ADAPTIVE® **TechMemo** **#00-0006A**

PRIORITY:	Normal
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TITLE:	Configuration data for Alpha® Gateway Networks
ECO REFERENCE:	N/A
PRODUCT(S) AFFECTED:	Alpha® Gateway Interface
SUMMARY:	The Alpha® Gateway Interface (the "AGI") can be used to connect Alpha® sign networks with a number of different types of industrial networks. This document is not intended to provide installation guidelines for any specific network configuration. Its purpose, instead, is to serve as a programmer's reference for those functions of the AGI which must be taken into account when network PLCs are programmed to transfer PLC information through the AGI to the Alpha® sign network.

Overview

The Alpha® Gateway Interface maps Output and Input Data tables in the PLC to the Gateway interface's Input and Output Data tables, as shown in Figure 1. Once mapped, the PLC, operating through the Alpha® Gateway Interface (the "AGI"), controls the function and operations of the Alpha® sign network.

The Gateway network is configured to allow two different types of messaging, "Add/remove messages" and "Priority messaging".

- "Add/remove messages" allows several different messages to all be active at once. The messaging control function allows different priority levels to be applied to the messages that are programmed with *Alpha® Automation Software* (or *Gateway Messaging Software*.)
- "Priority messaging" activates only one message at a time, leaving full control of messaging display with the PLC.

Variable data corresponding to values in the Output Data Table and in the *Alpha® Automation Software* (or *Gateway Messaging Software*) may be included in any message.

NOTE: All Alpha® signs used in a Gateway network must have Alpha Industrial Protocol firmware.

Information flow

In an Alpha® sign network, a device is any point in the information pathway that is capable of sending and receiving a data signal.

In the most basic network configuration (one input, one PLC, one AGI, and one sign), the PLC, AGI, and sign are all capable of both sending and receiving data.

In Figure 1, data communication pathways are all shown with solid lines. Other network information traffic—which may be required for initial setup and installation, or for optional/part-time or back-up communication with other local networks—is shown with dotted lines.

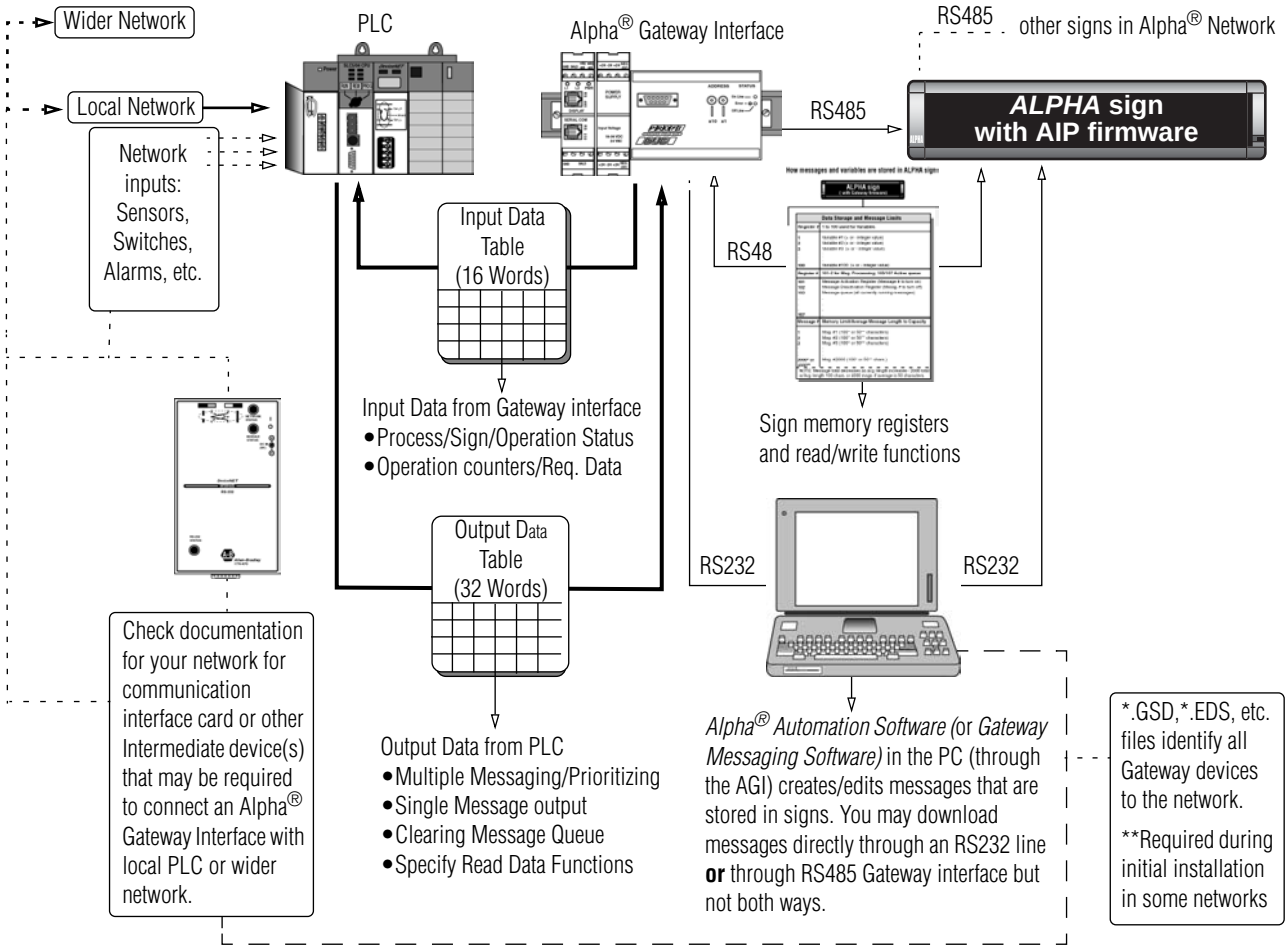


Figure 1: Information flow

Functional capacity

Data mapping between the PLC and AGI allows the industrial network to control the following operations of an Alpha® sign network:

- Priority messaging
- Add/remove messages in queue
- Read currently-running messages in a sign
- Read variable data
- Update variable data
- Monitor the status of signs on the network, individually or all at once
- Determine if the AGI is processing data
- Clear any status bits set by the AGI
- Clear all messages currently being displayed

Related documentation

Part number	Document name
--	Alpha® Automation Software online Help system
9711-8809	How to configure and connect the Alpha® Gateway Interface to a DeviceNet network
9711-8810	How to configure and connect the Alpha® Gateway Interface to a Profibus DP network
9711-8811	Alpha® Gateway Interface Installation Instructions for Modbus Plus
9703-7006	How to connect Alpha® signs to a Data Highway Plus using the Bridgeport

Alpha® sign network data storage

An Alpha® Gateway Interface is connected to the Alpha® signs via a multi-drop RS485 network. This network will support up to 32 drops before requiring a repeater. These signs can be addressed from 001 to 254 by using *Alpha® Automation Software* (see the *Alpha® Automation Software* online Help system) or through each sign's internal DIP switches.

Alpha® sign memory map

Messages are created and stored in the sign's memory using the *Alpha® Automation Software (*or *Gateway Messaging Software*.) An Alpha® sign can store up to 4000 messages (1-4000) and can support up to 100 variables (0-99).

The following table shows a sign's memory allocations and meaning:

How messages and variables are stored inside Alpha® signs

Data Storage and Message Limits	
Register #	**1 to 100 used for Variables**
001	Variable #0 (+ or - integer value)
002	Variable #1 (+ or - integer value)
003	Variable #2 (+ or - integer value)
.	.
.	.
.	.
100	Variable #99 (+ or - integer value)
Register #	**101-102 for message processing; 103-167 for active queue**
101	Message Activation Register (message number to turn on)
102	Message Deactivation Register (message number to turn off)
103	Message queue (all currently running messages)
.	.
.	.
.	.
167	.
Message #	**Memory Limit/Average Message Length to Capacity**
1	Message #1 (100 or 50 characters *)
2	Message #2 (100 or 50 characters *)
3	Message #3 (100 or 50 characters *)
.	.
.	.
.	.
2000 or 4000	Message #2000 (100 or 50 characters *)
* NOTE: Message total decreases as average length increases - 2000 total messages if average length is 100 characters or 4000 messages if average length is 50 characters.	

Read — Write (Variable #0 (+ or - integer value) … Variable #99 (+ or - integer value))

Write (Message Activation Register (message number to turn on); Message Deactivation Register (message number to turn off))

Read — 104–166 not accessible with the write command (Message queue (all currently running messages) … 167)

Write during download only (Message #1 (100 or 50 characters *) … Message #2000 (100 or 50 characters *))

Network device GSD and EDS files

The AGI operating on an industrial network may need to be identified to the network using an initialization file. For example, Profibus DP networks use *.GSD files; DeviceNet networks use *.EDS files. Check your network documentation.

Look for *.GSD and *.EDS files in the same directory path used to install *Alpha® Automation Software (*or *Gateway Messaging Software*.) When loading the *.GSD or *.EDS files to your system, set the input and output parameters as follows:

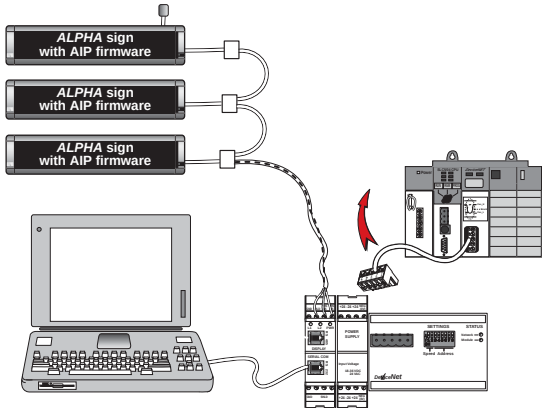
32 Words (64 Bytes) out for the PLC Output Data table from the PLC to the Gateway

16 Words (32 Bytes) in for the PLC Input Data table from the Gateway to the PLC

Downloading messages to an Alpha® sign network

To download messages from the *Alpha® Automation Software (*or *Gateway Messaging Software*) to the Alpha® sign network, *physically disconnect the Network Interface Module from the industrial network*. Reconnect the network input to the Network Interface Module only after you have completed all downloads.

Also, you could bypass the Network Interface Module and physically connect your PC to the Alpha® sign network directly via an RS232 connection:



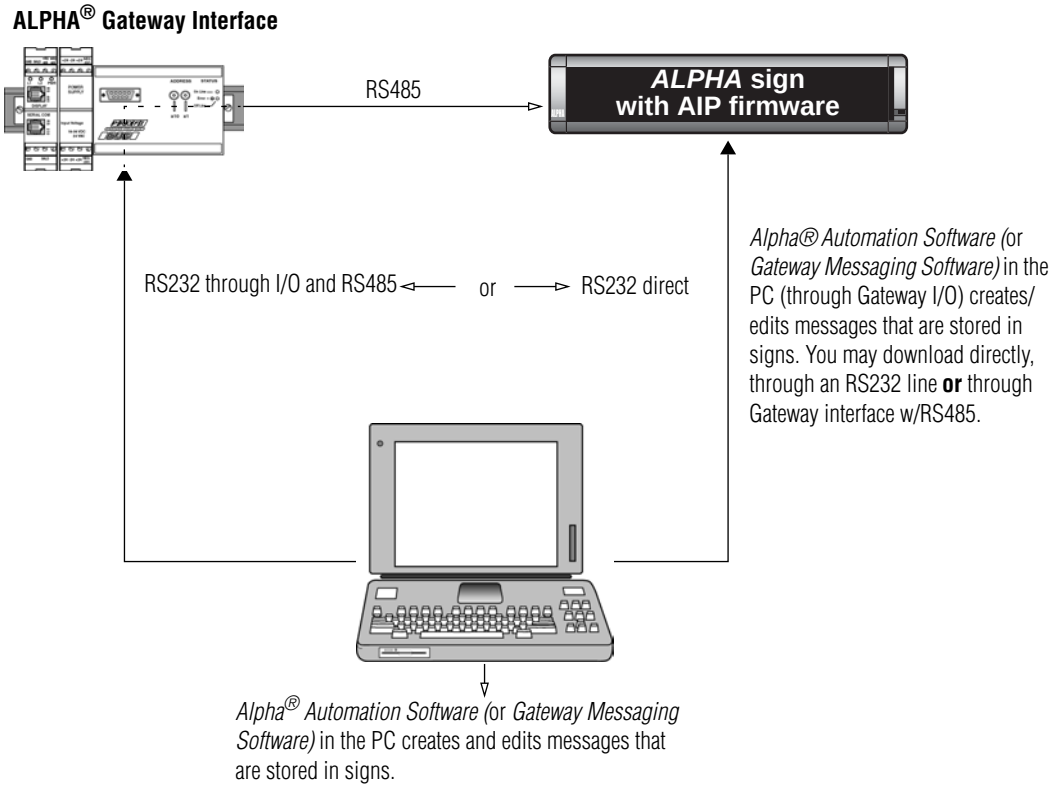


Figure 2: Downloading messages to an ALPHA® sign network

Output Data table

The Output Data table mapped in the PLC to the AGI Input Data table is used to control and execute all available operations of the message sign network.

The Output Data table consists of 32 words, reserved for the functions described in the table below. Valid values are listed for each word. (Invalid values are shown in Table 9 on page 11.)

Table 1: Output Data Table

Word	Description	Valid values (decimal)
0	Control Word	2 = Write 3 = Read Message Queue 4 = Read Variable Data -1 = Clear Status bits
1	Sign Address (SA)	1 – 254, 255 is broadcast address.
2	Add Message Number to queue (AM) (When the Control Word is a 2)	1 – 4000 and 4095 are valid message numbers; 4001–4094 are *not* valid. (4095 identifies the background message.)
	Clearing a single bit in Words 1 and 2 of the Input Data table (CB) (When the Control Word is a -1)	0 = Used for clearing a Status bit for an individual sign address
	Starting Register Index (RI) (When the Control Word is a 3)	1-6 when reading Message queue data
	Starting Register Index (RI) (When the Control Word is a 4)	1-9 when reading Variable data.
3	Remove Message Number from queue (When the Control Word is a 2)	0 = Used for adding multiple messages to the queue 1 – 4000 and 4095 valid Message Numbers: 4001–4094 *not* valid. 4095 always used to identify the background message -1 = Used for priority messaging and clearing the message queue
4	Variable data #0	0 – 65535
5	Variable data #1	0 – 65535
6	Variable data #2	0 – 65535
7	Variable data #3	0 – 65535
8	Variable data #4	0 – 65535
9	Variable data #5	0 – 65535
10	Variable data #6	0 – 65535
11	Variable data #7	0 – 65535
12	Variable data #8	0 – 65535
13	Variable data #9	0 – 65535
14	Variable data #10	0 – 65535
15	Variable data #11	0 – 65535
16	Variable data #12	0 – 65535
17	Variable data #13	0 – 65535
18	Variable data #14	0 – 65535
19	Variable data #15	0 – 65535
20	User defined Variable ID #1	16 – 99
21	Variable data	0 – 65535
22	User defined Variable ID #2	16 – 99
23	Variable data	0 – 65535
24	User defined Variable ID #3	16 – 99
25	Variable data	0 – 65535
26	User defined Variable ID #4	16 – 99
27	Variable data	0 – 65535
28	User defined Variable ID #5	16 – 99
29	Variable data	0 – 65535
30	User defined Variable ID #6	16 – 99
31	Variable data	0 – 65535

Displaying messages on Alpha® signs

There are three different ways in which messages can be displayed or managed on an Alpha® sign:

- **Add/remove messages** — Allows more than one message to be displayed at a time, with priority levels set for each message. This allows the ability to manage display sequences and timing.
- **Priority messaging** — Used to display one message at a time.
- **Clearing the Message Queue** — Removes messages from the message queue, to display the background message.

Table 2: Messaging Methods

Method	Reference	Summary	Benefit	Valid Values (See Notes below.)
Add/remove messages	See Table 3 on page 7 and Table 4 on page 7	Two examples show how to add 3 different messages, one at a time or all 3 at once.	Allows some scheduling of messaging display during initial creation of the message.	Word 0 = 2 (only valid) Word 1 = 1—255d* Word 2** = 1—4000, 4095d Word 3** = 1—4000, 4095d
Priority messaging	See Table 5 on page 8	The example in Table 6 shows how to add 3 messages sequentially.	This method allows the PLC to have full control of message display.	Word 0 = 2 Word 1 = 1—255d* Word 2** = 1—4000, 4095d Word 3** = 0xFFFF(-1d)
Clearing the Message Queue	See Table 11 on page 12	Two ways to clear data in message queue	Clears all message queue data.	Word 0 = 2 Word 1 = 1—255d* Word 2** = 0 (only valid) Word 3** = 0xFFFF(-1d)
*When the sign address is 255 decimal/0xFFFF hexadecimal, this is a broadcast message. There is NO reply from sign(s) on the network.				
** The value of Words 2 and 3 can not be the same. The Gateway will not process the information. See Output Data Table Integrity Bit Table.				

Add/remove messages

Add/remove messages allows the ability to have multiple messages running concurrently on the same sign(s). When this method is used it also allows the use of priority levels to control the timing and display sequence for all the messages in the queue.

Priority messaging

Priority messaging allows one message number to be used to show a single message while automatically removing the single message that was running previously. This frees you from having to remove the message that was running before you display a new message.

NOTE: For a more detailed explanation of Priority Messaging, see the *Alpha® Automation Software* online Help system.

Clearing the Message Queue

Clearing the Message Queue allows you to clear all currently running messages on a sign, by storing 0 in word 2 and –1d (0xFFFF) in word 3, as shown in Table 2 on page 6.

When this is done, the background message that was programmed using the *Alpha® Automation Software (*or *Gateway Messaging Software*) is displayed. (This is the default background message "NO BACKGROUND MESSAGE" if no other has been programmed.)

Add/remove messages examples

Example 1

This is an example of the steps required to add three different messages, one at a time, on the same Alpha® sign with *Add/remove messages* method.

In this example, we want to display messages 40, 42, and 500 individually on the same sign. The sign address is 6 (decimal).

Using information found in Table 1 on page 5, store the desired message numbers and sign information into words 0-3 of the Output Data table.

Table 3: Add/Remove messages Example 1

Word	Step 1	Step 2	Step 3	Step 4
0	2	2	2	2
1	6	6	6	6
2	0	40	42	500
3	-1	0	40	42
Result	Message queue is cleared and the background message is displayed.	Message 0 is removed and Message 40 is added to the queue.	Message 40 is removed and Message 42 is added to the queue.	Message 42 is removed and Message 500 is added to the queue.
NOTE: All values for Words 0 – 3 are shown in decimal.				

Example 2

This example shows how to add three different messages to the queue at the same time on an Alpha® sign. This requires that each message be added without removing the previous message.

In this example, we want to display messages 84, 589 and 34 at the same time on a sign. The sign address is 55 (decimal).

Using information found in Table 1 on page 5, store the desired message numbers and sign information into words 0-3 of the Output Data table.

Table 4: Add/Remove messages Example 2

Word	Step 1	Step 2	Step 3	Step 4
0	2	2	2	2
1	55	55	55	55
2	0	84	589	34
3	-1	0	0	0
NOTE: All values for Words 0 – 3 are shown in decimal				
Result	Message queue is cleared and the background message is displayed.	Message 0 is removed and message 84 is displayed.	Message 0 is removed and messages 84 and 589 are displayed.	Message 42 is removed and messages 84, 589 and 34 are displayed.

NOTE: Messages can be removed individually (see steps 3 and 4 in Table 3) or all at the same time (step 1 in Table 5).

Priority messaging example

This example shows how to display individual messages using *Priority messaging*, and the steps required to add three different messages on an Alpha® sign with *Priority messaging*. This means that only the number of the message to be displayed is stored in word 2.

In this example, we want to display messages 954, 26, and 50 individually on the same sign. The sign address is 3 (decimal). Using information found in Table 1, store the desired message numbers and sign information into words 0-3 of the Output Data table.

Table 5: Priority Message Disabled Example

Word	Step 1	Step 2	Step 3	Step 4
0	2	2	2	2
1	3	3	3	3
2	0	954	26	50
3	-1	-1	-1	-1
NOTE: All values shown in decimal				
Result	Message Queue is Cleared and the background message is displayed.	Message 954 is displayed.	Message 26 is displayed.	Message 50 is displayed.

Displaying variable data on Alpha® signs

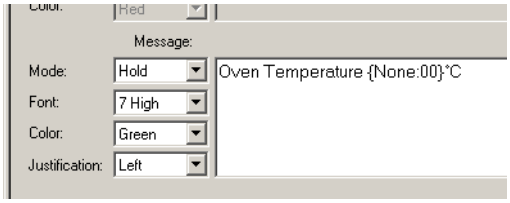
An Alpha® sign has the capability to store up to 100 variables in its memory. These variables are stored in a sign's memory register (001 to 100) corresponding to the variable number (0 to 99) used in the *Alpha® Automation Software (*or *Gateway Messaging Software*.)

There are 16 words in the Output Data table that are reserved for variable numbers 0-15. Words 20-31 are used to allow access to variable numbers 16-99. Variable data stored in words 4-31 are sent to all signs by using defined variable ID numbers and variable data in the next word following (see Output Data Table, odd-numbered variable data in words 20-31 must correspond to even-numbered variable ID numbers in the preceding word), once the Gateway receives the change of state for a particular variable.

The two examples that follow show display of messages containing embedded variable data.

Example 1

In this first example, message 5 contains variable 0, used for a processor's oven temperature. Message 5 is created in *Alpha® Automation Software (*or *Gateway Messaging Software*) in this format:



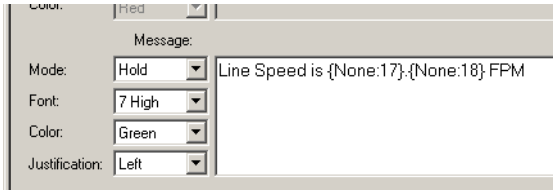
We want to display this on the sign with address 20 using the *Add/remove messages* method. This only requires that the message be triggered once and the variable data that is required stored in word 4 of the Output Data table.

Table 6: Displaying Variable Data Example 1

Word	Step 1	Step 2	Step 3	Step 4
0	2	2	2	2
1	20	20	20	20
2	0	5	5	5
3	-1	0	0	0
4	0	30	31	32
NOTE: All values shown in decimal				
Result	Message queue is cleared and the background message is displayed.	Message 0 is removed and message 5 is displayed as "Oven Temperature 30˚C".	Message 0 is removed and message 5 is displayed as "Oven Temperature 31˚C".	Message 0 is removed and message 5 is displayed as "Oven Temperature 32˚C".

Example 2

In this second example, message 30 contains variables 17 and 18 that are used for a manufacturer's production line speed in XX.X FPM. Message 30 is created using the *Alpha® Automation Software* (or *Gateway Messaging Software*) in a format that will look like this:



We want to display this message on the sign with address 4 using the *Priority messaging* method. This only requires that the message be triggered once, with variable data stored in the appropriate words of the Output Data table (in this case words 20–23).

Table 7: Displaying Variable Data Example 2

Word	Step 1	Step 2	Step 3	Step 4
0	2	2	2	2
1	4	4	4	4
2	0	30	30	30
3	-1	-1	-1	-1
20	17	17	17	17
21	6	14	14	14
22	18	18	18	18
23	0	3	2	4
NOTE: All values shown in decimal				
Result	Message queue is cleared and the background message is displayed.	Message 30 is displayed as "Line Speed is 14.3 FPM".	Message 30 is displayed as "Line Speed is 14.2 FPM".	Message 30 is displayed as "Line Speed is 14.4 FPM".

Input Data table from the AGI to the PLC

The Input Data table consists of 16 words that are used in conjunction with the Output Data table for the function that is being used.

Various words are used to determine the status of a sign, the status of the Gateway and requested data.

The Input Data table also gives feedback to the PLC. If there is a problem trying to communicate with a specific sign address (1-31), it will alert the PLC if there is a major fault and store data values requested by the PLC.

The functions/features in the Input Data table are:

- Operation Counter
- Operation Status of the Gateway
- Output Data Table Integrity (O.D.T.I.)
- Sign Status
- Requested Data

Table 8: Input Data Table

Word	Meaning	Valid data (decimal)
0	Operation Counter	0 – 65535
1	Error Status (sign address #1-15) / Output Data Table Integrity	Output Data Table Integrity bit (Bit 0) 0 = Gateway completed processing of data or no error 1 = Improper data in Output Data Table Error Status (Bits 1-15) 0 = Gateway received a response from a sign 1 = Gateway did not receive a response from a sign
2	Error Status (sign address #16-31)	Error Status (Bits 0-15) 0 = Gateway received a response from a sign 1 = Gateway did not receive a response from a sign
3	Reserved	Reserved for future use
4	Requested Data #1	0 – 65535
5	Requested Data #2	
6	Requested Data #3	
7	Requested Data #4	
8	Requested Data #5	
9	Requested Data #6	
10	Requested Data #7	
11	Requested Data #8	
12	Requested Data #9	
13	Requested Data #10	
14	Requested Data #11	
15	Requested Data #12	

Operation Counter/Output Data Table Integrity Bit (ODTI)

The Operation Counter (word 0) is used to let the PLC know that it has completed a task. When the Gateway receives data from the PLC, it begins to process the operation immediately. Once it has successfully completed the operation, the Operation Counter is incremented by 1. The counter automatically resets itself back to zero when it reaches 65,535 (0xFFFF).

The Output Data Table Integrity bit (or ODTI; word 1, bit 0) is similar to the Operation Counter, but it lets the PLC know that the Gateway is currently processing data. If the bit is set high (1), it indicates that the Gateway is processing data. If the bit is set low (0), it indicates that the Gateway has completed processing of data. If the Gateway encounters a problem, such as invalid data sent by the PLC, it will also set this bit high (1). This will remain high until the Gateway receives valid information. The Operation Counter is then incremented.

Table 9: ODTI bit invalid data

If Output Data Table Word 0 is:	Then Word(s):	(whose function is:)	will have Word 1, Bit 0 set to 1 (invalid data) if:
2	1	Sign Address (SA)	SA > 255 OR S A = 0
	2	Add Message (AM)	AM < 1 or (≥ 4001 and ≤ 4094) or ≥ 4096
	3	Remove Message (RM)	RM (> -1 and < 1) or (≥ 4001 and ≤ 4094) or ≥ 4096
	2, 3	Add Message / Remove Message	AM = RM
	20, 22, 24, 26, 28, 30	Valid Variable ID (VID)	VID = 0 or < 0 or >100
3	1	Read message queue for Sign Address (SA)	SA > 254 or SA = 0
	2	Read Register Index (RI) for message queue	RI > 6 or RI = 0
4	1	Read variable data for Sign Address (SA)	SA > 254 or SA = 0
	2	Read Register Index (RI) for variable data	RI > 9 or RI = 0

Sign Status

The Sign Status bit consists of two words that indicate whether the sign gave an acknowledge back to the Gateway.

When the Gateway receives an acknowledgement, it will clear (0) the appropriate bit. The Gateway will set the bit if the sign does not give an acknowledgement back after 2 attempts 500 milliseconds apart.

Word 1—Bit 0 of the word is for the Output Data Table Integrity bit.

Word 1—Bits 1-15 of the word contain the Error Status for sign addresses 1-15.

Word 2—Bits 0-15 of the word contain the Error Status for sign addresses 16-31.

Table 10: Words 1 and 2 of Input Data Table

Word 1	Most Significant Byte							
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Sign Number	15	14	13	12	11	10	9	8
Data	0	0	0	0	0	0	0	0

Word 1	Least Significant Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Sign Number	7	6	5	4	3	2	1	Output Data Table Integrity Bit
Data	0	0	0	0	0	0	0	0

Word 2	Most Significant Byte							
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Sign Number	31	30	29	28	27	26	25	24
Data	0	0	0	0	0	0	0	0

Word 2	Least Significant Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Sign Number	23	22	21	20	19	18	17	16
Data	0	0	0	0	0	0	0	0

Clearing the Sign Status bits

There are two ways to clear the bits in words 0-2: all at once or individually:

- To clear all the bits in words 0-2, configure the Output Data table using the information found in step 1 of Table 11.
- To clear a bit in words 1 and 2 representing a specific sign address, configure the information in the Output Data table using the information found in step 2 of Table 11:

Table 11: Methods of Clearing the Sign Status Bits

Word	Step 1	Step 2
0	-1 (0xFFFF)	-1 (0xFFFF)
1	3	3
2	1–4000, 4095	0
Result	Clears Words 0-2 of the Input Data table. Sets all bits to 0.	Clears only Bit 3 in Word 1 representing sign number 3.

Input Data table words 0 - 2 example

The following table shows information relating to Words 0, 1 and 2 in the Input Data table.

In this example, the Gateway has completed 100 operations (word 0). Bit 0 word 1 is set high (1) and is indicating that the Gateway is currently processing data or that the PLC sent invalid data. Bit 8 of word 1 and bits 1 and 2 of word 2 are set high (1) representing that the Gateway did not receive any response from sign numbers 8, 17, and 18:

Table 12: Input Data Table Example

Word	Decimal	MSB	LSB	MSB	LSB	Meaning
0	00100 operations	00	64	0000 0000	0110 0100	Operation Process Counter
1	00257	01	01	0000 0001	0000 0001	Error Status (#1-15) /Process Status
2	00006	00	06	0000 0000	0000 0110	Error Status (#16-31)

Sign address 8 (bit 8, Word 1)

Sign address 18 and 17 (See Table 9, least significant byte; see bit 1 and 2 of word 2.)

Output Data Table Integrity bit (bit 0, Word 1)

Requesting data from an Alpha® sign

When data is requested by the PLC, the PLC stores the requested information in words 4-15 of the Input Data table.

This data can either be currently running messages (in the Message Queue) or variable data from a sign. These words are reserved in the Input Data table that the Alpha® Gateway Interface uses only for returning message information or variable data to the PLC.

Requesting currently running messages in a sign

The Alpha® Gateway Interface allows you to read currently running messages in a sign's queue by using the Read Message Queue function.

The message queue allows for up to 64 messages running at one time on any given sign. These message numbers are stored in the sign's memory from registers 103 to 166. Register 103 represents the most recent message number to be added. Register 166 represents the message number that has not been activated for the longest interval.

Since there are only 12 words available in the Input Data table for the requested data, the data is returned to the PLC in 6 groups of 12 words.

The group of 12 words that are returned to the PLC is determined by the Starting index (word 3 of the Output Data table). The Starting Index value and the associated registers that will be returned to the PLC are shown in the following section of the Output Data table.

Table 13: Requesting Message Queue Data (Output Data Table)

Word	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7
0	Control Word	3	3	3	3	3	3
1	Sign #	6	6	6	6	6	6
2	Starting Index	1	2	3	4	5	6
Meaning	Read registers from sign #6	Read registers 103-114	Read registers 115-126	Read registers 127-138	Read registers 139-150	Read registers 151-162	Read registers 163-166 NOTE: Words 8–15 set to -1d (0xFFFF)

The requested data is stored in the Input Data table in words 4-15.

Requesting Variable data from a sign

The Gateway allows you to read the variable data that is currently stored in a sign.

All signs on the network will have the same variable data. There are 100 variable registers in a sign. This variable data is stored in the sign memory from registers 001 to 100. Since there are only 12 words available in the Input Data table for the requested data, the data is returned to the PLC in one of 9 groups of 12 words.

The group of 12 words that are returned to the PLC is determined by the Starting index (word 3 of the Output Data table).

The Starting Index value and the associated registers that will be returned to the PLC are shown in the following section of the Output Data table:

Table 14: Requesting Variable Data (Output Data Table)

Word	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9
0	Control Word	4	4	4	4	4	4	4	4
1	Sign #	6	6	6	6	6	6	6	6
2	Starting Index	1	2	3	4	5	6	7	8
Meaning	Read registers from sign #6	Read registers 001-013	Read registers 014-026	Read registers 027-039	Read registers 040-052	Read registers 053-065	Read registers 066-078	Read registers 079-091	Read registers 092-100 NOTE: Words 13–15 set to -1d (0xFFFF)

The data requested will be sent back to the PLC using words 4–15 in the Input Data table.