-up, one of these two commands must be used to properly initialize this bit.

### ***Format***

#520

### ***Pre-condition***

There is no pre-condition for this command.

### ***Post-condition***

This command takes effect immediately.

### ***Default***

This command does not have a default condition.

### ***Response***

#PWRB P<0-1>

where

P0 indicates power to reader has been maintained since last zeroing of this bit.

P1 indicates power to reader has been lost since last zeroing of this bit.

### ***See Also***

#63 RESET READER

#65 RESET POWER OUTAGE BIT

## **#521 DISPLAY READER ID NUMBER**

This command displays the reader identification (ID) number.

### ***Format***

#521

### ***Parameters***

There are no parameters for this command.

### ***Pre-condition***

There is no pre-condition for this command.

### ***Post-condition***

This command takes effect immediately.

### ***Default***

This command does not have a default condition.

### ***Response***

#RDID <00–FF>

This value is hex from 00 to FF and is set by the #60NN SET READER ID NUMBER command. This number is stored in non-volatile EEPROM and is preserved across a power interruption.

### ***See Also***

#31N APPEND AUXILIARY INFORMATION SELECTION

#60NN SET READER ID NUMBER

## **#522 DISPLAY COM1 PORT COMMUNICATION PARAMETERS**

This command displays the parameters set for the COM1 port communications. Values correspond to those used to set the communications parameters through the various #100N-series commands.

### **Format**

#522

### **Parameters**

There are no parameters for this command.

### **Pre-condition**

There is no pre-condition for this command.

### **Post-condition**

This command takes effect immediately.

### **Default**

This command does not have a default condition.

### **Response**

#COM1 B<0-9> S<0-1> P<0-2> D<0-3>

where

B is the baud rate and can be a value from 0 to 9

| <b>B</b>                                         | <b>Baud Rate (bps)</b> |
|--------------------------------------------------|------------------------|
| 0                                                | 300                    |
| 1                                                | 600                    |
| 2                                                | 1200                   |
| 3                                                | 2400                   |
| 4                                                | 4800                   |
| <b>5</b>                                         | <b>9600</b>            |
| 6                                                | 19200                  |
| 7                                                | 38400                  |
| 8                                                | 57600                  |
| 9                                                | 115200*                |
| *Requires the use of a high-quality RS-232 cable |                        |

S is the stop bits. Stop bits (S) can be either 0 or 1

| <b>S</b> | <b>Stop Bits</b> |
|----------|------------------|
| <b>0</b> | 1 stop bit       |
| 1        | 2 stop bits      |

P is the parity and can be a value from 0 to 2

| <b>P</b> | <b>Parity</b>      |
|----------|--------------------|
| <b>0</b> | Disable parity     |
| 1        | Enable even parity |
| 2        | Enable odd parity  |

D is the end-of-line delay and can be a value from 0 to 3

| <b>D</b> | <b>End-Of-Line Delay</b> |
|----------|--------------------------|
| <b>0</b> | 0 ms                     |
| 1        | 100 ms                   |
| 2        | 200 ms                   |
| 3        | 300 ms                   |

There is one space between each value.

For example, if the reader has the factory settings, the display reads:

#COM1 B5 S0 P0 D1

B5      baud rate of 9600

S0      one stop bit

P0      parity disabled

D1      100-ms end-of-line delay

### **See Also**

#100N SET BAUD RATE

#101N SET COM1 PORT STOP BITS

#102N SET COM1 PORT PARITY

## **#524 DISPLAY APPENDED INFORMATION STATUS**

This command displays the information being appended to reader transmissions. The information can be a combination of time, date, auxiliary, and authority information, such as reader ID number, antenna number, number of times the previous tag was read, sensor input status, and whether authority information is numeric or ASCII.

### **Format**

#524

### **Parameters**

There are no parameters for this command.

### **Pre-condition**

There is no pre-condition for this command.

### **Post-condition**

This command takes effect immediately.

### **Default**

This command does not have a default condition.

### **Response**

#IDAP T<0-1> D<0-1> X<0-1>

where

|    |                                                 |
|----|-------------------------------------------------|
| T0 | indicates time is not appended                  |
| T1 | indicates time is appended                      |
| D0 | indicates date is not appended                  |
| D1 | indicates date is appended                      |
| X0 | indicates auxiliary information is not appended |
| X1 | indicates auxiliary information appended        |

There is one space between each of the values.

For example, if the reader has the factory settings, the display reads

#IDAP T1 D1 X1.

This corresponds to time, date, auxiliary, and four-byte numeric authority information appended. When time and date are appended, they are appended to ID codes, sensor status change and sensor input report messages.

### **See Also**

#30N APPEND TIME AND DATE SELECTION

#31N APPEND AUXILIARY INFORMATION SELECTION

## #525 ENQUIRE COMMUNICATION PROTOCOL STATUS

This command displays the communication protocol status set by the #61N command.

### **Format**

#525

### **Parameters**

There are no parameters for this command.

### **Pre-condition**

There is no pre-condition for this command.

### **Post-condition**

This command takes effect immediately.

### **Default**

See Response section.

### **Response**

#ECPS P<0-1> T<00-FF> X<0-2> S<0>

where

|           |                                         |                 |
|-----------|-----------------------------------------|-----------------|
| <b>P0</b> | basic protocol enabled                  | factory setting |
| P1        | error correcting protocol (ECP) enabled |                 |
| T         | ECP acknowledgment time-out             |                 |
| <b>X0</b> | disable flow control                    | factory setting |
| X1        | enable XON/XOFF flow control            |                 |
| X2        | enable hardware flow control            |                 |
| <b>S0</b> | <som> = # (23 hex)                      | factory setting |

If the reader has factory settings, the response is

```
#ECPS P0 TFE X0 S0
      basic protocol enabled
      time-out set to 3 (@150 ms)
      ON/XOFF flow control enabled
      # as <som> character
```

### **See Also**

#61N SELECT COMMUNICATION PROTOCOL

#612NN SET ERROR CORRECTING PROTOCOL TIME-OUT

#614N FLOW CONTROL SETTINGS



## #526 DISPLAY I/O STATUS

This command displays the I/O status indicating whether the output status modules are controlled externally through the #620N SET OUTPUT CONTROL commands or internally through the #62N SET PREDEFINED OUTPUT CONTROL command. If the output modules are controlled externally, this command displays the current energized or de-energized states. This command also displays the condition of the four sensor input circuits. The final value displayed is the output pulse duration set by the #67NP SET OUTPUT PULSE DURATION command.

### **Format**

#526

### **Parameters**

There are no parameters associated with this command.

### **Pre-condition**

The reader must be in command mode.

### **Post-condition**

This command takes effect immediately.

### **Default**

This command does not have a default condition.

### **Response**

#I0ST C<0-2> O<0-F> I<0-F> D0<0-F> D1<0-F> D2<0-F> D3<0-F>

where

|    |                                           |
|----|-------------------------------------------|
| C0 | control is external (See #620N commands)  |
| C1 | control is internal (See #621 command)    |
| C2 | control is internal (See #622 command)    |
| ON | output status N<0-F> (see table below)    |
| IN | input status N<0-F> (see table below)     |
| D0 | output pulse duration DIGITAL I/O port D0 |
| D1 | output pulse duration DIGITAL I/O port D1 |
| D2 | output pulse duration DIGITAL I/O port D2 |
| D3 | output pulse duration DIGITAL I/O port D3 |

|    | Output Port # |   |   |   |
|----|---------------|---|---|---|
|    | 0             | 1 | 2 | 3 |
| O0 | —             | — | — | — |
| O1 | X             | — | — | — |
| O2 | —             | X | — | — |

|    | Output Port # |   |   |   |
|----|---------------|---|---|---|
|    | 0             | 1 | 2 | 3 |
| O3 | X             | X | – | – |
| O4 | –             | – | X | – |
| O5 | X             | – | X | – |
| O6 | –             | X | X | – |
| O7 | X             | X | X | – |
| O8 | –             | – | – | X |
| O9 | X             | – | – | X |
| OA | –             | X | – | X |
| OB | X             | X | – | X |
| OC | –             | – | X | X |
| OD | X             | – | X | X |
| OE | –             | X | X | X |
| OF | X             | X | X | X |

|    | Input Port # |   |   |   |
|----|--------------|---|---|---|
|    | 0            | 1 | 2 | 3 |
| I0 | –            | – | – | – |
| I1 | X            | – | – | – |
| I2 | –            | X | – | – |
| I3 | X            | X | – | – |
| I4 | –            | – | X | – |
| I5 | X            | – | X | – |
| I6 | –            | X | X | – |

|                                   | Input Port # |   |   |   |
|-----------------------------------|--------------|---|---|---|
|                                   | 0            | 1 | 2 | 3 |
| I7                                | X            | X | X | – |
| I8                                | –            | – | – | X |
| I9                                | X            | – | – | X |
| IA                                | –            | X | – | X |
| IB                                | X            | X | – | X |
| IC                                | –            | – | X | X |
| ID                                | X            | – | X | X |
| IE                                | –            | X | X | X |
| IF                                | X            | X | X | X |
| X = configured as output or input |              |   |   |   |

### See Also

#620N SET OUTPUT CONTROL

#62N SET PREDEFINED OUTPUT CONTROL

#67NP SET OUTPUT PULSE DURATION

**Note:** The values for D0 through D3 correspond to the values entered through the #67NP SET OUTPUT PULSE DURATION commands and range from 0 (4 ms) to F (752 ms).

## **#527 DISPLAY RF STATUS**

This command displays the current RF status. The command also shows if the RF is controlled through external host commands, sense input, or is in dual-channel multiplex mode; whether the RF is off or on; and the uniqueness time-out setting determined by the #44N SET VARIABLE TIME-OUT commands.

### **Format**

#527

### **Parameters**

There are no parameters associated with this command.

### **Pre-condition**

There is no pre-condition for this command.

### **Post-condition**

This command takes effect immediately.

### **Default**

This command does not have a default condition.

### **Response**

#RFST C<0-1> M<0-F> O<0-5> T<1-2>

where

|    |                                                   |                                              |
|----|---------------------------------------------------|----------------------------------------------|
| C0 | RF on continuously enabled                        | (see command #6411 for detailed description) |
| C1 | RF on by presence enabled                         | (see command #6410 for detailed description) |
| M0 | Single channel                                    | (see command #6420 for detailed description) |
| M1 | Single-channel antenna synchronization compatible | (see command #6421 for detailed description) |
| M3 | Two-channel multiplexing (0, 1)                   | (see command #6423 for detailed description) |
| MC | Two-channel multiplexing (2, 3)                   | (see command #642C for detailed description) |
| M7 | Three-channel multiplexing (0, 1, 2)              | (see command #6427 for detailed description) |
| MF | Four-channel multiplexing (0, 1, 2, 3)            | (see command #642F for detailed description) |
| O0 | RF off (real-time status)                         |                                              |
| O1 | Manual antenna channel 0 on (1, 2, 3 off)         |                                              |
| O2 | Manual antenna channel 1 on (0, 2, 3 off)         |                                              |
| O3 | Manual antenna channel 2 on (0, 1, 3 off)         |                                              |
| O4 | Manual antenna channel 3 on (0, 1, 2 off)         |                                              |
| O5 | RF on (real-time status)                          |                                              |
| T1 | Variable time-out clock set to 2 minutes          |                                              |

|    |                                           |  |
|----|-------------------------------------------|--|
| T2 | Variable time-out clock set to 20 minutes |  |
|----|-------------------------------------------|--|

**See Also**

#44N SET VARIABLE TIME-OUT

#620N SET OUTPUT CONTROL

#640N RF CONTROL

#641N RF MODE CONTROL

#642N RF ANTENNA MULTIPLEXER MODE

**Note:** #6410 RF BY PRESENCE ENABLED

*O0 displayed when presence is deasserted for any RF channel*

*O5 displayed when presence is asserted for any RF channel*

**Note:** #6411 RF ON CONTINUOUSLY ENABLED

*O0 displayed if #6400 TURN RF OFF is in effect*

*O5 displayed is #6405 TURN RF ON is in effect*

## **#529 DISPLAY PRESENCE DETECTOR STATUS**

This command displays the parameters set for presence detector status as defined by the #69N-series of commands.

### **Format**

#529

### **Parameters**

There are no parameters associated with this command.

### **Pre-condition**

The reader must be in command mode.

### **Post-condition**

This command takes effect immediately.

### **Default**

This command does not have a default condition.

### **Response**

#PRST P<0-1> D<0-F> A<0-2> T<0-F> I<0-1>

where

|    |                                                 |                     |
|----|-------------------------------------------------|---------------------|
| P0 | Sensor input reports disabled                   | (see command #6900) |
| P1 | Sensor input reports enabled                    | (see command #6901) |
| DN | Presence minimum true period                    | (see command #691N) |
| A0 | RF off on time-out only                         | (see command #6920) |
| A1 | RF off on time-out or tag                       | (see command #6921) |
| A2 | RF off on time-out or presence conditions false | (see command #6922) |
| TN | Presence control time-out                       | (see command #693N) |
| I0 | Sense input energized for true                  | (see command #6940) |
| I1 | Sense input de-energized for true               | (see command #6941) |

For example, if the reader has the factory settings, it responds with:

#PRST P0 D6 A2 TF I0

which corresponds to

Sensor input reports disabled

Presence true period of 32 ms

RF control off on time-out only

Presence RF control time-out of 32 ms

Digital sense input module energized for positive logic

**See Also**

#690N SENSOR INPUT REPORTS

#691N SET MINIMUM PRESENCE TRUE PERIOD

#692N SELECT PRESENCE RF CONTROL ALGORITHM

#693N SELECT PRESENCE RF CONTROL TIME-OUT PERIOD

#694N SELECT SENSE INPUT INVERSION

### **#530 DISPLAY FILTER PARAMETER STATUS**

This command displays the parameters set for the identification separation and validation parameters.

#### **Format**

#530

#### **Parameters**

There are no parameters associated with this command.

#### **Pre-condition**

The reader must be in command mode.

#### **Post-condition**

This command takes effect immediately.

#### **Default**

This command does not have a default condition.

#### **Response**

#RF0S U<0-1> V<0-4>

U: Uniqueness filter criteria

V: Valid ID code criteria.

Values correspond to those used to set the uniqueness and valid ID code parameters through the #410N SELECT UNIQUE ID CODE CRITERIA and #420N SELECT VALID ID CODE CRITERIA commands.

For example, if the reader is set to the factory values, the display would read as follows:

#RF0S U0 V0

U0: separation of one ID for uniqueness filtering

V0: obtaining an ID one time to consider it valid.

#### **See Also**

#410N SELECT UNIQUE ID CODE CRITERIA

#420N SELECT VALID ID CODE CRITERIA.



### **#535 DISPLAY BUFFER CONTROL STATUS**

This command displays buffer control mode status as enabled or disabled.

#### ***Format***

#535

#### ***Parameters***

There are no parameters associated with this command.

#### ***Pre-condition***

The reader must be in command mode.

#### ***Post-condition***

This command takes effect immediately.

#### ***Default***

This command does not have a default condition.

#### ***Response***

#BCM <0-1>

where

0 buffer control mode disabled

1 buffer control mode enabled

#### ***See Also***

#616N BUFFER CONTROL MODE SETTINGS

## **#5493 DISPLAY IT2200 CONFIGURATION**

This command displays the IT2200 configuration.

### **Field Format**

#5493<Protocol><Command Action><Command Code><Reserved><Antenna>

### **Text Format**

#5493PPAAAACCCCVVVVAA

### **Parameters**

where

**Protocol (PP)** — 1-byte value indicating IT2200 as the tag type data

0x00 = IT2200

**Command Action (AAAA)** — 2-byte value

0x0000

**Command Code (CCCC)** — 2-byte value indicating a Gen Ack or Page Read

0xC003 = Page Read

0xF00F = Gen Ack

**Reserved (VVVV)** — 2-byte field for future use

0x0000

**Antenna (AA)** — 1-byte value indicating the antenna channel

0x00 = Antenna 0

0x01 = Antenna 1

0x02 = Antenna 2

0x03 = Antenna 3

### **Pre-condition**

The reader must be in command mode.

### **Post-condition**

This command takes effect immediately.

### **Default**

This command does not have a default condition.

### **Example**

//Get Antenna 0 Parameters

#54930000000C0030000000

#54930000000C0030030010007010000000000000

where

PP = 00 = IT2200

AAAA = 0000 = Command Action

QQQQ = C003 = IT2200 Read Request

BBBB = 0030 = Bit Count

OO = 01 = Option

PPPP = 0007 = Starting Page Number

NN = 01 = Page Count

CCCC = 0000 = Reserved (CRC placeholder)

SS = 00 = OpType (normal operation)

TTTT = 0000 = Tries

AA = 00 = Antenna Number

**See Also**

#493 IT2200 GENERAL COMMAND REQUEST CONFIGURATION

## **#5493 DISPLAY eGo/SeGo CONFIGURATION**

This command displays the Group Select Equal settings for eGo or SeGo.

### **Field Format**

#5493<Protocol><Command Action><Command Code><Command Depth><Antenna>

### **Text Format**

#5493PPAAAACDDAA

where

**Protocol (PP)** — 1-byte value indicating tag type data

0x03 = eGo

0x05 = SeGo

**Command Action (AAAA)** — 2-byte value

0x0000

**Command Code (CC)** — 1-byte value indicating a Group Select Equals

0x00 = Group Select Equals

**Command Depth (DD)** — 1-byte value

0x00 = 1st layer

**Antenna (AA)** — 1-byte indicating the antenna channel

0x00 = Antenna 0

0x01 = Antenna 1

0x02 = Antenna 2

0x03 = Antenna 3

### **Pre-condition**

The reader must be in command mode.

### **Post-condition**

This command takes effect immediately.

### **Default**

This command does not have a default condition.

### **Response**

Valid Entry:

#5493PPAAAACCTTTTTTTTTTTTTTTTTTMMADDSDSSTTTTAA

Invalid Entry

#Error

### Example

```
//Get Antenna 0 Parameters
```

#5493050000000000

[illegible]

### See Also

### #493 SET eGo/SeGo GROUP SELECT EQUALS CONFIGURATION

## **#54B [AP] DISPLAY SECONDARYTAG SEQUENCE**

This command displays the options to the Mode 88 operation by allowing the user to select from a set of predefined tag operations per protocol.

### **Format**

#54B [AP]

### **Parameters**

A = Antenna Number and has a range from 0 to 3

P = Tag Protocol and has a range from 0 to 7 where

|   |                |
|---|----------------|
| 0 | IT2200         |
| 1 | Title 21       |
| 2 | ATA full-frame |
| 3 | eGo            |
| 4 | IAG            |
| 5 | SeGo           |
| 6 | CVISN          |
| 7 | ATA half-frame |

### **Pre-condition**

The reader must be in command mode

### **Post-condition**

*Note: #63 RESET READER command required for changes to take effect.*

### **Default**

For IT2200, no acknowledge (Ack)

### **Response**

The possible responses are shown here.

| P |         |           |
|---|---------|-----------|
| 0 | #IT2200 | A[A] N[N] |
| 1 | #T21    | A[A] N[N] |
| 2 | #ATA    | A[A] N[N] |
| 3 | #EGO    | A[A] N[N] |
| 4 | #IAG    | A[A] N[N] |
| 5 | #SEGO   | A[A] N[N] |
| 6 | #CVISN  | A[A] N[N] |
| 7 | #ATA1/2 | A[A] N[N] |

where

A = Antenna Number and has a range from 0 to 3

N = Sequence per Protocol and has a range from 0 to F

### **Parameters**

Sequence Matrix

| P/N | 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | A  | B  | C  | D  | E  | F  |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 0   | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 0A | 0B | 0C | 0D | 0E | 0F |
| 1   | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 1A | 1B | 1C | 1D | 1E | 1F |
| 2   | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 2A | 2B | 2C | 2D | 2E | 2F |
| 3   | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 3A | 3B | 3C | 3D | 3E | 3F |
| 4   | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 4A | 4B | 4C | 4D | 4E | 4F |
| 5   | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 5A | 5B | 5C | 5D | 5E | 5F |
| 6   | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 6A | 6B | 6C | 6D | 6E | 6F |
| 7   | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 7A | 7B | 7C | 7D | 7E | 7F |

| PNA Sequence                    | Description                                     |
|---------------------------------|-------------------------------------------------|
| 00 IT2200 read-only             | Restores normal operation                       |
| 01 IT2200 read w/Gen Ack        | Read followed by a Gen Ack configured with #493 |
| 10 Title 21 read-only           | Restores normal operation                       |
| 11 Title 21 read w/Title 21 Ack | Read followed by a Title 21 Ack                 |

Examples:

#4B010                      Set Title 21 read-only on Antenna 0 #4BN  
#DONE

#54B01                      Get Title 21 N on Antenna 0  
#T21                        A0 N0 T21 read-only on Antenna 0

#4B101                      Set IT2200 read w/Gen Ack on Antenna 1  
#DONE

#54B01                      Get IT2200 N on Antenna 1  
#IT2200 A1 N1            IT2200 read w/Gen Ack

### **See Also**

#4B[AP] SECONDARY TAG SEQUENCES

## **#550 DISPLAY SYSTEM CHECK TAG CONTROL PARAMETERS**

This command displays the control parameters for the system check tag.

### ***Format***

#550

### ***Parameters***

There are no parameters associated with this command.

### ***Pre-condition***

The reader must be in command mode.

### ***Post-condition***

This command takes effect immediately.

### ***Default***

This command does not have a default condition.

### ***Response***

#SCTS M<0–1> T<0–F> X<0–1>

where

M0 indicates periodic test mode disabled

M1 indicates periodic test mode enabled

T0 is a repetitive time interval of 30 seconds

T1 is a repetitive time interval of 2 minutes

T2 is a repetitive time interval of 4 minutes

T3 is a repetitive time interval of 8 minutes

T4 is a repetitive time interval of 15 minutes

T5 is a repetitive time interval of 30 minutes

T6 is a repetitive time interval of 1 hour

T7 is a repetitive time interval of 2 hours

T8 is a repetitive time interval of 4 hours

T9 is a repetitive time interval of 8 hours

X0 indicates eGo, SeGo, or ATA check tag modes

X1 indicates Title 21 or IT2200 check tag modes

### ***See Also***

#810 DISABLE SYSTEM CHECK TAG PERIODIC MODE

#813YX SET SYSTEM CHECK TAG PERIODIC TIME INTERVAL



## #560 DISPLAY SENSOR STATUS CHANGE MODE

This command displays the sensor status change feature status.

### **Format**

#560

### **Parameters**

There are no parameters associated with this command.

### **Pre-condition**

The reader must be in command mode.

### **Post-condition**

This command takes effect immediately.

### **Default**

This command does not have a default condition.

### **Response**

#SSTC E<0-1> M<0-F>

where

E0 indicates sensor status change status disabled

E1 indicates sensor status change status enabled

MN indicates value of mask for inputs enabled (see table)

|    | Input Port |   |   |   |
|----|------------|---|---|---|
|    | 0          | 1 | 2 | 3 |
| M0 | –          | – | – | – |
| M1 | X          | – | – | – |
| M2 | –          | X | – | – |
| M3 | X          | X | – | – |
| M4 | –          | – | X | – |
| M5 | X          | – | X | – |
| M6 | –          | X | X | – |
| M7 | X          | X | X | – |
| M8 | –          | – | – | X |
| M9 | X          | – | – | X |

|                       | Input Port |   |   |   |
|-----------------------|------------|---|---|---|
|                       | 0          | 1 | 2 | 3 |
| MA                    | –          | X | – | X |
| MB                    | X          | X | – | X |
| MC                    | –          | – | X | X |
| MD                    | X          | – | X | X |
| ME                    | –          | X | X | X |
| MF                    | X          | X | X | X |
| where X = on, – = off |            |   |   |   |

**See Also**

#82X SET SENSOR STATUS CHANGE MODE

## **#561 DISPLAY LINE LOSS**

This command displays the coaxial cable line loss between the Encompass Reader and the antenna.

### ***Format***

#561

### ***Parameters***

There are no parameters associated with this command.

### ***Pre-condition***

The reader must be in command mode.

### ***Post-condition***

This command takes effect immediately.

### ***Default***

This command does not have a default condition.

### ***Response***

#LINE LOSS N

where

N

0 dB

1 dB

2 dB

3 dB

### ***See Also***

#960N SET LINE LOSS

## **#565 DISPLAY TAG MODE SETTING**

This command displays the Encompass Reader tag mode.

### ***Format***

#565

### ***Parameters***

There are no parameters associated with this command.

### ***Pre-condition***

The reader must be in command mode.

### ***Post-condition***

This command takes effect immediately.

### ***Default***

This command does not have a default condition.

### ***Response***

|        |                    |
|--------|--------------------|
| #56500 | Stop Mode (RF off) |
| #56588 | Mode 88            |

### ***See Also***

#47NN SELECT TAG TYPE MODE

## #566 DISPLAY PROTOCOLS

This command displays the current tag mode.

### ***Format***

#566

### Parameters

There are no parameters associated with this command.

### ***Pre-condition***

The reader must be in command mode.

### ***Post-condition***

This command takes effect immediately.

**Default**

This command does not have a default condition.

## Response

#566NNNN

where

NNNN parameter specifies the tag read mode. This parameter must be converted to binary to yield the protocol enable bits.

Range NNNN Hex: 0000–03FF Hex

(0000 0000 0000 0000–0000 0011 1111 1111 binary)

[illegible]

10 bits are used, 16 are allocated

The first 4 bits are reserved (Rsvd) as indicated by 0, where X specifies an enabled bit.

### Example

|         |     |      |      |      |      |                                                   |
|---------|-----|------|------|------|------|---------------------------------------------------|
| 0000HEX | --> | 0000 | 0000 | 0000 | 0000 | binary = No protocols enabled                     |
| 0037HEX | --> | 0000 | 0000 | 0011 | 1111 | binary = eGo, IT2200, Title 21, ATA 1/2, ATA full |
| 0036HEX | --> | 0000 | 0000 | 0011 | 1110 | binary = eGo, IT2200, Title 21, ATA 1/2, ATA full |
| ****    |     |      |      |      |      |                                                   |
| 0FFFHEX | --> | 0000 | 0011 | 1111 | 1111 | binary = All protocols enabled                    |

**See Also**

#4ANNNN SET PROTOCOLS — UNIVERSAL TAG MODE

***Note:** The Encompass Reader skips the reserved fields (indicated by \*\*\*). If the reserved bit is enabled, then the bit field does not change the transaction state machine.*

## **#57N DISPLAY ATTENUATION AND RANGE SETTINGS**

This command displays the attenuation and range settings for a given tag type N.

### **Format**

#57N

### **Pre-condition**

The reader must be in command mode.

### **Post-condition**

This command takes effect immediately.

### **Default**

This command does not have a default condition.

### **Response**

| N | Response                     |
|---|------------------------------|
| 0 | #ITGS D<0-F> U<0-F> R<00-14> |
| 1 | #T21S D<0-F> U<0-F> R<00-14> |
| 2 | #ATAS U<0-F> R<00-14>        |
| 3 | #EGOS D<0-F> U<0-F> R<00-14> |
| 4 | #IAGS D<0-F>                 |
| 5 | #SEGO D<0-F> U<0-F> R<00-14> |
| 6 | #CVISN D<0-F> U<0-F> R<00-F> |
| 7 | #ATA1/2 U<0-F> R<00-14>      |

where

DN downlink attenuation

UN uplink attenuation

RNN range adjust

### **See Also**

#920NDU SET RF ATTENUATION

#921NRR SET RANGE ADJUST

## **#581 DISPLAY FREQUENCY IN MHZ**

This command displays the frequency parameters in MHz.

### **Format**

#581

There are no parameters associated with this command.

### **Pre-condition**

The reader must be in command mode.

### **Post-condition**

This command takes effect immediately.

### **Default**

This command does not have a default condition.

### **Response**

#F UNNN.NN DNNN.NN

where

UNNN.NN            Uplink frequency setting (see UNNN.NN table for settings)

DNNN.NN            Downlink frequency setting (see DNNN.NN table for settings)

| UNNN.NN<br>Frequency (MHz) | UNNN.NN<br>Frequency (MHz) |
|----------------------------|----------------------------|
| U800.00*                   |                            |
| U902.25                    | U915.00                    |
| U902.50                    | U915.25                    |
| U902.75                    | U915.50                    |
| U903.00                    | U915.75                    |
| U903.25                    | U916.00                    |
| U903.50                    | U916.25                    |
| U903.75                    | U916.50                    |
| U910.00                    | U916.75                    |
| U910.25                    | U917.00                    |
| U910.50                    | U917.25                    |
| U910.75                    | U917.50                    |
| U911.00                    | U917.75                    |
| U911.25                    | U918.00                    |



| <b>UNNN.NN<br/>Frequency (MHz)</b>                                                                                                                                                | <b>UNNN.NN<br/>Frequency (MHz)</b> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| U911.50                                                                                                                                                                           | U918.25                            |
| U911.75                                                                                                                                                                           | U918.00                            |
| U912.00                                                                                                                                                                           | U918.50                            |
| U912.25                                                                                                                                                                           | U918.75                            |
| U912.50                                                                                                                                                                           | U919.00                            |
| U912.75                                                                                                                                                                           | U919.25                            |
| U913.00                                                                                                                                                                           | U919.50                            |
| U913.25                                                                                                                                                                           | U919.75                            |
| U913.50                                                                                                                                                                           | U920.25                            |
| U913.75                                                                                                                                                                           | U920.50                            |
| U914.00                                                                                                                                                                           | U920.75                            |
| U914.25                                                                                                                                                                           | U921.00                            |
| U914.50                                                                                                                                                                           | U921.25                            |
| U914.75                                                                                                                                                                           | U921.50                            |
| <b>Note</b> * These frequencies are not in the location and monitoring service band and are not available for use in the United States; these include all 800.00 MHz frequencies. |                                    |

| <b>DNNN.NN<br/>Frequency (MHz)</b> | <b>DNNN.NN<br/>Frequency (MHz)</b> |
|------------------------------------|------------------------------------|
| D870.00*                           |                                    |
| D902.25*                           | D915.00                            |
| D902.50*                           | D915.25                            |
| D902.75*                           | D915.50                            |
| D903.00*                           | D915.75                            |
| D903.25*                           | D916.00                            |
| D903.50*                           | D916.25                            |
| D903.75*                           | D916.50                            |
| D910.00*                           | D916.75                            |

| DNNN.NN<br>Frequency (MHz)                                                                                                                                                       | DNNN.NN<br>Frequency (MHz) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| D910.25*                                                                                                                                                                         | D917.00                    |
| D910.50*                                                                                                                                                                         | D917.25                    |
| D910.75*                                                                                                                                                                         | D917.50                    |
| D911.00*                                                                                                                                                                         | D917.75                    |
| D911.25*                                                                                                                                                                         | D918.00                    |
| D911.50*                                                                                                                                                                         | D918.25                    |
| D911.75*                                                                                                                                                                         | D918.50                    |
| D912.00*                                                                                                                                                                         | D918.75                    |
| D912.25*                                                                                                                                                                         | D919.00*                   |
| D912.50*                                                                                                                                                                         | D919.25*                   |
| D912.75                                                                                                                                                                          | D919.50*                   |
| D913.00                                                                                                                                                                          | D919.75*                   |
| D913.25                                                                                                                                                                          | D920.00*                   |
| D913.50                                                                                                                                                                          | D920.25*                   |
| D913.75                                                                                                                                                                          | D920.50*                   |
| D914.00                                                                                                                                                                          | D920.75*                   |
| D914.25                                                                                                                                                                          | D921.00*                   |
| D914.50                                                                                                                                                                          | D921.25*                   |
| D914.75                                                                                                                                                                          | D921.50*                   |
| <b>Note</b> *These frequencies are not in the location and monitoring service band and are not available for use in the United States; these include all 800.00 MHz frequencies. |                            |

### ***Exceptions***

**Note:** When using eGo/SeGo protocol tags, use downlink frequencies from 911.75 MHz to 919.75 MHz.

**Note:** When using IT2200 and Title 21 protocol tags, use downlink frequencies from 912.75 MHz to 918.75 MHz.

**Note:** When using active tags, such as IAG protocol tags, use downlink frequencies from 914.75 MHz to 916.75 MHz.

### **See Also**

#9CNNNN SET UPLINK RF IN MHZ  
#9FNNNN SET DOWNLINK RF IN MHZ

## **#582 DISPLAY TDM TIME VALUES**

This command displays the TDM time values currently active in the Encompass Reader.

### **Format**

#582

### **Parameters**

There are no parameters associated with this command.

### **Pre-condition**

The reader must be in command mode.

### **Post-condition**

This command takes effect immediately.

### **Default**

This command does not have a default condition.

### **Response**

#TDMT D<NNN> U<NNN> S<NN>

where

D<NNN>            transaction delay, transaction delay time =  $NNN * 50 \mu s$ .

U<NNN>            transaction duration, transaction duration time =  $NNN * 50 \mu s$ .

S<NN>            synchronization rate, where NN = synchronization rate in periods per second. The value range for S is 02 to FF hex. The synchronization rate =  $1/\text{synchronization period}$ .

## **#585 DISPLAY TDM SETTINGS**

This command displays the active TDM settings in the Encompass Reader.

### ***Format***

#585

### ***Parameters***

There are no parameters associated with this command.

### ***Pre-condition***

The reader must be in command mode.

### ***Post-condition***

This command takes effect immediately.

### ***Default***

This command does not have a default condition.

### ***Response***

#TDMS T<0–1> M<0–3> S<0–26>

where

T = TDM is off (0) or TDM is on (1)

M = reader is GPS slave (0), master (1), secondary (2), or GPS primary (3)

S = slave number from 0 to 26

### ***See Also***

#984NYY SET TDM AS MASTER OR SLAVE

## **#587 DISPLAY IAG SLOT NUMBER**

This command displays the IAG slot number.

### ***Format***

#587

### ***Parameters***

There are no parameters associated with this command.

### ***Pre-condition***

The reader must be in command mode.

### ***Post-condition***

This command takes effect immediately.

### ***Default***

This command does not have a default condition.

### ***Response***

#Slot S<1–3>

where

S = 1 to 3

### ***See Also***

#487N SET IAG SLOT NUMBER

## **#590 DISPLAY HANDSHAKE COUNT ON ALL CHANNELS**

This command displays the tag read handshake count for all active RF antenna multiplexer channels.

### ***Format***

#590

### ***Parameters***

There are no parameters associated with this command.

### ***Pre-condition***

The reader must be in command mode.

### ***Post-condition***

This command takes effect immediately.

### ***Default***

This command does not have a default condition.

### ***Response***

#TRHS <00–FF>

### ***See Also***

#440 RESET UNIQUENESS ON ALL CHANNELS

### **#590N DISPLAY HANDSHAKE COUNT PER CHANNEL**

This command displays the tag read handshake count on a per channel basis. Each RF antenna multiplexer channel has a last tag handshake count value.

#### **Format**

#590N

#### **Parameter**

N<0-3>

#### **Pre-condition**

The reader must be in command mode.

#### **Post-condition**

This command takes effect immediately.

#### **Default**

This command does not have a default condition.

#### **Response**

| N | Response      |
|---|---------------|
| 0 | #TRHS <00-FF> |
| 1 | #TRHS <00-FF> |
| 2 | #TRHS <00-FF> |
| 3 | #TRHS <00-FF> |

#### **See Also**

#440N RESET UNIQUENESS PER CHANNEL

#642N RF ANTENNA MULTIPLEXER MODE



## **#594P DISPLAY UPLINK SOURCE CONTROL PER PROTOCOL**

This command displays the uplink source on the transceiver board per protocol.

### **Format**

#594P

### **Parameters**

|   |                |
|---|----------------|
| P | Tag Protocol   |
| 0 | IT2200         |
| 1 | Title 21       |
| 2 | ATA full-frame |
| 3 | eGo            |
| 4 | IAG            |
| 5 | SeGo           |
| 6 | CVISN          |
| 7 | ATA half-frame |

### **Pre-condition**

The reader must be in command mode.

### **Post-condition**

This command takes effect immediately

### **Default**

There is no default setting.

### **Response**

|   |                 |
|---|-----------------|
| P | Tag Protocol    |
| 0 | #ITG S<0-1>     |
| 1 | #T21 S<0-1>     |
| 2 | #ATA S<0-1>     |
| 3 | #EGO S<0-1>     |
| 4 | #IAG S<0-1>     |
| 5 | #SEGO S<0-1>    |
| 6 | #CVISN S<0-1>   |
| 7 | #ATA 1/2 S<0-1> |

where

|   |                                |
|---|--------------------------------|
| S | Uplink Source                  |
| 0 | Use Uplink Source (Source 2)   |
| 1 | Use Downlink Source (Source 1) |

### **See Also**

#94PS SET UPLINK SOURCE CONTROL

### **#597 DISPLAY OPTO PORT(S) DIRECTION**

This command displays the OPTO port(s) direction as either input or output.

#### **Format**

#597

#### **Parameter**

N<0-F>

#### **Pre-condition**

There is no pre-condition for this command.

#### **Post-condition**

This command takes effect immediately.

#### **Default**

This command does not have a default condition.

#### **Response**

#OPTO DN

where N = range from 0–F

| N | Port |   |   |   |
|---|------|---|---|---|
|   | 0    | 1 | 2 | 3 |
| 0 | I    | I | I | I |
| 1 | O    | I | I | I |
| 2 | I    | O | I | I |
| 3 | O    | O | I | I |
| 4 | I    | I | O | I |
| 5 | O    | I | O | I |
| 6 | I    | O | O | I |
| 7 | O    | O | O | I |
| 8 | I    | I | I | O |
| 9 | O    | I | I | O |
| A | I    | O | I | O |

| N                           | Port |   |   |   |
|-----------------------------|------|---|---|---|
|                             | 0    | 1 | 2 | 3 |
| B                           | O    | O | I | O |
| C                           | I    | I | O | O |
| D                           | O    | I | O | O |
| E                           | I    | O | O | O |
| F                           | O    | O | O | O |
| where I = input, O = output |      |   |   |   |

**See Also**

#697N SET OPTO PORT(S) DIRECTION

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## **Command Group 6 – Reader Control Functions**

Command Group 6 commands set such reader control functions as output control, RF control, and ECP.

***Note:** Unless otherwise indicated, Group 6 commands return #DONE or #ERROR.*

### **#60NN SET READER ID NUMBER**

This command assigns an ID number (NN) to the reader. This number can be displayed by using the #521 DISPLAY READER ID NUMBER command. See #31N APPEND AUXILIARY INFORMATION SELECTION commands.

#### **Format**

#60NN

#### **Parameters**

Values for NN are hexadecimal entries of 00 through FF.

#### **Pre-condition**

The reader must be in command mode. The previously set or default reader number must be in effect.

#### **Post-condition**

The reader number is stored and is preserved in case of power outages.

This command takes effect immediately.

#### **Default**

The factory value is N = 00.

#### **Response**

|        |                 |
|--------|-----------------|
| #DONE  | Valid setting   |
| #ERROR | Invalid setting |

#### **See Also**

#521 DISPLAY READER ID NUMBER

#31N APPEND AUXILIARY INFORMATION SELECTION

## **#61N SELECT COMMUNICATION PROTOCOL**

This command selects between the two communication protocol options: basic or ECP.

### **Format**

#61N

### **Parameters**

| Command | Function                     |
|---------|------------------------------|
| #610    | Enables basic protocol       |
| #611    | Selects AI1200-emulation ECP |

### **Pre-condition**

The reader must be in command mode. The message buffer must be empty prior to changing communications protocol. Allow the buffer to empty or issue #63 RESET READER command to empty the buffer.

### **Post-condition**

This command takes effect immediately.

### **Default**

|      |                        |
|------|------------------------|
| #610 | Enables basic protocol |
|------|------------------------|

### **Response**

|        |                 |
|--------|-----------------|
| #DONE  | Valid Setting   |
| #ERROR | Invalid Setting |

### **See Also**

#525 ENQUIRE COMMUNICATION PROTOCOL STATUS

## **#612NN SET ERROR CORRECTING PROTOCOL TIME-OUT**

This command sets time-out interval for ECP. The time-out value applies to both transmission and receipt of serial data over the COM1 communications port. The time-out on transmission is initiated immediately following the transmission of the last character of a message (<com>). The time-out on receipt is initiated immediately after the <som> character is received.

### **Format**

#612NN

### **Parameters**

Values for ECP are NN with a range of 03 to FE.

If NN = FF, then the time-out is disabled. The time-out value in ms is approximated by the following formula:

Time-out (ms) = 50 \* nn

### **Pre-condition**

The reader must be in command mode. Unless the timer is already operating, this command will take effect after the next timer reset.

### **Post-condition**

This command takes effect immediately.

### **Default**

#612FE, the default interval is 12.7 seconds, NN = FE hex

### **Response**

|        |                 |
|--------|-----------------|
| #DONE  | Valid setting   |
| #ERROR | Invalid setting |

### **See Also**

#525 ENQUIRE COMMUNICATION PROTOCOL STATUS

## #614N FLOW CONTROL SETTINGS

This command controls the flow control settings for reader-to-host communications.

Software Flow Control: XON/XOFF, where

XOFF

CTRL-S: host character used to stop reader transmission

ASCII symbol DC3

Hex 13, Decimal 19

XON

CTRL-Q: host character used to resume reader transmission

ASCII symbol DC1

Hex 11, Decimal 17

Hardware Flow Control: The reader controls the ready to send (RTS) line and monitors the readiness of the host device via the clear to send (CTS) line. When the CTS line switches to false, the reader will halt transmission within one character.

### **Format**

#614N

### **Parameters**

| Command | Function                                 |
|---------|------------------------------------------|
| #6140   | Disables the flow control                |
| #6141   | Enables software flow control (XON/XOFF) |
| #6142   | Enables hardware flow control (CTS/RTS)  |

### **Pre-condition**

The reader must be in command mode.

### **Post-condition**

*Note:* #63 RESET READER command required for changes to take effect.

### **Default**

#6140            Flow control disabled

### **Response**

#DONE            Valid setting

#ERROR           Invalid setting

### **See Also**

#525 ENQUIRE COMMUNICATION PROTOCOL STATUS

## #616N BUFFER CONTROL MODE SETTINGS

Buffer control mode (BCM) is an ECP option that prevents unsolicited (asynchronous) reader transmissions.

If the **buffer control is disabled**, then the reader transmits data to the host as soon as the data is acquired. The host must acknowledge the data according to the ECP acknowledgment/negative acknowledgment (Ack/Nak) protocol. If the **buffer control is enabled**, then the host must request messages from the reader using the #06 TRANSMIT BUFFER ENTRY command. The **exception** to this rule occurs on startup when the reader transmits its two-line sign-on message asynchronously. When in BCM, the reader remains in command mode. If the reader receives a #00 SWITCH TO DATA MODE request, then the reader responds with #ERROR. To exit BCM, send #6160 DISABLE BUFFER CONTROL MODE.

The reader returns an error message if it receives #06 when BCM is not enabled. If buffer control is enabled, the reader does not support ECP Ack or Nak messages from the host. Since all messages are transmitted in response to a host command, acknowledgment from the host is not required. Instead, the ECP sequence numbers are used to ensure data integrity. If the host receives an erroneous reader message, it should retransmit #06, TRANSMIT BUFFER ENTRY, with the same sequence number. This causes the reader to search and replace its previous message. If buffer control is enabled, the reader will not use the time-out to trigger re-transmission of data because in BCM, reader data is transmitted only when requested by the host.

| Number      | Command Description                                                      | Message                   |
|-------------|--------------------------------------------------------------------------|---------------------------|
| 06          | Transmit buffer entry                                                    | Done, error, or <message> |
| 535         | Display buffer control status where<br>x = 0 for disabled, 1 for enabled | BCM x                     |
| <b>6160</b> | Disable BCM (default)                                                    | Done                      |
| 6161        | Enable BCM                                                               | Done                      |

### **Format**

#616N

### **Parameters**

#6160            Disable Buffer Control Mode  
#6161            Enable Buffer Control Mode

### **Pre-condition**

The reader must be in ECP mode. The reader must be in command mode.

### **Post-condition**

This command takes effect immediately.



***Default***

#6160 Disable Buffer Control Mode

***Response***

|        |                 |
|--------|-----------------|
| #DONE  | Valid setting   |
| #ERROR | Invalid setting |

***See Also***

#06 TRANSMIT BUFFER ENTRY

#525 ENQUIRE COMMUNICATION PROTOCOL STATUS

#535 DISPLAY BUFFER CONTROL STATUS

## **#617N ECHO SETTINGS**

This command controls whether or not the reader echoes received host commands. If echo is enabled, then as the reader receives a host command, it echoes each character of the command. Once the entire command has been received and processed, the reader transmits its response. If echoing is disabled, the reader will not echo the command but only transmits its response. The reader never echoes while in ECP operation.

### **Format**

#617N

### **Parameters**

| Command | Function     |
|---------|--------------|
| #6170   | Disable Echo |
| #6171   | Enable Echo  |

### **Pre-condition**

The reader must be in command mode.

### **Post-condition**

This command takes effect immediately.

### **Default**

#6171            Enable echo

### **Response**

#DONE

### **See Also**

*Note: There is no associated Get command.*

## #620N SET OUTPUT CONTROL

This command sets any of the reader's four output OPTO 22 circuits either on or off. These commands are for the host computer to control external hardware, such as gates or traffic lights.

### Format

#620N

### Parameters

| Command               | Outputs |   |   |   |
|-----------------------|---------|---|---|---|
| #620N                 | 0       | 1 | 2 | 3 |
| #6200                 | –       | – | – | – |
| #6201                 | X       | – | – | – |
| #6202                 | –       | X | – | – |
| #6203                 | X       | X | – | – |
| #6204                 | –       | – | X | – |
| #6205                 | X       | – | X | – |
| #6206                 | –       | X | X | – |
| #6207                 | X       | X | X | – |
| #6208                 | –       | – | – | X |
| #6209                 | X       | – | – | X |
| #620A                 | –       | X | – | X |
| #620B                 | X       | X | – | X |
| #620C                 | –       | – | X | X |
| #620D                 | X       | – | X | X |
| #620E                 | –       | X | X | X |
| #620F                 | X       | X | X | X |
| where X = on, – = off |         |   |   |   |

### Pre-condition

The reader must be in command mode. Ports must be configured as outputs and have the supporting OPTO 22 output hardware.

***Post-condition***

This command takes effect immediately. Command execution disables #621 SET PREDEFINED OUTPUT CONTROL. These commands are stored only in volatile memory. After a power outage or reader reset, all output status modules return to an off position.

***Note:*** #63 RESET READER command required for changes to take effect.

***Default***

#6200 is the default condition.

***Response***

|        |                 |
|--------|-----------------|
| #DONE  | Valid setting   |
| #ERROR | Invalid setting |

***See Also***

#526 DISPLAY I/O STATUS  
#597 DISPLAY OPTO PORT(S) DIRECTION  
#62N SET PREDEFINED OUTPUT CONTROL

## **#62N SET PREDEFINED OUTPUT CONTROL**

This command configures the reader to activate outputs when tag reads occur under a variety of input/output (I/O) configurations and antenna multiplexing options.

### **Format**

#62N

### **Parameters**

| <b>N</b> | <b>Function</b>                      |
|----------|--------------------------------------|
| 1        | Activate all available outputs       |
| 2        | Activate outputs per antenna channel |

### **Pre-condition**

Outputs are activated for the allotted time defined by the #67NP SET OUTPUT PULSE DURATION commands.

#621 Configure I/Os according to the system requirements  
All outputs fire upon a tag read.

#622 Activate outputs per antenna channel

#6411 RF on is in effect (configure outputs with #697N command)

Single-channel read occurs  $\Rightarrow$  Output 0 activated

All #642N Antenna Multiplex Modes

Read occurs on Antenna 0  $\Rightarrow$  Output 0 activated

Read occurs on Antenna 1  $\Rightarrow$  Output 1 activated

Read occurs on Antenna 2  $\Rightarrow$  Output 2 activated

Read occurs on Antenna 3  $\Rightarrow$  Output 3 activated

#6410 RF by Sensor is in effect

#6420/#6421 Single-channel Mode

#6974, #6976, #697C, #697E SET OPTO PORT(S) DIRECTION allowed

(Ports 0 1 2 3: I X 0 X)

Input 0 controls RF

Read Occurs  $\Rightarrow$  Output 2 activated

#6423 Two-Channel Mode (antenna channels 0 and 1)

#697C SET OPTO PORT(S) DIRECTION (Ports 0 1 2 3 = I I O O)

Input 0 controls RF for Antenna 0

Input 1 controls RF for Antenna 1

Read Occurs on Antenna 0  $\Rightarrow$  Output 2 activated

Read Occurs on Antenna 1  $\Rightarrow$  Output 3 activated

#642C Two Channel Mode (antenna channels 2 and 3)

#6973 SET OPTO PORT(S) DIRECTION (Ports 0 1 2 3 = O O I I)

Input 2 controls RF for Antenna 2

Input 3 controls RF for Antenna 3

Read Occurs on Antenna 2  $\Rightarrow$  Output 0 activated

Read Occurs on Antenna 3  $\Rightarrow$  Output 1 activated

#6427 Three-Channel Mode (antenna channels 0, 1, and 2)

#6978 SET OPTO PORT(S) DIRECTION (ports 0 1 2 3 = I I I O)

Input 0 controls RF for Antenna 0

Input 1 controls RF for Antenna 1

Input 2 controls RF for Antenna 2

Read Occurs on any antenna  $\Rightarrow$  output 3 activated

#642F Four-Channel Mode (Antenna Channels 0, 1, 2, and 3)

(Ports 0 1 2 3 = I I I I)

#6970 No outputs available

### **Post-condition**

This command takes effect immediately.

Outputs are ready to be activated on a valid tag read.

### **Default**

There is no default setting for this command.

### **Response**

#DONE Valid setting

#ERROR Invalid setting

### **See Also**

#526 DISPLAY I/O STATUS

#620N SET OUTPUT CONTROL

#642N RF ANTENNA MULTIPLEXER MODE

#67NP SET OUTPUT PULSE DURATION

#697N SET OPTO PORT(S) DIRECTION

## #63 RESET READER

This command performs a software reset of the reader.

### **Format**

#63

### **Parameters**

There are no parameters associated with this command.

### **Pre-condition**

Not applicable

### **Post-condition**

This command takes effect immediately.

All volatile settings return to the last programmed state prior to reset, except for the power outage bit that is reset to 0.



### **Caution**

*All buffered data are lost when this command is executed.*

- Retains nonvolatile settings
- Clears unacknowledged tag and report data
- Sets output status modules to off
- Reader responds with sign-on message:

#Model E5 AI1200 Ver X.XX SNXXXXXXX

#Copyright 200X, TransCore, Inc.

where

Line 1 lists the current version of the microcontroller firmware and reader-assigned serial number (SN). The SN is a 1 to 7 digit decimal value (0 through 9 for each digit) with the first 2 digits representing the year.

Line 2 lists the firmware copyright year and the TransCore name.

### **Default**

#00 DATA MODE is the default mode coming out of reset following the sign on message.

### **Response**

#Model E5 AI1200 Ver X.XX SNXXXXXXX

#Copyright 200X, TransCore, Inc.

### **See Also**

#505 DISPLAY FIRMWARE VERSION AND SERIAL NUMBER

***Note:*** Refer to the firmware version number when contacting TransCore about the firmware.



## **#640N RF CONTROL**

This command selects the RF channel.

### **Format**

#640N

### **Parameters**

The N variable controls the RF channel selection as follows:

| Command | RF Control                                                      |
|---------|-----------------------------------------------------------------|
| #6400   | RF off for all channels                                         |
| #6401   | RF channel 0 on (automatic antenna multiplexing override)       |
| #6402   | RF channel 1 on (automatic antenna multiplexing override)       |
| #6403   | RF channel 2 on (automatic antenna multiplexing override)       |
| #6404   | RF channel 3 on (automatic antenna multiplexing override)       |
| #6405   | RF on for all channels (restore antenna multiplexing operation) |

### **Pre-condition**

Not applicable

### **Post-condition**

This command takes effect immediately.

Sending command #6401, #6402, #6403, or #6404 immediately overrides the current antenna multiplexing commands #6420 through #6423. Sending #6405 disables the manual antenna channel control and enables the previously set #642x command.

When set in #6410, #6405 restores the previously set #642X command. When #6411 is invoked, #6405 RF on is invoked.

### **Default**

**#6400** RF off for all channels

### **Response**

#DONE Valid setting

#ERROR Invalid setting

### **See Also**

#31N APPEND AUXILIARY INFORMATION SELECTION

#527 DISPLAY RF STATUS

#641N RF MODE CONTROL

*Note: RF channels are never on simultaneously.*

## **#641N RF MODE CONTROL**

This command sets the RF mode control type to 0 for RF by sensor or 1 for RF on continuously.

### **Set RF by Sensor**

A sensor is a device installed in the lane that detects whether or not a vehicle is present in the lane; vehicle present equals presence detected. Any given sensor must be capable of asserting a voltage or current signal that can be interfaced to an OPTO 22 input module. Some sensor examples are

- Detection loops
- Light curtains
- Treadles
- Laser scanners

### **Format**

#641N

### **Parameters**

N, with a range of 0-1

|              |                        |
|--------------|------------------------|
| <b>#6410</b> | Set RF by sensor       |
| <b>#6411</b> | Set RF on continuously |

### **Pre-condition**

A #47XX tag mode also must be enabled.

For #6410:

RF is controlled according to the algorithm set under the Presence RF control selection, which is determined by the #692N SELECT PRESENCE RF CONTROL ALGORITHM commands.

### **Post-condition**

#4700 STOP MODE switches RF off.

Sending #47NN SELECT TAG TYPE MODE switches RF on if #6411 has already been sent.

*Note: #63 RESET READER command required for changes to take effect.*

### **Default**

**#6410**

### **Response**

|        |                 |
|--------|-----------------|
| #DONE  | Valid setting   |
| #ERROR | Invalid setting |

**See Also**

#527 DISPLAY RF STATUS

#529 DISPLAY PRESENCE DETECTOR STATUS

#642N RF ANTENNA MULTIPLEXER MODE

#690N SENSOR INPUT REPORTS

#691N SET MINIMUM PRESENCE TRUE PERIOD

#692N SELECT PRESENCE RF CONTROL ALGORITHM

#693N SELECT PRESENCE RF CONTROL TIME-OUT PERIOD

#694N SELECT SENSE INPUT INVERSION

#697N SET OPTO PORT(S) DIRECTION

## #642N RF ANTENNA MULTIPLEXER MODE

This command selects the RF antenna multiplexer modes.

**Single Channel:** No antenna multiplexer required

**Single Channel:** Antenna synchronization compatible.

**Two Channel:** The antenna multiplexer cycles between two antennas continuously at a 50% duty cycle for each antenna port.

**Three Channel:** The antenna multiplexer cycles between three antennas continuously at a 33% duty cycle for each antenna port.

**Four Channel:** The antenna multiplexer cycles between four antennas continuously at a 25% duty cycle for each antenna port.

### Format

#642N

### Parameters

N ranges from 0 to F and is restricted to {0, 1, 3, 7, C, F}

| Command<br>#642N | 3 | 2 | 1 | 0 | Multiplexing Mode                                                    |
|------------------|---|---|---|---|----------------------------------------------------------------------|
| #6420            | – | – | – | – | Single-Channel Mode (no multiplexing, switch on TDM synchronization) |
| #6421            | – | – | – | X | Single-Channel Mode (antenna synchronization compatible, slot-based) |
| #6423            | – | – | X | X | Two-Channel Mode (antenna channels 0 and 1)                          |
| #642C            | X | X | – | – | Two-Channel Mode (antenna channels 2 and 3)                          |
| #6427            | – | X | X | X | Three-Channel Mode (antenna channels 0, 1, and 2)                    |
| #642F            | X | X | X | X | Four-Channel Mode (antenna channels 0, 1, 2, and 3)                  |

### Pre-condition

#6410 SET RF BY SENSOR

If the reader is configured to #6410 SET RF BY SENSOR, then the number of input ports must match the number of antenna channels being used.

#### Input Port Setup

##### Single Channel

#6420: Configure OPTO 22 port 0 to input by sending #697E SET OPTO PORT(S) DIRECTION.

##### Single Channel

#6421: Configure OPTO 22 port 0 to input by sending #697E SET OPTO PORT(S) DIRECTION.

### Two Channel

#6423: Configure OPTO 22 ports 0 and 1 to inputs by sending #697C SET OPTO PORT(S) DIRECTION.

#642C: Configure OPTO 22 ports 2 and 3 to inputs by sending #6973 SET OPTO PORT(S) DIRECTION.

### Three Channel

#6427: Configure OPTO 22 ports 0, 1, and 2 to inputs by sending #6978 SET OPTO PORT(S) DIRECTION.

### Four Channel

#642F: Configure OPTO 22 ports 0, 1, 2, and 3 to inputs by sending #6970 SET OPTO PORT(S) DIRECTION.

After OPTO 22s are configured:

RF switches on for Antenna Port 0 if Input 0 is true (single-, two-, three-, and four-channel modes)

RF switches on for Antenna Port 1 if Input 1 is true (two-, three-, and four-channel modes)

RF switches on for Antenna Port 2 if Input 2 is true (three- and four-channel modes)

RF switches on for Antenna Port 3 if Input 3 is true (four-channel mode)

If reader is configured to #6411 SET RF ON, then RF remains on as antennas are cycled for all modes.

### **Post-condition**

Single channel mode to multiplexing mode.

*Note: This command takes effect immediately.*

### **Default**

#6420 Single-Channel Mode

### **Response**

|        |                 |
|--------|-----------------|
| #DONE  | Valid setting   |
| #ERROR | Invalid setting |

### **See Also**

#31N APPEND AUXILIARY INFORMATION SELECTION

#527 DISPLAY RF STATUS

#641N RF MODE CONTROL

#691N SET MINIMUM PRESENCE TRUE PERIOD

#692N SELECT PRESENCE RF CONTROL ALGORITHM

#693N SELECT PRESENCE RF CONTROL TIME-OUT PERIOD

#694N SELECT SENSE INPUT INVERSION

#697N SET OPTO PORT(S) DIRECTION

## **#65 RESET POWER OUTAGE BIT**

This command resets the power outage counter bit to zero. The bit changes from 0 to 1 when reader power is restored. On reader power-up, either #65 RESET POWER OUTAGE BIT or #63 RESET READER must be executed to properly initialize this bit. To display the status of the power outage bit, use the #520 DISPLAY POWER OUTAGE AND RESTORE BITS command.

### ***Format***

#65

### ***Parameters***

There are no parameters associated with this command.

### ***Pre-condition***

Not applicable

### ***Post-condition***

This command takes effect immediately.

### ***Default***

This command does not have a default condition.

### ***Response***

#DONE

### ***See Also***

#520 DISPLAY POWER OUTAGE AND RESTORE BITS

#63 RESET READER

## **#66F LOAD DEFAULT OPERATING PARAMETERS**

This command restores the reader to factory defaults.

### **Format**

#66F

### **Parameters**

There are no parameters associated with this command.

### **Pre-condition**

Not applicable

### **Post-condition**

Factory defaults are restored following a reset.

***Note:** This command resets the A11200 tag buffer.*

Basic mode:

#63 RESET READER command required for changes to take effect.

ECP mode:

The system switches to basic mode immediately following a

#<odd seq num>66F<CRC> command.

Therefore, a #63 RESET READER command without the <seq nums> and <CRC> is required.

### **Default**

This command does not have a default condition.

### **Response**

#DONE

### **See Also**

#63 RESET READER

## #67NP SET OUTPUT PULSE DURATION

This command sets the output pulse duration for the #62N SET PREDEFINED OUTPUT CONTROL command. The variable N has a value from 0 to F and ranges from 4 to 752 ms, and P is the port to activate (0 through 3):

### Format

#67NP

### Parameters

N: pulse duration, range of 0–F (4 to 752 ms)

P: output port, range of 0–3

| Command      | Time (ms)  |
|--------------|------------|
| #670P        | 4          |
| #671P        | 8          |
| #672P        | 12         |
| #673P        | 16         |
| #674P        | 20         |
| #675P        | 24         |
| #676P        | 32         |
| #677P        | 40         |
| #678P        | 48         |
| #679P        | 60         |
| #67AP        | 76         |
| #67BP        | 152        |
| #67CP        | 228        |
| <b>#67DP</b> | <b>300</b> |
| #67EP        | 376        |
| #67FP        | 752        |

### Pre-condition

Command #62N is in effect. Output modules installed on the OPTO 22 board are matched to the #697N SET OPTO PORT(S) DIRECTION command.

***Note:** This command should be used with discretion. When the tag acquisition interval is short compared to the programmed pulse period, distinct pulses cannot be generated. The durations indicated apply to minimum energized and de-energized*



*periods. For example, the command #67FP (752 ms) provides a 752-ms energized period and a 752-ms de-energized period.*

### **Post-condition**

Additional IDs can be acquired either during the energized period or de-energized period; however, the timing is restarted upon each successive ID acquisition.

This command takes effect immediately.

### **Default**

#67DP                      300

### **Response**

|        |                 |
|--------|-----------------|
| #DONE  | Valid setting   |
| #ERROR | Invalid setting |

### **See Also**

#526 DISPLAY I/O STATUS  
#597 DISPLAY OPTO PORT(S) DIRECTION  
#62N SET PREDEFINED OUTPUT CONTROL  
#697N SET OPTO PORT(S) DIRECTION

## **#690N SENSOR INPUT REPORTS**

Enabling #690N SENSOR INPUT REPORTS causes the reader to send a report when sensor input presence true conditions are satisfied, but tag ID acquisition does not occur. This command is useful for reporting the passage of untagged vehicles.

The format of the report is as follows:

#SENSOR INPUT REPORT <&time date><%aux>

where <&time date> is optionally appended time or time and date  
<%aux> is optionally appended auxiliary information.

There is one space between SENSOR INPUT REPORT and any optionally appended information.

### **Format**

#690N

### **Parameters**

| Command | Function                     |
|---------|------------------------------|
| #6900   | Disable Sensor Input Reports |
| #6901   | Enable Sensor Input Reports  |

### **Pre-condition**

Not applicable

### **Post-condition**

This command takes effect immediately.

### **Default**

#6900            DISABLE SENSOR INPUT REPORTS

### **Response**

#DONE            Valid setting  
#ERROR           Invalid setting

### **See Also**

#30N APPEND TIME AND DATE SELECTION  
#31N APPEND AUXILIARY INFORMATION SELECTION  
#526 DISPLAY I/O STATUS  
#529 DISPLAY PRESENCE DETECTOR STATUS  
#597 DISPLAY OPTO PORT(S) DIRECTION  
#641N RF MODE CONTROL  
#691N SET MINIMUM PRESENCE TRUE PERIOD  
#697N SET OPTO PORT(S) DIRECTION

### **#691N SET MINIMUM PRESENCE TRUE PERIOD**

This command sets the presence sensor minimum true time. The hardware debounces the presence signal for the time period (ms), which corresponds to the command setting. For example, #6916 = 32 ms, prior to applying the true criteria. An additional debounce period, determined by the command setting, is applied to the presence signal transition to no presence.

#### **Format**

#691N

#### **Parameters**

N = range 0 to F [0 ms (always true) to infinite (never true)]

N determines the minimum time (presence true period) that an input must be asserted to be a valid presence true.

| Command      | True Period (ms)      |
|--------------|-----------------------|
| #6910        | 0 (always true)       |
| #6911        | 4                     |
| #6912        | 8                     |
| #6913        | 12                    |
| #6914        | 20                    |
| #6915        | 24                    |
| <b>#6916</b> | 32                    |
| #6917        | 48                    |
| #6918        | 60                    |
| #6919        | 92                    |
| #691A        | 152                   |
| #691B        | 300                   |
| #691C        | 452                   |
| #691D        | 600                   |
| #691E        | 752                   |
| #691F        | infinite (never true) |

#### **Pre-condition**

Inputs require debouncing. TransCore recommends using the default (**#6916**).

#### **Post-condition**

This command takes effect immediately.

***Default***

**#6916**            32 ms

***Response***

Not applicable

***See Also***

#527 DISPLAY RF STATUS

#529 DISPLAY PRESENCE DETECTOR STATUS

#597 DISPLAY OPTO PORT(S) DIRECTION

#641N RF MODE CONTROL

#692N SELECT PRESENCE RF CONTROL ALGORITHM

#693N SELECT PRESENCE RF CONTROL TIME-OUT PERIOD

#697N SET OPTO PORT(S) DIRECTION

## **#692N SELECT PRESENCE RF CONTROL ALGORITHM**

This command selects the algorithm for turning RF power off, when the RF power is controlled by sense input modules.

#6920 command: Reader switches off RF power based on the time-out established by the #693N commands.

#6921 command: Reader allows turning off RF power either after the time-out period or the acquisition of a tag ID, whichever occurs first.

#6922 command: Reader switches off RF power either after the time-out period, or when the sense input modules indicate the vehicle has passed, whichever occurs first.

### **Format**

#692N

### **Parameters**

N = range from 0 to 2

| Command | RF Power Off                |
|---------|-----------------------------|
| #6920   | On time-out only            |
| #6921   | Time-out or tag ID acquired |
| #6922   | Time-out or presence false  |

### **Pre-condition**

#6410 SET RF BY SENSOR is in effect.

### **Post-condition**

This command takes effect immediately.

### **Default**

#6922            Time-out or presence false

### **Response**

Not applicable

### **See Also**

#527 DISPLAY RF STATUS

#529 DISPLAY PRESENCE DETECTOR STATUS

#597 DISPLAY OPTO PORT(S) DIRECTION

#641N RF MODE CONTROL

#67NP SET OUTPUT PULSE DURATION

#691N SET MINIMUM PRESENCE TRUE PERIOD

#693N SELECT PRESENCE RF CONTROL TIME-OUT PERIOD

#697N SET OPTO PORT(S) DIRECTION

### **#693N SELECT PRESENCE RF CONTROL TIME-OUT PERIOD**

This command sets the RF Off time-out period used for the #692N SELECT PRESENCE RF CONTROL ALGORITHM.

#### **Format**

#693N

#### **Parameters**

N = range from 0 to F [0 ms (always expired) to infinite (never expires)]

| Command | Time-out (ms)            |
|---------|--------------------------|
| #6930   | 0 (always expired)       |
| #6931   | 20                       |
| #6932   | 32                       |
| #6933   | 60                       |
| #6934   | 92                       |
| #6935   | 152                      |
| #6936   | 300                      |
| #6937   | 452                      |
| #6938   | 600                      |
| #6939   | 752                      |
| #693A   | 1500                     |
| #693B   | 3000                     |
| #693C   | 6000                     |
| #693D   | 12000                    |
| #693E   | 24000                    |
| #693F   | infinite (never expires) |

#### **Pre-condition**

There is no pre-condition for this command.

#### **Post-condition**

*Note:* #63 RESET READER command required for changes to take effect.

#### **Default**

**#693F**                      infinite (never expires)

***Response***

Not applicable

***See Also***

#527 DISPLAY RF STATUS

#529 DISPLAY PRESENCE DETECTOR STATUS

#597 DISPLAY OPTO PORT(S) DIRECTION

#641N RF MODE CONTROL

#691N SET MINIMUM PRESENCE TRUE PERIOD

#692N SELECT PRESENCE RF CONTROL ALGORITHM

#697N SET OPTO PORT(S) DIRECTION

### **#694N SELECT SENSE INPUT INVERSION**

This command selects either energized or de-energized digital I/O modules for the logic true algorithm. This command applies to the inputs as they are directed to the OPTO 22 input modules. All four inputs are configured by this command.

#### **Format**

#694N

#### **Parameters**

N = 0 or 1

| Command | Option                                                           |
|---------|------------------------------------------------------------------|
| #6940   | Energized digital I/O modules for logic true (positive logic)    |
| #6941   | De-energized digital I/O modules for logic true (negative logic) |

#### **Pre-condition**

There is no pre-condition for this command.

#### **Post-condition**

*Note: #63 RESET READER command required for changes to take effect.*

#### **Default**

#6940 Energized digital I/O modules for logic true (positive logic)

#### **Response**

Not applicable

#### **See Also**

#31N APPEND AUXILIARY INFORMATION SELECTION

#526 DISPLAY I/O STATUS

#527 DISPLAY RF STATUS

#529 DISPLAY PRESENCE DETECTOR STATUS

#597 DISPLAY OPTO PORT(S) DIRECTION

#641N RF MODE CONTROL

#691N SET MINIMUM PRESENCE TRUE PERIOD

#692N SELECT PRESENCE RF CONTROL ALGORITHM

#697N SET OPTO PORT(S) DIRECTION



## **#696S...S STORE HARDWARE CONFIGURATION**

This command stores hardware configuration information into reader memory.

### ***Format***

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

696S...S

### ***Parameters***

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

### ***Pre-condition***

There is no pre-condition for this command.

### ***Post-condition***

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

This command takes effect immediately.

### ***Default***

SSSSSSSSSSSSSSSSSSSSSS = 00000000000000000000

### ***Response***

#DONE

### ***See Also***

#506 DISPLAY HARDWARE CONFIGURATION INFORMATION

### **#697N SET OPTO PORT(S) DIRECTION**

This command sets OPTO port(s) to output(s) or input(s).

#### **Format**

#697N

#### **Parameters**

N = range from 0 to F

| Command<br>#697N            | Port |   |   |   |
|-----------------------------|------|---|---|---|
|                             | 0    | 1 | 2 | 3 |
| #6970                       | I    | I | I | I |
| #6971                       | O    | I | I | I |
| #6972                       | I    | O | I | I |
| #6973                       | O    | O | I | I |
| #6974                       | I    | I | O | I |
| #6975                       | O    | I | O | I |
| #6976                       | I    | O | O | I |
| #6977                       | O    | O | O | I |
| #6978                       | I    | I | I | O |
| #6979                       | O    | I | I | O |
| #697A                       | I    | O | I | O |
| #697B                       | O    | O | I | O |
| <b>#697C</b>                | I    | I | O | O |
| #697D                       | O    | I | O | O |
| #697E                       | I    | O | O | O |
| #697F                       | O    | O | O | O |
| where I = input, O = output |      |   |   |   |

#### **Pre-condition**

The appropriate hardware has been installed and matches the selected #697N setting.

**Post-condition**

*Note:* #63 RESET READER command required for changes to take effect.

**Default**

#697C      (11 0 0)

**Response**

Not applicable

**See Also**

#597 DISPLAY OPTO PORT(S) DIRECTION

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## ***Command Group 7 – Search Control Functions***

Group 7 commands are not used at this time.

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## **Command Group8– Auxiliary Reader Control**

Group 8 commands provide control over the reader functions, such as the system check tag. These commands control writing parameters to and restoring parameters from the EEPROM.

***Note:** Unless otherwise indicated, Group 8 commands return #DONE or #ERROR.*

### **#810 DISABLE SYSTEM CHECK TAG PERIODIC MODE**

This command disables the period operation of the system check tag.

#### **Format**

#810

#### **Parameters**

There are no parameters associated with this command.

#### **Pre-condition**

Not applicable

#### **Post-condition**

This command takes effect immediately.

#### **Default**

#810 DISABLE SYSTEM CHECK TAG PERIODIC MODE is the default setting for command #813YX SET SYSTEM CHECK TAG PERIODIC TIME INTERVAL

#### **Response**

|        |                 |
|--------|-----------------|
| #DONE  | Valid setting   |
| #ERROR | Invalid setting |

#### **See Also**

#550 DISPLAY SYSTEM CHECK TAG CONTROL PARAMETERS

## #813YX SET SYSTEM CHECK TAG PERIODIC TIME INTERVAL

This command sets the time interval for the periodic system check tag test and activates the check tag.

### Format

#813YX

### Parameters

Time interval Y = range 0–9 [30 seconds to 8 hours].

| #813YX | Periodic Time Value |
|--------|---------------------|
| #8130X | 30 seconds          |
| #8131X | 2 minutes           |
| #8132X | 4 minutes           |
| #8133X | 8 minutes           |
| #8134X | 15 minutes          |
| #8135X | 30 minutes          |
| #8136X | 1 hour              |
| #8137X | 2 hours             |
| #8138X | 4 hours             |
| #8139X | 8 hours             |

Tag Type X = range 0–3

where

0 = eGo, SeGo, or ATA – periodic

1 = Title 21 or IT2200 – periodic

2 = eGo, SeGo, or ATA – manual

3 = Title 21 or IT2200 – manual

E = enable all protocols – periodic

**F = enable all protocols – manual**

***Note:** Enable all runs the check tag on all of the protocols that have been enabled by the Set Protocols command (#4ANNNN)*

### Pre-condition

Not applicable

### Post-condition

This command takes effect immediately.

***Response***

|        |                 |
|--------|-----------------|
| #DONE  | Valid setting   |
| #ERROR | Invalid setting |

***Note:*** *You can choose only one value for  $X$  at a time.*



**#82X SET SENSOR STATUS CHANGE MODE**

#82X commands are used to enable selected sense input lines. The enabled sense input lines are monitored for any changes in logic states. If a change is detected, the system generates a SENSOR STATUS CHANGE report and treats it as a tag ID. If the auxiliary information option is enabled, the sensor input status field displays the current de-bounced input values.

**Format**

#82X

**Parameters**

X = range 0–F

| Command | Inputs |   |   |   | (feature disabled) |
|---------|--------|---|---|---|--------------------|
| #82X    | 3      | 2 | 1 | 0 |                    |
| #820    | –      | – | – | – |                    |
| #821    | –      | – | – | X |                    |
| #822    | –      | – | X | – |                    |
| #823    | –      | – | X | X |                    |
| #824    | –      | X | – | – |                    |
| #825    | –      | X | – | X |                    |
| #826    | –      | X | X | – |                    |
| #827    | –      | X | X | X |                    |
| #828    | X      | – | – | – |                    |
| #829    | X      | – | – | X |                    |
| #82A    | X      | – | X | – |                    |
| #82B    | X      | – | X | X |                    |
| #82C    | X      | X | – | – |                    |
| #82D    | X      | X | – | X |                    |
| #82E    | X      | X | X | – |                    |
| #82F    | X      | X | X | X |                    |

| Command               | Inputs |
|-----------------------|--------|
| where X = on, – = off |        |

### ***Pre-condition***

The selected input lines are configured as inputs using the #697N command.

### ***Post-condition***

When the selected sense input lines change, a SENSOR STATUS CHANGE report is issued.

This command takes effect immediately.

### ***Default***

**#82X (3 2 1 0)**

**#820** (– – – –) (feature disabled)

### ***Response***

|        |                 |
|--------|-----------------|
| #DONE  | Valid setting   |
| #ERROR | Invalid setting |

### ***See Also***

#560 DISPLAY SENSOR STATUS CHANGE MODE

---

## Command Group 9 – Reader System Configuration

Group 9 commands provide control of reader system configuration, such as RF attenuation and TDM control.

### #920NDU SET RF ATTENUATION

This command sets the uplink and downlink attenuations. Downlink attenuation represents the downlink continuous wave (CW) RF attenuation in 1-dB increments. Uplink attenuation represents the uplink CW RF attenuation in 1-dB increments.

#### Format

#920NDU

#### Parameters

N indicates tag mode  
D indicates downlink attenuation  
U indicates uplink attenuation

where

D = range 0–F [0 dB to 15 dB]  
U = range 0–F [0 dB to 15 dB]

| #920NDU | Tag Type       |
|---------|----------------|
| #9200DU | IT2200         |
| #9201DU | Title 21       |
| #9202DU | ATA Full-Frame |
| #9203DU | eGo            |
| #9204DU | IAG            |
| #9205DU | eGo Plus       |
| #9206DU | CVISN          |
| #9207DU | ATA Half-Frame |

#### Pre-condition

Not applicable

#### Post-condition

This command takes effect immediately.

#### Default

D = 6 dB (06H)  
U = 6 dB (06H)

#### Response

Not applicable

**See Also****#57N DISPLAY ATTENUATION AND RANGE SETTINGS**

**Note:** IAG uplink attenuation is a non-critical variable. However, TransCore recommends that the IAG uplink attenuation be set to the same value as the downlink attenuation. For the IAG protocol, the receive attenuation is set to the same value as the downlink attenuation. The display command returns the value of the IAG receive setting.

## #921NRR SET RANGE ADJUST

This command provides a means to restrict the receiver sensitivity, which helps to control the read zone. Higher values correspond to a smaller read zone.

### Format

#921NRR

### Parameters

N indicates tag mode

RR indicates range

where

N = range of 0–7

RR = range of 00–14 hex (0 dB to 20 dB decimal), except for CVISN, which has a range of 00–F hex (0 dB to 15 dB decimal)

| #921NRR | Tag Type       |
|---------|----------------|
| #9210RR | IT2200         |
| #9211RR | Title 21       |
| #9212RR | ATA Full-Frame |
| #9213RR | eGo            |
| #9214RR | IAG            |
| #9215RR | eGo Plus       |
| #9216RR | CVISN          |
| #9217RR | ATA Half-Frame |

### Pre-condition

Not applicable

### Post-condition

This command takes effect immediately.

### Default

RR = 00 (00dB for all tag types)

### Response

Not applicable

### See Also

#57N DISPLAY ATTENUATION AND RANGE SETTINGS

*Note:* There is no range adjust control for IAG or CVISN tags.

## **#9CNNNN SET UPLINK RF IN MHZ**

This command sets the uplink RF in MHz.

### **Format**

#9CNNNN

### **Parameters**

Frequency settings change in 250-kHz increments. The user can enter any frequency, in 250-kHz increments, preceded by #9C.

NNNN Range: 800.00 to 999.75 MHz

### **Example**

| <b>Command</b> | <b>Uplink Frequency</b> |
|----------------|-------------------------|
| #9C80000       | 800.00 MHz              |
| #9C80025       | 800.25 MHz              |
| #9C80050       | 800.50 MHz              |
| #9C80075       | 800.75 MHz              |
| #9C82100       | 821.00 MHz              |
| #9C82125       | 821.25 MHz              |
| #9C82150       | 821.50 MHz              |
| #9C82175       | 821.75 MHz              |
| #9C90200       | 902.00 MHz              |
| #9C90225       | 902.25 MHz              |
| #9C90250       | 902.50 MHz              |
| #9C90275       | 902.75 MHz              |
| #9C91700       | 917.00 MHz              |
| #9C91725       | 917.25 MHz              |
| #9C91750       | 917.50 MHz              |
| #9C91775       | 917.75 MHz              |
| #9C99900       | 999.00 MHz              |
| #9C99925       | 999.25 MHz              |
| #9C99950       | 999.50 MHz              |
| #9C99975       | 999.75 MHz              |

**Pre-condition**

*Note:* Set the reader to STOP MODE (#4700) before sending this command

*Note:* The reader must be in command mode

**Post-condition**

This command takes effect immediately.

**Default**

**#9C30300**                      903.00 MHz

**Response**

#DONE

**Examples**

#9C80000 = 800.00 MHz frequency

#9C90225 = 902.25 MHz frequency

#ERROR

*Note:* #Error occurs when setting a frequency that is not in the frequency range permitted for the region. For example, setting #9C87000 (870.00 MHz) in North America results in #Error.

**See Also**

#581 DISPLAY FREQUENCY IN MHZ

## **#94PS SET UPLINK SOURCE CONTROL**

This command sets the uplink source on the transceiver board.

### **Format**

#94PS

### **Parameters**

| <b>P</b> | <b>Tag Protocol</b>            |
|----------|--------------------------------|
| 0        | IT2200                         |
| 1        | Title 21                       |
| 2        | ATA full-frame                 |
| 3        | eGo                            |
| 4        | IAG                            |
| 5        | SeGo                           |
| 6        | CVISN                          |
| 7        | ATA half-frame                 |
| <b>S</b> | <b>Uplink Source</b>           |
| 0        | Use Uplink Source (Source 2)   |
| 1        | Use Downlink Source (Source 1) |

### **Pre-condition**

The reader must be in command mode.

### **Post-condition**

*Note: #63 RESET READER command required for changes to take effect.*

### **Default**

There is no default setting.

### **Response**

#DONE = Success

#ERROR = Invalid Parameters

### **See Also**

#594P DISPLAY UPLINK SOURCE CONTROL PER PROTOCOL



## **#9FNNNNN SET DOWNLINK RF IN MHZ**

This command sets the downlink RF in MHz.

### **Format**

#9FNNNNN

### **Parameters**

Frequency settings change in 250-kHz increments. The user can enter any frequency, in 250-kHz increments, preceded by #9F.

NNNNN Range: 800.00 to 999.75 MHz

### **Example:**

| Command         | Downlink Frequency |
|-----------------|--------------------|
| #9F80000        | 800.00 MHz         |
| #9F80025        | 800.25 MHz         |
| #9F80050        | 800.50 MHz         |
| #9F80075        | 800.75 MHz         |
| #9F80100        | 801.00 MHz         |
| #9F80125        | 801.25 MHz         |
| #9F80150        | 801.50 MHz         |
| #9F80175        | 901.75 MHz         |
| #9F90200        | 902.00 MHz         |
| #9F90225        | 902.25 MHz         |
| #9F90250        | 902.50 MHz         |
| #9F90275        | 902.75 MHz         |
| #9F91700        | 917.00 MHz         |
| #9F91725        | 917.25 MHz         |
| #9F91750        | 917.50 MHz         |
| <b>#9F91775</b> | 917.75 MHz         |
| #9F99900        | 999.00 MHz         |
| #9F99925        | 999.25 MHz         |
| #9F999.50       | 999.50 MHz         |
| #9F999.75       | 999.75 MHz         |

**Pre-condition**

***Note:** Set the reader to STOP MODE (#4700) before sending this command*

**Post-condition**

This command takes effect immediately.

**Default**

#9F91775            917.75 MHz

**Response**

#Done

**Examples**

#9F80000 = 800.00 MHz frequency

#9F90225 = 902.25 MHz frequency

**#Error**

***Note:** #Error occurs when setting a frequency that is not in the frequency range permitted for the region. For example, setting #9F87000 (870.00 MHz) in North America results in #Error.*

***Note:** When using eGo/SeGo protocol tags, use downlink frequencies from 911.75 MHz to 919.75 MHz.*

***Note:** When using IT2200 and Title 21 protocol tags, use downlink frequencies from 912.75 MHz to 918.75 MHz.*

***Note:** When using active tags, such as IAG protocol tags, use downlink frequencies from 914.75 MHz to 916.75 MHz.*

**See Also**

#581 DISPLAY FREQUENCY IN MHZ

## **#960N SET LINE LOSS**

This command sets the line loss value to the loss of the coaxial cable between the Encompass Reader and the antenna.

### ***Format***

#960N

### ***Parameters***

N is the line loss in dB.

The range for N is 0 to 3.

### ***Pre-condition***

The line loss has been measured.

### ***Post-condition***

This command takes effect immediately.

### ***Default***

N = 0 dB

### ***Response***

#DONE

### ***See Also***

#561 DISPLAY LINE LOSS

## **#980 TURN TDM OFF**

This command disables the reader TDM function. The TDM function requires that the TDM synchronization interconnect be attached between readers for the readers to operate together.

### ***Format***

#980

### ***Parameters***

There are no parameters associated with this command.

### ***Pre-condition***

Not applicable

### ***Post-condition***

This command takes effect immediately.

### ***Default***

TDM off is the default #98N setting.

### ***Response***

#DONE

### ***See Also***

#585 DISPLAY TDM SETTINGS

## **#984NYY SET TDM AS MASTER OR SLAVE**

This command sets the TDM as master or slave and switches TDM on. The reader can operate as slave or master, or GPS secondary or GPS primary based strictly on the values programmed into each of the readers for the TDM synchronization parameters. If you configure a reader as the master and it receives an external synchronization pulse, the reader generates an error message and the ERR3 LED on the Encompass Reader lights. Similarly, If you configure a reader as a slave and it does not receive an external synchronization pulse prior to the end of its own internal synchronization pulse, the reader generates an error message and the ERR3 LED lights on the Encompass Reader.

### **Format**

#984NYY

### **Parameters**

N is the master/slave designation as follows:

YY is the slave select count and can have a range of values from 0 to 26

| #984NYY | TDM Control   |
|---------|---------------|
| #9840YY | Slave         |
| #9841YY | Master        |
| #9842YY | GPS secondary |
| #9843YY | GPS primary   |

### **Pre-condition**

Only one reader can be set as the master reader on a given TDM group at any given time.

### **Post-condition**

This command takes effect immediately.

### **Default**

#984100                      Master

### **Response**

#DONE

### **See Also**

#585 DISPLAY TDM SETTINGS

Choose one field only, for example, GPS primary, GPS secondary, master, or slave.

**GPS Primary** — This field specifies whether the reader is to be configured as the GPS primary.

| <b>GPS Primary</b> | <b>Definition</b> |
|--------------------|-------------------|
| 0                  | Not GPS Primary   |
| 1                  | GPS Primary       |

*Note: For A11200-emulation command set use #9843YY.*

**GPS Secondary** — This field specifies whether the reader is to be configured as the GPS secondary.

| <b>GPS Secondary</b> | <b>Definition</b> |
|----------------------|-------------------|
| 0                    | Not GPS Secondary |
| 1                    | GPS Secondary     |

*Note: For A11200-emulation command set use #9842YY.*

**Master** — This field specifies whether the reader is to be configured as the master.

| <b>Master</b> | <b>Definition</b> |
|---------------|-------------------|
| 0             | Not Master        |
| 1             | Master            |

*Note: For A11200-emulation command set use #9841YY.*

**Slave** — This field specifies whether the reader is to be configured as the slave.

| <b>Slave</b> | <b>Definition</b> |
|--------------|-------------------|
| 0            | Not Slave         |
| 1            | Slave             |

*Note: For A11200-emulation command set use #9840YY.*

For this example, the sum of the delay and duration period is 19.9 milliseconds, which is less than the synchronization rate of 20 milliseconds. If the sum of the delay and duration periods equals the synchronization rate, unexpected results can occur.

**Slave Select Count** — This field specifies the order that a slave or GPS primary or secondary reader issues a synchronization pulse whenever a given reader within a synchronization group fails to recognize the signal from the preassigned master or whenever a GPS receiver fails to issue a 1-pps signal, respectively. The maximum slave count = 26.

**Scenario 1** — One master,  $n$  slaves. The master has no slave behavior, therefore it is assigned a slave select count of 0. Each slave is assigned an increasingly greater number from 1 to  $n$ . When the master fails, slave 1 becomes the master, and so on.

**Scenario 2** — GPS primary, GPS secondary, N slave readers. When in fault mode (1-pps signal missing), a GPS primary is slave to a GPS secondary and all other slaves and is assigned the last slave select count, n. A GPS secondary takes over when a GPS primary is in fault mode, therefore it is assigned a slave select count of 1. All slaves are assigned increasingly greater numbers from 2 to n+1.

**Scenario 3** — One GPS primary and n slaves. This scenario forces the GPS primary to have no slave behavior by specifying a slave select count of 0. Each slave is an increasingly higher number from 1 to n. When the master fails, slave 1 becomes the master. If slave 1 should fail, slave 2 takes over, and so on (Table 7-4).

**Table 7-4 Reader Slave Count Configuration Table**

| Scenario 1 — One Master, n Slaves                 |               |       |       |       |       |             |
|---------------------------------------------------|---------------|-------|-------|-------|-------|-------------|
| Reader Mode                                       | Master        | Slave | Slave | Slave | Slave | Slave       |
| Slave Select Count                                | 0             | 1     | 2     | ...   | n-1   | n           |
| Scenario 2 — GPS Primary, GPS Secondary, n Slaves |               |       |       |       |       |             |
| Reader Mode                                       | GPS Secondary | Slave | Slave | Slave | Slave | GPS Primary |
| Slave Select Count                                | 1             | 2     | 3     | ...   | n+1   | n+2         |
| Scenario 3 — One GPS Primary, n Slaves            |               |       |       |       |       |             |
| Reader Mode                                       | GPS Primary   | Slave | Slave | Slave | Slave | Slave       |
| Slave Select Count                                | 0             | 1     | 2     | ...   | n-1   | n           |
| n = Total number of slave readers                 |               |       |       |       |       |             |

## ***ASCII Extended Command Set***

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The operation and configuration commands supplement the standard AI1200 Reader protocol used by the Encompass Reader.

#STATUS REPORT E5 STATUS

Description

This command reports the details of the Encompass Reader.

### ***Format***

#STATUS

### ***Parameters***

There are no parameters associated with this command.

### ***Pre-condition***

Not applicable

### ***Post-condition***

This command takes effect immediately.

### ***Default***

This command does not have a default condition.

### ***Response***

The reader responds as follows:

#STATUS T<0-3> P<0-1> R<0-1> C<0-1> O<0-1> B<0-1> E<0-1>

where

T = TDM status

T0 = no fault

T1 = GPS fault

T2 = master-slave fault

T3 = two-master fault

P = power supply status

P0 = no fault

P1 = power supply fault

R = transceiver status

R0 = no fault

R1 = transceiver fault

C = com links

C0 = no fault

C1 = communication fault

O = other error

O0 = no fault

O1 = other fault



B = buffer tags  
    B0 = no tags in buffer  
    B1 = tags in buffer  
E = error log  
    E0 = no data in log  
    E1 = data in log

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## Tag Responses



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## Tag Responses

*This chapter provides tag responses for both User Datagram Protocol (UDP) and AI1200-emulation tag requests.*

### **UDP Tag Responses**

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In general, the tag response is transmitted as the record type code and the tag response data. Response lengths vary depending on the tag response record type. The tag response record type communicates to the host the tag response type that the reader processed.

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#### **UDP Tag Response Field Definitions**

Tag command processing allows the host-Encompass<sup>®</sup> Reader interface to be more understandable and maintainable. All of the interfaces closely parallel the Encompass Reader-to-tag interface. Tag processing responses are listed in [Table 8-1](#).

**Table 8-1 Tag Transaction Record Types**

| Record Type Code | Corresponding Tag Response                       |
|------------------|--------------------------------------------------|
| 3003H            | SeGo Non-Group Select Response                   |
| 3021H            | SeGo Streamlined Read Response                   |
| 3022H            | SeGo Read Verify Page Response                   |
| 3023H            | SeGo ID Word Response (SeGo Group Select Equals) |
| 3024H            | Title 21 Read Response                           |
| 3042H            | Seen Frame Counter Error Report                  |
| 3043H            | Seen Frame Counter Report                        |
| 4000H            | ATA Half-Frame Read Response                     |
| 4001H            | ATA Full-Frame Read Response                     |
| 4021H            | eGo Streamlined Read Response                    |
| 4022H            | eGo Read Verify Page Response                    |
| 4023H            | eGo ID Word Response (eGo Group Select Equals)   |

| Record Type Code | Corresponding Tag Response   |
|------------------|------------------------------|
| 4303H            | IT2000 Read Response         |
| 5014H            | CVISN Read Response          |
| 5026H            | IAG Read Response            |
| 5027H            | IAG Cross-Lane Read Response |
| 7000H            | Reserved                     |

| Streamlined Read Response Data |                   |       |       |       |       |       |       |       | Data Payload |
|--------------------------------|-------------------|-------|-------|-------|-------|-------|-------|-------|--------------|
| Field                          | Bit 7             | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |              |
| Record                         | Record Type (MSB) |       |       |       |       |       |       |       | 30H          |
| Record                         | Record Type (LSB) |       |       |       |       |       |       |       | 21H          |
| Data                           | ID Byte 0         |       |       |       |       |       |       |       | XXH          |
| Data                           | ID Byte 1         |       |       |       |       |       |       |       | XXH          |
| Data                           | ID Byte 2         |       |       |       |       |       |       |       | XXH          |
| Data                           | ID Byte 3         |       |       |       |       |       |       |       | XXH          |
| Data                           | ID Byte 4         |       |       |       |       |       |       |       | XXH          |
| Data                           | ID Byte 5         |       |       |       |       |       |       |       | XXH          |
| Data                           | ID Byte 6         |       |       |       |       |       |       |       | XXH          |
| Data                           | ID Byte 7         |       |       |       |       |       |       |       | XXH          |
| Data                           | Page Data Byte 0  |       |       |       |       |       |       |       | XXH          |
| Data                           | Page Data Byte 1  |       |       |       |       |       |       |       | XXH          |

|         |                  |                |     |
|---------|------------------|----------------|-----|
| Data    | Page Data Byte 2 |                | XXH |
| Data    | Page Data Byte 3 |                | XXH |
| Data    | Page Data Byte 4 |                | XXH |
| Data    | Page Data Byte 5 |                | XXH |
| Data    | Page Data Byte 6 |                | XXH |
| Data    | Page Data Byte 7 |                | XXH |
| CRC     | CRC (MSB)        |                | XXH |
| CRC     | CRC (MSB)        |                | XXH |
| Antenna |                  | Antenna Number | XXH |

SeGo Streamlined Read Response     3021AABBCCDDEEFF0011ABCDEF0123456789A1B5

where

**Note:** Tag Data and CRC are used for parsing and format purposes only. The record types shown contain valid data.

The SeGo ID Word (SeGo Group Select Equals) response is as follows: 3023<Data><CRC>. Table 8-3 lists the response data.

| SeGo ID Word Data Response |                   |       |       |       |       |       |       |       | Data Payload |
|----------------------------|-------------------|-------|-------|-------|-------|-------|-------|-------|--------------|
| Field                      | Bit 7             | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |              |
| Record                     | Record Type (MSB) |       |       |       |       |       |       |       | 30H          |
| Record                     | Record Type (LSB) |       |       |       |       |       |       |       | 23H          |
| Data                       | ID Byte 0         |       |       |       |       |       |       |       | XXH          |

Table 8-3 SeGo ID Word Data Response (3023H)

|         |           |                       |
|---------|-----------|-----------------------|
| Data    | ID Byte 1 | XXH                   |
| Data    | ID Byte 2 | XXH                   |
| Data    | ID Byte 3 | XXH                   |
| Data    | ID Byte 4 | XXH                   |
| Data    | ID Byte 5 | XXH                   |
| Data    | ID Byte 6 | XXH                   |
| Data    | ID Byte 7 | XXH                   |
| CRC     | CRC (MSB) | XXH                   |
| CRC     | CRC (LSB) | XXH                   |
| Antenna |           | Antenna Number<br>0XH |

SeGo ID Word Data – Group Select Example

SeGo ID Word Data Response     3023ABCDEF0123456789A1B5

where

3023     SeGo ID Word Data Record Type, 2 bytes in hex

ABCDEF0123456789     Tag ID, 8 bytes in hex

A1B5     CRC, 2 bytes in hex

*Note: Tag Data and CRC are used for parsing and format purposes only. The record types shown contain valid data.*

Title 21 Read Response

The Title 21 Read Response is as follows: 3024<Data><CRC>. [Table 8-4](#) lists the response data.

Table 8-4 Title 21 Read Response (3024H)

| Title 21 Read Response Data |                   |       |       |       |                         |       |       |       | Data Payload |
|-----------------------------|-------------------|-------|-------|-------|-------------------------|-------|-------|-------|--------------|
| Field                       | Bit 7             | Bit 6 | Bit 5 | Bit 4 | Bit 3                   | Bit 2 | Bit 1 | Bit 0 |              |
| Record                      | Record Type (MSB) |       |       |       |                         |       |       |       | 30H          |
| Record                      | Record Type (LSB) |       |       |       |                         |       |       |       | 24H          |
| Data (MSB)                  | Tag Type (4 bits) |       |       |       | Facility Code (18 bits) |       |       |       | XXH          |

**Table 8-4 Title 21 Read Response (3024H)**

|            |                           |                 |     |
|------------|---------------------------|-----------------|-----|
| Data       | Facility Code             |                 |     |
| Data       | Facility Code             | Internal Tag ID | XXH |
| Data (LSB) | Internal Tag ID (10 bits) |                 | XXH |
| CRC        | CRC                       |                 | XXH |
| CRC        | CRC                       |                 | XXH |
| Antenna    |                           | Antenna Number  | 0XH |

***Note:** A Title 21 response consists of a 0001 record type; however, there is a response code conflict with the Set Mode Command response (0001) in UDP. The Encompass Reader addresses this conflict by replacing the 0001 Title 21 response code with a 3024 response code.*

### **Record Type**

This field identifies the message as a Title 21 Read Response message. This field contains the following value: 3024H - Title 21 Read\_Response.

### **Tag Type**

This four-bit field is used to uniquely differentiate the State of California tags/transponders from those originating in other state agencies. Currently, the tag type value defaults to 0 (California). Values of 1 to 15 are unassigned at this time.

### **Internal Tag ID**

This field contains the Title 21 ID for the responding tag.

### **CRC**

This field contains the standard message CRC. The CRC is calculated for all data beginning with the transaction record type code and includes everything occurring previous to the error detection code field.

### **Facility Code**

This field identifies the agency issuing the tags.

### **Title 21 Read Response Example:**

Title 21 Tag Read Response    30240FCE8E7DD4E400   0   258979   637

where

|          |                            |
|----------|----------------------------|
| 3024     | Title 21 tag response code |
| 0FCE8E7D | 32-bit tag ID              |



|   |        |      |                                         |
|---|--------|------|-----------------------------------------|
|   |        | D4E4 | CRC                                     |
|   |        | 00   | Antenna number (single channel)         |
| 0 | 258979 | 637  | Parsed Title 21 32-bit tag ID (decimal) |

where

|  |        |     |                 |
|--|--------|-----|-----------------|
|  |        | 0   | Tag type        |
|  | 258979 |     | Facility code   |
|  |        | 637 | Internal tag ID |

---

## Seen Frame Counter Report

This message is used to report the value of the Seen Count when the Seen Frame Counter times out and if the Seen Count is greater than zero. The Seen Frame Counter Response is as follows: 3043<Data><CRC> [Table 8-5](#) lists the response data.

**Table 8-5 Seen Frame Counter Report (3043H)**

| Seen Frame Counter Report |                   | Data Payload |
|---------------------------|-------------------|--------------|
| Field                     | Bits 7–0          |              |
| Record                    | Record Type (MSB) | 30H          |
| Record                    | Record Type (LSB) | 43H          |
| Data                      | Protocol          | 0XH          |
| Data                      | Seen Count (MSB)  | XXH          |
| Data                      | Seen Count (LSB)  | XXH          |
| Antenna                   | Antenna           | 0XH          |

**Protocol** — This field specifies the protocol for the counters.

| Protocol | Definition     |
|----------|----------------|
| 0        | IT2200         |
| 1        | SeGo           |
| 2        | IAG            |
| 3        | CVISN          |
| 4        | Title 21       |
| 5        | ATA Full-Frame |
| 6        | eGo            |
| 7        | ATA Half-Frame |
| 8        | Reserved       |

# ATA Half-Frame Tag Response

ATA Half-Frame Read Response Data is as follows: 4000<Data><CRC> [Table 8-6](#) lists the response data.

Table 8-6 ATA Half-Frame Tag Response (4000H)

| ATA Half-Frame Tag Response Data |                      |       |       |       |       |       |                |       | Data Payload |
|----------------------------------|----------------------|-------|-------|-------|-------|-------|----------------|-------|--------------|
| Field                            | Bit 7                | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1          | Bit 0 |              |
| Record                           | Record Type (MSB)    |       |       |       |       |       |                |       | 40H          |
| Record                           | Record Type (LSB)    |       |       |       |       |       |                |       | 00H          |
| Data                             | Response Data Byte 0 |       |       |       |       |       |                |       | XXH          |
| Data                             | Response Data Byte 1 |       |       |       |       |       |                |       | XXH          |
| Data                             | Response Data Byte 2 |       |       |       |       |       |                |       | XXH          |
| Data                             | Response Data Byte 3 |       |       |       |       |       |                |       | XXH          |
| Data                             | Response Data Byte 4 |       |       |       |       |       |                |       | XXH          |
| Data                             | Response Data Byte 5 |       |       |       |       |       |                |       | XXH          |
| Data                             | Response Data Byte 6 |       |       |       |       |       |                |       | XXH          |
| Data                             | Response Data Byte 7 |       |       |       |       |       |                |       | XXH          |
| Antenna                          |                      |       |       |       |       |       | Antenna Number |       | 0XH          |

## ATA Half-Frame Read Response Examples

ATA Half-Frame Read Response 1     4000ABCDEFGH

where

4000     ATA half-frame record type  
ABCDEFGH     8 characters of raw hex data

ATA Half-Frame Read Response 2     400001234567

where

4000     ATA half-frame record type  
XYZ.123456789     8 characters of raw hex data

where

## ATA Full-Frame Tag Response

**Table 8-7 ATA Full-Frame Tag Response (4001H)**

| ATA Full Frame Tag Response Data |                       |       |       |       |       |       |       |       | Data Payload |
|----------------------------------|-----------------------|-------|-------|-------|-------|-------|-------|-------|--------------|
| Field                            | Bit 7                 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |              |
| Record                           | Record Type (MSB)     |       |       |       |       |       |       |       | 40H          |
| Record                           | Record Type (LSB)     |       |       |       |       |       |       |       | 01H          |
| Data                             | Response Data Byte 0  |       |       |       |       |       |       |       | XXH          |
| Data                             | Response Data Byte 1  |       |       |       |       |       |       |       | XXH          |
| Data                             | Response Data Byte 2  |       |       |       |       |       |       |       | XXH          |
| Data                             | Response Data Byte 3  |       |       |       |       |       |       |       | XXH          |
| Data                             | Response Data Byte 4  |       |       |       |       |       |       |       | XXH          |
| Data                             | Response Data Byte 5  |       |       |       |       |       |       |       | XXH          |
| Data                             | Response Data Byte 6  |       |       |       |       |       |       |       | XXH          |
| Data                             | Response Data Byte 7  |       |       |       |       |       |       |       | XXH          |
| Data                             | Response Data Byte 8  |       |       |       |       |       |       |       | XXH          |
| Data                             | Response Data Byte 9  |       |       |       |       |       |       |       | XXH          |
| Data                             | Response Data Byte 10 |       |       |       |       |       |       |       | XXH          |
| Data                             | Response Data Byte 11 |       |       |       |       |       |       |       | XXH          |
| Data                             | Response Data Byte 12 |       |       |       |       |       |       |       | XXH          |
| Data                             | Response Data Byte 13 |       |       |       |       |       |       |       | XXH          |
| Data                             | Response Data Byte 14 |       |       |       |       |       |       |       | XXH          |



**Table 8-8 eGo Streamlined Read Response (4021H) (continued)**

|         |                  |                    |
|---------|------------------|--------------------|
| Data    | ID Byte 7        | XXH                |
| Data    | Page Data Byte 0 | XXH                |
| Data    | Page Data Byte 1 | XXH                |
| Data    | Page Data Byte 2 | XXH                |
| Data    | Page Data Byte 3 | XXH                |
| Data    | Page Data Byte 4 | XXH                |
| Data    | Page Data Byte 5 | XXH                |
| Data    | Page Data Byte 6 | XXH                |
| Data    | Page Data Byte 7 | XXH                |
| CRC     | CRC (MSB)        | XXH                |
| CRC     | CRC (LSB)        | XXH                |
| Antenna |                  | Antenna Number 0XH |

### ***eGo Streamlined Read Example***

eGo Streamlined Read Response     4021AABBCCDDEEFF0011ABCDEF0123456789A1B5

where

4021     eGo Page Data Record Type, 2 bytes in hex  
AABBCCDDEEFF0011     ID Word Data, 8 bytes in hex  
ABCDEF0123456789     Page Data, 8 bytes in hex  
A1B5     CRC, 2 bytes in hex

**Note:** Tag Data and CRC are used for parsing and format purposes only. The record types shown contain valid data.

---

### ***eGo Word ID Data Response***

The eGo Word ID Data Response (Group Select Equals) is as follows:  
4023<Data><CRC>. [Table 8-9](#) lists the response data.

**Table 8-9 eGo Word ID Data Response (4023H)**

| eGo ID Word Data Response |       |       |       |       |       |       |       |       | Data Payload |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------------|
| Field                     | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |              |

**Table 8-9 eGo Word ID Data Response (4023H) (continued)**

|         |                   |                |     |
|---------|-------------------|----------------|-----|
| Record  | Record Type (MSB) |                | 40H |
| Record  | Record Type (LSB) |                | 23H |
| Data    | ID Byte 0         |                | XXH |
| Data    | ID Byte 1         |                | XXH |
| Data    | ID Byte 2         |                | XXH |
| Data    | ID Byte 3         |                | XXH |
| Data    | ID Byte 4         |                | XXH |
| Data    | ID Byte 5         |                | XXH |
| Data    | ID Byte 6         |                | XXH |
| Data    | ID Byte 7         |                | XXH |
| CRC     | CRC (MSB)         |                | XXH |
| CRC     | CRC (LSB)         |                | XXH |
| Antenna |                   | Antenna Number | 0XH |

### ***eGo ID Word Data – Group Select Example***

eGo ID Word Response    4023ABCDEF0123456789A1B5

where

4023    eGo ID Word Data record type, 2 bytes in hex  
 ABCDEF0123456789    Tag ID, 8 bytes in hex  
 A1B5    CRC, 2 bytes in hex

**Note:** Tag Data and CRC are used for parsing and format purposes only. The record types shown contain valid data.

---

### ***IT2200 Read Response***

The IT2200 Read Response is as follows 4303<Data><CRC>. [Table 8-10](#) lists the response data.

**Table 8-10 IT2200 Read Response (4303H)**

| IT2200 Read Response Data |          | Data Payload |
|---------------------------|----------|--------------|
| Field                     | Bits 7–0 |              |

**Table 8-10 IT2200 Read Response (4303H) (continued)**

|        |                         |     |
|--------|-------------------------|-----|
| Record | Record Type (MSB)       | 43H |
| Record | Record Type (LSB)       | 03H |
| Data   | Bit Count (MSB)         | 00H |
| Data   | Bit Count (LSB)         | 00H |
| Data   | Options                 | 00H |
| Data   | Tag ID (MSB)            | F0H |
| Data   | Tag ID                  | 0FH |
| Data   | Tag ID                  | 00H |
| Data   | Tag ID (LSB)            | 50H |
| Data   | Page Number (MSB)       | XXH |
| Data   | Page Number (LSB)       | XXH |
| Data   | Page Data Byte 15 (MSB) | XXH |
| Data   | Page Data Byte 14       | XXH |
| Data   | Page Data Byte 13       | XXH |
| Data   | Page Data Byte 12       | XXH |
| Data   | Page Data Byte 11       | XXH |
| Data   | Page Data Byte 10       | XXH |
| Data   | Page Data Byte 9        | 00H |
| Data   | Page Data Byte 8        | 00H |
| Data   | Page Data Byte 7        | 0XH |
| Data   | Page Data Byte 6        | XXH |
| Data   | Page Data Byte 5        | XXH |
| Data   | Page Data Byte 4        |     |
| Data   | Page Data Byte 3        |     |
| Data   | Page Data Byte 2        |     |
| Data   | Page Data Byte 1        |     |
| Data   | Page Data Byte 0 (LSB)  |     |
| CRC    | CRC                     |     |
| CRC    | CRC                     |     |



**Table 8-10 IT2200 Read Response (4303H) (continued)**

| Antenna |  | Antenna<br>Number |  |
|---------|--|-------------------|--|
|---------|--|-------------------|--|

### ***IT2200 Read Response Example:***

IT2200 Read Response     430300CD0E0123456720AABBCCDDEEFF11223344556677889900A1B5

where

|                                  |                                    |
|----------------------------------|------------------------------------|
| 4303                             | IT2200 Record Type, 2 bytes in hex |
| 00CD                             | Bit count, 2 bytes in hex          |
| 0E                               | Options, 1 byte in hex             |
| 01234567                         | Tag ID, 4 bytes in hex             |
| 20                               | Page number, 1 byte in hex         |
| AABBCCDDEEFF11223344556677889900 | Page data, 16 bytes in hex         |
| A1B5                             | CRC, 2 bytes in hex                |

**Note:** Tag Data and CRC are used for parsing and format purposes only. The record types shown contain valid data.

---

### ***CVISN Read Response***

The CVISN Read Response format is as follows: 5014<Data><CRC>. Table 8-11 lists the response data.

**Table 8-11 CVISN Read Response (5014H)**

| CVISN Read Response Data |                                                       | Data Payload |
|--------------------------|-------------------------------------------------------|--------------|
| Field                    | Bits 7–0                                              |              |
| Record                   | Record Type (MSB)                                     | 50H          |
| Record                   | Record Type (LSB)                                     | 14H          |
| Data                     | Valid Tag 1                                           | 0000H/0001H  |
| Data                     | Valid Tag 2                                           | 0000H/0001H  |
| Data                     | Valid Tag 3                                           | 0000H/0001H  |
| Data                     | Valid Tag 4                                           | 0000H/0001H  |
| Data                     | Transponder Message and Message Type Tag 1 (not used) | XXH          |
| Data                     | Transponder ID Tag 1                                  | XXXX.XXXXH   |
| CRC                      | CRC Tag 1                                             | XXXXH        |
| Data                     | Tag Type Indicator (Toll Tag = 01H)                   | XXH          |

**Table 8-11 CVISN Read Response (5014H) (continued)**

|         |                                                       |            |
|---------|-------------------------------------------------------|------------|
| Data    | Transponder Message and Message Type Tag 2 (not used) | XXH        |
| Data    | Transponder ID Tag 2                                  | XXXX.XXXXH |
| CRC     | CRC Tag 2                                             | XXXXH      |
| Data    | Tag Type Indicator (Toll Tag = 01H)                   | XXH        |
| Data    | Transponder Message and Message Type Tag 3 (not used) | XXH        |
| Data    | Transponder ID Tag 3                                  | XXXX.XXXXH |
| CRC     | CRC Tag 3                                             | XXXXH      |
| Data    | Tag Type Indicator (Toll Tag = 01H)                   | XXH        |
| Data    | Transponder Message and Message Type Tag 4 (not used) | XXH        |
| Data    | Transponder ID Tag 4                                  | XXXX.XXXXH |
| CRC     | CRC Tag 4                                             | XXXXH      |
| Data    | Tag Type Indicator (Toll Tag = 01H)                   | XXH        |
| Antenna | Antenna Number                                        | XXH        |

The valid tags are set to 0 for tag not in frame slot and 1 for tag in frame slot. The transponder message is the high-order nibble and the message type tag is the low-order nibble. This byte is passed with each tag but currently is not used. The transponder ID tag is the identifier read from the tag. There may be one to four tags read for a given response. A read with no transponder ID tags is not forwarded to the host. The reader also presents a tag's CRC to the host as part of the response in the CRC field.

---

## **IAG Read Response**

The IAG Read Response format is as follows: 5026<Data><CRC>. [Table 8-12](#) lists the response data.

**Table 8-12 IAG Read Response Data Parameters (5026H)**

| IAG Read Response |                     |       |       |                   |       |       |                 |       | Data Payload |
|-------------------|---------------------|-------|-------|-------------------|-------|-------|-----------------|-------|--------------|
| Field             | Bit 7               | Bit 6 | Bit 5 | Bit 4             | Bit 3 | Bit 2 | Bit 1           | Bit 0 |              |
| Record            | Record Type (MSB)   |       |       |                   |       |       |                 |       | 50H          |
| Record            | Record Type (LSB)   |       |       |                   |       |       |                 |       | 26H          |
|                   | Read Only Partition |       |       |                   |       |       |                 |       |              |
| Data              | Header (3 bits)     |       |       | Tag Type (3 bits) |       |       | App ID (3 bits) |       | XXH          |

**Table 8-12 IAG Read Response Data Parameters (5026H) (continued)**

**Table 8-12 IAG Read Response Data Parameters (5026H) (continued)**

| IAG Read Response |                              |       |       |       |       |       |         |       | Data Payload |
|-------------------|------------------------------|-------|-------|-------|-------|-------|---------|-------|--------------|
| Field             | Bit 7                        | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1   | Bit 0 |              |
| Data              | Agency Data                  |       |       |       |       |       |         |       | XXH          |
| Data              | Agency Data                  |       |       |       |       |       |         |       | XXH          |
| Data              | Transaction Number (16 bits) |       |       |       |       |       |         |       | XXH          |
| Data              | Transaction Number           |       |       |       |       |       |         |       | XXH          |
| CRC               | CRC                          |       |       |       |       |       |         |       | XXH          |
| CRC               | CRC                          |       |       |       |       |       |         |       | XXH          |
| Antenna           |                              |       |       |       |       |       | Antenna |       |              |

### ***IAG Read Response Example***

#5026ECC11E01FCB21200010587052DBAAD1607852D89687D54E03060001AAFB5983

where

5026 IAG Read Record Type, 2 bytes in hex

**Note:** Due to overlap of byte boundaries by tag data fields, all further data breakdown will be in binary.

Hex tag data:

MSB ECC11E01FCB21200 010587052DBAAD1 607852D89687D54E 03060001AAFB5983 LSB

32 bytes tag data\*8 bits/byte = 256 bits

32 bytes/8 bytes per line = 4 lines

256 bits/4 lines = 64 bits/line from MSB to LSB

MSB 11101100110000011000111100000000111111001011001100001001000000000  
00000001100000101100001110000010100101101101110101010101011010001  
0110000001111000010100101101100010010110100001111101010101001110  
0000001100000110000000000000000110101010111110110101100110000011 LSB

Response breakdown is from MSB to LSB, starting with the header field and ending with the CRC.

*Read-Only Partition*

| Field (# of bits)          | : | Bit Pattern              | : | Decimal |
|----------------------------|---|--------------------------|---|---------|
| Header (3 bits)            | : | 111                      | : | 7       |
| Tag Type (3 bits)          | : | 011                      | : | 3       |
| Application ID (3 bits)    | : | 001                      | : | 1       |
| Group ID (7 bits)          | : | 1000001                  | : | 65      |
| Agency ID (7 bits)         | : | 0001111                  | : | 15      |
| Serial Number (24 bits)    | : | 000000001111111001011001 | : | 65113   |
| Vehicle Class (11 bits)    | : | 00001001000              | : | 72      |
| Revenue Type (4 bits)      | : | 0000                     | : | 0       |
| Commission Status (1 bit)  | : | 0                        | : | 0       |
| Mounting Location (2 bits) | : | 00                       | : | 00      |
| Agency Data 1 (3 bits)     | : | 000                      | : | 000     |
| ISTHA Class (4 bits)       | : | 0001                     | : | 1       |
| Agency Data 2 (24 bits)    | : | 000001011000011100000101 | : | 362245  |

*Read/Write Partition*

| Field (# of bits)            | : | Bit Pattern                    | : | Decimal  |
|------------------------------|---|--------------------------------|---|----------|
| Reader ID (12 bits)          | : | 001011011011                   | : | 731      |
| TM Date (9 bits)             | : | 101010101                      | : | 341      |
| TM Time (17 bits)            | : | 01011010001011000              | : | 46168    |
| Agency ID (7 bits)           | : | 0001111                        | : | 15       |
| Plaza ID (7 bits)            | : | 0000101                        | : | 5        |
| Lane ID (5 bits)             | : | 00101                          | : | 5        |
| Date (9 bits)                | : | 101100010                      | : | 354      |
| Time (17 bits)               | : | 01011010000111110              | : | 46142    |
| Vehicle Class (11 bits)      | : | 10101010011                    | : | 1363     |
| Future (4 bits)              | : | 1000                           | : | 8        |
| Agency Data (30 bits)        | : | 000011000001100000000000000001 | : | 50724865 |
| Transaction Number (16 bits) | : | 1010101011111011               | : | 43771    |

CRC (16 bits) : 0101100110000011

: 22915

## IAG Cross-Lane Read Response

The IAG Cross-Lane Read Response format is as follows: 5027<Data><CRC>. [Table 8-13](#) lists the response data.

**Table 8-13 IAG Cross-Lane Read Response (5027H)**

| IAG Cross-Lane Read Response |                         |                        |                       |                   |                      |                   |                    |       | Data Payload |
|------------------------------|-------------------------|------------------------|-----------------------|-------------------|----------------------|-------------------|--------------------|-------|--------------|
| Field                        | Bit 7                   | Bit 6                  | Bit 5                 | Bit 4             | Bit 3                | Bit 2             | Bit 1              | Bit 0 |              |
| Record                       | Record Type (MSB)       |                        |                       |                   |                      |                   |                    |       | 50H          |
| Record                       | Record Type (LSB)       |                        |                       |                   |                      |                   |                    |       | 27H          |
|                              | Read-Only Partition     |                        |                       |                   |                      |                   |                    |       |              |
| Data                         | Header (3 bits)         |                        |                       | Tag Type (3 bits) |                      |                   | App. ID (3 bits)   |       | XXH          |
| Data                         | App ID                  | Group ID (7 bits)      |                       |                   |                      |                   |                    |       | XXH          |
| Data                         | Agency ID (7 bits)      |                        |                       |                   |                      |                   | Ser Num            |       | XXH          |
| Data                         | Serial Number (24 bits) |                        |                       |                   |                      |                   |                    |       | XXH          |
| Data                         | Serial Number           |                        |                       |                   |                      |                   |                    |       | XXH          |
| Data                         | Serial Number           |                        |                       |                   |                      |                   | V. Class           |       | XXH          |
| Data                         | Vehicle Class (11 bits) |                        |                       |                   |                      |                   |                    |       | XXH          |
| Data                         | Vehicle Class           |                        | Revenue Type (4 bits) |                   |                      |                   | C. S.              | M. L. | XXH          |
| Data                         | M. L.                   | Agency Data 1 (3 bits) |                       |                   | ISTHA Class (4 bits) |                   |                    |       | XXH          |
| Data                         | Agency Data 2 (24 bits) |                        |                       |                   |                      |                   |                    |       | XXH          |
| Data                         | Agency Data 2           |                        |                       |                   |                      |                   |                    |       | XXH          |
| Data                         | Agency Data 2           |                        |                       |                   |                      |                   |                    |       | XXH          |
|                              | Read/Write Partition    |                        |                       |                   |                      |                   |                    |       |              |
| Data                         | Reader ID (12 bits)     |                        |                       |                   |                      |                   |                    |       | XXH          |
| Data                         | Reader ID               |                        |                       |                   | TM Date (9 bits)     |                   |                    |       | XXH          |
| Data                         | TM Date                 |                        |                       |                   |                      | TM Time (17 bits) |                    |       | XXH          |
| Data                         | TM Time                 |                        |                       |                   |                      |                   |                    |       | XXH          |
| Data                         | TM Time                 |                        |                       |                   |                      |                   | Agency ID (7 bits) |       | XXH          |

**Table 8-13 IAG Cross-Lane Read Response (5027H) (continued)**

| IAG Cross-Lane Read Response |                              |               |                       |       |                         |              |                 |       | Data Payload |
|------------------------------|------------------------------|---------------|-----------------------|-------|-------------------------|--------------|-----------------|-------|--------------|
| Field                        | Bit 7                        | Bit 6         | Bit 5                 | Bit 4 | Bit 3                   | Bit 2        | Bit 1           | Bit 0 |              |
| Data                         | Agency ID                    |               |                       |       |                         | Plaza ID (7) |                 |       | XXH          |
| Data                         | Plaza ID                     |               |                       |       | Lane ID (5 bits)        |              |                 |       | XXH          |
| Data                         | Lane ID                      | Date (9 bits) |                       |       |                         |              |                 |       | XXH          |
| Data                         | Date                         |               | Time (17 bits)        |       |                         |              |                 |       | XXH          |
| Data                         | Time                         |               |                       |       |                         |              |                 |       | XXH          |
| Data                         | Time                         |               |                       |       | Vehicle Class (11 bits) |              |                 |       | XXH          |
| Data                         | Vehicle Class                |               |                       |       |                         |              | Future (4 bits) |       | XXH          |
| Data                         | Future                       |               | Agency Data (30 bits) |       |                         |              |                 |       | XXH          |
| Data                         | Agency Data                  |               |                       |       |                         |              |                 |       | XXH          |
| Data                         | Agency Data                  |               |                       |       |                         |              |                 |       | XXH          |
| Data                         | Agency Data                  |               |                       |       |                         |              |                 |       | XXH          |
| Data                         | Transaction Number (16 bits) |               |                       |       |                         |              |                 |       | XXH          |
| Data                         | Transaction Number           |               |                       |       |                         |              |                 |       | XXH          |
| CRC                          | CRC                          |               |                       |       |                         |              |                 |       | XXH          |
| CRC                          | CRC                          |               |                       |       |                         |              |                 |       | XXH          |
| Antenna                      |                              |               |                       |       |                         |              | Antenna Number  |       |              |

***IAG Cross-Lane Read Response Example***

The IAG Cross-Lane Read Response example is

#5027ECC11E01FCB21200010587052DBAAAD1607852D89687D54E03060001AAFB5983

where

5027 IAG Cross-Lane Read Record Type, 2 bytes in hex

***Note:*** Due to overlap of byte boundaries by tag data fields, all field breakdowns are in binary.

Hex tag data:

MSB ECC11E01FCB21200 010587052DBAAAD1 607852D89687D54E 03060001AAFB5983 LSB



32 bytes tag data\*8 bits/byte = 256 bits

32 bytes/8 bytes per line = 4 lines

256 bits/4 lines = 64 bits/line from MSB to LSB

MSB 111011001100000100011110000000011111100101100100001001000000000  
0000000100000101100001110000010100101101101110101010101011010001  
011000000111100001010010110110001001011010000111101010101001110  
00000011000001100000000000000000110101010111110110101100110000011 LSB

Response breakdown is from MSB to LSB, starting with the header field and ending with the CRC.

#### Read-Only Partition

| Field (# of bits)           | : | Bit Pattern              | : | Decimal |
|-----------------------------|---|--------------------------|---|---------|
| Header (3 bits)             | : | 111                      | : | 7       |
| Tag Type (3 bits)           | : | 011                      | : | 3       |
| Application ID (17 bits)    | : | 001                      | : | 1       |
| Group ID (7 bits)           | : | 1000001                  | : | 65      |
| Agency ID (7 bits)          | : | 0001111                  | : | 15      |
| Serial Number (24 bits)     | : | 000000001111111001011001 | : | 65113   |
| Vehicle Class (11 bits)     | : | 00001001000              | : | 72      |
| Revenue Type (4 bits)       | : | 0000                     | : | 0       |
| Commission Status (11 bits) | : | 0                        | : | 0       |
| Mounting Location (2 bits)  | : | 00                       | : | 00      |
| Agency Data 1 (3 bits)      | : | 000                      | : | 000     |
| ISTHA Class (4 bits)        | : | 0001                     | : | 1       |
| Agency Data 2 (24 bits)     | : | 000001011000011100000101 | : | 362245  |

#### Read/Write Partition

| Field (# of bits)   | : | Bit Pattern  | : | Decimal |
|---------------------|---|--------------|---|---------|
| Reader ID (12 bits) | : | 001011011011 | : | 731     |
| TM Date (9 bits)    | : | 101010101    | : | 341     |

|                              |                                  |   |          |
|------------------------------|----------------------------------|---|----------|
| TM Time (17 bits)            | : 01011010001011000              | : | 46168    |
| Agency ID (7 bits)           | : 0001111                        | : | 15       |
| Plaza ID (7 bits)            | : 0000101                        | : | 5        |
| Lane ID (5 bits)             | : 00101                          | : | 5        |
| Date (9 bits)                | : 101100010                      | : | 354      |
| Time (17 bits)               | : 01011010000111110              | : | 46142    |
| Vehicle Class (11 bits)      | : 10101010011                    | : | 1363     |
| Future (4 bits)              | : 1000                           | : | 8        |
| Agency Data (30 bits)        | : 000011000001100000000000000001 | : | 50724865 |
| Transaction Number (16 bits) | : 1010101011111011               | : | 43771    |
| CRC (16 bits)                | : 0101100110000011               | : | 22915    |

# AI1200-Emulation Tag Responses

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In general, the tag response is transmitted as a # sign followed by the tag response record type code and the tag response data. Response lengths vary depending on the tag response record type. The tag response record type communicates to the host the tag response type that the reader processed.

---

## Tag Response Format

*No Append Information: (#300, #310)*

**ECP protocol:** <som><seq><rrrr><data><crc><eom>

**Basic protocol:** <som><rrrr><data> <eom>

*Append Information: (#302, #311)*

**ECP protocol:** <som><seq><rrrr><data>&<time><date>%<aux info><crc><eom>

**Basic protocol:** <som><data>&<time><date>%<aux info><eom>

where

the tag response contains the following:

<som> #

<seq> hexadecimal character 0-F, *ECP mode only*

<rrrr> Transaction record type (hex)

<data> Tag response data (hex/AMTECH 6-bit, length and format depend on tag type)

*Append options: (see Commands #300, #301, #302, #310, #311)*

*Time and Time/Date Stamps*

& = Time stamp delimiter and time/date stamp delimiter

*Time only appended: (#301 Time Only Appended)*

<time>: &HH:MM:SS.hh

HH = Hours (00-23 decimal)

MM = Minutes (00-59 decimal)

SS = Seconds (00-59 decimal)

hh = Hundredths of seconds (00-99 decimal)

*Time and date stamp: (#302 Time and Date Appended)*

`<time><date>: &HH:MM:SS.hh MM/DD/YY`

MM = Month (01-12 decimal)

DD = Day (01-31 decimal)

YY = Year (00-99 decimal)

*Auxiliary Information: (#311 Auxiliary Information Appended)*

% = Auxiliary information delimiter

`<aux info> = xx-y-zz-q`

xx = reader ID (00-FF hex)

y = antenna number (0-3)

zz = number of reads of the previous tag  
(00-FF hexadecimal)

q = state of Digital I/O input bits (0-F  
hexadecimal)

`<crc> = CRC (2-byte CRC) ECP mode only`

`<eom> = CR+LF`

### **Basic Protocol Example**

Title 21 Tag Report with Time and Date Stamp and Auxiliary Information:

`#0001D52F80044FFC&12:45:23.99 03/15/07%00-1-20-b`

**Note:** *<eom> omitted from basic mode example*

### **ECP Protocol Example**

Title 21 Tag Report with Sequence Number, Time and Date Stamp, Auxiliary Information and CRC:

`#020001D52F80044FFC&12:45:23.99 03/15/07%00-1-20-b45F3`

**Note:** *<eom> omitted from ECP mode example*

**Note:** *The data presented in the examples are invalid and are used for illustration purposes only.*

---

## ***AI1200-Emulation Tag Response Field Definitions***

Tag response record type codes are entered before each tag data response to indicate the type of transaction processed by the reader. All transaction response codes are hexadecimal ([Table 8-14](#)).

**Table 8-14 Tag Response Record Types and Associated Codes**

| <b>Record Type Code</b>             | <b>Corresponding Tag Responses</b> |
|-------------------------------------|------------------------------------|
| 0001H                               | Title 21 Read Response             |
| 3002H                               | ATA Full-Frame Read Response       |
| 3012H                               | ATA Half-Frame Read Response       |
| 4303H                               | IT2200 Read Response               |
| 5014H                               | CVISN Read Response                |
| 5026H                               | IAG Read Response                  |
| 5027H                               | IAG Cross Lane Response            |
| E000H                               | eGo ID Word Data Response          |
| E2XXH, where XX = page address byte | eGo Streamlined Read Response      |
| E800H                               | SeGo ID Word Data Response         |
| EAXXH, where XX = page address byte | SeGo Streamlined Read Response     |

---

## ***Title 21 Read Response***

The format for the general tag response is as follows: #0001<data><CRC>. [Table 8-15](#) lists the Title 21 Read Response format fields.

**Table 8-15 Title 21 Read Response Format**

| <b>Field</b>   | <b>Size (bytes)</b> | <b>Field Source</b> | <b>Description</b>                 |
|----------------|---------------------|---------------------|------------------------------------|
| Record Type    | 2                   | Tag                 | Title 21 response code/record type |
| Data           | 4                   | Tag                 | Title 21 tag ID                    |
| CRC            | 2                   | Tag                 | Calculated on record type and data |
| Total Response | 8                   | —                   | —                                  |

where

RS-232 transmission format is hexadecimal to ASCII

ASCII Characters: 16

[Table 8-16](#) lists the Title 21 Read Response Data parameters:

**Table 8-16 Title 21 Read Response Data Parameters (0001H)**

| Title 21 Read Response |                           |       |       |       |                         |       |                 |       | Data Payload |
|------------------------|---------------------------|-------|-------|-------|-------------------------|-------|-----------------|-------|--------------|
| Field                  | Bit 7                     | Bit 6 | Bit 5 | Bit 4 | Bit 3                   | Bit 2 | Bit 1           | Bit 0 | Byte         |
| Record                 | Record Type (MSB)         |       |       |       |                         |       |                 |       | 00H          |
| Record                 | Record Type (LSB)         |       |       |       |                         |       |                 |       | 01H          |
| Data (MSB)             | Tag Type (4 bits)         |       |       |       | Facility Code (18 bits) |       |                 |       | XXH          |
| Data                   | Facility Code             |       |       |       |                         |       |                 |       | XXH          |
| Data                   | Facility Code             |       |       |       |                         |       | Internal Tag ID |       | XXH          |
| Data (LSB)             | Internal Tag ID (10 bits) |       |       |       |                         |       |                 |       | XXH          |
| CRC                    | CRC                       |       |       |       |                         |       |                 |       | XXH          |
| CRC                    | CRC                       |       |       |       |                         |       |                 |       | XXH          |

### **Title 21 Tag Response Example**

The SIRIT/TransCore tag response example is #0001D52F80044FFC

where

# SOM

0001 Title 21 record type, two bytes hex

D52F8004 32-bit Title 21 ID, four bytes hex

4FFC CRC, two bytes hex

32-bit Title 21 Tag ID Composition ([Table 8-16](#)).

32 bit Title 21 ID hex

MSB D52F8004 LSB hex

MSB 110101010010111100000000000000100LSB binary

MSB Tag Type 4 bits

Facility Code 18 bits

Internal Tag ID 10 bits LSB

|               | <u>Binary</u>      | <u>Decimal</u> |
|---------------|--------------------|----------------|
| Tag Type      | 1101               | 13             |
| Facility Code | 010100101111100000 | 84960          |
| Tag ID        | 0000000100         | 4              |

## ATA Full-Frame Response

The ATA full-frame response is as follows: #3002<Data>. [Table 8-17](#) lists the ATA Full-Frame Response format fields.

**Table 8-17 ATA Full-Frame Response Format**

| Field          | Size (bytes) | Field Source | Description                    |
|----------------|--------------|--------------|--------------------------------|
| Record Type    | 2            | Reader       | 3002H: ATA Full-Frame Response |
| Data           | 20           | Tag          | AMTECH Six Bit Alphanumeric    |
| Total Response | 22           | —            | —                              |

RS-232 Transmission Format: Record Type (hex to ASCII), data (AMTECH 6-bit ASCII)

ASCII Characters: 24

[Table 8-18](#) lists the ATA Full-Frame Data Response parameters.

**Table 8-18 ATA Full-Frame Data Response Parameters**

| ATA Full-Frame Data Response |                             | Data Payload |
|------------------------------|-----------------------------|--------------|
| Field                        | Bits 7–0                    |              |
| Record                       | Record Type (MSB)           | 30H          |
| Record                       | Record Type (LSB)           | 02H          |
| Data                         | AMTECH SIX BIT ASCII Byte 0 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 1 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 2 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 3 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 4 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 5 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 6 | XXH          |

**Table 8-18 ATA Full-Frame Data Response Parameters (continued)**

| ATA Full-Frame Data Response |                              | Data Payload |
|------------------------------|------------------------------|--------------|
| Field                        | Bits 7–0                     |              |
| Data                         | AMTECH SIX BIT ASCII Byte 7  | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 8  | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 9  | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 10 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 11 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 12 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 13 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 14 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 15 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 16 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 17 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 18 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 19 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 20 | XXH          |

### ***ATA Full-Frame Response Examples***

The ATA full-frame response example is #3002ABCDEFGH IJKLMNOPQRST

where

# SOM

3002 ATA full-frame record type

ABCDEFGH IJKLMNOPQRST 20 characters of AMTECH 6-bit alphanumeric in ASCII

One response is #3002ZYXWVUTSRQPONMLKJIHG

where

# SOM

3002 ATA full-frame record type



ZYXWVUTSRQPONMLKJIHG 20 characters of AMTECH 6-bit alphanumeric in  
ASCII

Another response is #3002XYZ.123456789TAGSRUS  
where

#   SOM  
3002   ATA full-frame record type  
XYZ.123456789TAGSRUS   20 characters of AMTECH 6-bit alphanumeric in  
                                  ASCII

---

### ATA Half-Frame Response

The ATA half-frame response is as follows: #3012<Data> . [Table 8-19](#) lists the ATA Half-Frame Response format fields.

**Table 8-19 ATA Half-Frame Response Format**

| Field          | Size (Bytes) | Field Source | Description                    |
|----------------|--------------|--------------|--------------------------------|
| Record Type    | 2            | Reader       | 3012H: ATA half-frame response |
| Data           | 10           | Tag          | AMTECH six-bit alphanumeric    |
| Total Response | 12           | —            | —                              |

RS-232 Transmission Format: Record type (hex to ASCII), data (AMTECH 6-bit ASCII)  
ASCII Characters: 14

[Table 8-20](#) lists the ATA Half-Frame Data Response parameters.

**Table 8-20 ATA Half-Frame Data Response Parameters**

| ATA Half-Frame Data Response |                             | Data Payload |
|------------------------------|-----------------------------|--------------|
| Field                        | Bits 7–0                    |              |
| Record                       | Record Type (MSB)           | 30H          |
| Record                       | Record Type (LSB)           | 12H          |
| Data                         | AMTECH SIX BIT ASCII Byte 0 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 1 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 2 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 3 | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 4 | XXH          |

**Table 8-20 ATA Half-Frame Data Response Parameters (continued)**

| ATA Half-Frame Data Response |                              | Data Payload |
|------------------------------|------------------------------|--------------|
| Field                        | Bits 7–0                     |              |
| Data                         | AMTECH SIX BIT ASCII Byte 5  | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 6  | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 7  | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 8  | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 9  | XXH          |
| Data                         | AMTECH SIX BIT ASCII Byte 10 | XXH          |

### ***ATA Half-Frame Response Examples***

One ATA half-frame response is #3012ABCDEFGH I J

where

# SOM

3012 ATA half-frame record type

ABCDEFGH I J 10 characters of AMTECH 6-bit alphanumeric in ASCII

Another ATA half-frame response is #30120123456789

where

# SOM

3012 ATA half-frame record type

0123456789 10 characters of AMTECH 6-bit alphanumeric in ASCII

The ATA half-frame response is #3012XYZTAGSRUS

where

# SOM

3012 ATA half-frame record type

XYZTAGSRUS 10 characters of AMTECH 6-bit alphanumeric in ASCII

---

## IT2200 Read Response

The IT2200 Read Response is as follows: #4303<Data><CRC>. [Table 8-21](#) lists the IT2200 Read Response format fields.

**Table 8-21 IT2200 Read Response Format**

| Field          | Size (bytes) | Field Source | Description                   |
|----------------|--------------|--------------|-------------------------------|
| Record Type    | 2            | Tag          | 4303H: IT2200 read response   |
| Data           | 25           | Tag          | —                             |
| CRC            | 2            | Tag          | CRC uses record type and data |
| Total Response | 29           | —            | —                             |

RS-232 Transmission Format: hex to ASCII

ASCII Characters: 58

[Table 8-22](#) lists the IT2200 Read Response Data parameters.

**Table 8-22 IT2200 Read Response Data Parameters (4303H)**

| IT2200 Read Response |                         | Data Payload |
|----------------------|-------------------------|--------------|
| Field                | Bits 7–0                |              |
| Record               | Record Type (MSB)       | 43H          |
| Record               | Record Type (LSB)       | 03H          |
| Data                 | Bit Count (MSB)         | XXH          |
| Data                 | Bit Count (LSB)         | XXH          |
| Data                 | Options                 | XXH          |
| Data                 | Tag ID (MSB)            | XXH          |
| Data                 | Tag ID                  | XXH          |
| Data                 | Tag ID                  | XXH          |
| Data                 | Tag ID (LSB)            | XXH          |
| Data                 | Page number (MSB)       | XXH          |
| Data                 | Page number (LSB)       | XXH          |
| Data                 | Page Data byte 15 (MSB) | XXH          |

**Table 8-22 IT2200 Read Response Data Parameters (4303H) (continued)**

| IT2200 Read Response |                        | Data Payload |
|----------------------|------------------------|--------------|
| Field                | Bits 7–0               |              |
| Data                 | Page Data byte 14      | XXH          |
| Data                 | Page Data byte 13      | XXH          |
| Data                 | Page Data byte 12      | XXH          |
| Data                 | Page Data byte 11      | XXH          |
| Data                 | Page Data byte 10      | XXH          |
| Data                 | Page Data byte 9       | XXH          |
| Data                 | Page Data byte 8       | XXH          |
| Data                 | Page Data byte 7       | XXH          |
| Data                 | Page Data byte 6       | XXH          |
| Data                 | Page Data byte 5       | XXH          |
| Data                 | Page Data byte 4       | XXH          |
| Data                 | Page Data byte 3       | XXH          |
| Data                 | Page Data byte 2       | XXH          |
| Data                 | Page Data byte 1       | XXH          |
| Data                 | Page Data byte 0 (LSB) | XXH          |
| CRC                  | CRC                    | XXH          |
| CRC                  | CRC                    | XXH          |

### ***IT2200-Series Read Page Response Example***

The IT2200-series response example is

#430300CD0E0123456720AABBCCDDEEFF11223344556677889900A1B5

where

# SOM

4303 IT2200 Record Type, 2 bytes in hex

00CD Bit count, 2 bytes in hex

0E Options, 1 byte in hex

01234567 Tag ID, 4 bytes in hex

20 Page number, 2 bytes in hex

AABBCCDDEEFF112223344556677889900 Page data, 16 bytes in hex

A1B5 CRC, 2 bytes in hex

***Note:** Tag Data and CRC are used for parsing and format purposes only. The record types shown contain valid data.*

---

## CVISN Read Response

The CVISN response is as follows: #5014<Data><CRC>. [Table 8-23](#) lists the CVISN Read Response format fields.

**Table 8-23 CVISN Read Response Format**

| Field          | Size (Bytes) | Field Source | Description                |
|----------------|--------------|--------------|----------------------------|
| Record Type    | 2            | Reader       | 5014H: CVISN Read Response |
| Data           | 39           | Tag          | —                          |
| Total Response | 41           | —            | —                          |

RS-232 Transmission Format: hex to ASCII

ASCII Characters: 82

[Table 8-24](#) lists the IAG Read Response Data parameters.

**Table 8-24 CVISN Read Response (5014H)**

| CVISN Read Response Data |                                                       | Data Payload |
|--------------------------|-------------------------------------------------------|--------------|
| Field                    | Bits 7–0                                              |              |
| Record                   | Record Type (MSB)                                     | 50H          |
| Record                   | Record Type (LSB)                                     | 14H          |
| Data                     | Valid Tag 1                                           | 0000H/0001H  |
| Data                     | Valid Tag 2                                           | 0000H/0001H  |
| Data                     | Valid Tag 3                                           | 0000H/0001H  |
| Data                     | Valid Tag 4                                           | 0000H/0001H  |
| Data                     | Transponder Message and Message Type Tag 1 (not used) | XXH          |
| Data                     | Transponder ID Tag 1                                  | XXXX.XXXXH   |

**Table 8-24 CVISN Read Response (5014H) (continued)**

|         |                                                       |            |
|---------|-------------------------------------------------------|------------|
| CRC     | CRC Tag 1                                             | XXXXH      |
| Data    | Tag Type Indicator (Toll Tag = 01H)                   | XXH        |
| Data    | Transponder Message and Message Type Tag 2 (not used) | XXH        |
| Data    | Transponder ID Tag 2                                  | XXXX.XXXXH |
| CRC     | CRC Tag 2                                             | XXXXH      |
| Data    | Tag Type Indicator (Toll Tag = 01H)                   | XXH        |
| Data    | Transponder Message and Message Type Tag 3 (not used) | XXH        |
| Data    | Transponder ID Tag 3                                  | XXXX.XXXXH |
| CRC     | CRC Tag 3                                             | XXXXH      |
| Data    | Tag Type Indicator (Toll Tag = 01H)                   | XXH        |
| Data    | Transponder Message and Message Type Tag 4 (not used) | XXH        |
| Data    | Transponder ID Tag 4                                  | XXXX.XXXXH |
| CRC     | CRC Tag 4                                             | XXXXH      |
| Data    | Tag Type Indicator (Toll Tag = 01H)                   | XXH        |
| Antenna | Antenna Number                                        | XXH        |

The valid tags are set to 0 for tag not in frame slot and 1 for tag in frame slot. The transponder message is the high-order nibble and the message type tag is the low-order nibble. This byte is passed with each tag but currently is not used. The transponder ID tag is the identifier read from the tag. There may be one to four tags read for a given response. A read with no transponder ID tags is not forwarded to the host. The reader also presents a tag's CRC to the host as part of the response in the CRC field.

---

## ***IAG Read Response***

The IAG Read Response is as follows: #5026<Data><CRC>. [Table 8-25](#) lists the IAG Read Response format fields.

**Table 8-25 IAG Read Response Format**

| Field       | Size (Bytes) | Field Source | Description              |
|-------------|--------------|--------------|--------------------------|
| Record Type | 2            | Reader       | 5026H: IAG Read Response |
| Data        | 30           | Tag          | —                        |
| CRC         | 2            | Tag          | CRC of data only         |

**Table 8-25 IAG Read Response Format (continued)**

| Field          | Size (Bytes) | Field Source | Description |
|----------------|--------------|--------------|-------------|
| Total Response | 34           | —            | —           |

RS-232 Transmission Format: hex to ASCII

ASCII Characters: 68

Table 8-26 lists the IAG Read Response Data parameters.

**Table 8-26 IAG Read Response Data Parameters (5026H)**

| IAG Read Response |                         |                   |                        |                   |                  |                      |                 |       | Data Payload |
|-------------------|-------------------------|-------------------|------------------------|-------------------|------------------|----------------------|-----------------|-------|--------------|
| Field             | Bit 7                   | Bit 6             | Bit 5                  | Bit 4             | Bit 3            | Bit 2                | Bit 1           | Bit 0 |              |
| Record            | Record Type (MSB)       |                   |                        |                   |                  |                      |                 |       | 50H          |
| Record            | Record Type (LSB)       |                   |                        |                   |                  |                      |                 |       | 26H          |
|                   | Read Only Partition     |                   |                        |                   |                  |                      |                 |       |              |
| Data              | Header (3 bits)         |                   |                        | Tag Type (3 bits) |                  |                      | App ID (3 bits) |       | XXH          |
| Data              | App ID                  | Group ID (7 bits) |                        |                   |                  |                      |                 |       | XXH          |
| Data              | Agency ID (7 bits)      |                   |                        |                   |                  |                      | Ser Num         |       | XXH          |
| Data              | Serial Number (24 bits) |                   |                        |                   |                  |                      |                 |       | XXH          |
| Data              | Serial Number           |                   |                        |                   |                  |                      |                 |       | XXH          |
| Data              | Serial Number           |                   |                        |                   |                  |                      | V. Class        |       | XXH          |
| Data              | Vehicle Class (11 bits) |                   |                        |                   |                  |                      |                 |       | XXH          |
| Data              | Vehicle Class           |                   | Revenue Type (4 bits)  |                   |                  |                      | C. S.           | M. L. | XXH          |
| Data              | M. L.                   |                   | Agency Data 1 (3 bits) |                   |                  | ISTHA Class (4 bits) |                 |       | XXH          |
| Data              | Agency Data 2 (24 bits) |                   |                        |                   |                  |                      |                 |       | XXH          |
| Data              | Agency Data 2           |                   |                        |                   |                  |                      |                 |       | XXH          |
| Data              | Agency Data 2           |                   |                        |                   |                  |                      |                 |       | XXH          |
|                   | Read/Write Partition    |                   |                        |                   |                  |                      |                 |       |              |
| Data              | Reader ID (12 bits)     |                   |                        |                   |                  |                      |                 |       | XXH          |
| Data              | Reader ID               |                   |                        |                   | TM Date (9 bits) |                      |                 |       | XXH          |
| Data              | TM Date                 |                   |                        |                   |                  | TM Time (17 bits)    |                 |       | XXH          |



**Table 8-26 IAG Read Response Data Parameters (5026H) (continued)**

| IAG Read Response |                              |               |                       |                |                         |              |                    |       | Data Payload |
|-------------------|------------------------------|---------------|-----------------------|----------------|-------------------------|--------------|--------------------|-------|--------------|
| Field             | Bit 7                        | Bit 6         | Bit 5                 | Bit 4          | Bit 3                   | Bit 2        | Bit 1              | Bit 0 |              |
| Data              | TM Time                      |               |                       |                |                         |              |                    |       | XXH          |
| Data              | TM Time                      |               |                       |                |                         |              | Agency ID (7 bits) |       | XXH          |
| Data              | Agency ID                    |               |                       |                |                         | Plaza ID (7) |                    |       | XXH          |
| Data              | Plaza ID                     |               |                       |                | Lane ID (5 bits)        |              |                    |       | XXH          |
| Date              | Lane ID                      | Date (9 bits) |                       |                |                         |              |                    |       | XXH          |
| Date              | Date                         |               |                       | Time (17 bits) |                         |              |                    |       | XXH          |
| Date              | Time                         |               |                       |                |                         |              |                    |       | XXH          |
| Date              | Time                         |               |                       |                | Vehicle Class (11 bits) |              |                    |       | XXH          |
| Date              | Vehicle Class                |               |                       |                |                         |              | Future (4 bits)    |       | XXH          |
| Date              | Future                       |               | Agency Data (30 bits) |                |                         |              |                    |       | XXH          |
| Date              | Agency Data                  |               |                       |                |                         |              |                    |       | XXH          |
| Date              | Agency Data                  |               |                       |                |                         |              |                    |       | XXH          |
| Date              | Agency Data                  |               |                       |                |                         |              |                    |       | XXH          |
| Date              | Transaction Number (16 bits) |               |                       |                |                         |              |                    |       | XXH          |
| Date              | Transaction Number           |               |                       |                |                         |              |                    |       | XXH          |
| CRC               | CRC                          |               |                       |                |                         |              |                    |       | XXH          |
| CRC               | CRC                          |               |                       |                |                         |              |                    |       | XXH          |

### ***IAG Read Response Example***

The IAG Read Response example is

#5026ECC11E01FCB21200010587052DBAAD1607852D89687D54E03060001AAFB5983  
where

# SOM

5026 IAG Read Record Type, 2 bytes in hex

**Note:** Due to overlap of byte boundaries by tag data fields, all further data breakdown will be in binary.

Hex tag data:

MSB ECC11E01FCB21200 010587052DBAAAD1 607852D89687D54E 03060001AAFB5983 LSB

$32 \text{ bytes tag data} * 8 \text{ bits/byte} = 256 \text{ bits}$

$32 \text{ bytes} / 8 \text{ bytes per line} = 4 \text{ lines}$

$256 \text{ bits} / 4 \text{ lines} = 64 \text{ bits/line from MSB to LSB}$

MSB 111011001100000100011110000000011111100101100100001001000000000  
0000000100000101100001110000010100101101101110101010101011010001  
01100000011110000101001011011000100101101000011111010101001110  
0000001100000110000000000000000110101010111110110101100110000011 LSB

Response breakdown is from MSB to LSB, starting with the header field and ending with the CRC.

#### Read-Only Partition

| Field (# of bits)          | : | Bit Pattern              | : | Decimal |
|----------------------------|---|--------------------------|---|---------|
| Header (3 bits)            | : | 111                      | : | 7       |
| Tag Type (3 bits)          | : | 011                      | : | 3       |
| Application ID (3 bits)    | : | 001                      | : | 1       |
| Group ID (7 bits)          | : | 1000001                  | : | 65      |
| Agency ID (7 bits)         | : | 0001111                  | : | 15      |
| Serial Number (24 bits)    | : | 000000001111111001011001 | : | 65113   |
| Vehicle Class (11 bits)    | : | 00001001000              | : | 72      |
| Revenue Type (4 bits)      | : | 0000                     | : | 0       |
| Commission Status (1 bit)  | : | 0                        | : | 0       |
| Mounting Location (2 bits) | : | 00                       | : | 00      |
| Agency Data 1 (3 bits)     | : | 000                      | : | 000     |
| ISTHA Class (4 bits)       | : | 0001                     | : | 1       |
| Agency Data 2 (24 bits)    | : | 000001011000011100000101 | : | 362245  |

#### Read/Write Partition

| Field (# of bits)   | : | Bit Pattern       | : | Decimal |
|---------------------|---|-------------------|---|---------|
| Reader ID (12 bits) | : | 001011011011      | : | 731     |
| TM Date (9 bits)    | : | 101010101         | : | 341     |
| TM Time (17 bits)   | : | 01011010001011000 | : | 46168   |
| Agency ID (7 bits)  | : | 0001111           | : | 15      |
| Plaza ID (7 bits)   | : | 0000101           | : | 5       |
| Lane ID (5 bits)    | : | 00101             | : | 5       |

Date (9 bits) : 101100010 : 354  
 Time (17 bits) : 01011010000111110 : 46142  
 Vehicle Class (11 bits) : 10101010011 : 1363  
 Future (4 bits) : 1000 : 8  
 Agency Data (30 bits) : 000011000001100000000000000001 : 50724865  
 Transaction Number (16 bits) : 1010101011111011 : 43771  
 CRC (16 bits) : 0101100110000011 : 22915

## **IAG Cross-Lane Read Response**

The IAG Cross-Lane Read Response is as follows: #5027<Data><CRC>. [Table 8-27](#) lists the IAG Cross-Lane Read Response format fields.

**Table 8-27 IAG Cross-Lane Read Response Format**

| Field          | Size (bytes) | Field Source | Description                |
|----------------|--------------|--------------|----------------------------|
| Record Type    | 2            | Reader       | 5027H: IAG Cross-Lane Read |
| Data           | 30           | Tag          | —                          |
| CRC            | 2            | Tag          | CRC of data only           |
| Total Response | 34           | —            | —                          |

RS-232 Transmission Format: hex to ASCII

ASCII Characters: 68

[Table 8-28](#) lists the IAG Cross-Lane Read Response data parameters.

**Table 8-28 IAG Cross-Lane Read Response Data Parameters (5027H)**

| IAG Cross-Lane Read Response |                    |                   |       |                   |       |       |                  |       | Data Payload |
|------------------------------|--------------------|-------------------|-------|-------------------|-------|-------|------------------|-------|--------------|
| Field                        | Bit 7              | Bit 6             | Bit 5 | Bit 4             | Bit 3 | Bit 2 | Bit 1            | Bit 0 |              |
| Record                       | Record Type (MSB)  |                   |       |                   |       |       |                  |       | 50H          |
| Record                       | Record Type (LSB)  |                   |       |                   |       |       |                  |       | 27H          |
| Data                         | Header (3 bits)    |                   |       | Tag Type (3 bits) |       |       | App. ID (3 bits) |       | XXH          |
| Data                         | App ID             | Group ID (7 bits) |       |                   |       |       |                  |       | XXH          |
| Data                         | Agency ID (7 bits) |                   |       |                   |       |       | Ser Num          |       | XXH          |

**Table 8-28 IAG Cross-Lane Read Response Data Parameters (5027H) (continued)**

**Table 8-28 IAG Cross-Lane Read Response Data Parameters (5027H) (continued)**

| IAG Cross-Lane Read Response |                    |       |       |       |       |       |       |       | Data Payload |
|------------------------------|--------------------|-------|-------|-------|-------|-------|-------|-------|--------------|
| Field                        | Bit 7              | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |              |
| Data                         | Transaction Number |       |       |       |       |       |       |       | XXH          |
| CRC                          | CRC                |       |       |       |       |       |       |       | XXH          |
| CRC                          | CRC                |       |       |       |       |       |       |       | XXH          |

### ***IAG Cross-Lane Read Response Example***

The IAG Cross-Lane Read Response example is

#5027ECC11E01FCB21200010587052DBAAAD1607852D89687D54E03060001AAFB5983

where

# SOM

5027 IAG Cross-Lane Read Record Type, 2 bytes in hex

**Note:** Due to overlap of byte boundaries by tag data fields, all field breakdowns are in binary.

Hex tag data:

MSB ECC11E01FCB21200 010587052DBAAAD1 607852D89687D54E 03060001AAFB5983 LSB

32 bytes tag data\*8 bits/byte = 256 bits

32 bytes/8 bytes per line = 4 lines

256 bits/4 lines = 64 bits/line from MSB to LSB

MSB 11101100110000010001111000000001111111001011001000010010000000000  
0000000100000101100001110000010100101101101110101010101011010001  
0110000001111000010100101101100010010110100001111101010101001110  
00000011000001100000000000000001101010101111101110101100110000011 LSB

Response breakdown is from MSB to LSB, starting with the header field and ending with the CRC.

*Read-Only Partition*

| Field (# of bits) | : | Bit Pattern | : | Decimal |
|-------------------|---|-------------|---|---------|
| Header (3 bits)   | : | 111         | : | 7       |

|                             |   |                          |   |        |
|-----------------------------|---|--------------------------|---|--------|
| Tag Type (3 bits)           | : | 011                      | : | 3      |
| Application ID (17 bits)    | : | 001                      | : | 1      |
| Group ID (7 bits)           | : | 1000001                  | : | 65     |
| Agency ID (7 bits)          | : | 0001111                  | : | 15     |
| Serial Number (24 bits)     | : | 000000001111111001011001 | : | 65113  |
| Vehicle Class (11 bits)     | : | 00001001000              | : | 72     |
| Revenue Type (4 bits)       | : | 0000                     | : | 0      |
| Commission Status (11 bits) | : | 0                        | : | 0      |
| Mounting Location (2 bits)  | : | 00                       | : | 00     |
| Agency Data 1 (3 bits)      | : | 000                      | : | 000    |
| ISTHA Class (4 bits)        | : | 0001                     | : | 1      |
| Agency Data 2 (24 bits)     | : | 000001011000011100000101 | : | 362245 |

#### Read/Write Partition

| Field (# of bits)            | : | Bit Pattern                    | : | Decimal  |
|------------------------------|---|--------------------------------|---|----------|
| Reader ID (12 bits)          | : | 001011011011                   | : | 731      |
| TM Date (9 bits)             | : | 101010101                      | : | 341      |
| TM Time (17 bits)            | : | 01011010001011000              | : | 46168    |
| Agency ID (7 bits)           | : | 0001111                        | : | 15       |
| Plaza ID (7 bits)            | : | 0000101                        | : | 5        |
| Lane ID (5 bits)             | : | 00101                          | : | 5        |
| Date (9 bits)                | : | 101100010                      | : | 354      |
| Time (17 bits)               | : | 01011010000111110              | : | 46142    |
| Vehicle Class (11 bits)      | : | 10101010011                    | : | 1363     |
| Future (4 bits)              | : | 1000                           | : | 8        |
| Agency Data (30 bits)        | : | 000011000001100000000000000001 | : | 50724865 |
| Transaction Number (16 bits) | : | 1010101011111011               | : | 43771    |
| CRC (16 bits)                | : | 0101100110000011               | : | 22915    |

---

## ***eGo ID Word Data Response***

The eGo ID Word Data Response is as follows: #E000<Data><CRC>. [Table 8-29](#) lists the eGo ID Word Data Response format fields.

**Table 8-29 eGo ID Word Data Response Format**

| Field          | Size (Bytes) | Field Source | Description                  |
|----------------|--------------|--------------|------------------------------|
| Record Type    | 2            | Reader       | eGo ID word data record type |
| Data           | 8            | Tag          | ID word data                 |
| CRC            | 2            | Tag          | CRC of data only             |
| Total Response | 12           | —            | —                            |

RS-232 Transmission Format: hex to ASCII

ASCII Characters: 24

[Table 8-30](#) lists the eGo ID Word Data Response parameters.

**Table 8-30 eGo ID Word Data Response Parameters (E000H)**

| eGo ID Word Data Response |                   | Data Payload |
|---------------------------|-------------------|--------------|
| Field                     | Bits 7–0          |              |
| Record                    | Record Type (MSB) | E0H          |
| Record                    | Record Type (LSB) | 00H          |
| Data                      | ID Byte 0         | XXH          |
| Data                      | ID Byte 1         | XXH          |
| Data                      | ID Byte 2         | XXH          |
| Data                      | ID Byte 3         | XXH          |
| Data                      | ID Byte 4         | XXH          |
| Data                      | ID Byte 5         | XXH          |
| Data                      | ID Byte 6         | XXH          |
| Data                      | ID Byte 7         | XXH          |
| CRC                       | CRC (MSB)         | XXH          |
| CRC                       | CRC (LSB)         | XXH          |

### **eGo ID Word Data Response Example**

The eGo ID Word Data Response example is #E000ABCDEF0123456789A1B5



where

# SOM

E000 eGo ID Word Data Record Type, 2 bytes in hex

ABCDEF0123456789 Tag ID, 8 bytes in hex

A1B5 CRC, 2 bytes in hex

***Note:** Tag Data and CRC are used for parsing and format purposes only. The record types shown contain valid data.*

## eGo Streamlined Read Response

The eGo Streamlined Read response is #E2h<Data><CRC>. [Table 8-31](#) lists the eGo Streamlined Read Response format fields.

**Table 8-31 eGo Streamlined Read Response Format**

| Field           | Size (Bytes) | Field Source | Description                      |
|-----------------|--------------|--------------|----------------------------------|
| Record Type     | 1            | Reader       | eGo streamlined read record type |
| XX Page Address | 1            | Reader       | Page address                     |
| Data            | 16           | Tag          | Page data                        |
| CRC             | 2            | Tag          | CRC of data only                 |
| Total Response  | 20           | —            | —                                |

RS-232 Transmission Format: hex to ASCII

ASCII Characters: 40

[Table 8-32](#) lists the eGo Streamlined Read response parameters.

**Table 8-32 eGo Streamlined Read Response Parameters (E2HXXH)**

| eGo Streamlined Read Response Data |                  | Data Payload |
|------------------------------------|------------------|--------------|
| Field                              | Bits 7–0         |              |
| Record                             | Record Type      | E2H          |
| Record                             | Page Address     | XXH          |
| Data                               | ID Byte 0        | XXH          |
| Data                               | ID Byte 1        | XXH          |
| Data                               | ID Byte 2        | XXH          |
| Data                               | ID Byte 3        | XXH          |
| Data                               | ID Byte 4        | XXH          |
| Data                               | ID Byte 5        | XXH          |
| Data                               | ID Byte 6        | XXH          |
| Data                               | ID Byte 7        | XXH          |
| Data                               | Page Data Byte 0 | XXH          |

**Table 8-32 eGo Streamlined Read Response Parameters (E2HXXH) (continued)**

| eGo Streamlined Read Response Data |                  | Data Payload |
|------------------------------------|------------------|--------------|
| Field                              | Bits 7–0         |              |
| Data                               | Page Data Byte 1 | XXH          |
| Data                               | Page Data Byte 2 | XXH          |
| Data                               | Page Data Byte 3 | XXH          |
| Data                               | Page Data Byte 4 | XXH          |
| Data                               | Page Data Byte 5 | XXH          |
| Data                               | Page Data Byte 6 | XXH          |
| Data                               | Page Data Byte 7 | XXH          |
| CRC                                | CRC              | XXH          |
| CRC                                | CRC              | XXH          |

### ***eGo Streamlined Read Response Example***

The eGo Streamlined Read response is #E250AABBCCDDEEFF0011ABCDEF0123456789A1B5 where

# SOM

E2 eGo Page Data Record Type, 1 byte in hex

50 XX Page Address, 1 byte in hex

AABBCCDDEEFF0011 ID Word Data, 8 bytes in hex

ABCDEF0123456789 Page Data, 8 bytes in hex

A1B5 CRC, 2 bytes in hex

XX Page Address: 50 hex → 80 decimal/8 bytes/page = Page 10

***Note:*** Tag Data and CRC are used for parsing and format purposes only. The record types shown contain valid data.

## SeGo ID Word Data Response

The SeGo ID Word Data response is #E800<Data><CRC>. [Table 8-33](#) lists the SeGo ID Word Data Response format fields.

**Table 8-33 SeGo ID Word Data Response Format**

| Field          | Size (Bytes) | Field Source | Description                   |
|----------------|--------------|--------------|-------------------------------|
| Record Type    | 2            | Reader       | SeGo ID word data record type |
| Data           | 8            | Tag          | ID word data                  |
| CRC            | 2            | Tag          | CRC of data only              |
| Total Response | 12           | —            | —                             |

RS-232 Transmission Format: hex to ASCII

ASCII Characters: 24

[Table 8-34](#) lists the SeGo ID Word Data Response parameters.

**Table 8-34 SeGo ID Word Data Response Parameters (E800H)**

| SeGo ID Word Data Response |                   | Data Payload |
|----------------------------|-------------------|--------------|
| Field                      | Bits 7–0          |              |
| Record                     | Record Type (MSB) | E8H          |
| Record                     | Record Type (LSB) | 00H          |
| Data                       | ID Byte 0         | XXH          |
| Data                       | ID Byte 1         | XXH          |
| Data                       | ID Byte 2         | XXH          |
| Data                       | ID Byte 3         | XXH          |
| Data                       | ID Byte 4         | XXH          |
| Data                       | ID Byte 5         | XXH          |
| Data                       | ID Byte 6         | XXH          |
| Data                       | ID Byte 7         | XXH          |
| CRC                        | CRC               | XXH          |
| CRC                        | CRC               | XXH          |

## SeGo ID Word Data Response Example

The SeGo ID Word Data Response example is #E800ABCDEF0123456789A1B5  
where

# SOM

E800 SeGo ID Word Data Record Type, 2 bytes in hex

ABCDEF0123456789 Tag ID, 8 bytes in hex

A1B5 CRC, 2 bytes in hex

***Note:** Tag Data and CRC are used for parsing and format purposes only. The record types shown contain valid data.*

---

## SeGo Streamlined Read Response

The SeGo Streamlined Read response is #EAXX<Data><CRC>. [Table 8-35](#) lists the SeGo Streamlined Read Response format fields.

**Table 8-35 SeGo Streamlined Read Response Format**

| Field           | Size (Bytes) | Field Source | Description                       |
|-----------------|--------------|--------------|-----------------------------------|
| Record Type     | 1            | Reader       | SeGo streamlined read record type |
| XX Page Address | 1            | Reader       | Page address                      |
| Data            | 16           | Tag          | Page data                         |
| CRC             | 2            | Tag          | CRC of data only                  |
| Total Response  | 20           | —            | —                                 |

RS-232 Transmission Format: hex to ASCII

ASCII Characters: 40

[Table 8-36](#) lists the SeGo Streamlined Read Response data parameters.

**Table 8-36 SeGo Streamlined Read Response Parameters (EAXXH)**

| SeGo Streamlined Read Response Data |              | Data Payload |
|-------------------------------------|--------------|--------------|
| Field                               | Bits 7–0     |              |
| Record                              | Record Type  | EAH          |
| Record                              | Page Address | XXH          |

**Table 8-36 SeGo Streamlined Read Response Parameters (EAXXH) (continued)**

| SeGo Streamlined Read Response Data |                  | Data Payload |
|-------------------------------------|------------------|--------------|
| Field                               | Bits 7–0         |              |
| Data                                | ID Byte 0        | XXH          |
| Data                                | ID Byte 1        | XXH          |
| Data                                | ID Byte 2        | XXH          |
| Data                                | ID Byte 3        | XXH          |
| Data                                | ID Byte 4        | XXH          |
| Data                                | ID Byte 5        | XXH          |
| Data                                | ID Byte 6        | XXH          |
| Data                                | ID Byte 7        | XXH          |
| Data                                | Page Data Byte 0 | XXH          |
| Data                                | Page Data Byte 1 | XXH          |
| Data                                | Page Data Byte 2 | XXH          |
| Data                                | Page Data Byte 3 | XXH          |
| Data                                | Page Data Byte 4 | XXH          |
| Data                                | Page Data Byte 5 | XXH          |
| Data                                | Page Data Byte 6 | XXH          |
| Data                                | Page Data Byte 7 | XXH          |
| CRC                                 | CRC              | XXH          |
| CRC                                 | CRC              | XXH          |

### ***SeGo Streamlined Read Response Example***

The SeGo Streamlined Read Response example is #EA50AABBCCDDEEFF0011ABC-DEF0123456789A1B5

where

# SOM

EA SeGo Page Data Record Type, 1 byte in hex

50 XX Page Address, 1 byte in hex

AABBCCDDEEFF0011 ID Word Data, 8 bytes in hex

ABCDEF0123456789 Page Data, 8 bytes in hex

A1B5 CRC, 2 bytes in hex

XX Page Address: 50 hex → 80 decimal/8 bytes/page = Page 10

***Note:** Tag Data and CRC are used for parsing and format purposes only. The record types shown contain valid data.*

---

## ***Cyclic Redundancy Check***

All <som> and <eom> character conversions are performed after the CRC of the transmit data and before the CRC of the receive data. The CRC is calculated as follows:

```
typedef unsigned short      UWORD;
typedef unsigned char       UCHAR;

UWORD
uwAI1200eCalculateCrc(
    UCHAR *pucStr
){
    UWORD uwCrc;
    /*
     * this array taken from AMTECH code to speed up calculation
     */
    UWORD puwCrcTab[256] = {
        0x0000, 0x1021, 0x2042, 0x3063, 0x4084, 0x50a5, 0x60c6, 0x70e7,
        0x8108, 0x9129, 0xa14a, 0xb16b, 0xc18c, 0xd1ad, 0xe1ce, 0xf1ef,
        0x1231, 0x0210, 0x3273, 0x2252, 0x52b5, 0x4294, 0x72f7, 0x62d6,
        0x9339, 0x8318, 0xb37b, 0xa35a, 0xd3bd, 0xc39c, 0xf3ff, 0xe3de,
        0x2462, 0x3443, 0x0420, 0x1401, 0x64e6, 0x74c7, 0x44a4, 0x5485,
        0xa56a, 0xb54b, 0x8528, 0x9509, 0xe5ee, 0xf5cf, 0xc5ac, 0xd58d,
        0x3653, 0x2672, 0x1611, 0x0630, 0x76d7, 0x66f6, 0x5695, 0x46b4,
        0xb75b, 0xa77a, 0x9719, 0x8738, 0xf7df, 0xe7fe, 0xd79d, 0xc7bc,
        0x48c4, 0x58e5, 0x6886, 0x78a7, 0x0840, 0x1861, 0x2802, 0x3823,
        0xc9cc, 0xd9ed, 0xe98e, 0xf9af, 0x8948, 0x9969, 0xa90a, 0xb92b,
        0x5af5, 0x4ad4, 0x7ab7, 0x6a96, 0x1a71, 0x0a50, 0x3a33, 0x2a12,
        0xdbfd, 0xcbdc, 0xfbbf, 0xeb9e, 0x9b79, 0x8b58, 0xbb3b, 0xab1a,
        0x6ca6, 0x7c87, 0x4ce4, 0x5cc5, 0x2c22, 0x3c03, 0x0c60, 0x1c41,
        0xedae, 0xfd8f, 0xcdec, 0xddcd, 0xad2a, 0xbd0b, 0x8d68, 0x9d49,
        0x7e97, 0x6eb6, 0x5ed5, 0x4ef4, 0x3e13, 0x2e32, 0x1e51, 0x0e70,
        0xff9f, 0xefbe, 0xdfdd, 0xcffc, 0xbf1b, 0xaf3a, 0x9f59, 0x8f78,
        0x9188, 0x81a9, 0xb1ca, 0xa1eb, 0xd10c, 0xc12d, 0xf14e, 0xe16f,
        0x1080, 0x00a1, 0x30c2, 0x20e3, 0x5004, 0x4025, 0x7046, 0x6067,
        0x83b9, 0x9398, 0xa3fb, 0xb3da, 0xc33d, 0xd31c, 0xe37f, 0xf35e,
        0x02b1, 0x1290, 0x22f3, 0x32d2, 0x4235, 0x5214, 0x6277, 0x7256,
```



```

0xb5ea, 0xa5cb, 0x95a8, 0x8589, 0xf56e, 0xe54f, 0xd52c, 0xc50d,
0x34e2, 0x24c3, 0x14a0, 0x0481, 0x7466, 0x6447, 0x5424, 0x4405,
0xa7db, 0xb7fa, 0x8799, 0x97b8, 0xe75f, 0xf77e, 0xc71d, 0xd73c,
0x26d3, 0x36f2, 0x0691, 0x16b0, 0x6657, 0x7676, 0x4615, 0x5634,
0xd94c, 0xc96d, 0xf90e, 0xe92f, 0x99c8, 0x89e9, 0xb98a, 0xa9ab,
0x5844, 0x4865, 0x7806, 0x6827, 0x18c0, 0x08e1, 0x3882, 0x28a3,
0xcb7d, 0xdb5c, 0xeb3f, 0xfb1e, 0x8bf9, 0x9bd8, 0xabbb, 0xbb9a,
0x4a75, 0x5a54, 0x6a37, 0x7a16, 0x0af1, 0x1ad0, 0x2ab3, 0x3a92,
0xfd2e, 0xed0f, 0xdd6c, 0xcd4d, 0xbdaa, 0xad8b, 0x9de8, 0x8dc9,
0x7c26, 0x6c07, 0x5c64, 0x4c45, 0x3ca2, 0x2c83, 0x1ce0, 0x0cc1,
0xef1f, 0xff3e, 0xcf5d, 0xdf7c, 0xaf9b, 0xbfba, 0x8fd9, 0x9ff8,
0x6e17, 0x7e36, 0x4e55, 0x5e74, 0x2e93, 0x3eb2, 0x0ed1, 0x1ef0 };

```

```

/*

```

```

 * Traverse thru the string calculating the CRC as we go

```

```

 */

```

```

for( uwCrc = 0; *pucStr != '\0'; ++pucStr ){

```

```

    uwCrc = puwCrcTab[ ((uwCrc >> 8) & 0xff) ] ^
        (uwCrc << 8) ^ ( *pucStr & 0xff );

```

```

}

```

```

return( uwCrc );

```

```

}

```

```

strcpy(sOutBuf, "#620");

```

```

sprintf(sTmp, "%04X", uwAI1200eCalculateCrc(&sOutBuf[1]) );

```

```

strcat(sOutBuf, sTmp);

```

---

## Configuring the Lane



# Configuring the Lane

***This chapter provides information on the importance of lane tuning for optimum automatic vehicle identification (AVI) system performance. This chapter also describes the Encompass<sup>®</sup> Reader functions and features that can assist you in tuning an AVI lane.***

## ***Why You Need to Configure a Lane***

---

Lane configuration optimizes the radio frequency (RF) characteristics and signal timing of an AVI-equipped toll lane to maximize the performance prescribed by the lane's traffic requirements. Typically, consideration of these factors is necessary for each individual lane, although in some installations it may be possible to identify broader solutions, then apply these solutions to certain classes of lanes having similar characteristics, followed by additional fine adjustment on an individual lane-by-lane basis. This process is necessitated by the radio link, which is subject to varying factors such as:

- Lane type
- Geometry of fixed objects near the capture zone
- Interference from external sources
- Adjacent lane interference
- Natural non-homogeneity of RF field strength within the ideal capture zone
- Varying tag environments

These factors may vary within an installation and from lane to lane within the same plaza. The tag protocol types used at an installation play a significant role in configuring the lanes for operation. Knowing the appropriate factors and available tools is necessary for the set-up and troubleshooting of AVI lanes.

## ***Marking the Read Zone***

---

The area where the Encompass Reader reads tags at the current RF range is called the read zone. The antenna pattern, or read zone, of the Encompass Reader would look roughly like a pear-shaped balloon if you were able to see it. When installing the AA3152 Universal Toll Antenna (UTA), you should first mark the unit's read zone using the RF range set at the factory-default maximum.

If two UTAs are installed near each other, TransCore recommends that you fine-tune

each reader for the ideal read zone before connecting it permanently to sense input/sense output and communications cables.

---

## Required Supplies

You need the following supplies to mark the read zone:

- Test tags, supplied by the TransCore dealer or distributor
- Piece of windshield-type glass 0.19 to 0.23 inches (4.82 to 5.84 mm) in thickness and approximately 12 inches (30.48 cm) square on which to attach the eGo Plus Sticker Tag



### Caution

*The eGo Plus Sticker Tag and eGo Windshield Sticker Tag have a reduced read range if not mounted on glass.*

- Audible circuit tester and 9V DC battery for circuit tester power as described in the section
- Piece of chalk or roll of tape
- Plastic or wooden yardstick for tags
- Vinyl electrical tape or hook-and-loop material

---

## Guidelines

***Note:** 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.*

### To mark the read zone

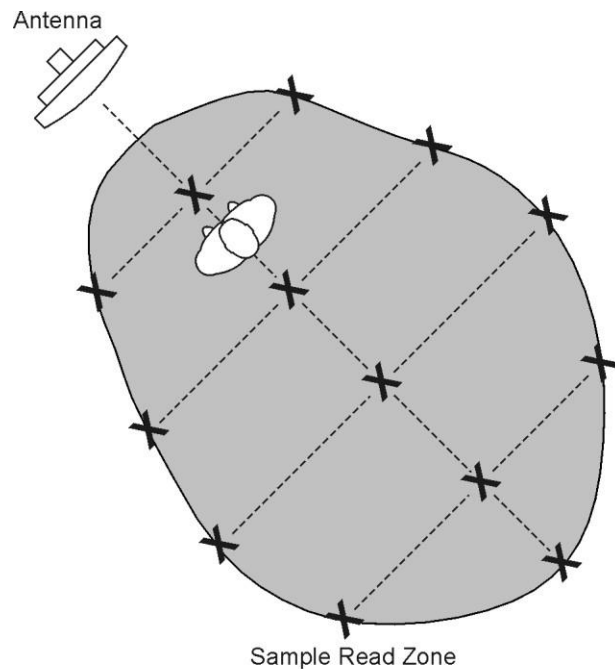
1. Turn on continuous RF power using the #6411 command.
2. Secure the test tag to the end of the yardstick using electrical tape or hook-and-loop material or affix the test eGo Plus Sticker Tag or eGo Windshield Sticker Tag to the glass piece. Be sure the tag polarization (horizontal or vertical alignment) matches that of the UTA. If using an eGo Plus Sticker Tag or eGo Windshield Sticker Tag as the test tag, the glass should be in front of the tag (between the tag and the reader).
3. Stand directly in front of and about 5 feet (1.5 m) away from the overhead UTA. Hold the stick or the piece of glass so that the tag is positioned at a height and angle consistent with a tag installed on a vehicle. The audible tester sounds upon tag read. If the tester does not sound, try a different tag. If the tester still does not sound, verify that the tester is working correctly and retest the tag.

***Note:** If you hold the test tag in your hand, your hand absorbs the RF signal and*

*the test results are not accurate.*

4. Mark the spot with chalk or tape.
5. Move to the left until the sound stops and mark the ground with chalk or tape at the location of the tag when the sound stopped.
6. Return to the center and then move to the right until the sound stops and mark the ground with chalk or tape at the location of the tag when the sound stopped.
7. Return to the center and step backward 2 feet (0.6 m) and repeat steps 5 through 7.
8. Continue moving the tag in this manner, placing marks on the ground to identify the boundary of the read zone each time the sound stops. Continue moving the tag to various locations until the read zone is fully marked.
9. You can now connect the outer marks to draw the outer boundary of the read zone.

Figure 9-1 is a view of a sample read zone within a controlled lane. The outer X marks show the outside edges of the read zone.



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**Figure 9-1 Sample Read Zone Marking Pattern**

10. Standing at the farthest point of the pattern, walk toward the UTA and listen for a continuous sound from the audible tester. If the sound is not continuous, it could indicate a weak or *patchy* RF pattern.

Use the appropriate UDP command (Set RF Attenuation (0051H) or Set Data Detect (0053H) or both) or AI1200-emulation command (#920NDU) to adjust the footprint for the installation's tag protocols. To decrease the size of the footprint,

increase the attenuation, which lowers the transmit RF power.

## Lane Configuration Examples

---

This section presents starting values for lane configuration parameters that can be used for various protocol combinations. The tables do not represent all of the possible protocol combinations available with the Encompass Reader, but they provide a framework for developing installation-specific configuration parameters.

---

### Lane Configuration Parameters for SeGo/IT2200 Protocols

To configure the reader for initial use reading SeGo and IT2200 protocols, set the recommended starting values for the parameters listed in [Table 9-1](#).

**Table 9-1 Initial Configuration Parameters for IT2200 and SeGo Protocols**

| Parameter                      | Recommended Starting Value                                                                             |
|--------------------------------|--------------------------------------------------------------------------------------------------------|
| Protocol Selection             | IT2200 and SeGo                                                                                        |
| Enable Sequence                | IT2200 → Ack or Nack → Antenna → Set                                                                   |
| SeGo Group Select Equals (GSE) | If using GSE, use the recommended settings shown in <i>italics</i> and marked with <sup>a</sup>        |
| <sup>a</sup> Tag ID            | 8-byte tag request ID; however, it is not used in Mode 88 so value should be set to 0000000000000000H. |
| <sup>a</sup> Command Control   | Always set to 00H for GSE                                                                              |
| <sup>a</sup> Page Data         | Contains 8 bytes of configurable comparison data. Set to 0 by default                                  |
| <sup>a</sup> Antenna           | Set antenna with values between 0 to 0FH. Set to 0 by default                                          |
| <sup>a</sup> Address           | Tag memory address for byte mask. Tag memory address varies, so values for this field may vary         |
| <sup>a</sup> Mask              | Set mask to desired bit, range = 0–FF                                                                  |
| <sup>a</sup> Start Address     | Set to 00H                                                                                             |
| <sup>a</sup> Command Depth     | Set to 00H                                                                                             |
| Reset                          | Reset reader for changes to take effect                                                                |
| Downlink Frequency             | Set downlink frequency to 916.00 dB                                                                    |
| Uplink Frequency               | Set uplink frequency to 903.00 dB                                                                      |
| IT2200 Downlink Attenuation    | Set attenuation so that the line loss and attenuation value = 8 dB                                     |

**Table 9-1 Initial Configuration Parameters for IT2200 and SeGo Protocols (continued)**

|                                          |                                                                                                         |
|------------------------------------------|---------------------------------------------------------------------------------------------------------|
| IT2200 Uplink Attenuation                | Set attenuation so that the line loss and attenuation value = 8 dB                                      |
| SeGo Downlink Attenuation                | Set attenuation so that the line loss and attenuation value = 0 dB                                      |
| SeGo Uplink Attenuation                  | Set attenuation so that the line loss and attenuation value = 0 dB                                      |
| Retry Count                              | Recommend setting of 5 for all required retry counts                                                    |
| IT2200 Data Detect                       | Set to 2 dB                                                                                             |
| SeGo Data Detect                         | Set to 4 dB                                                                                             |
| IT2200 Seen Count                        | Set to 10 (every 140 ms) for both tag types                                                             |
| IT2200 Uniqueness Count                  | Set to 1000 every 140 seconds for both tag types                                                        |
| SeGo Seen Count                          | Set to 10 (every 140 ms) for both tag types                                                             |
| SeGo Uniqueness Count                    | Set to 1000 every 140 seconds for both tag types                                                        |
| Line Loss                                | Set the RF cable loss (line loss from reader to antenna) to the nearest dB value or 0, 1, 2, or 3       |
| IT2200 Configuration Parameters          | Set recommended IT2200 configuration parameters as shown in <i>italics</i> and marked with <sup>b</sup> |
| <sup>b</sup> <i>Retry Count</i>          | <i>Recommend setting of 5 for all required retry counts</i>                                             |
| <sup>b</sup> <i>Time-out</i>             | <i>If using IT2200 Gen Ack, set desired tag “sleep time” ranging between 0 and 127 seconds (s).</i>     |
| <sup>b</sup> <i>Tag ID</i>               | <i>Set 4-bit tag request ID</i>                                                                         |
| <sup>b</sup> <i>LCD</i>                  | <i>Set desired value between 02H–0FH</i>                                                                |
| <sup>b</sup> <i>Antenna</i>              | <i>Set antenna with values between 0 to 0FH. Set to 0 by default</i>                                    |
| <sup>b</sup> <i>Audio/Visual Options</i> | <i>Set desired options</i>                                                                              |
| <sup>b</sup> <i>Check Tag (optional)</i> | <i>Select IT2200, SeGo, or All, and “fire” check tag</i>                                                |

---

## **Lane Configuration Parameters for Title 21/SeGo Protocols**



To configure the reader for initial use reading Title 21 and SeGo protocols, set the recommended starting values for the parameters listed in [Table 9-2](#).

**Table 9-2 Initial Configuration Parameters for Title 21 and SeGo Protocols**

| Parameter                     | Recommended Starting Value                                                                                   |
|-------------------------------|--------------------------------------------------------------------------------------------------------------|
| Protocol Selection            | Title 21 and SeGo                                                                                            |
| Enable Sequence               | Title 21 → Ack or Nack → Antenna → Set                                                                       |
| SeGo GSE                      | If using GSE, use the recommended settings shown in <i>italics</i> and marked with <sup>c</sup>              |
| <sup>c</sup> Tag ID           | <i>8-byte tag request ID; however, it is not used in Mode 88 so value should be set to 0000000000000000H</i> |
| <sup>c</sup> Command Control  | <i>Always set to 00H for GSE</i>                                                                             |
| <sup>c</sup> Page Data        | <i>Contains 8 bytes of configurable comparison data. Set to 0 by default</i>                                 |
| <sup>c</sup> Antenna          | <i>Set antenna with values between 0 to 0FH. Set to 0 by default</i>                                         |
| <sup>c</sup> Address          | <i>Tag memory address for byte mask. Tag memory address varies, so values for this field may vary</i>        |
| <sup>c</sup> Mask             | <i>Set mask to desired bit, range = 0–FF</i>                                                                 |
| <sup>c</sup> Start Address    | <i>Set to 00H</i>                                                                                            |
| <sup>c</sup> Command Depth    | <i>Set to 00H</i>                                                                                            |
| Reset                         | Reset reader for changes to take effect                                                                      |
| Downlink Frequency            | Set downlink frequency to 916.00 dB                                                                          |
| Uplink Frequency              | Set uplink frequency to 903.00 dB                                                                            |
| Title 21 Downlink Attenuation | Set Attenuation so that the line loss and attenuation value = 10 dB                                          |
| Title 21 Uplink Attenuation   | Set Attenuation so that the line loss and attenuation value = 0 dB                                           |
| SeGo Downlink Attenuation     | Set attenuation so that the line loss and attenuation value = 0 dB                                           |
| SeGo Uplink Attenuation       | Set attenuation so that the line loss and attenuation value = 0 dB                                           |
| Retry Count                   | Recommend setting of 5 for all required retry counts                                                         |
| Title 21 Data Detect          | Set to 0 dB                                                                                                  |
| SeGo Data Detect              | Set to 0 dB                                                                                                  |
| Title 21 Seen Count           | Set to 10 (every 140 ms) for both tag types                                                                  |
| Title 21 Uniqueness Count     | Set to 1000 every 140 seconds for both tag types                                                             |

**Table 9-2 Initial Configuration Parameters for Title 21 and SeGo Protocols (continued)**

|                       |                                                                                                   |
|-----------------------|---------------------------------------------------------------------------------------------------|
| SeGo Seen Count       | Set to 10 (every 140 ms) for both tag types                                                       |
| SeGo Uniqueness Count | Set to 1000 every 140 seconds for both tag types                                                  |
| Line Loss             | Set the RF cable loss (line loss from reader to antenna) to the nearest dB value or 0, 1, 2, or 3 |

---

## Lane Configuration Parameters for Title 21/eGo/ATA Protocols

To configure the reader for initial use reading Title 21, eGo, and ATA protocols, set the recommended starting values for the parameters listed in [Table 9-3](#).

**Table 9-3 Initial Configuration Parameters for Title 21, eGo, and ATA Protocols**

| Parameter                     | Recommended Starting Value                                                                                   |
|-------------------------------|--------------------------------------------------------------------------------------------------------------|
| Protocol Selection            | Title 21, ATA, and eGo                                                                                       |
| Enable Sequence               | Title 21 → Ack or Nack → Antenna → Set                                                                       |
| eGo GSE                       | If using GSE, use the recommended settings shown in <i>italics</i> and marked with <sup>d</sup>              |
| <sup>d</sup> Tag ID           | <i>8-byte tag request ID; however, it is not used in Mode 88 so value should be set to 0000000000000000H</i> |
| <sup>d</sup> Command Control  | <i>Always set to 00H for GSE</i>                                                                             |
| <sup>d</sup> Page Data        | <i>Contains 8 bytes of configurable comparison data. Set to 0 by default</i>                                 |
| <sup>d</sup> Antenna          | <i>Set antenna with values between 0 to 0FH. Set to 0 by default</i>                                         |
| <sup>d</sup> Address          | <i>Tag memory address for byte mask. Tag memory address varies, so values for this field may vary</i>        |
| <sup>d</sup> Mask             | <i>Set mask to desired bit, range = 0–FF</i>                                                                 |
| <sup>d</sup> Start Address    | <i>Set to 00H</i>                                                                                            |
| <sup>d</sup> Command Depth    | <i>Set to 00H</i>                                                                                            |
| Reset                         | Reset reader for changes to take effect                                                                      |
| Downlink Frequency            | Set downlink frequency to 916.00 dB                                                                          |
| Uplink Frequency              | Set uplink frequency to 903.00 dB                                                                            |
| Title 21 Downlink Attenuation | Set attenuation so that the line loss and attenuation value = 10 dB                                          |
| Title 21 Uplink Attenuation   | Set attenuation so that the line loss and attenuation value = 0 dB                                           |
| ATA Downlink Attenuation      | Set attenuation so that the line loss and attenuation value = 6 dB                                           |
| ATA Uplink Attenuation        | Set attenuation so that the line loss and attenuation value = 6 dB                                           |
| eGo Downlink Attenuation      | Set attenuation so that the line loss and attenuation value = 0 dB                                           |
| eGo Uplink Attenuation        | Set attenuation so that the line loss and attenuation value = 0 dB                                           |
| Retry Counts                  | Recommend setting of 5 for all required retry counts                                                         |

**Table 9-3 Initial Configuration Parameters for Title 21, eGo, and ATA Protocols (continued)**

|                           |                                                                                                    |
|---------------------------|----------------------------------------------------------------------------------------------------|
| Title 21 Data Detect      | Set to 0 dB                                                                                        |
| ATA Data Detect           | Set to 2 dB                                                                                        |
| eGo Data Detect           | Set to 4 dB                                                                                        |
| Title 21 Seen Count       | Set to 10 (every 140 ms) for both tag types                                                        |
| Title 21 Uniqueness Count | Set to 1000 every 140 seconds for both tag types                                                   |
| ATA Seen Count            | Set to 10 (every 140 ms) for both tag types                                                        |
| ATA Uniqueness Count      | Set to 1000 every 140 seconds for both tag types                                                   |
| eGo Seen Count            | Set to 10 (every 140 ms) for both tag types                                                        |
| eGo Uniqueness Count      | Set to 1000 every 140 seconds for both tag types                                                   |
| Line Loss                 | Set the RF cable loss (line loss from reader to antenna) to the nearest dB value or 0, 1, 2, or 3. |



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## System Diagnostics and Preventive Maintenance

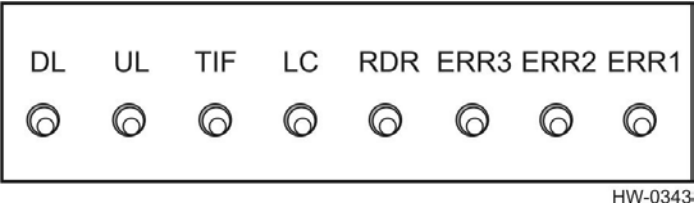


# System Diagnostics and Preventive Maintenance

*This chapter provides information on diagnosing problems with the Encompass<sup>®</sup> Reader components and schedule and instructions for preventive maintenance.*

## Error Indicators

The Encompass reader has light-emitting diodes (LED) that display operational functions and error conditions. [Figure 10-1](#) shows the LED locations.



HW-0343

**Figure 10-1 Operational LEDs**

[Table 10-1](#) describes the LED indications.

**Table 10-1 Operational LED Indicator Descriptions**

| Operational LED             |      |      | Description                                       |
|-----------------------------|------|------|---------------------------------------------------|
| Three fault indication LEDs |      |      |                                                   |
| ERR3                        | ERR2 | ERR1 | Failure Mode                                      |
| ●                           | ●    | ●    | Microprocessor resetting                          |
| ●                           | ●    | ○    | Power supply failure                              |
| ●                           | ○    | ●    | Transceiver failure                               |
| ●                           | ○    | ○    | TDM/GPS failure                                   |
| ○                           | ●    | ●    | No communication with lane controller/host system |
| ○                           | ●    | ○    | Other failure                                     |
| ○                           | ○    | ●    | Data in buffer                                    |



**Table 10-1 Operational LED Indicator Descriptions (continued)**

| Operational LED                     |   |   | Description                                                                                                                                                                                                                  |
|-------------------------------------|---|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ○                                   | ○ | ○ | No failure                                                                                                                                                                                                                   |
| RDR                                 |   |   | Encompass reader communicating with host                                                                                                                                                                                     |
| LC                                  |   |   | Host communicating with Encompass reader                                                                                                                                                                                     |
| TIF                                 |   |   | Encompass reader is transacting with tag. LED lit when Encompass reader receives correctly decoded tag message including correct cyclic redundancy check for message. The LED is lit for 250 ms following a tag transaction. |
| UL                                  |   |   | RF uplink signal on                                                                                                                                                                                                          |
| DL                                  |   |   | RF downlink signal on                                                                                                                                                                                                        |
| <b>Note</b> All ERR LEDs light red. |   |   |                                                                                                                                                                                                                              |

## ***Troubleshooting Guidelines***

---

The Encompass reader is very reliable, so any service-related problems will most likely be due to external causes, such as damage to components. Visually inspect each system component and replace or repair components as needed.

### **To perform a visual inspection**

1. Make sure all component connectors are secure.
2. Make sure that the antenna is connected to the Encompass reader.
3. Make sure the Encompass reader is powered up by checking the Encompass reader Power LEDs.
4. Make sure the Encompass reader is communicating with the lane controller/host system by checking operational/error LEDs.
5. Review diagnostic commands and responses by accessing diagnostic port (COM2).

## ***Communicating Via Diagnostic Port (COM2)***

---

You can check the Encompass reader diagnostics by connecting a personal computer (PC) to the Encompass reader COM2 port using a serial null-modem cable. This cable crosses over the transmit and receive pins, which allows you to communicate with the Encompass reader.

Once you have connected the PC to the Encompass reader, you need to configure the terminal emulation software.

---

## Starting the Terminal Emulation Software

You can use a PC and any terminal emulation software to enter the host commands to retrieve diagnostic information. The following procedures show examples using Hyper Terminal™, an application included with Microsoft Windows. Most terminal emulation applications have a similar sequence for launching.

*Note:* In this hyperterminal selection, COM1 refers to the PC communications port.

### To start the terminal emulation software

1. At the command prompt, type your terminal emulation start command, or if using Windows Hyper Terminal, select: Programs>Accessories>Hyperterm and press ENTER.

The application displays the **Connection Description** dialog box as shown in Figure 10-2.

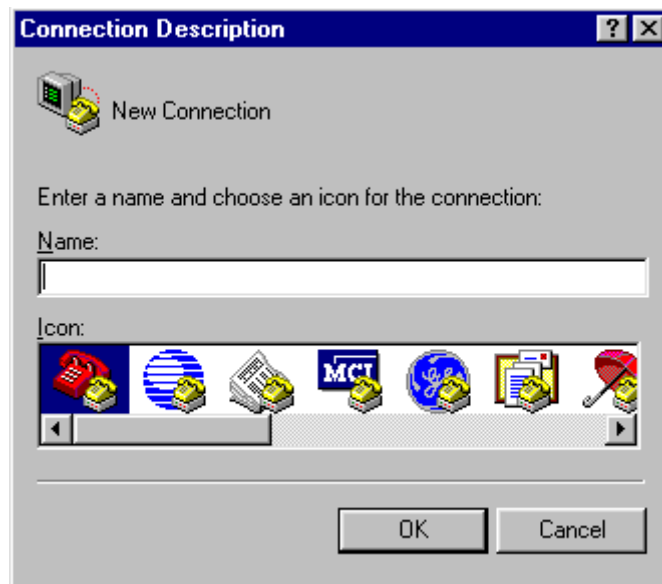


**Figure 10-2 Connection Description Dialog Box**

2. Enter a name for the session and click OK.

The application displays the **Phone Number** dialog box as shown in Figure 10-3.



**Figure 10-3 Phone Number Dialog Box**

3. From the **Connect using** pull-down list, choose the **Com1** 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 as shown in [Figure 10-4](#).

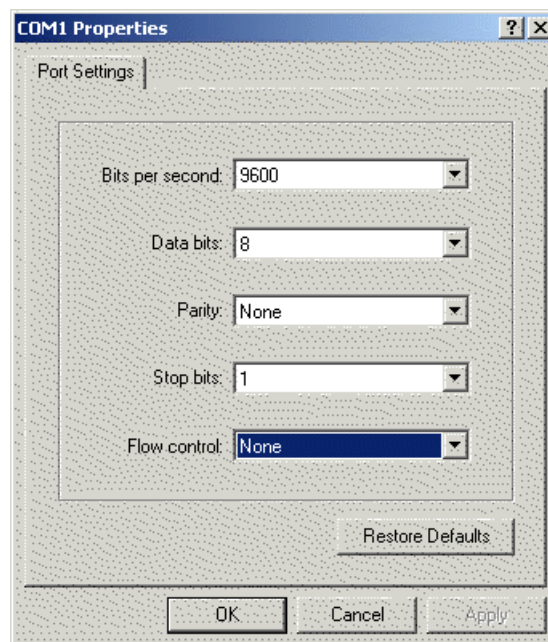


**Figure 10-4 COM1 Properties Dialog Box**

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
5. Click **OK**.

The application displays the **configparms - Hyper Terminal** main screen as shown in [Figure 10-5](#).

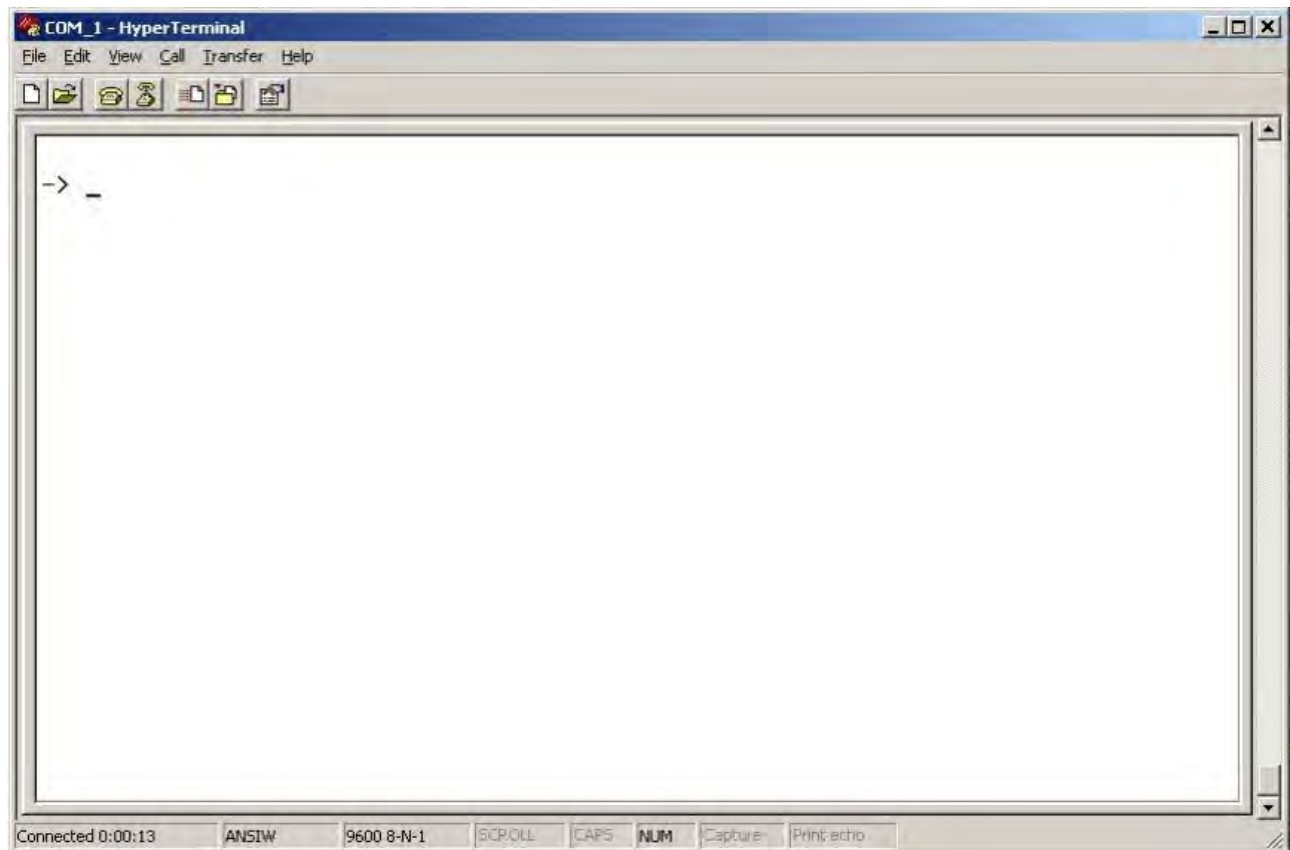


**Figure 10-5 Hyper Terminal Main Screen**

6. Press ENTER several times to get a flashing cursor prompt (-> \_).  
You can enter any of the diagnostic commands (see Diagnostic Command Group).

## Diagnostic COM2 Port Pin Assignments

This connector is a DB9 subminiature plug. The diagnostic signal descriptions are listed in [Table 10-2](#).

**Table 10-2 Diagnostic Communications Connector Parameters**

| Pin | Signal | Description                                 |
|-----|--------|---------------------------------------------|
| 1   | RSD    | Received line signal detect (not connected) |
| 2   | RXD    | Receive Data                                |
| 3   | TXD    | Transmit Data                               |
| 4   | DTR    | Data Terminal Ready (not connected)         |
| 5   | GND    | Ground                                      |
| 6   | DSR    | Data Set Ready (not connected)              |
| 7   | RTS    | Request to Send                             |
| 8   | CTS    | Clear to Send                               |
| 9   | RI     | Ring indicator (not connected)              |

## Diagnostic Commands

---

The Encompass reader uses the commands outlined in this section to help you diagnose problems between the host and Encompass reader ([Table 10-3](#)).

**Table 10-3 Diagnostic Commands**

| Diagnostic Command | Command Description                                                                                                                                                                                                                                                                                         |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| version            | Responds with the Encompass reader's IP addresses. The last IP address is the Encompass reader's address (udpinet = XXX.XXX.XXX.XXX)                                                                                                                                                                        |
| bootChange         | Used to change the Encompass reader's IP address. Press <b>Enter</b> until the cursor is at the other line, then type:<br>udpinet=XXX.XXX.XXX.XXX<br>where the X's are the new IP address. You must begin the line with "udpinet=" See "bootChange" section below for detailed description of this command. |
| ShowErrorLog       | Scrolls the error log in chronological order.                                                                                                                                                                                                                                                               |
| ClearErrorLog      | Clears entries from the error log.                                                                                                                                                                                                                                                                          |

**Table 10-3 Diagnostic Commands**

|                   |                                                                     |
|-------------------|---------------------------------------------------------------------|
| ShowSysStatusBits | Shows the status bits for error conditions in the Encompass reader. |
|-------------------|---------------------------------------------------------------------|

**Note:** All diagnostic host commands are case sensitive.

---

## ***bootChange***

This section describes each line of the bootChange command and provides instructions for sending this command.

|                                        |                                                                                          |
|----------------------------------------|------------------------------------------------------------------------------------------|
| boot device                            | Required, must be motfec0                                                                |
| processor number                       | Required, must be 0                                                                      |
| host name                              | Required, must be lcHost                                                                 |
| file name                              | Not required, should be left as is or blank                                              |
| inet on Ethernet (e)                   | Should be left as 10.3.11.96:ffff0000. Changing this value will cause errors on startup. |
| inet on backplane (b)                  | Not required, should be left as is or blank                                              |
| host inet (h)                          | Required, should be set to IP address of host computer                                   |
| gateway inet (g)                       | Not required, should be left as is or blank                                              |
| user (u)                               | Not required, should be left as is or blank                                              |
| ftp password (pw)<br>(blank = use rsh) | Not required, should be left as is or blank                                              |
| flags (f)                              | Required, should be 0x0                                                                  |
| target name (tn)                       | Not required, should be left as is or blank                                              |
| startup script (s)                     | Not required, should be left blank                                                       |
| other (o)                              | <b>!</b> <b>Mandatory:</b> Encompass reader IP address must be<br>udpnet=xxx.xxx.xxx.xxx |

Press Enter if you do not want to change an entry. To clear an entry on a line, type a “.” (period). To change a line, type what is needed, then press Enter. On the other (o) line you must enter the Encompass reader IP address with “udpnet=xxx.xxx.xxx.xxx” where the xxx.xxx.xxx.xxx is the Encompass reader IP address.

**Note:** *If you do not enter the Encompass reader IP address exactly as shown, the Encompass reader’s Ethernet communications will not work.*

Upon boot-up, the Encompass reader uses the host inet (h) IP address as the IP address where it sends UDP data.

When you have finished entering the bootChange, the screen displays the following information:

|                  |         |
|------------------|---------|
| boot device      | motfec0 |
| processor number | 0       |
| host name        | lcHost  |

|                                        |                      |
|----------------------------------------|----------------------|
| boot device                            | motfec0              |
| file name                              |                      |
| inet on Ethernet (e)                   | 10.3.11.96:ffff0000  |
| inet on backplane (b)                  |                      |
| host inet (h)                          | 192.168.10.1         |
| gateway inet (g)                       |                      |
| user (u)                               |                      |
| ftp password (pw)<br>(blank = use rsh) |                      |
| flags (f)                              | 0x0                  |
| target name (tn)                       |                      |
| startup script (s)                     |                      |
| Other (o)                              | udpinet=192.168.10.3 |

---

## ***Power Cycling the Encompass Reader***

If the Encompass reader stops communicating with the host system and does not respond to RESET READER (0006H) for UDP command set or #63 RESET READER command if using AI1200-emulation command set, try power cycling the reader.

### **To power cycle the reader**

1. Note the reader's operational LEDs statuses.
2. Display the version by typing **version**. This provides the IP addresses for the Encompass reader.
3. Display the error log by typing **ShowErrorLog**. Using the Hyper Terminal, save the error log to a file by selecting **Capture Text..** from the **Transfer** drop-down menu ([Figure 10-6](#)). The **Capture** feature in the menu bar at the bottom of the screen darkens to show text is captured.



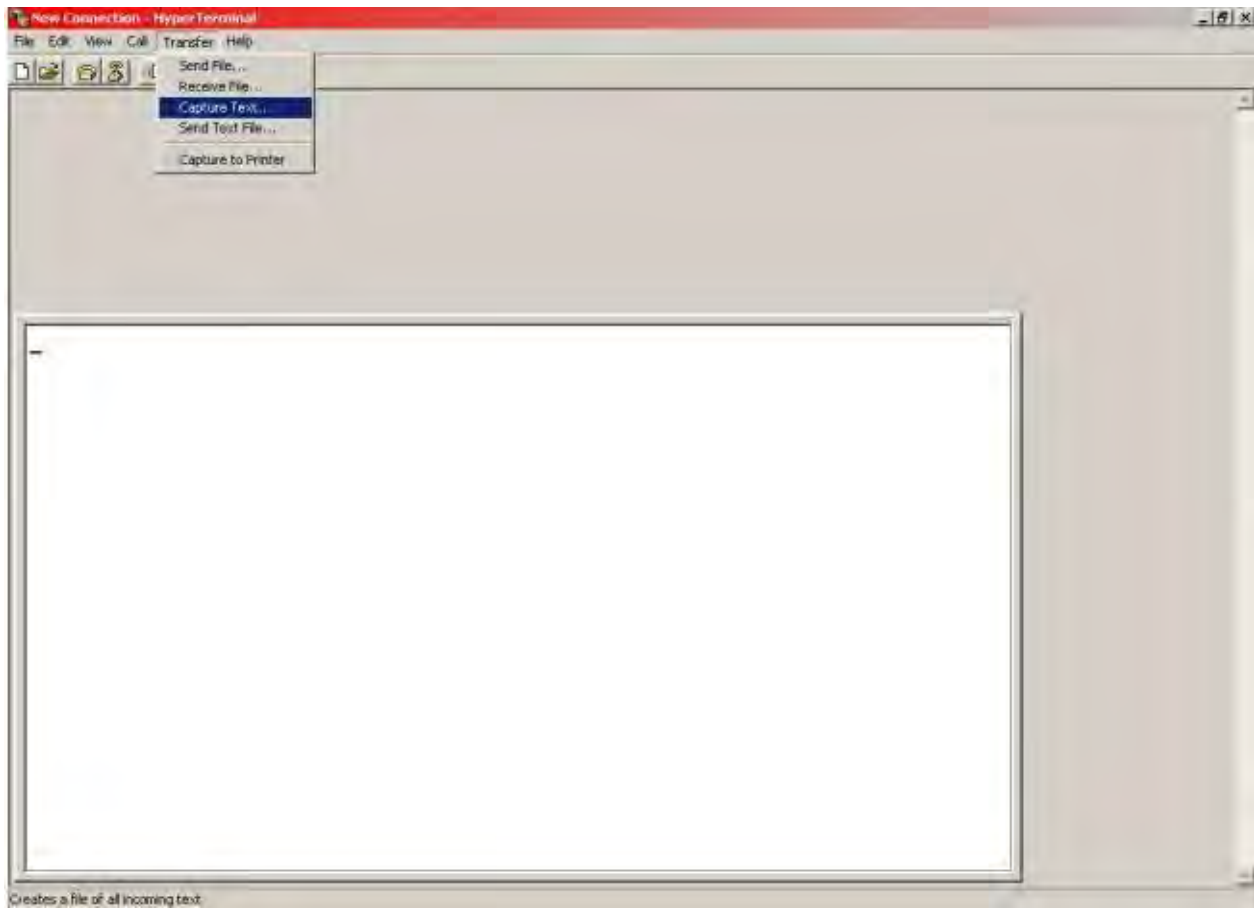


**Figure 10-6 Capture Text Feature**

Stop or pause the error log capture by selecting **Capture Text...** from the **Transfer** drop-down menu by selecting **Stop** or **Pause** from the **Capture Text...** feature (Figure 10-7).

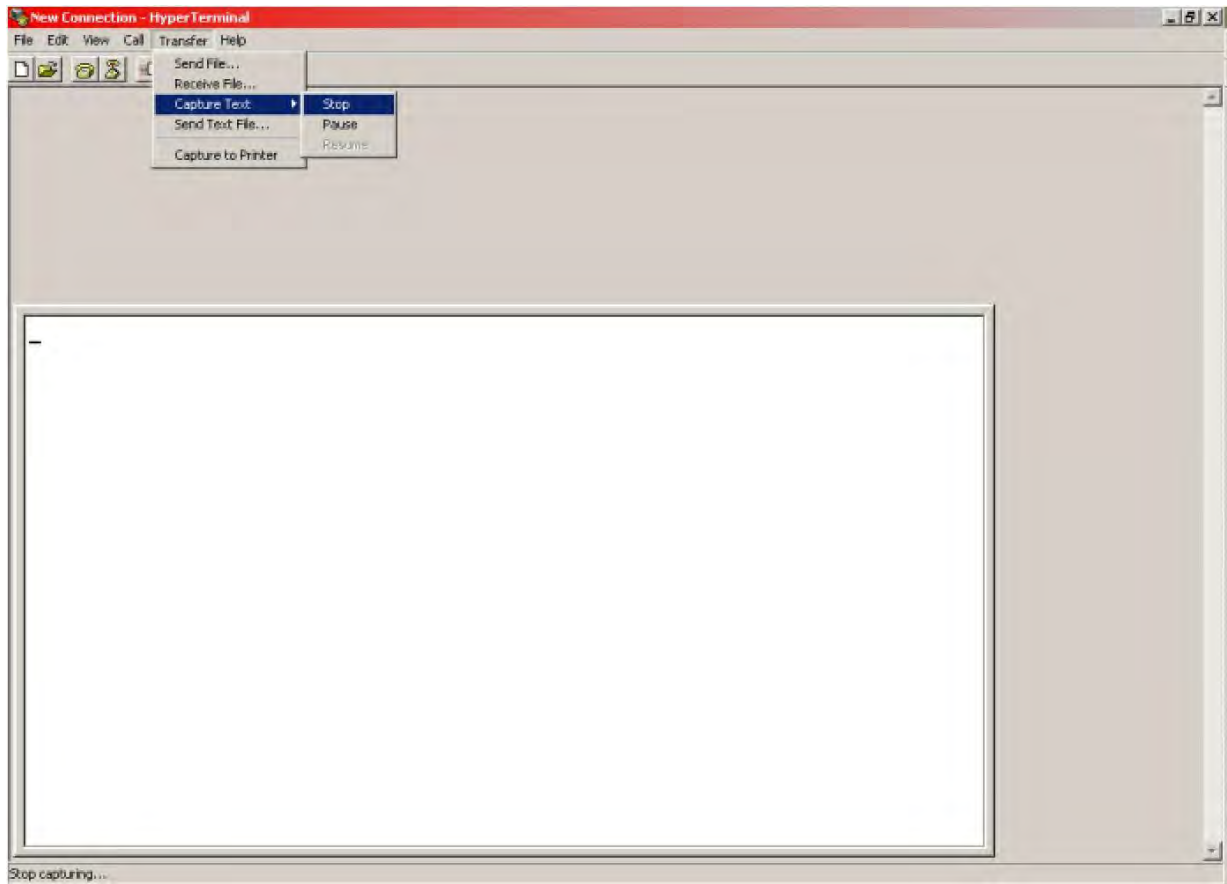


**Figure 10-7 Stop or Pause Text Capture**

4. Display the error condition status bits by typing **ShowSysStatusBits**.
5. Cycle power to the Encompass reader by unplugging the AC/DC transformer/power supply cord or by loosening the two mounting screws securing the power connector to the reader and unplugging the power for at least 10 seconds.
6. Plug the power supply cord to the transformer and/or plug connector back into the reader and tighten the two mounting screws.

## Error Log Reference

---

This section lists all the error log messages that can occur in the Encompass reader system. [Table 10-4](#) lists the Encompass reader software module numbers for reference.

**Table 10-4 Software Module Numbers**

| Software Module                                   | Module Number |
|---------------------------------------------------|---------------|
| System Initialization Module                      | 0000H         |
| Lane Controller Interface Module                  | 0001H         |
| System Interface Module                           | 0002H         |
| Mode Interface Module                             | 0003H         |
| Tag Interface Module                              | 0004H         |
| Time-Division Multiplexing (TDM) Module           | 0005H         |
| Global Positioning System (GPS) Module            | 0006H         |
| Radio Frequency (RF) Transceiver Interface Module | 0007H         |
| Diagnostic Module                                 | 0008H         |
| Not used                                          | 0009H         |
| Tag Buffer Module                                 | 000AH         |
| Not used                                          | 000BH         |
| Not used                                          | 000CH         |
| Digital I/O (DIO) Module                          | 000DH         |

**Note:** Only those software module error logs that are currently being used in the Encompass reader are listed here.

---

## System Initialization Module Errors

Table 10-5 contains the system initialization module (MSIM) error numbers and log entry descriptions.

**Table 10-5 System Initialization Module Errors (0000H)**

| Log Entry                                   | Description                                                                                                                                                        | Error Number |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Reserved                                    | N/A                                                                                                                                                                | 0000H        |
| Timer Initialization Error                  | This error indicates that the system timer initialization failed. This error could prevent the Encompass reader's ability to transact with tags.                   | 0001H        |
| Buffer Management (BM) Initialization Error | This error indicates that the BM system initialization failed. This error could prevent the Encompass reader's ability to transact with tags.                      | 0002H        |
| Tag Buffer Initialization Error             | This error indicates that the tag buffer module initialization failed.                                                                                             | 0003H        |
| System Queue Create Error                   | This error indicates that the creation of one or more system message queues failed. This error could prevent the Encompass reader's ability to transact with tags. | 0004H        |
| System Task Create Error                    | This error indicates that the creation of one or more system tasks failed. This error could prevent the Encompass reader's ability to transact with tags.          | 0005H        |
| System Security Error                       | This error indicates that the system security was violated. This error could prevent the Encompass reader's ability to transact with tags.                         | 0006H        |
| Error Recovery Event                        | One or more of the errors recovered.                                                                                                                               | 0007H        |

---

## Lane Controller Interface Module Errors

Table 10-6 contains the lane controller interface module (LCIM) error numbers and log entry descriptions.

**Table 10-6 Lane Controller Interface Module Errors (0001H)**

| Log Entry                             | Description                                                                                                                                                             | Error Number |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Reserved                              | N/A                                                                                                                                                                     | 0000H        |
| Saved SysComMsgs Initialization Error | This error indicates that the system communication message buffer initialization failed. This error could prevent the Encompass reader's ability to transact with tags. | 0001H        |

**Table 10-6 Lane Controller Interface Module Errors (0001H) (continued)**

|                                                          |                                                                                                                                                                                             |       |
|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Buffer Management Create Queue Error                     | This error indicates that the creation of the LCI BM queue failed. This error could prevent the Encompass reader's ability to transact with tags.                                           | 0002H |
| Buffer Management Not Initialized Error                  | This error indicates that BM is not initialized. This error could prevent the Encompass reader's ability to transact with tags.                                                             | 0003H |
| UDP/IP Core Initialization Error                         | This error indicates that the initialization of the UDP/IP Core failed. This error could prevent the Encompass reader's ability to transact with tags.                                      | 0004H |
| System Serial Device Error                               | This error indicates that the initialization of the system serial port failed.                                                                                                              | 0005H |
| System Message Queue Full Error                          | This error indicates that the LC Message Queue is full. This error could prevent the Encompass reader's ability to transact with tags.                                                      | 0006H |
| Get Buffer Management Buffer Error                       | This error indicates that the get BM buffer failed. This error could prevent the Encompass reader's ability to transact with tags.                                                          | 0007H |
| Message Queue Send Error                                 | This error indicates that the message queue send failed. This error could prevent the Encompass reader's ability to transact with tags.                                                     | 0008H |
| Reserved                                                 | N/A                                                                                                                                                                                         | 0009H |
| Message Queue Receive Error                              | This error indicates that the message queue receive failed. This error could prevent the Encompass reader's ability to transact with tags.                                                  | 000AH |
| Return Buffer Management Buffer Error                    | This error indicates that the return BM buffer failed. This error could prevent the Encompass reader's ability to transact with tags.                                                       | 000BH |
| Reserved                                                 | N/A                                                                                                                                                                                         | 000CH |
| Reserved                                                 | N/A                                                                                                                                                                                         | 000DH |
| Reserved                                                 | N/A                                                                                                                                                                                         | 000EH |
| Wait For UDP/IP Core Transmit (Tx) Buffer Time-out Error | This error indicates that there are no Tx buffers available and the time-out period for waiting has expired. This error could prevent the Encompass reader's ability to transact with tags. | 000FH |
| Tag Buffer Write Error                                   | This error indicates that tag data failed to be written into the tag buffering location in flash memory.                                                                                    | 0010H |
| Tag Buffer Overflow Error                                | This error indicates that there is a tag buffer overflow.                                                                                                                                   | 0011H |
| Tag Buffer State Not Idle Error                          | This error indicates that the tag buffering runtime state is not idle.                                                                                                                      | 0012H |
| Serial Communication Link Error                          | This error indicates that the serial communication link is down.                                                                                                                            | 0013H |

**Table 10-6 Lane Controller Interface Module Errors (0001H) (continued)**

|                                 |                                                                                                                                                 |       |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| UDP/IP Communication Link Error | This error indicates that the UDP/IP communication link is down. This error could prevent the Encompass reader's ability to transact with tags. | 0014H |
| Reserved                        | N/A                                                                                                                                             | 0015H |
| Error Recovery Event            | One or more of the errors recovered.                                                                                                            | 0016H |

---

## System Interface Module Errors

Table 10-7 contains the system interface module (SIM) error numbers and log entry descriptions.

**Table 10-7 System Interface Module Errors (0002H)**

| Log Entry                                     | Description                                                                                                                                      | Error Number |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Reserved                                      | N/A                                                                                                                                              | 0000H        |
| Buffer Management Create Queue Error          | This error indicates that the creation of the SI BM queue failed. This error could prevent the Encompass reader's ability to transact with tags. | 0001H        |
| Buffer Management Not Initialized Error       | This error indicates that BM is not initialized. This error could prevent the Encompass reader's ability to transact with tags.                  | 0002H        |
| Message Queue Receive Error                   | This error indicates that the message queue receive failed. This error could prevent the Encompass reader's ability to transact with tags.       | 0003H        |
| Return Buffer Management Buffer Error         | This error indicates that the return BM buffer failed. This error could prevent the Encompass reader's ability to transact with tags.            | 0004H        |
| Get Buffer Management Buffer Error            | This error indicates that the get BM buffer failed. This error could prevent the Encompass reader's ability to transact with tags.               | 0005H        |
| Message Queue Send Error                      | This error indicates that the message queue send failed. This error could prevent the Encompass reader's ability to transact with tags.          | 0006H        |
| Tag Buffer Read Error                         | This error indicates that tag data failed to be read from the tag buffering location in flash memory.                                            | 0007H        |
| Tag Buffer Overflow Error                     | This error indicates that there is a tag buffer overflow.                                                                                        | 0008H        |
| Erase Tag Buffers Error                       | Tags in the Tag Buffer location in Flash failed to be erased.                                                                                    | 0009H        |
| Erase Entire Tag Buffer Space Error           | This error indicates that erase entire tag buffers flash space failed.                                                                           | 000AH        |
| Wait For Tag Buffer Idle State Time-out Error | This error indicates that the wait for tag buffering runtime idle state, timed out.                                                              | 000BH        |
| Reserved                                      | N/A                                                                                                                                              | 000CH        |
| Error Recovery Event                          | One or more of the errors recovered.                                                                                                             | 000DH        |

---

## Mode Interface Module Error Numbers

Table 10-8 contains the mode interface module (MIM) error numbers and log entry descriptions.

**Table 10-8 Mode Interface Module Errors (0003H)**

| Log Entry                                  | Description                                                                                                                                                                                                                  | Error Number |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Reserved                                   | N/A                                                                                                                                                                                                                          | 0000H        |
| Prior Required Configuration Not Set Error | This error indicates that not all required configuration parameters are set for the system to be able to start running in the requested mode. This error could prevent the Encompass reader's ability to transact with tags. | 0001H        |
| Reserved                                   | N/A                                                                                                                                                                                                                          | 0002H        |
| Error Recovery Event                       | One or more of the errors recovered.                                                                                                                                                                                         | 0003H        |

---

## Tag Interface Module Error Numbers

Table 10-9 contains the tag interface module (TIM) error numbers and log entry descriptions.

**Table 10-9 Tag Interface Module Errors (0004H)**

| Log Entry                      | Description                                                                                                                               | Error Number |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Reserved                       | N/A                                                                                                                                       | 0000H        |
| TIM System Error               | This error indicates that a system call failed. This error could prevent the Encompass reader's ability to transact with tags.            | 0001H        |
| FPGA1 Not Ready Error          | This error indicates that the FPGA1 is not ready. This error could prevent the Encompass reader's ability to transact with tags.          | 0002H        |
| RF Transceiver Not Ready Error | This error indicates that the RF Transceiver is not ready. This error could prevent the Encompass reader's ability to transact with tags. | 0003H        |
| FPGA1 Memory Test Error        | This error indicates that the FPGA1 memory test failed. This error could prevent the Encompass reader's ability to transact with tags.    | 0004H        |
| FPGA2 Memory Test Error        | This error indicates that the FPGA2 memory test failed. This error could prevent the Encompass reader's ability to transact with tags.    | 0005H        |



**Table 10-9 Tag Interface Module Errors (0004H) (continued)**

|                                             |                                                                                                                                                                                                                             |       |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Queue Message Error                         | This error indicates that the source of the message is invalid. This error could prevent the Encompass reader's ability to transact with tags.                                                                              | 0006H |
| Reserved                                    | N/A                                                                                                                                                                                                                         | 0007H |
| Tag Transaction Configuration Command Error | This error indicates that an invalid tag transaction configuration command was sent to the reader. This error could prevent the Encompass reader's ability to transact with tags.                                           | 0008H |
| Tag Transaction Sequence Command Error      | This error indicates that an invalid tag transaction sequence command was sent to the reader. This error could prevent the Encompass reader's ability to transact with tags.                                                | 0009H |
| Reserved                                    | N/A                                                                                                                                                                                                                         | 000AH |
| Reserved                                    | N/A                                                                                                                                                                                                                         | 000BH |
| Reserved                                    | N/A                                                                                                                                                                                                                         | 000CH |
| Reserved                                    | N/A                                                                                                                                                                                                                         | 000DH |
| Reserved                                    | N/A                                                                                                                                                                                                                         | 000EH |
| Reserved                                    | N/A                                                                                                                                                                                                                         | 000FH |
| Buffer Management Create Queue Error        | This error indicates that the creation of a BM queue failed. This error could prevent the Encompass reader's ability to transact with tags.                                                                                 | 0010H |
| Get Buffer Management Buffer Error          | This error indicates that the get BM buffer failed. This error could prevent the Encompass reader's ability to transact with tags.                                                                                          | 0011H |
| Return Buffer Management Buffer Error       | This error indicates that the return BM buffer failed. This error could prevent the Encompass reader's ability to transact with tags.                                                                                       | 0012H |
| Get System Queue Identification (ID) Error  | This error indicates that getting the system queue identification failed. This error could prevent the Encompass reader's ability to transact with tags.                                                                    | 0013H |
| Error Recovery Event                        | One or more of the errors recovered.                                                                                                                                                                                        | 0014H |
| Product ID Error                            | This error indicates that the Encompass reader is being set to communicate with three or more protocols but the reader platform is an Encompass 5. Setting three or more protocols requires an Encompass 6 reader platform. | 0015H |
| Queue Create Error                          | This error indicates that the message queues create failed. This error could prevent the Encompass reader's ability to transact with tags.                                                                                  | 0016H |
| Task Create Error                           | This error indicates that the creation of a tag interface task failed. This error could prevent the Encompass reader's ability to transact with tags.                                                                       | 0017H |

**Table 10-9 Tag Interface Module Errors (0004H) (continued)**

|                                                         |                                                                                                                                                                   |       |
|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| M5e Antenna Configuration Error                         | This error indicates that the antenna configuration on the M5e module is in error. This error could prevent the Encompass reader's ability to transact with tags. | 0018H |
| M5e Antenna Configuration Recovery                      | The antenna configuration error has recovered.                                                                                                                    | 0019H |
| Tag Interface Module Configuration Initialization Error | This error indicates that the tag interface configuration initialization failed. This error could prevent the Encompass reader's ability to transact with tags.   | 001AH |

---

## ***TDM Module Error Numbers***

Table 10-10 contains the TDM module (TDMM) error numbers and log entry descriptions.

**Table 10-10 TDM Module Errors (0005H)**

| <b>Log Entry</b>                      | <b>Description</b>                                                                     | <b>Error Number</b> |
|---------------------------------------|----------------------------------------------------------------------------------------|---------------------|
| Reserved                              | N/A                                                                                    | 0000H               |
| TDM Two Masters Error                 | This error indicates that two readers are configured as masters.                       | 0001H               |
| TDM Master Slave Error                | This error indicates that a reader, configured as a slave, does not detect the master. | 0002H               |
| TDM Clock Error                       | This error indicates that a TDM clock error occurred.                                  | 0003H               |
| GPS Window Error                      | This error indicates that a GPS window error occurred.                                 | 0004H               |
| GPS One-PPS Error                     | This error indicates that the one-pulse per second failed.                             | 0005H               |
| TDM Two Masters Error Recovery Event  | This event indicates that the two masters error, recovered.                            | 0006H               |
| TDM Master Slave Error Recovery Event | This event indicates that the master slave error, recovered.                           | 0007H               |
| TDM Clock Error Recovery Event        | This event indicates that the TDM clock error, recovered.                              | 0008H               |
| GPS Window Error Recovery Event       | This event indicates that the GPS Window error, recovered                              | 0009H               |
| GPS One PPS Error Recovery Event      | This event indicates that the one-pulse per second, recovered.                         | 000AH               |

---

## ***GPS Module Error Numbers***

Table 10-11 contains the GPS module (GPSM) module error numbers and log entry descriptions.

**Table 10-11 GPS Module Errors (0006H)**

| <b>Log Entry</b>             | <b>Description</b>                                                       | <b>Error Number</b> |
|------------------------------|--------------------------------------------------------------------------|---------------------|
| Reserved                     | N/A                                                                      | 0000H               |
| GPS Communication Link Error | This error indicates that the communication with the GPS module is down. | 0001H               |

**Table 10-11 GPS Module Errors (0006H) (continued)**

|                                             |                                                                          |       |
|---------------------------------------------|--------------------------------------------------------------------------|-------|
| GPS T-RAIM Alarm Set Event                  | This error indicates that the T-RAIM algorithm of the GPS module failed. | 0002H |
| GPS Self-Test Failed Event                  | This error indicates that the self-test of the GPS module failed.        | 0003H |
| GPS Power On Failure Event                  | This error indicates that the GPS module failed the power on test.       | 0004H |
| GPS Auto Survey Failure Event               | This error indicates that the auto survey failed.                        | 0005H |
| GPS Communication Link Error Recovery Event | This event indicates that GPS Communication link, recovered.             | 0006H |
| GPS T-RAIM Alarm Set Error Recovery Event   | This event indicates that T-RAIM alarm cleared.                          | 0007H |
| GPS Self-Test Failed Recovery Event         | This event indicates that self-test error cleared.                       | 0008H |
| GPS Power-On Failure Recovery Event         | This event indicates that self-test error cleared.                       | 0009H |
| GPS Auto Survey Failure Recovery Event      | This event indicates that the auto survey failure cleared.               | 000AH |

---

## ***RF Transceiver Interface Module Error Numbers***

Table 10-12 contains the RF transceiver interface module (RFTIM) error numbers and log entry descriptions.

**Table 10-12 RF Transceiver Interface Module Errors (0007H)**

| <b>Log Entry</b>                     | <b>Description</b>                                                                                                                                       | <b>Error Number</b> |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| Reserved                             | N/A                                                                                                                                                      | 0000H               |
| Buffer Management Create Queue Error | This error indicates that the creation of a BM queue failed. This error could prevent the Encompass reader's ability to transact with tags.              | 0001H               |
| Memory Allocate Error                | This error indicates that the Memory allocation failed. This error could prevent the Encompass reader's ability to transact with tags.                   | 0002H               |
| System Queue ID Retrieve Error       | This error indicates that getting the system queue identification failed. This error could prevent the Encompass reader's ability to transact with tags. | 0003H               |
| Serial SMC Open Error                | This error indicates that opening the serial SMC failed. This error could prevent the Encompass reader's ability to transact with tags.                  | 0004H               |

**Table 10-12 RF Transceiver Interface Module Errors (0007H) (continued)**

|                                                                             |                                                                                                                                                                        |       |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Connect Interrupt Handler Error                                             | This error indicates that connecting the interrupt handler failed. This error could prevent the Encompass reader's ability to transact with tags.                      | 0005H |
| Enable Interrupt Error                                                      | This error indicates that enabling the interrupt failed. This error could prevent the Encompass reader's ability to transact with tags.                                | 0006H |
| I/O Semaphore Create Error                                                  | This error indicates that creating the I/O semaphore failed. This error could prevent the Encompass reader's ability to transact with tags.                            | 0007H |
| Non-volatile Random Access Memory (NVRAM) Configuration Data Retrieve Error | This error indicates that retrieving configuration data from NVRAM failed. This error could prevent the Encompass reader's ability to transact with tags.              | 0008H |
| NVRAM Configuration Data Corrupt Error                                      | This error indicates that the configuration data in NVRAM is corrupt. This error could prevent the Encompass reader's ability to transact with tags.                   | 0009H |
| NVRAM Configuration Data Write Error                                        | This error indicates that writing configuration data to NVRAM failed. This error could prevent the Encompass reader's ability to transact with tags.                   | 000AH |
| RF Transceiver Reset Error                                                  | This error indicates that the transceiver reset failed. This error could prevent the Encompass reader's ability to transact with tags.                                 | 000BH |
| RF Heartbeat Task Create Error                                              | This error indicates that the creation of the heartbeat task failed. This error could prevent the Encompass reader's ability to transact with tags.                    | 000CH |
| Get Buffer Management Buffer Error                                          | This error indicates that the get BM buffer failed. This error could prevent the Encompass reader's ability to transact with tags.                                     | 000DH |
| Return Buffer Management Buffer Error                                       | This error indicates that the return BM buffer failed. This error could prevent the Encompass reader's ability to transact with tags.                                  | 000EH |
| Serial Command Code Error                                                   | This error indicates that an invalid command was received. This error could prevent the Encompass reader's ability to transact with tags.                              | 000FH |
| Message Queue Send Error                                                    | This error indicates that the message queue send failed. This error could prevent the Encompass reader's ability to transact with tags.                                | 0010H |
| Set Tx Attenuation (Attn) Invalid Input Error                               | This error indicates that invalid input was sent to the reader for setting the Tx Attn. This error could prevent the Encompass reader's ability to transact with tags. | 0011H |
| Set Rx Attn Invalid Input Error                                             | This error indicates that invalid input was sent to the reader for setting the Rx Attn. This error could prevent the Encompass reader's ability to transact with tags. | 0012H |

**Table 10-12 RF Transceiver Interface Module Errors (0007H) (continued)**

|                                             |                                                                                                                                                                                    |       |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Set Range Adjust Invalid Input Error        | This error indicates that invalid input was sent to the reader for setting the Range Adjust. This error could prevent the Encompass reader's ability to transact with tags.        | 0013H |
| Set Protocol Parameters Invalid Input Error | This error indicates that invalid input was sent to the reader for setting the protocol parameters. This error could prevent the Encompass reader's ability to transact with tags. | 0014H |
| Set Frequency Invalid Input Error           | This error indicates that invalid input was sent to the reader for setting the frequency. This error could prevent the Encompass reader's ability to transact with tags.           | 0015H |
| Reserved                                    | N/A                                                                                                                                                                                | 0016H |
| Reserved                                    | N/A                                                                                                                                                                                | 0017H |
| Reserved                                    | N/A                                                                                                                                                                                | 0018H |
| Reserved                                    | N/A                                                                                                                                                                                | 0019H |
| Reserved                                    | N/A                                                                                                                                                                                | 001AH |
| Reserved                                    | N/A                                                                                                                                                                                | 001BH |
| Message Queue Receive Error                 | This error indicates that the message queue receive failed. This error could prevent the Encompass reader's ability to transact with tags.                                         | 001CH |
| Error Recovery Event                        | One or more of the errors recovered.                                                                                                                                               | 001DH |
| Task Create Error                           | This error indicates that the creation of an RF transceiver task failed. This error could prevent the Encompass reader's ability to transact with tags.                            | 001EH |
| Queue Create Error                          | This error indicates that the message queues create failed. This error could prevent the Encompass reader's ability to transact with tags.                                         | 001FH |
| Invalid Operation Mode Initialization       | This error indicates that the RF transceiver interface module was given an invalid mode number. This error could prevent the Encompass reader's ability to transact with tags.     | 0040H |
| Transceiver Serial Communication Error      | This error indicates that a serial communication link is down.                                                                                                                     | 0041H |
| Transceiver Reset Error                     | This error indicates that the transceiver reset failed upon initialization. This error could prevent the Encompass reader's ability to transact with tags.                         | 0042H |
| Frequency Initialization Error              | This error indicates that the frequency initialization failed. This error could prevent the Encompass reader's ability to transact with tags.                                      | 0043H |
| Tx Attenuation Initialization Error         | This error indicates that the transmit attenuation initialization failed. This error could prevent the Encompass reader's ability to transact with tags.                           | 0044H |

**Table 10-12 RF Transceiver Interface Module Errors (0007H) (continued)**

|                                                                  |                                                                                                                                                                                                               |       |
|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Rx Attenuation Initialization Error                              | This error indicates that the receive attenuation initialization failed. This error could prevent the Encompass reader's ability to transact with tags.                                                       | 0045H |
| Data Detect Initialization Error                                 | This error indicates that the data detect initialization failed. This error could prevent the Encompass reader's ability to transact with tags.                                                               | 0046H |
| 13-MHz Disable Initialization Error                              | This error indicates that there is a 13-MHz disable error. This error could prevent the Encompass reader's ability to transact with tags.                                                                     | 0047H |
| RF Transceiver ADC Above Maximum Error                           | This error indicates that the analog-to-digital converter (ADC) in the control feedback loop has exceeded a maximum set value. This error could prevent the Encompass reader's ability to transact with tags. | 0201H |
| RF Transceiver ADC Below Minimum Error                           | This error indicates that the ADC in the control feedback loop has fallen below a minimum set value. This error could prevent the Encompass reader's ability to transact with tags.                           | 0202H |
| RF Transceiver Attn DAC1 Above Maximum Error                     | This error indicates that the attenuation DAC for source 1 has exceeded a maximum set value. This error could prevent the Encompass reader's ability to transact with tags.                                   | 0203H |
| RF Transceiver Attn DAC1 Below Minimum Error                     | This error indicates that the attenuation DAC for source 1 has fallen below a minimum set value. This error could prevent the Encompass reader's ability to transact with tags.                               | 0204H |
| RF Transceiver Attn DAC2 Above Maximum Error                     | This error indicates that the attenuation DAC for source 2 has exceeded a maximum set value. This error could prevent the Encompass reader's ability to transact with tags.                                   | 0205H |
| RF Transceiver Attn DAC2 Below Minimum Error                     | This error indicates that the attenuation DAC for source 2 has fallen below a minimum set value. This error could prevent the Encompass reader's ability to transact with tags.                               | 0206H |
| RF Transceiver Depth-of-Modulation (DOM) DAC Above Maximum Error | This error indicates that the depth of modulation DAC has exceeded a maximum set value. This error could prevent the Encompass reader's ability to transact with tags.                                        | 0207H |
| RF Transceiver DOM DAC Below Minimum Error                       | This error indicates that the depth of modulation DAC has fallen below a minimum set value. This error could prevent the Encompass reader's ability to transact with tags.                                    | 0208H |
| RF Transceiver Source1 PLL Unlocked Error                        | This error indicates that the source 1 phase lock loop is unlocked. This error could prevent the Encompass reader's ability to transact with tags.                                                            | 0209H |
| RF Transceiver Source2 PLL Unlocked Error                        | This error indicates that the source 2, phase lock loop is unlocked. This error could prevent the Encompass reader's ability to transact with tags.                                                           | 020AH |
| RF Transceiver 13-MHz Control Error                              | This error indicates that there is a 13-MHz Control error. This error could prevent the Encompass reader's ability to transact with tags.                                                                     | 020BH |

**Table 10-12 RF Transceiver Interface Module Errors (0007H) (continued)**

|                                               |                                                                                                                                                                          |       |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| RF Transceiver 5V DC Fault Error              | This error indicates that the 5VDC digital supply is above or below the threshold. This error could prevent the Encompass reader's ability to transact with tags.        | 020CH |
| RF Transceiver Uncalibrated Error             | This error indicates that the Transceiver is uncalibrated. This error could prevent the Encompass reader's ability to transact with tags.                                | 020DH |
| Reserved                                      | N/A                                                                                                                                                                      | 020EH |
| RF Transceiver 5V DC Undervoltage Error       | This error indicates that the 5VDC digital supply is below the threshold. This error could prevent the Encompass reader's ability to transact with tags.                 | 020FH |
| Nack From RF Error                            | This error indicates that the digital board received a Nack from the Transceiver board. This error could prevent the Encompass reader's ability to transact with tags.   | 0401H |
| Serial Command Time-out Error                 | This error indicates that the digital board failed to send data to the Transceiver board. This error could prevent the Encompass reader's ability to transact with tags. | 0402H |
| Reserved                                      | N/A                                                                                                                                                                      | 0403H |
| Set Tx Attn Command Failure Error             | This error indicates that the "Set Tx Attn Command" failed. This error could prevent the Encompass reader's ability to transact with tags.                               | 0404H |
| Get Tx Attn Command Failure Error             | This error indicates that the "Get Tx Attn Command" failed. This error could prevent the Encompass reader's ability to transact with tags.                               | 0405H |
| Set Rx Attn Command Failure Error             | This error indicates that the "Set Rx Attn Command" failed. This error could prevent the Encompass reader's ability to transact with tags.                               | 0406H |
| Get Rx Attn Command Failure Error             | This error indicates that the "Get Rx Attn Command" failed. This error could prevent the Encompass reader's ability to transact with tags.                               | 0407H |
| Set Range Adjust Command Failure Error        | This error indicates that the "Set Range Adjust Command" failed. This error could prevent the Encompass reader's ability to transact with tags.                          | 0408H |
| Get Range Adjust Command Failure Error        | This error indicates that the "Get Range Adjust Command" failed. This error could prevent the Encompass reader's ability to transact with tags.                          | 0409H |
| Set Protocol Parameters Command Failure Error | This error indicates that the "Set Protocol Parameters Command" failed. This error could prevent the Encompass reader's ability to transact with tags.                   | 040AH |
| Get Protocol Parameters Command Failure Error | This error indicates that the "Get Protocol Parameters Command" failed. This error could prevent the Encompass reader's ability to transact with tags.                   | 040BH |



**Table 10-12 RF Transceiver Interface Module Errors (0007H) (continued)**

|                                                 |                                                                                                                                                          |       |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Set Frequency Command Failure Error             | This error indicates that the “Set Frequency Command” failed. This error could prevent the Encompass reader’s ability to transact with tags.             | 040CH |
| Get Frequency Command Failure Error             | This error indicates that the “Get Frequency Command” failed. This error could prevent the Encompass reader’s ability to transact with tags.             | 040DH |
| Get Firmware ID Command Failure Error           | This error indicates that the “Get Firmware ID Command” failed. This error could prevent the Encompass reader’s ability to transact with tags.           | 040EH |
| Get Status Command Failure Error                | This error indicates that the “Get Status Command” failed. This error could prevent the Encompass reader’s ability to transact with tags.                | 040FH |
| 13-MHz Control Command Failure Error            | This error indicates that the “13-MHz Control Command” failed. This error could prevent the Encompass reader’s ability to transact with tags.            | 0410H |
| RF Transceiver Reset Command Failure Error      | This error indicates that the “RF Transceiver Reset Command” failed. This error could prevent the Encompass reader’s ability to transact with tags.      | 0411H |
| Reference Synchronization Command Failure Error | This error indicates that the “Reference Synchronization Command” failed. This error could prevent the Encompass reader’s ability to transact with tags. | 0412H |

---

## ***Diagnostic Module Error Numbers***

Table 10-13 contains the diagnostic module (DM) error numbers and log entry descriptions.

**Table 10-13 Diagnostic Module Error Numbers (0008H)**

| <b>Log Entry</b>                     | <b>Description</b>                                                        | <b>Error Number</b> |
|--------------------------------------|---------------------------------------------------------------------------|---------------------|
| Reserved                             | N/A                                                                       | 0000H               |
| Buffer Management Create Queue Error | This error indicates that the creation of a BM queue failed.              | 0001H               |
| Memory Allocate Error                | This error indicates that allocation of memory failed.                    | 0002H               |
| System Queue ID Retrieve Error       | This error indicates that getting the system queue identification failed. | 0003H               |
| Connect Interrupt Handler Error      | This error indicates that connecting the interrupt handler failed.        | 0004H               |
| Enable Interrupt Error               | This error indicates that enabling the interrupt failed.                  | 0005H               |

**Table 10-13 Diagnostic Module Error Numbers (0008H) (continued)**

|                                       |                                                                                                                                                                            |       |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Get Buffer Management Buffer Error    | This error indicates that the get BM buffer failed.                                                                                                                        | 0006H |
| Return Buffer Management Buffer Error | This error indicates that the return BM buffer failed.                                                                                                                     | 0007H |
| Illegal Command Code Error            | This error indicates that illegal command was sent to the reader for setting the frequency.                                                                                | 0008H |
| Message Queue Send Error              | This error indicates that the message queue send failed.                                                                                                                   | 0009H |
| Message Queue Receive Error           | This error indicates that the message queue receive failed.                                                                                                                | 000AH |
| WatchDog Create Error                 | This error indicates that creation of a watchdog timer failed.                                                                                                             | 000BH |
| WatchDog Start Error                  | This error indicates that starting a watchdog timer failed.                                                                                                                | 000CH |
| Power On or Reset Event               | This error indicates that a power on or reset event occurred. This error could prevent the Encompass reader's ability to transact with tags.                               | 000DH |
| Power Supply Fault Error              | This error indicates that a power supply fault occurred. This error could prevent the Encompass reader's ability to transact with tags.                                    | 000EH |
| Digital Board OverVoltage Error       | This error indicates that an overvoltage fault occurred on the digital board power supply. This error could prevent the Encompass reader's ability to transact with tags.  | 000FH |
| Digital Board UnderVoltage Error      | This error indicates that an undervoltage fault occurred on the digital board power supply. This error could prevent the Encompass reader's ability to transact with tags. | 0010H |
| Reserved                              | N/A                                                                                                                                                                        | 0011H |
| Power Supply Fault Status Error       | This error indicates that an invalid power supply fault occurred. This error could prevent the Encompass reader's ability to transact with tags.                           | 0012H |
| Power Supply Fault Source Error       | This error indicates that an erroneous power supply fault occurred. This error could prevent the Encompass reader's ability to transact with tags.                         | 0013H |
| Error Recovery Event                  | One or more of the errors recovered.                                                                                                                                       | 0014H |

---

## **Tag Buffer Module Error Numbers**

Table 10-14 contains the tag buffer module (TBM) error numbers and log entry descriptions.

**Table 10-14 Tag Buffer Module Errors (000AH)**

| Log Entry                  | Description                                                      | Error Number |
|----------------------------|------------------------------------------------------------------|--------------|
| Reserved                   | N/A                                                              | 0000H        |
| Tag Buffer Threshold Error | This error indicates that there is a tag buffer threshold error. | 0001H        |
| Error Recovery Event       | One or more of the errors recovered.                             | 0002H        |

---

## Digital Input/Output Module Error Numbers

Table 10-15 contains the digital input/output module (DIO) error numbers and log entry descriptions.

**Table 10-15 Digital I/O Module Errors (000DH)**

| Log Entry                                 | Description                                                                                                                                               | Error Number |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Reserved                                  | N/A                                                                                                                                                       | 0000H        |
| DIOM Task Create Error                    | This error indicates that the creation of the digital I/O task failed. This error could prevent the Encompass reader's ability to transact with tags.     | 0001H        |
| Buffer Management Create Queue Error      | This error indicates that the creation of a BM queue failed. This error could prevent the Encompass reader's ability to transact with tags.               | 0002H        |
| Get Buffer Management Buffer Error        | This error indicates that the get BM buffer failed. This error could prevent the Encompass reader's ability to transact with tags.                        | 0003H        |
| Return Buffer Management Buffer Error     | This error indicates that the return BM buffer failed. This error could prevent the Encompass reader's ability to transact with tags.                     | 0004H        |
| DIOM Synchronization Error                | This error indicates that there is a synchronization error. This error could prevent the Encompass reader's ability to transact with tags.                | 0005H        |
| Message Queue Create Error                | This error indicates that the message queues create failed. This error could prevent the Encompass reader's ability to transact with tags.                | 0006H        |
| Message Queue Send Error                  | This error indicates that the message queue send failed. This error could prevent the Encompass reader's ability to transact with tags.                   | 0007H        |
| Message Queue Receive Error               | This error indicates that the message queue receive failed. This error could prevent the Encompass reader's ability to transact with tags.                | 0008H        |
| DIOM Invalid Configuration Error          | This error indicates that there is an invalid configuration command error. This error could prevent the Encompass reader's ability to transact with tags. | 0009H        |
| DIOM Event Error                          | This error indicates that there is an invalid event error.                                                                                                | 000AH        |
| DIOM Synchronization Error Recovery Event | One or more of the synchronization errors recovered.                                                                                                      | 000BH        |
| Error Recovery Event                      | One or more of the errors recovered.                                                                                                                      | 000CH        |

## Check Tag Operation

The check tag is designed to test the Encompass reader system.

### Set Check Tag Using UDP Command Set

If using UDP command set, you must issue the Run Check Tag command.

#### Run Check Tag

The check tag is designed to test the Encompass reader system. The Run Check Tag command activates the check tag for a system test. The check tag is designed to operate without interfering with vehicle tag reads. The check tag function switches on for one synchronous pulse frame.

For optimum results, TransCore recommends that you operate the check tag when no vehicles are in the Encompass reader system read zone. [Table 10-16](#) lists the command data.

**Table 10-16 Run Check Tag Command (0025H)**

| Run Check Tag Command Data  |       |       |       |          |       |       |       | Data Payload |
|-----------------------------|-------|-------|-------|----------|-------|-------|-------|--------------|
| Bit 7                       | Bit 6 | Bit 5 | Bit 4 | Bit 3    | Bit 2 | Bit 1 | Bit 0 |              |
| Run Check Tag Command (MSB) |       |       |       |          |       |       |       | 00H          |
| Run Check Tag Command (LSB) |       |       |       |          |       |       |       | 25H          |
| Protocol                    |       |       |       | Interval |       |       |       | XXH          |

**Protocol** — This field sets the check tag protocol.

| Protocol | Definition                      |
|----------|---------------------------------|
| 0        | IT2200, Title 21 – manual       |
| 1        | SeGo, eGo, ATA – manual         |
| 2        | IT2200, Title 21 – periodic     |
| 3        | SeGo – periodic                 |
| E        | Enable all protocols – periodic |
| F        | Enable all protocols – manual   |

**Interval** — This field sets the time interval for the Periodic Check Tag test..

| Interval | Definition |
|----------|------------|
| 0        | 30 seconds |
| 1        | 2 minutes  |
| 2        | 4 minutes  |
| 3        | 8 minutes  |
| 4        | 15 minutes |
| 5        | 30 minutes |
| 6        | 1 hour     |
| 7        | 2 hours    |
| 8        | 4 hours    |

**Note:** *There is no specific response to the Run Check Tag command. Any response is reported as a tag read through the Mode Command Group responses. The reader responds with a command complete.*

---

## ***Set Check Tag Using the AI1200-Emulation Command Set***

If you are using AI1200-emulation commands, then you must run command #813YX. This command activates the check tag for a system test. The check tag function switches on for one synchronous pulse frame. For optimum results, TransCore recommends that you operate the check tag when no vehicles are in the Encompass reader system read zone.

### ***#813YX SET SYSTEM CHECK TAG PERIODIC TIME INTERVAL***

This command sets the time interval for the periodic system check tag test and activates the check tag.

#### ***Format***

#813YX

#### ***Parameters***

Time interval Y = range 0–9 [30 seconds to 8 hours]

#### **#813YX    Periodic Time Value**

#8130X    30 seconds

#8131X    2 minutes

#8132X    4 minutes

#8133X    8 minutes

#8134X    15 minutes

#8135X    30 minutes

#8136X    1 hour

#8137X    2 hours

#8138X    4 hours

#8139X    8 hours

Tag Type X = range 0–3

where

0 = eGo, SeGo, or ATA – periodic

1 = Title 21 or IT2200 – periodic

2 = eGo, SeGo, or ATA – manual

3 = Title 21 or IT2200 – manual

E = enable all protocols – periodic

**F = enable all protocols – manual**

***Note:** Enable all runs the check tag on all of the protocols that have been enabled by the Set Protocol command (#4ANNNN).*

***Pre-condition***

Not applicable

***Post-condition***

This command takes effect immediately.

***Default***

**F = enable all protocols**

***Response***

|        |                 |
|--------|-----------------|
| #DONE  | Valid setting   |
| #ERROR | Invalid setting |

***Note:** You can choose only one value for X at a time.*



# Hardware Preventive Maintenance and Troubleshooting Procedures

---

The Encompass reader system has limited serviceable parts, however, there are preventive maintenance steps that can help to keep the equipment operating to specification. This section describes the preventive maintenance steps and troubleshooting techniques that can help determine if a component is failing.

---

## Hardware Preventive Maintenance Schedule

Table 10-17 lists the schedule of preventive maintenance activities for the Encompass reader system components.

**Table 10-17 Preventive Maintenance Task Schedule**

| Period       | Task Description                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Weekly       | Visually inspect the antennas for physical damage, such as cracks or stressed cables.                                                                                                                                                                                                                                                                                                                                                                             |
| Quarterly    | Visually inspect all transmit/receive and check tag antenna cables for signs of damage or water invasion.                                                                                                                                                                                                                                                                                                                                                         |
| Semiannually | <p>Check the lane configuration. See Chapter 9 for detailed lane configuration settings.</p> <p>The AA3152 UTAs have two weep holes located at the lower left and right corners of the radome. Check that these holes are open to allow any trapped water to drain from the antenna.</p> <p><b>Note</b> If the antennas are installed upside down (TransCore logo is upside down) drill two new weep holes in the lower left and right corners of the radome.</p> |
| Annually     | Check NEMA enclosure seal for signs of damage or water invasion.                                                                                                                                                                                                                                                                                                                                                                                                  |

---

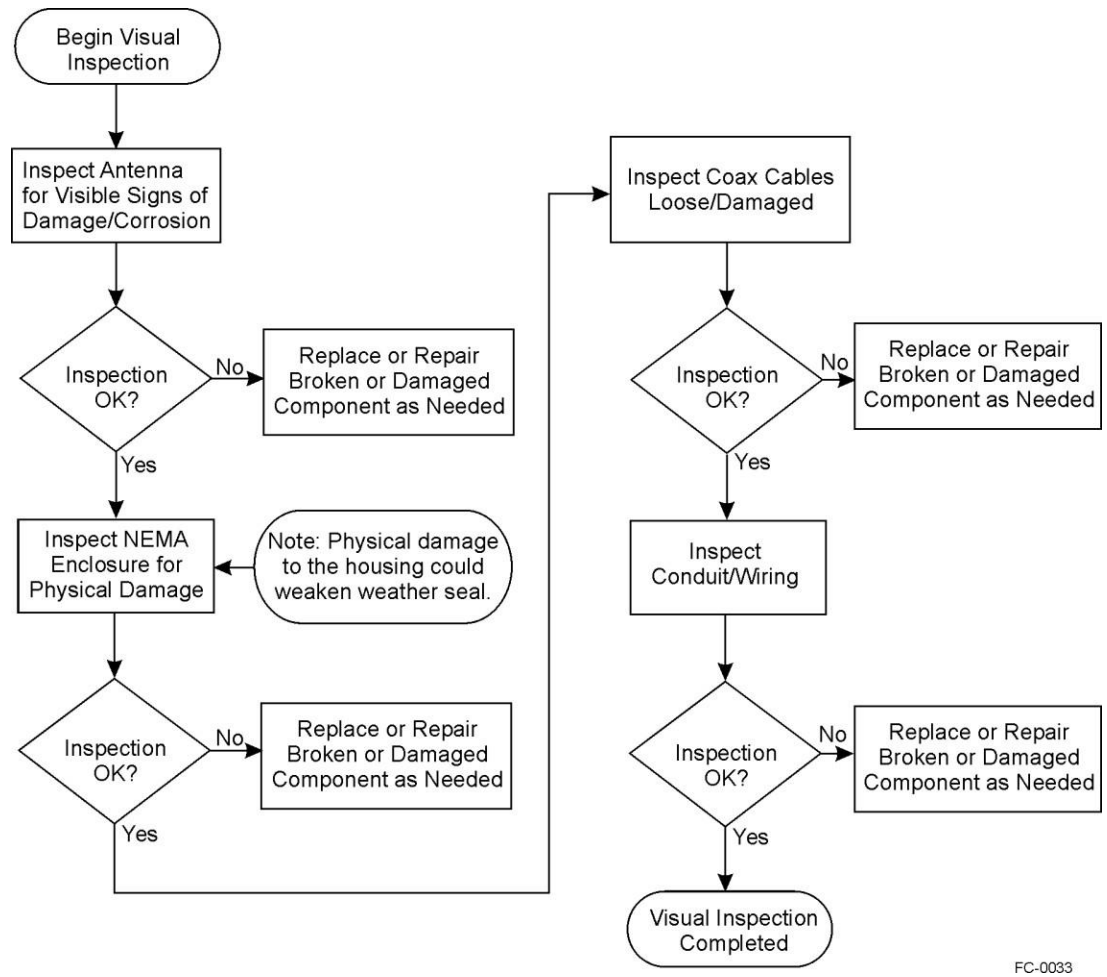
## Visual Inspection

The Encompass reader system is very reliable, so any service-related problems most likely will be due to external causes, such as damage to components. Visually inspect each system component and replace or repair components, if serviceable, as needed.

### To perform a visual inspection

1. Inspect the transmit/receive antenna and check tag antenna for signs of damage or corrosion.
2. Check cables between the transmit/receive antenna, check tag antenna, and Encompass reader. Look for damage or loose connections.

Figure 10-8 shows the visual inspection process.



FC-0033

**Figure 10-8 Visual Inspection Process**

# Replacement Instructions for Encompass Reader and AVI Equipment

---

This section explains how to replace an Encompass reader and other AVI equipment. This section shows Encompass readers that are installed in NEMA enclosures at the factory.

These instructions provide the following:

- Replacement instructions for an Encompass in a NEMA enclosure
- Replacement instructions for a transmit/receive antenna

Check tag assembly and antenna replacement instructions can be found in Appendix D, “Assembling the Check Tag Antenna” on page D-11.

Figure 10-9 shows the basic Encompass reader and its connection ports and LEDs.

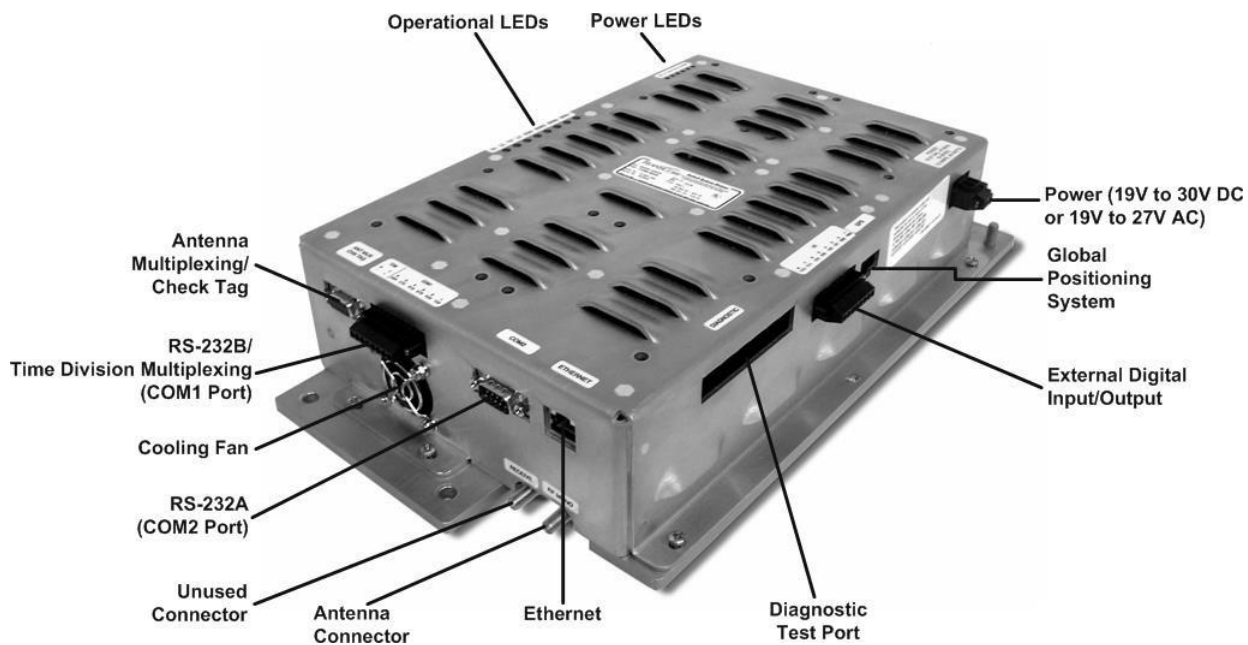


**Figure 10-9 Connector and Indicator Locations on the Encompass Reader**

---

## Replacing an Encompass Reader in a NEMA Enclosure

Refer to Figure 10-9 for port and connector locations.

**Note:** There are no serviceable parts on the Encompass reader. These instructions explain how to replace a failed Encompass reader only.

### To remove an Encompass reader in a NEMA enclosure

1. Open the NEMA enclosure.
2. Disconnect the power supply at the Encompass connector. Be sure to unscrew the two mounting screws on the connector before pulling connector away from the Encompass (Figure 10-10).



**CAUTION:**  
Loosen mounting screws before  
removing plug.

### Figure 10-10 Encompass Power Plug

3. Using a 5/16-inch torque wrench, loosen and then disconnect the SMA connector on the RF antenna cable.

**Note:** Be sure to move the cable and connector aside from the RF MONO connection before removing the Encompass reader from the NEMA enclosure.

4. Disconnect Ethernet cable from Encompass reader.  
If the check tag assembly is not being returned, remove it from the Encompass reader.
5. Loosen the mounting screws and disconnect the check tag assembly data cable from the Encompass reader.
6. Using a 5/16-inch torque wrench, loosen and then disconnect the check tag antenna SMA connector from the check tag assembly.

**Note:** Be sure to move this cable and connector aside before removing Encompass reader from NEMA enclosure.

7. Loosen and remove the four locking nuts and washers securing the Encompass reader from the mounting posts. Carefully lift the Encompass reader out of the NEMA enclosure. Be sure to keep all hardware available for replacing the reader.
8. Return Encompass reader to TransCore.

### To install an Encompass reader in a NEMA enclosure

1. Open NEMA enclosure.
2. Place Encompass reader onto the four mounting posts. Screw the washers and locking nuts over posts and tighten the locking nuts until snug-tight.

3. Place the check tag assembly atop Encompass reader (follow procedure outlined in “Installing the Check Tag Assembly” on page D-9).
4. Connect Ethernet cable to the Encompass reader.
5. Using a 5/16-inch torque wrench, tighten the SMA connector on the RF antenna cable to 10 in-lb.
6. Connect the power supply plug at the Encompass connector. Be sure to tighten the two mounting screws on the connector after plugging in connector at the Encompass reader.

---

## ***Replacing a Transmit/Receive Antenna on a Gantry***

### **To remove an antenna**

1. Close traffic lane below where the antenna is being replaced.
2. Shut off RF power to the antenna.
3. Use an inclinometer to record the antenna angle from horizontal before moving it.
4. Cut off the shrink tubing from around the RF coaxial cable connector.
5. Disconnect the RF connector from the rear of the antenna.
6. Remove nuts and washers from U-bolts.
7. Remove antenna from mounting pipe.
8. Return antenna to TransCore.

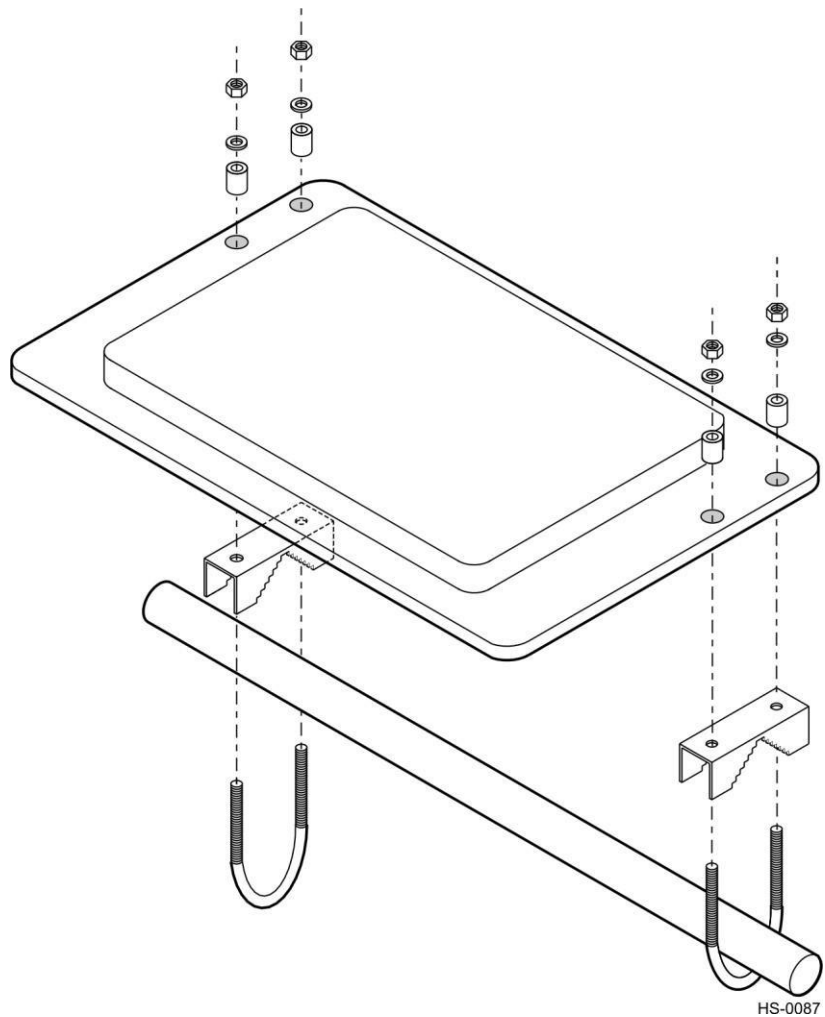


**Figure 10-11 Transmit/Receive Antenna Mounting and Connections**

**To install a Transmit/Receive Antenna**

1. Place the antenna below the mounting pipe and insert a U-bolt around the pole and down through the bracket on the side of the antenna closest to the center of the lane. This antenna should be mounted toward the driver side of the traffic lane. Place a spacer, lock washer, and nut over each end of the U-bolt, but do not tighten the nuts. Repeat for the other U-bolt (Figure 10-11).



**Caution**

*When installing the antenna use only the mounting hardware provided. Do not use oversized washers to secure the plastic radome to the bracket. This practice can weaken the radome material.*

2. Rotate the antenna up and toward oncoming traffic. Rotate up 15° from horizontal for a dedicated lane or 10° up for a mixed-use lane. Use an inclinometer or angle finder to check the angle.
3. Tighten nuts with a torque wrench to 50 ft-lb (68 N-m).
4. Slide the shrink tubing over the coaxial cable, but do not heat it.
5. Connect the coaxial cable to the antenna. Heat the shrink tubing at the back of the antenna after configuring the lane.

## ***Preventive Maintenance Schedule***

---

Table 10-18 lists the schedule of preventive maintenance activities for the Encompass reader components.

**Table 10-18 Preventive Maintenance Schedule**

| Period       | Task Description                                                                                        |
|--------------|---------------------------------------------------------------------------------------------------------|
| Weekly       | Visually inspect the antennas and NEMA enclosure for physical damage such as cracks or stressed cables. |
| Quarterly    | Visually inspect all antenna and cables entering NEMA enclosure for signs of damage or water invasion.  |
| Semiannually | Check the lane configuration. See Chapter 9, “Configuring the Lane.”                                    |

---

## ***Removal and Replacement Procedures***

This section outlines the procedures to remove or replace the Encompass reader components.

---

### ***Transmit/Receive Antenna***

#### ***Removal***

##### **To remove a transmit/receive antenna**

1. Switch off power to the Encompass reader and disconnect the antenna from the port.
2. Remove shrink tubing covering connector.
3. Disconnect the antenna cable from the antenna.
4. Check the antenna mounting angle using an inclinometer and record the angle. Also, note the position of any spacers on the mounting bracket.
5. Remove the nuts holding the mounting bracket U-bolts, then remove the antenna.

6. When lane tuning is complete, use a heat gun to shrink the tubing covering the antenna cable connections.



## ***Replacement***

### **To install a replacement antenna**

1. Position the new antenna along the mounting pipe.
2. Insert the U-bolts through the mounting brackets and secure with lock washers and nuts. Replace any spacers in the same position as before.
3. Set the antenna mounting angle to match the original antenna.
4. Tighten the mounting nuts to 50 ft-lb (68 N-m).
5. Put a length of heat shrink tubing over the antenna cable and connect the cable to the antenna.
6. Check the lane tuning.
7. When lane tuning is complete, use a heat gun to shrink the tubing covering the antenna cable connection.

---

## ***Antenna Cable***

### ***Removal***

#### **To remove an antenna cable**

1. Switch off power to the Encompass reader.
2. Disconnect the antenna cable from the Encompass reader antenna port.
3. Remove antenna cable from installation site. Because each installation may differ (e.g., cabling may be located inside or alongside mounting pipes), detailed removal instructions are not provided here.

### ***Replacement***

#### **To install a replacement antenna cable**

1. Route the new antenna cable between the antenna and Encompass reader as needed.
2. Connect the new cable to the Encompass reader at the antenna port.
3. Place a piece of heat shrink tubing over the antenna cable.
4. Connect the cable to the antenna.
5. Switch on power to the Encompass reader.
6. Check the lane tuning.
7. When lane tuning is complete, heat the shrink tubing covering the antenna cable connector.

## ***Technical Support***

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Contact TransCore at 505-856-8007.



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## Remote Hardware Reset



# Remote Hardware Reset

*This chapter provides information on resetting the Encompass<sup>®</sup> Reader remotely.*

## ***Performing a Remote Hardware Reset***

---

You can perform a full hardware reset through the Ethernet interface on the Encompass Reader. To reset the Encompass Reader, the host sends three special packets in sequence. The Encompass Reader is reset when it receives these three packets correctly and in the correct order ([Figure 11-1](#)).

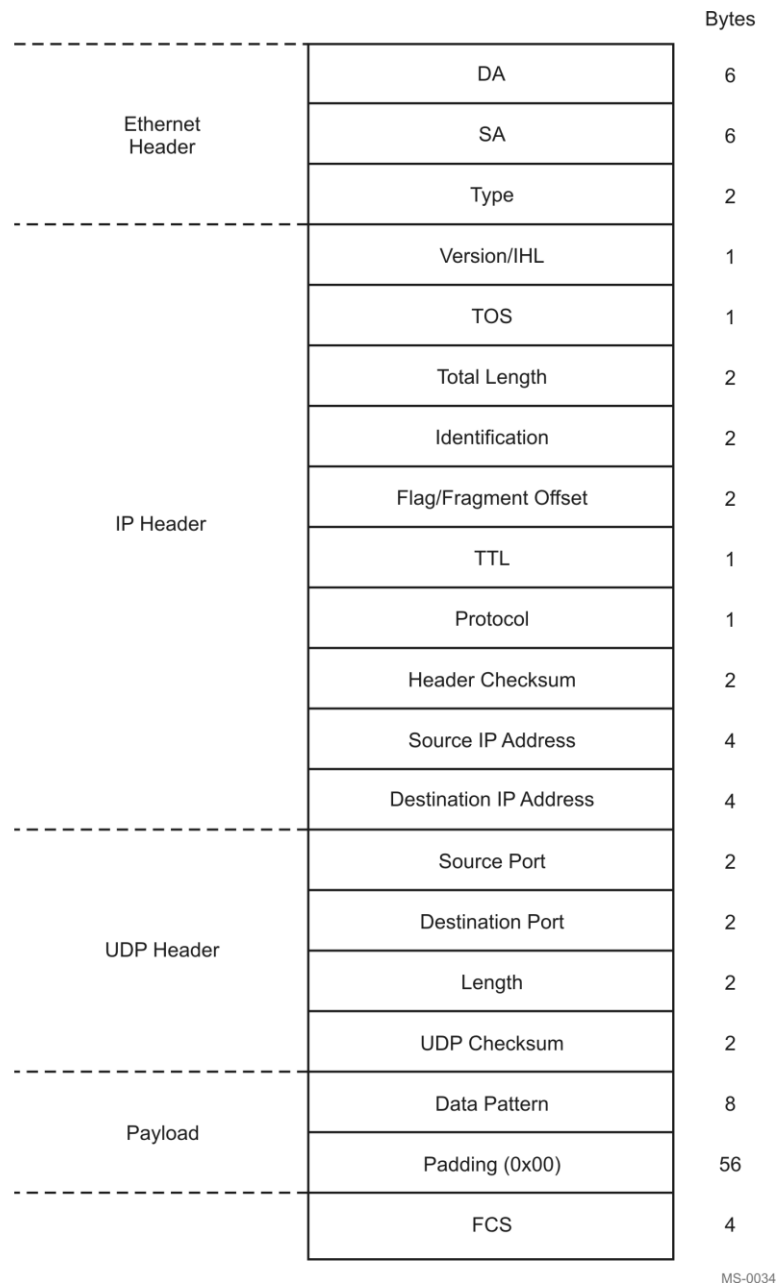


**Figure 11-1 Packet Format for Remote Hardware Reset**

As shown in [Figure 11-1](#) in the packet payload, an 8-byte data pattern is used for remote reset. The three data patterns are defined as follows:

Data Pattern 1: 0xFFFFFFFFFFFFFFFF

Data Pattern 2: 0x0000000000000000

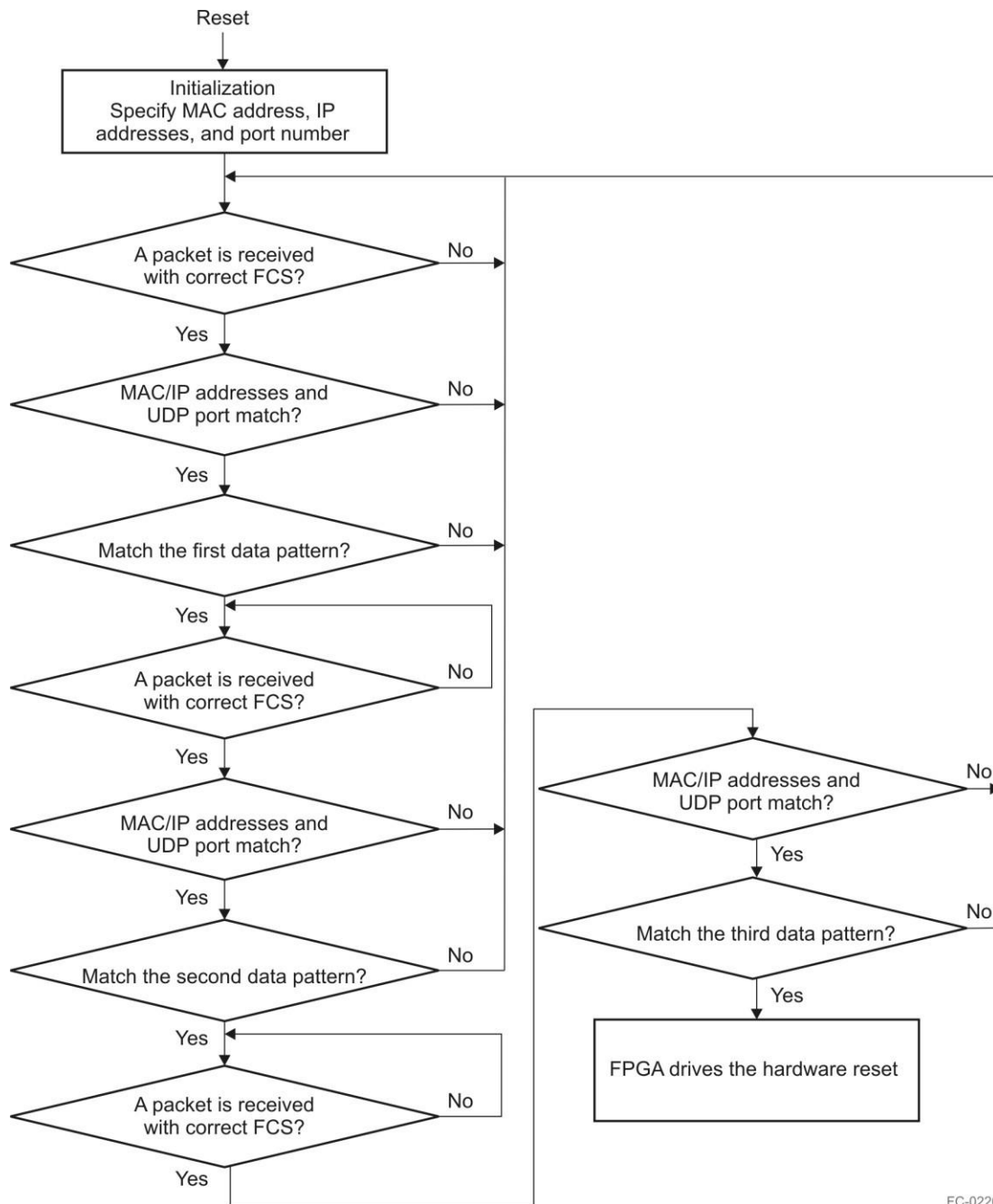
Data Pattern 3: 0xB0B5DEADBEEFCAFE

The following fields in the packet are processed for remote reset:

- Destination Ethernet address
- Destination IP address
- Source IP address (the host must send packets for remote reset)
- Layer 4 protocol (must be UDP)
- Destination UDP port number
- Data pattern
- FCS (32-bit cyclic redundancy check (CRC))



Figure 11-2 shows the process for remote hardware reset control operation.



FC-0226

**Figure 11-2 Remote Reset Control Operation Flow Chart**

The definitions for acronyms used in [Figure 11-1](#) and [Figure 11-2](#) are listed here.

|             |                                 |
|-------------|---------------------------------|
| <b>DA</b>   | Destination address             |
| <b>FCS</b>  | Frame check sequence            |
| <b>FPGA</b> | Field programmable gate-array   |
| <b>IHL</b>  | Internet protocol header length |
| <b>IP</b>   | Internet protocol               |
| <b>MAC</b>  | Media access control            |
| <b>SA</b>   | Source address                  |
| <b>TOS</b>  | Type of service                 |
| <b>TTL</b>  | Transistor-transistor logic     |
| <b>UDP</b>  | User datagram protocol          |



A

---

## Acronyms and Glossary



# Acronyms and Glossary

## ***Acronyms and Glossary***

---

### **A**

|                |                                                                                                                                             |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A</b>       | amp(s)                                                                                                                                      |
| <b>A/V</b>     | audio/visual                                                                                                                                |
| <b>AC</b>      | alternating current                                                                                                                         |
| <b>ACK</b>     | acknowledge (data valid)                                                                                                                    |
| <b>ADC</b>     | analog-to-digital converter                                                                                                                 |
| <b>antenna</b> | passive device that converts RF energy into magnetic energy (RF signal)                                                                     |
| <b>APP</b>     | application                                                                                                                                 |
| <b>ASCII</b>   | American Standard Code for Information Interchange                                                                                          |
| <b>ATA</b>     | American Trucking Associations, which refers to a standard RF communications protocol and data storage method. ATA-type tags are read only. |
| <b>AVI</b>     | automatic vehicle identification                                                                                                            |
| <b>AWG</b>     | American Wire Gauge                                                                                                                         |

### **B**

|                    |                                                                                                            |
|--------------------|------------------------------------------------------------------------------------------------------------|
| <b>backscatter</b> | portion of an RF signal that is modulated by a tag and radiated back to the reader                         |
| <b>baud</b>        | measure of number of bits per second of a digital signal; for example, 9600<br>baud = 9600 bits per second |
| <b>BCM</b>         | buffer control mode                                                                                        |
| <b>bit</b>         | The smallest unit of information, consisting of a 0 or 1, that is formed from a binary digit               |
| <b>byte</b>        | binary character; for example, one 8-bit ASCII character                                                   |

## C

|                        |                                                                                                                                                                                                  |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>C</b>               | Centigrade                                                                                                                                                                                       |
| <b>CHKSUM</b>          | checksum                                                                                                                                                                                         |
| <b>cm</b>              | centimeter(s)                                                                                                                                                                                    |
| <b>CMD</b>             | command                                                                                                                                                                                          |
| <b>command</b>         | data set that is recognized by the receiving device as intending to elicit a specific response                                                                                                   |
| <b>CPU</b>             | central processing unit                                                                                                                                                                          |
| <b>CR</b>              | carriage return                                                                                                                                                                                  |
| <b>CRC</b>             | cyclic redundancy check                                                                                                                                                                          |
| <b>crossover cable</b> | Ethernet cable equivalent of a null modem for serial cables. The crossover cable is used so that two systems that use the same transmit and receive pins on the RJ-45 connector can communicate. |
| <b>CS</b>              | commission status                                                                                                                                                                                |
| <b>CSN</b>             | command sequence number                                                                                                                                                                          |
| <b>CTRL</b>            | control                                                                                                                                                                                          |
| <b>CTS</b>             | clear to send                                                                                                                                                                                    |
| <b>CVISN</b>           | Commercial Vehicle Information Systems and Networks application, an ASTM Draft 6 Specification                                                                                                   |
| <b>CW</b>              | continuous wave                                                                                                                                                                                  |

## D

|                       |                                                     |
|-----------------------|-----------------------------------------------------|
| <b>DAC</b>            | digital-to-analog converter                         |
| <b>data</b>           | information that is processed by a computing device |
| <b>DC</b>             | direct current                                      |
| <b>dB</b>             | decibel(s)                                          |
| <b>dB<sub>i</sub></b> | decibel(s), referencing isotropic radiator          |
| <b>DIAG</b>           | diagnostic (command)                                |
| <b>DL</b>             | downlink                                            |
| <b>DLL</b>            | dynamic link library                                |

|            |                     |
|------------|---------------------|
| <b>DM</b>  | diagnostic module   |
| <b>DOM</b> | depth of modulation |
| <b>DSR</b> | data set ready      |
| <b>DTR</b> | data terminal ready |



## E

|                              |                                                                                                                                                                                                                                                                                         |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ECP</b>                   | error correcting protocol                                                                                                                                                                                                                                                               |
| <b>EEPROM</b>                | electrically erasable programmable read-only memory                                                                                                                                                                                                                                     |
| <b>eGo<sup>®</sup></b>       | Proprietary name for ANS INCITS 256-2001 and ISO 18000-6 compliant TransCore products. A registered trademark of TC IP, Ltd.                                                                                                                                                            |
| <b>eGo PST</b>               | eGo Plus Sticker Tag                                                                                                                                                                                                                                                                    |
| <b>Encompass<sup>®</sup></b> | proprietary name for ANS INCITS 256-2001 compliant TransCore tag products. TransCore brand of readers that are capable of reading single to multiple tag protocols. The Encompass Multiprotocol Reader can read from all tag protocols within North America. A trademark of TC IP, Ltd. |
| <b>eom</b>                   | end of message                                                                                                                                                                                                                                                                          |
| <b>ERR</b>                   | error                                                                                                                                                                                                                                                                                   |
| <b>ESD</b>                   | electrostatic discharge                                                                                                                                                                                                                                                                 |
| <b>ETC</b>                   | electronic toll collection                                                                                                                                                                                                                                                              |

## F

|                        |                                                                                                                                                        |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>f</b>               | frequency                                                                                                                                              |
| <b>F</b>               | Fahrenheit                                                                                                                                             |
| <b>FCC</b>             | Federal Communications Commission                                                                                                                      |
| <b>field</b>           | 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 |
| <b>FIFO</b>            | first-in, first-out                                                                                                                                    |
| <b>FPGA</b>            | field programmable gate-array                                                                                                                          |
| <b>frame</b>           | consecutive bits of data in memory that are read and written as a group                                                                                |
| <b>frequency bands</b> | range of RF frequencies assigned for transmission by an RF device                                                                                      |
| <b>ft</b>              | foot or feet                                                                                                                                           |
| <b>ftp</b>             | file transfer protocol                                                                                                                                 |

## G

|          |                                                  |
|----------|--------------------------------------------------|
| <b>G</b> | antenna gain referenced to an isotropic radiator |
| <b>G</b> | giga (10 <sup>9</sup> )                          |

|                    |                                                                                                                    |
|--------------------|--------------------------------------------------------------------------------------------------------------------|
| <b>Gen Ack</b>     | general acknowledgment                                                                                             |
| <b>GHz</b>         | gigahertz                                                                                                          |
| <b>GND</b>         | ground                                                                                                             |
| <b>GPS</b>         | global positioning system                                                                                          |
| <b>GPSM</b>        | GPS module                                                                                                         |
| <b>GSE</b>         | group select equals                                                                                                |
| <b>H</b>           |                                                                                                                    |
| <b>hex</b>         | hexadecimal                                                                                                        |
| <b>hexadecimal</b> | base 16 numbering system that uses the characters 0 through 9 and A through F to represent the digits 0 through 15 |
| <b>HH</b>          | hours                                                                                                              |
| <b>hh</b>          | hundredths of seconds                                                                                              |
| <b>host</b>        | device, generally a computer, that is connected to reader system components through the communications port        |
| <b>Hz</b>          | hertz                                                                                                              |
| <b>I</b>           |                                                                                                                    |
| <b>IC</b>          | Industry Canada                                                                                                    |
| <b>I/O</b>         | Input/output                                                                                                       |
| <b>IAG</b>         | Interagency Group                                                                                                  |
| <b>ID</b>          | identification; for example, encoded information unique to a particular tag, or an FCC identifier number           |
| <b>IEC/EN</b>      | International Electrotechnical Commission/ <i>Comite, Europe, en de Normalisation</i>                              |
| <b>IHL</b>         | Internet protocol header length                                                                                    |
| <b>in</b>          | inch(es)                                                                                                           |
| <b>interface</b>   | connection point for communications with another device                                                            |
| <b>IP</b>          | Internet protocol                                                                                                  |
| <b>ISTHA</b>       | Illinois State Toll Highway Authority                                                                              |

## **K**

|            |                 |
|------------|-----------------|
| <b>k</b>   | kilo ( $10^3$ ) |
| <b>kg</b>  | kilogram(s)     |
| <b>kHz</b> | kilohertz       |

## **L**

|                        |                                                                          |
|------------------------|--------------------------------------------------------------------------|
| <b>L</b>               | uniqueness counter timing feature                                        |
| <b>lane controller</b> | device that is used to integrate all activity that occurs in a toll lane |
| <b>lb</b>              | pound(s)                                                                 |
| <b>LC</b>              | lane controller                                                          |
| <b>LCD</b>             | liquid crystal display                                                   |
| <b>LCIM</b>            | lane controller interface module                                         |
| <b>LED</b>             | light-emitting diode                                                     |
| <b>LF</b>              | line feed                                                                |
| <b>LSB</b>             | least significant byte                                                   |
| <b>LSW</b>             | least significant word                                                   |

## **M**

|                |                                                                                                                                                                         |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $\mu$ s        | microsecond(s)                                                                                                                                                          |
| <b>m</b>       | meter(s)                                                                                                                                                                |
| <b>M</b>       | million ( $10^6$ )                                                                                                                                                      |
| <b>mA</b>      | milliamp(s)                                                                                                                                                             |
| <b>MB</b>      | megabyte(s)                                                                                                                                                             |
| <b>message</b> | combination of fields, frames, and pages as required by the system to transmit or receive associated command and response data to and from the reader and host computer |
| <b>MHz</b>     | megahertz                                                                                                                                                               |
| <b>milli</b>   | one-thousandth ( $10^{-3}$ )                                                                                                                                            |
| <b>MIM</b>     | mode interface module                                                                                                                                                   |
| <b>ML</b>      | mounting location                                                                                                                                                       |

|                   |                                                                                                        |
|-------------------|--------------------------------------------------------------------------------------------------------|
| <b>mode</b>       | method of operation                                                                                    |
| <b>MPI</b>        | multiprotocol interrogator                                                                             |
| <b>MPR</b>        | multiprotocol reader                                                                                   |
| <b>ms</b>         | milliseconds                                                                                           |
| <b>MSB</b>        | most significant byte                                                                                  |
| <b>MSIM</b>       | system interface module                                                                                |
| <b>MSW</b>        | most significant word                                                                                  |
| <b>mW</b>         | milliwatt(s)                                                                                           |
| <b>N</b>          |                                                                                                        |
| <b>N-m</b>        | Newton-meter(s)                                                                                        |
| <b>NACK</b>       | nonacknowledge                                                                                         |
| <b>NEMA</b>       | National Electrical Manufacturers Association                                                          |
| <b>NIC</b>        | network interface card                                                                                 |
| <b>null modem</b> | a communications cable that allows you to connect to another PC or serial device using modem protocol. |
| <b>NVRAM</b>      | non-volatile random access memory                                                                      |
| <b>O</b>          |                                                                                                        |
| <b>ORT</b>        | open road tolling                                                                                      |
| <b>OSHA</b>       | Occupational Safety and Health Administration                                                          |
| <b>P</b>          |                                                                                                        |
| <b>P</b>          | antenna input power                                                                                    |
| <b>P/N</b>        | part number                                                                                            |
| <b>PC</b>         | personal computer                                                                                      |
| <b>PLL</b>        | phase-lock loop                                                                                        |
| <b>PPS</b>        | pulse-per-second                                                                                       |
| <b>protocol</b>   | specified convention for the format of data messages communicated between devices                      |
| <b>PST</b>        | (eGo) Plus Sticker Tag                                                                                 |

**pw** password  
**PWA** printed wiring assembly

## **R**

**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** physical area in which a tag can be read by the reader system  
**RESP** response  
**RF** radio frequency  
**RFID** radio frequency identification  
**RFTIM** RF transceiver interface module  
**RI** ring indicator  
**RMS** root-mean-square  
**RSD** received line signal detect  
**RTS** request to send  
**RX** receive data  
**RXD** receive data

## **S**

**s** second(s)  
**S/N** serial number  
**SA** source address  
**S-record** an S-record file consists of a sequence of specially formatted ASCII character strings. An S-record is less than or equal to 78 bytes.  
**SeGo** SeGo is a superset of the TransCore eGo protocol.  
**seq** sequence  
**Ser Num** serial number  
**SGSPR** SeGo Streamlined Group Select Page Read  
**SI** system interface (command)

|                    |                                                                                                                                                                                                     |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SIM</b>         | system interface module                                                                                                                                                                             |
| <b>SL</b>          | step-lock                                                                                                                                                                                           |
| <b>SMA</b>         | sub-miniature A connector                                                                                                                                                                           |
| <b>SMC</b>         | serial management controller                                                                                                                                                                        |
| <b>SN</b>          | serial number                                                                                                                                                                                       |
| <b>som</b>         | start of message                                                                                                                                                                                    |
| <b>step-lock</b>   | a specific method of synchronizing RFID signals to eliminate or reduce the effect of interference among colocated RFID readers                                                                      |
| <b>system</b>      | a reader, RF module, antenna, and tag, which are described by the general application and interfaces with each other and any connected devices that are defined as being outside the system         |
| <b>T</b>           |                                                                                                                                                                                                     |
| <b>tag</b>         | small, self-contained device acting as an identifying transponder                                                                                                                                   |
| <b>TBM</b>         | tag buffer module                                                                                                                                                                                   |
| <b>TDM</b>         | time-division multiplexing, used in this document to refer to the use of time-division multiplexing of multiple readers in proximity of each other.                                                 |
| <b>TDMM</b>        | TDM module                                                                                                                                                                                          |
| <b>TIM</b>         | tag interface module                                                                                                                                                                                |
| <b>Title 21</b>    | state of California code of regulations, Chapter 16, Title 21, which is the standard used for AVI/DSRC (digital short-range communications) protocol                                                |
| <b>TM</b>          | traffic management, also timer module                                                                                                                                                               |
| <b>toll</b>        | any application of the system equipment wherein the equipment is used to assist in the orderly collection of money in exchange for the passage of a vehicle through a particular installation point |
| <b>T-RAIM</b>      | Timing-Receiver Autonomous Integrity Monitoring                                                                                                                                                     |
| <b>transponder</b> | a tag                                                                                                                                                                                               |
| <b>TX</b>          | transmit data                                                                                                                                                                                       |
| <b>TXD</b>         | transmit data                                                                                                                                                                                       |

## **U**

**UDP/IP** User datagram protocol/Internet protocol

**UL** uplink

**UTA** universal toll antenna

## **V**

**V** volt(s)

**V. Class** vehicle class

**VCC** voltage controlled current

**Ver** version (software)

## **W**

**W** watt(s)

B

---

## Hardware Interfaces



