GASSONIC

HART USER GUIDE FOR

Gassonic Observer-*i*

Ultrasonic Gas Leak Detector

Instruction Manual   **03-14**

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1.0 INTRODUCTION

1.1 SCOPE

The HART configuration of the Gassonic Observer-*i* ultrasonic gas leak detector complies with HART Protocol Revision 6.0. This document specifies all of the device specific features and documents HART Protocol implementation details. The functionality of this Field Device is described sufficiently to allow its proper application in a process and its complete support in HART capable Host Applications.

1.2 PURPOSE

This specification is designed to complement the Gassonic Observer-*i* Instruction Manual by providing a complete description of this field device from a HART Communications perspective. This specification is designed to be a technical reference for HART capable host application developers, system integrators, and knowledgeable end users.

1.3 REFERENCES

Document Name	Document Relationship
HART Communications Protocol Specifications	This is used to insure compliance with the HART Communication Protocol.
Gassonic Observer-*i* Instruction Manual	This is the Gassonic Observer-*i* Product Instruction Manual.

Table 1: Reference Documents

2.0 DEVICE IDENTIFICATION

The following Table 2 is the Field Device Identification Data for the instrument.

Manufacturer's Name	MSA	Model Number	Observer-i
HART ID Code	223 (DF Hex)	**Device Type Code:**	150 (96 Hex)
HART Protocol Revision	6.0	**Device Revision:**	1
Number of Device Variables	0		
Physical Layers Supported	1		
Physical Device Category	FSK		

Table 2: Field Device Identification Data

3.0 PRODUCT OVERVIEW

The Gassonic Observer-*i* is an ultrasonic gas leak detector for detecting pressurized gas leaks. The Gassonic Observer-*i* detects the gas leak by measuring the sound level and reports the measurement in decibel (dB).

3.1 GETTING STARTED

In order to enable HART communication with the Gassonic Observer-*i* detector, users may employ several means including HART handheld communicators or PC-based systems. Using a PC-based software application and a HART interface modem, for example, allow operators to access information from the Gassonic Observer-*i*. A typical setup is illustrated in Figure 1.
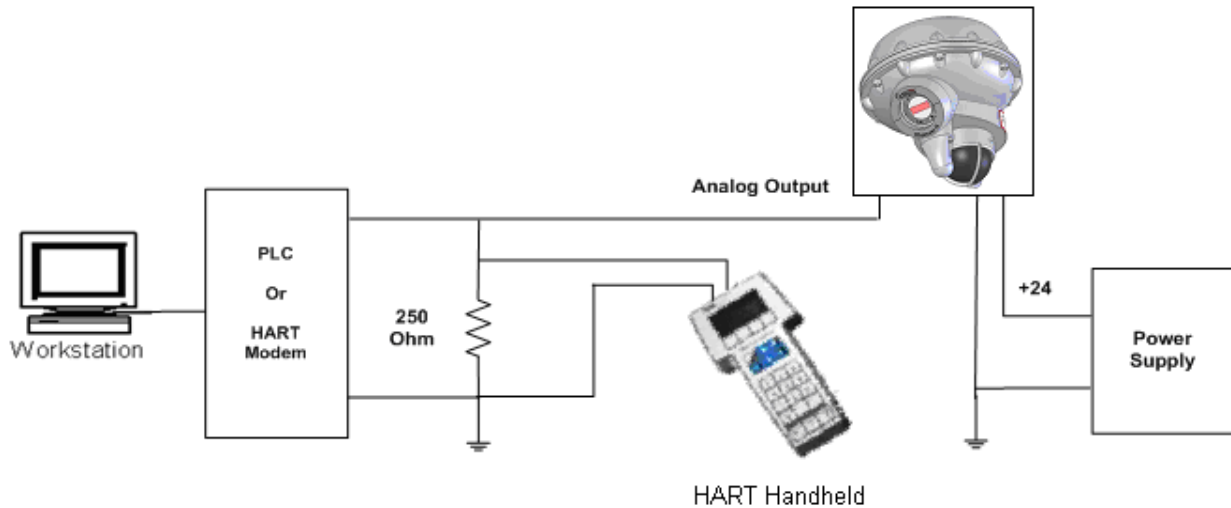
Figure 1: Connecting a PC to a HART Device

Once the detector is installed (see Gassonic Observer-*i* Instruction Manual) and connected to a PC, host application, or handheld terminal, the master will begin communication to the Gassonic Observer-*i* by using the HART Command #0. The field device will then respond only if its tag matches. The data in the reply to Command #11 is identical to that of Command #0, so the master can then construct the Unique Identifier for use with further commands.

NOTE: The handheld device allows for the retrieval of diagnostic information and input of device settings as needed and should not be used as a permanent part of a safety system.

4.0 PRODUCT INTERFACES

4.1 PROCESS INTERFACE

This section describes all interfaces between the devices and the measured process.

4.1.1 Sensor Input Channels

A digital display provides indications and display codes that can be viewed through a window on the Gassonic Observer-*i*. An analog signal (4-20 mA) and relays provide remote and/or discrete indications of the detector's operation.

4.2 HOST INTERFACE

The HART interface uses the 4-20 mA (analog output) current loop. Refer to the Gassonic Observer-*i* Installation Manual for connection details.

4.2.1 Analog Output

The primary variable is proportional to the decibel (dB) sound pressure level (SPL). 4.0 mA output current corresponds to <40 dB. 20.0 mA output current corresponds to 120 dB.

4.3 LOCAL INTERFACES, JUMPERS, AND SWITCHES

4.3.1 Local Controls and Displays

Refer to the Gassonic Observer-*i* Installation Manual for connection details.

4.3.2 Internal Jumpers and Switches

Refer to the Gassonic Observer-*i* Installation Manual for connection details.

5.0 DEVICE VARIABLES

There are no device variables available to the user.

6.0 DYNAMIC VARIABLES

There is only one Dynamic Variable available to the user.

6.1 PRIMARY VARIABLE = DECIBEL (dB)

The primary variable (PV) is proportional to the decibel (dB) SPL. 4.0 mA output current corresponds to <40 dB. 20.0 mA output current corresponds to 120 dB.

6.2 SECONDARY, TERTIARY, AND QUATERNARY VARIABLES: NOT APPLICABLE

There are none defined for the Gassonic Observer-*i* product.

7.0 ERROR/STATUS INFORMATION

The error status, which is returned via Common Practice Command #48, is shown in Table 3

Byte	Bit	Description	Class	Device Status Bits Set
1	0	Low Supply voltage	Error	4,7
	1	Not Used	Error	4,7
	2	Acoustic Error	Error	4,7
	3	Not Used	Error	4,7
	4	Remote Alarm Line Error	Error	4,7
	5	Remote Reset Line Error	Error	4,7
	6	Magnet Switch Error	Error	4,7
	7	Internal Voltage Error	Error	4,7
0	8	Memory Major Error	Error	4,7
	9	Memory User Error	Error	4,7
	10	Memory HART Error	Error	4,7
	11	Memory Event Error	Error	4,7
	12	Peak dB Low	Status	4,7
	13	Not Used	Error	4,7
	14	Not Used	Error	4,7
	15	Not Used	Error	4,7

Table 3: Error/Status Information

These bits may be set at power up to indicate an instrument failure. They may also be set by a failure detected during continuous background diagnostic testing.

8.0 UNIVERSAL COMMANDS

Command 3 returns the current loop variable and the primary variable for a total of 9 bytes returned. Command 9 returns the PV only.

9.0 COMMON PRACTICE COMMANDS

The following common practice commands are implemented.

9.1 SUPPORTED COMMANDS

The following common-practice commands shown in Table 4 are implemented:

Command Number	Byte Number	Meaning
Command 38	N/A	Reset Configuration Changed Flag
Command 48	0	Returns Priority Fault, High Byte
Command 48	1	Returns Priority Fault, Low Byte
Command 48	2	Returns Error Status (same as Modbus register x02), High Byte
Command 48	3	Returns Error Status (same as Modbus register x02), Low Byte
Command 48	4	Returns Power Cycled Flag
Command 48	5	Returns Event Happened Flag
Command 48	6	Returns 0x01 = "Maintenance Required" or 0x02 = Alarm or Warning
Command 48	7	Returns 0

Table 4: Gassonic Observer-*i* Common Practice Commands

9.2 BURST MODE

The Gassonic Observer-*i* does not support Burst Mode.

9.3 CATCH DEVICE VARIABLE

This Gassonic Observer-*i* does not support Catch Device Variable.

10.0 DEVICE SPECIFIC COMMANDS

The Device Specific commands are used strictly for the unique features of the Gassonic Observer-*i* and at the discretion of Gassonic, an MSA company. They are described here in Section 10.0 and are summarized in Table 5.

10.1 COMMAND #132: DO ALARM TEST

This command turns Alarm test mode on/off.

Request Data Bytes

Byte	Format	Description
0	Unsigned 8	N/A

Response Data Bytes

Byte	Format	Description
0	Unsigned 8	N/A

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 - 15		Undefined
16	Error	Access Restricted
17 - 127		Undefined

10.2 COMMAND #136: SET ALARM LEVEL

This command sets the Alarm Level.

Request Data Bytes

Byte	Format	Description
0	Unsigned-8	Alarm Level in dB

Response Data Bytes

Byte	Format	Description
0	Unsigned-8	Alarm Level in dB

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 – 2	N/A	Undefined
3	Error	Passed Parameter Too Large
4	N/A	Undefined
5	Error	Too Few Data Bytes Received
6 – 15	N/A	Undefined
16	Error	Access Restricted
17 – 127	N/A	Undefined

10.3 COMMAND #139: RESET ALARM

This command resets the latching Alarm relay.

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
None	N/A	N/A

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 - 15		Undefined
16	Error	Access Restricted
17 - 127		Undefined

10.4 COMMAND #141: SET ALARM RELAY CONFIGURATION

This command configures the relay settings.

Request Data Bytes

Byte	Format	Description
0	Unsigned-8	Alarm Hi Relay La/nL: 0 – nL, 1 – LA
1	Unsigned-8	Alarm Hi Relay En/dE: 0 – dE, 1 – En

Response Data Bytes

Byte	Format	Description
0	Unsigned-8	Alarm Hi Relay La/nL: 0 – nL, 1 – LA
1	Unsigned-8	Alarm Hi Relay En/dE: 0 – dE, 1 – En

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 - 2		Undefined
3	Error	Passed Parameter too large
4		Undefined
5	Error	Too Few Data Bytes Received
16	Error	Access Restricted
17 – 127		Undefined

10.5 COMMAND #142 RESET EVENT HAPPENED FLAG

This command resets the Event Happened Flag.

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
None	N/A	N/A

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 – 15		Undefined
16	Error	Access Restricted
17 – 127		Undefined

10.6 COMMAND #143: READ EVENT LOGGING COUNTERS

This command reads five event logging counters.

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
0 – 1	Unsigned-16	0
2 – 3	Unsigned-16	Alarm Event Counter
4 – 5	Unsigned-16	Fault Event Counter
6 – 7	Unsigned-16	Maintenance Event Counter
8 – 9	Unsigned-16	Calibrate Event Counter

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

10.7 COMMAND #144: CLEAR EVENT LOGGING COUNTERS

This command resets the 4 event logging counters to zero (Alarm, Fault, Calibration, and Maintenance events).

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
None	N/A	N/A

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

10.8 COMMAND #146: READ ALARM EVENT LOG

This command reads the Alarm Event Log as specified by the event log number. Event 0 is the most recent event. Event 1 is the one just before that and so forth.

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
0 – 3	Unsigned-32	Event Running Time (in Seconds)
4– 6	Date	Event Date: Day, Month, Year – 1900
7	Unsigned-8	Event Hour
8	Unsigned-8	Event Minute
9	Unsigned-8	Event Second
10	Unsigned-8	Alarm Detected by:. 0: by Classic Mode 1: by Enhanced Mode
11	Unsigned-8	Peak dB during the Alarm
12-13		Undefined

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

10.9 COMMAND #147: READ FAULT EVENT LOG

This command reads the Fault Event Log as specified by the event log number. Event 0 is the most recent event. Event 1 is the one just before that and so forth.

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
0 – 3	Unsigned-32	Event Running Time (in Seconds)
4– 6	Date	Event Date: Day, Month, Year – 1900
7	Unsigned-8	Event Hour
8	Unsigned-8	Event Minute
9	Unsigned-8	Event Second
10-11	Unsigned-16	Event Cause – See device specific table

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

10.10 COMMAND #148: READ MAINTENANCE EVENT LOG

This command reads the Maintenance Event Log as specified by the event log number. Event 0 is the most recent event. Event 1 is the one just before that and so forth.

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
0	Unsigned-8	Event Log Number
0 – 3	Unsigned-32	Event Running Time (in Seconds)
4– 6	Date	Event Date: Day, Month, Year – 1900
7	Unsigned-8	Event Hour

Byte	Format	Description
8	Unsigned-8	Event Minute
9	Unsigned-8	Event Second
10-11	Unsigned-8	Reserved = 0
12-13	Unsigned-8	Code: 4 - Acoustic Test, 8 - Alarm Test and 9 - Piezo Calibrated

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

10.11 COMMAND #149: SET CLOCK

This command sets the internal real-time clock.

Request Data Bytes

Byte	Format	Description
0 – 2	Date	Date: Day, Month, Year-1900
3	Unsigned-8	Hours
4	Unsigned-8	Minutes
5	Unsigned-8	Seconds

Response Data Bytes

Byte	Format	Description
0 – 2	Date	Date: Day, Month, Year-1900
3	Unsigned-8	Hours
4	Unsigned-8	Minutes
5	Unsigned-8	Seconds

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 – 4		Undefined
5	Error	Too Few Data Bytes Received
6 – 127		Undefined

10.12 COMMAND #150: READ CLOCK

This command reads the internal real-time clock setting.

Request Data Bytes

Byte	Format	Description
0	N/A	N/A

Response Data Bytes

Byte	Format	Description
0 – 2	Date	Date: Day, Month, Year-1900
3	Unsigned-8	Hours
4	Unsigned-8	Minutes
5	Unsigned-8	Seconds

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

10.13 COMMAND #151: SET RUN TIME METER

This command sets the internal run time meter.

Request Data Bytes

Byte	Format	Description
0 – 3	Unsigned-32	Run Time Meter Value

Response Data Bytes

Byte	Format	Description
0 – 3	Unsigned-32	Run Time Meter Value

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 – 4		Undefined
5	Error	Too Few Data Bytes Received
6 – 127		Undefined

10.14 COMMAND #152: READ RUN TIME METER

This command reads the internal run time meter.

Request Data Bytes

Byte	Format	Description
0	N/A	N/A

Response Data Bytes

Byte	Format	Description
0 – 3	Unsigned-32	Run Time Meter Value

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

10.15 COMMAND #154: SET EVENT INDEX

This command sets the index of logged event to read. 0 – latest event.

Request Data Bytes

Byte	Format	Description
0	Unsigned – 8	Sets index of logged event to read using commands 143, 145-148 and 156. Range 0 – 9.

Response Data Bytes

Byte	Format	Description
0	Unsigned – 8	Event Index

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 – 2		Undefined
3	Error	Passed Parameter Too Large
4		Undefined
5	Error	Too Few Data Bytes Received
6 – 127		Undefined

10.16 COMMAND #155: GET EVENT INDEX

This command reads the event logged index.

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
0	Unsigned – 8	Event index

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

10.17 COMMAND #156: READ CALIBRATION EVENT LOG

This command reads the Calibration Event Log as specified by the event log number. Event 0 is the most recent event. Event 1 is the one just before that and so forth.

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
0-3	Unsigned-32	Event Running Time (in Seconds)
4-6	Date	Event Date: Day, Month, Year – 1900
7	Unsigned-8	Event Hour
8	Unsigned-8	Event Minute
9	Unsigned-8	Event Second
10	Unsigned-8	Code: 4 - Cal. OK, 5 – Cal. Adjusted, 6 – Cal. Error.

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

10.18   COMMAND #163: GET FAST CHANGING INFORMATION

This command is used to collect data from the Observer-*i*, which is likely to change at a very fast rate.

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
0 – 1	Unsigned-16	Mode – Depends on Instrument
2 – 3	Unsigned-16	Sub Mode – Depends on Instrument
4 – 7	Float	Analog Output
8 – 9	Unsigned-16	Priority Fault (See Table 3: Error/Status Information)
10 – 11	Bit map	Error Status (in word)
12	Unsigned-8	Alarm Hi Trigger Level
13	Unsigned-8	N/A
14	Unsigned-8	N/A
15	Unsigned-8	Power Cycled flag
16	Unsigned-8	Event Happened flag
17	Integer-8	Decibel (dB)

18-21	Float	Peak dB

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

10.19 COMMAND #164: GET SLOW CHANGING INFORMATION

This command is used to collect data from the Observer-*i* which is likely to change at a very slow rate.

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
0 - 1	Signed-16	Unit Temperature
2 - 5	Float	Supply Voltage
6 - 7	Signed-16	Reserve

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

10.20 COMMAND #165: GET SET UP INFORMATION

This command reads the setup information in the Observer-*i*.

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
0	Unsigned-8	N/A

Byte	Format	Description
1	Enumerated	N/A
2- 5	Unsigned-32	Full Scale
6	Unsigned-8	Alarm Hi level in dB
7	Unsigned-8	Alarm Hi Relay La/nL: 0 – nL, 1 - LA
8	Unsigned-8	Alarm Hi Relay En/dE: 0 – dE, 1 - En
9	Unsigned-8	N/A
10	Unsigned-8	N/A
11	Unsigned-8	N/A
12	Unsigned-8	N/A
13	Unsigned-8	N/A
14	Unsigned-8	N/A
15	Unsigned-8	Alarm Delay Time
16	Unsigned-8	N/A
17	Unsigned-8	N/A
18	Unsigned-8	N/A
19-20	Unsigned-16	N/A
21	Unsigned-8	Enhance Mode Analog Output: 1: Discrete SPL: 4-12mA, 16mA, 20mA 2: Discrete 4mA: 16mA, 20mA 3 : Full SPL : 40-20mA
22	Unsigned-8	N/A
23	Unsigned-8	N/A
24	Unsigned-8	Current Range: 0= 3.5 – 20, 1=1.25 - 20

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

10.21   COMMAND #166: GET DEVICE FIRMWARE REVISION

This command reads the Gassonic Observer-*i* firmware revision.

Request Data Bytes

Byte	Format	Description
None	N/A	N/A

Response Data Bytes

Byte	Format	Description
0	Unsigned-8	System Firmware Revision. ASCII code

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

10.22   COMMAND #169: LOAD FACTORY DEFAULT SETTING

This command will load the factory default settings.

Request Data Bytes

Byte	Format	Description
0	N/A	N/A

Response Data Bytes

Byte	Format	Description
0	N/A	N/A

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1- 2		Undefined
3	Error	Parameter too Large
4	Error	Parameter too Small
5 - 15		Undefined
16	Error	Access Restricted
17 - 127		Undefined

10.23 COMMAND #170: SET CURRENT RANGE

This command sets the 4-20mA analog output range.

Request Data Bytes

Byte	Format	Description
0	Unsigned-8	0 – Range 3.5 mA – 20 mA, 1 -- Range 1.25 – 20 mA

Response Data Bytes

Byte	Format	Description
0	Unsigned-8	0 – Range 3.5 mA – 20 mA, 1 -- Range 1.25 – 20 mA

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 - 2		Undefined
3	Error	Passed Parameter Too Large
4		Undefined
5	Error	Too Few Data Bytes Received
6 - 127		Undefined

10.24 COMMAND #171: SET DETECTION MODE

This command sets the Detection Mode.

Request Data Bytes

Byte	Format	Description
0	Unsigned-8	0 – Classic Mode, 1 – Enhance Mode

Response Data Bytes

Byte	Format	Description
0	Unsigned-8	0 – Classic Mode, 1 – Enhance Mode

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 - 2		Undefined
3	Error	Passed Parameter Too Large

Code	Class	Description
4		Undefined
5	Error	Too Few Data Bytes Received
6 - 127		Undefined

10.25 COMMAND #172: SET ENHANCE MODE AO

This command sets the Analog output in Enhance Mode.

Request Data Bytes

Byte	Format	Description
0	Unsigned-8	1 – Discrete SPL (4-12mA for 40-120dB, 16mA for Warn, 20mA for Alarm) 2 – Discrete (4mA Stand by, 16mA for Warn and 20mA for Alarm) 3 – Full SPL (4 - 20mA for 40 to 120dB)

Response Data Bytes

Byte	Format	Description
0	Unsigned-8	1 – Discrete SPL (4-12mA for 40-120dB, 16mA for Warn, 20mA for Alarm) 2 – Discrete (4mA Stand by, 16mA for Warn and 20mA for Alarm) 3 – Full SPL (4 - 20mA for 40 to 120dB)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 - 2		Undefined
3	Error	Passed Parameter Too Large
4		Undefined
5	Error	Too Few Data Bytes Received
6 - 127		Undefined

10.26   COMMAND #192: DO CALIBRATION

This command initiates calibration mode.

Request Data Bytes

Byte	Format	Description
0	N/A	N/A

Response Data Bytes

Byte	Format	Description
0	N/A	N/A

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 - 15		Undefined
16	Error	Access Restricted
17 - 127		Undefined

10.27   COMMAND #195: DO ACOUSTIC TEST

This command initiates Acoustic Test mode.

Request Data Bytes

Byte	Format	Description
0	N/A	N/A

Response Data Bytes

Byte	Format	Description
0	N/A	N/A

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 – 15		Undefined
16	Error	Access Restricted
17 – 127		Undefined

10.28 COMMAND #201: SET ALARM DELAY TIME

This command sets the alarm delay time.

Request Data Bytes

Byte	Format	Description
0	Unsigned 8	Alarm delay: Alarm Delay Time = set value x10s. Ex: Set value =1 mean 1x10s = 10s or set value = 2 means 2x10=20s…

Response Data Bytes

Byte	Format	Description
0	Unsigned 8	Alarm delay

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 - 2		Undefined
3	Error	Passed Parameter Too Large
4		Undefined
5	Error	Too Few Data Bytes Received
6 - 127		Undefined

11.0   TABLES

11.1 GASSONIC OBSERVER-*i* DEVICE SPECIFIC COMMANDS SUMMARY

The following Table 5 is a summary of the Gassonic Observer-*i* Device Specific Commands.

Command Number	Meaning
132	Do Alarm Test
136	Set Alarm Level
139	Reset Alarms
141	Set Relay State
142	Reset Event Happening Flag
143	Read Event Logging Counters
144	Clear Event Logging Counters
146	Read Alarm Event Log
147	Read Fault Event Log
148	Read Maintenance Log
149	Set Time Clock
150	Read Time Clock
151	Set Running Time
152	Read Running Time
154	Set Event Index
155	Read Event Index
156	Read Calibrate Event Log
163	Get Fast Changing Information
164	Get Slow Changing Information
165	Get setup Information
166	Get Device Firmware Revision
169	Load Default Setting
170	Set Current Range
171	Set Detection Mode
172	Set Enhance Ao Mode
192	Do Calibration
195	Do Acoustic Test
201	Set Alarm Delay Time

Table 5: Gassonic Observer-*i* Device Specific Commands

11.2 GASSONIC OBSERVER-*i* – OPERATING MODES

The following is a summary of the Gassonic Observer-*i* Operating Modes:

Operating Mode	Value in Hex
Start Up	0x0001
Operational	0x0002
Acoustic Test	0x0004
Calibration	0x0008
Fault	0x0010
Set Up	0x0020
SB100 Test	0x0040
Alarm Test	0x0080
Cal. Pending	0x0100
Piezo Calibrate	0x0200
Alarm	0x0400
Show Rev.	0x0800
Not Used	0x1000
Not Used	0x2000
Not Used	0x4000
Not Used	0x8000

Table 6: Gassonic Observer-*i* Operating Modes

11.3 GASSONIC OBSERVER-*i* – CALIBRATION SUBMODE

This mode indicates the calibration status during the calibration.

Operating Submode	Value in Hex
Apply 1701	0x0001
Cal. in Progress	0x0002
Cal. Adjustment	0x0004
Cal. OK	0x0008
Cal. Error	0x0010

Table 7: Gassonic Observer-*i* Calibration Submode

11.4 CALIBRATION EVENT LOG – CAUSE DESCRIPTION

This event cause indicates the result of calibration.

Calibration Event Cause	Value in Hex
Calibration OK	0x0004
Calibration Adjusted	0x0005
Calibration Error	0x0006

Table 8: Gassonic Observer-*i* Calibration Event Log – Cause Description

11.5 MAINTENANCE EVENT LOG – CAUSE DESCRIPTION

This event cause indicates the type of maintenance.

Maintenance Event Cause	Value in Hex
Acoustic Test	0x0004
Alarm Test	0x0008
Piezo Calibrated	0x0009
SB100 Test	0x000A

Table 9: Gassonic Observer-*i* Maintenance Event Log – Cause Description

11.6 ALARM EVENT LOG – DETECTION DESCRIPTION

Alarm Event Detection	Value in Hex
By Classic Mode	0x0000
By Enhanced Mode	0x0001

11.7 FAULT EVENT LOG – CAUSE DESCRIPTION

The following Table 10 describes the cause as reported by the read event log commands:

Bits	Cause
0	Low Supply voltage
1	Not Used
2	Acoustic Error
3	Not Used
4	Remote Alarm Line Error
5	Remote Reset Line Error
6	Magnet Switch Error
7	Internal Voltage Error
8	Memory Major Error
9	Memory User Error
10	Memory HART Error
11	Memory Event Error
12	Not Used
13	Not Used
14	Not Used
15	Not Used

Table 10: Fault Event Log – Cause Description

12.0   PERFORMANCE

12.1 SAMPLING RATES

The Gassonic Observer-*i* samples the input signal from Microphone in 10 millisecond intervals.

12.2 POWER-UP

On power up, the Gassonic Observer-*i* executes a self-test procedure, which requires approximately 30 seconds. During this time, the Analog Output is set to1.25 mA or 3.5 mA depending on the setting. After the self-test is satisfactorily completed, the unit sets the Primary Variable to a value representing the mode of the instrument.

12.3 DEVICE RESET

The Gassonic Observer-*i* cannot be reset by any command. The unit only resets when power is cycled.

12.4 SELF-TEST

The Gassonic Observer-*i* goes through a self-test upon power cycle. Should any of the tests fail, the unit immediately reports a fault condition.

12.5 COMMAND RESPONSE DELAY

The Gassonic Observer-*i* responds as follows:

Response Type	Response Time
Minimum	20ms
Typical	50ms
Maximum	100ms

Table 11: Command Response Times

12.6 BUSY AND DELAYED-RESPONSE

The Gassonic Observer-*i* does not use delayed-response times.

12.7 LONG MESSAGES

The largest data field used by the Gassonic Observer-*i* is in response to Command 20 & 22 (Read/Write Long Tag): 34 bytes including the two status bytes.

12.8 NON-VOLATILE MEMORY (NVM)

The Gassonic Observer-*i* uses NVM to hold the device's configuration parameters. New data is written to this memory immediately on execution of a write command.

12.9 OPERATING MODES

The Gassonic Observer-*i* reports dB readings while in RUN mode. Various other modes are used to support the calibration and setup of the instrument.

12.10 WRITE PROTECTION

The Gassonic Observer-*i* does not support any write protection modes.

13.0   APPENDIX

13.1 CAPABILITY CHECKLIST

Manufacturer, Model, and Revision	MSA Gassonic Observer-*i*
Device Type	Ultrasonic Gas Leak Detector
HART Revision	6.0
Device Description Available	Yes
Number and Type of Sensors	1 Microphone
Number and Type of Actuators	0
Number and Type of Host Side Signals	1: 4 – 20 mA analog
Number of Device Variables	0
Number of Dynamic Variables	1
Mapable Dynamic Variables	No
Number of Common-Practice Commands	2
Number of Device-Specific Commands	28
Bits of additional device status	8
Alternative Operating Modes	No
Burst Mode	No
Write-protection	NA

Table 12: Capability Checklist

13.2 DEFAULT CONFIGURATION

Parameter	Default value
Lower Range Value	40 dB
Upper Range Value	120 dB
PV Units	Decibel (dB)
Sensor type	Microphone
Number of wires	3
Damping time constant	N/A
Fault-*i*ndication jumper	N/A
Write-protect jumper	N/A
Number of response preambles	5

Table 13: Default Configuration

13.3 DEVICE DESCRIPTION LANGUAGE MENU

Diag/Service Menu
1) Power Supply Volts
2) Power Cycle Flag
3) Unit Temperature
4) Peak dB
5) Reset Alarm
6) Operating Mode
7) Alarm Test
8) Acoustic Test
9) Error bits

**Observer i
Root Menu**
1) Device Setup Menu
2) Calibration Menu
3) Operating Mode
4) Primary Variable (dB)
5) Error Status
6) Loop Current

Alarm Event Log Menu
1) Alarm Total
2) Select Log Index
3) Running Time
4) Event Date
5) Event Hour
6) Event Minute
7) Event Sec
8) Alarm Detect by
9? dB inalarm

Configuration Menu
1) Alarm dB Level
2) Alarm Latch
3) Alarm En/De
4) Real Time Clock: Date
5) Real Time Clock: Hour
6) Real Time Clock: Minute
7) Real Time Clock: Second
8) Total in Seconds
9) Alarm Delay Time
10) Current Range
11) Detection Mode
12) Enhance Ao Mode
13) Load Factory Default

Device Setup Menu
1) Diag/Service Menu
2) Configuration Menu
3) Event Logging Menu
4) Basic Setup Menu
5) Detailed Setup Menu
6) Review Menu

Fault Log Menu
1) Fault Total
2) Select Log Index
3) Running Time
4) Event Date
5) Event Hour
6) Event Minute
7) Event Sec
8) Event Cause

Maint Log Menu
1) Maint Total
2) Select Log Index
3) Running Time
4) Event Date
5) Event Hour
6) Event Minute
7) Event Sec
8) Event Cause

Event Logging Menu
3) Alarm   Event Total
4) Alarm   Event Log Menu
5) Fault   Event Total
6) Fault   Event Log Menu
7) Maint   Event Total
8) Maint   Event menu
9) Cal   Event Total
10) Cal   Event Log Menu
11) Clear Events

Calibration Menu
1) Calibrate
2) Operating Mode
3) Sub Mode
4) Primary Variable (dB)
5) Error Status

Cal Log Menu
1) Cal Total
2) Select Log Index
3) Running Time
4) Event Date
5) Event Hour
6) Event Minute
7) Event Sec
8) Event Cause

Device Information Menu
1) Manufacturer
2) Model
3) Dev ID
4) Config Change Count
5) Tag
6) Long Tag
7) Date
8) Write Protect
9) Descriptor
10) Message
11) Final Asmbly Num
12) Revision #'s Menu

Basic Setup Menu
1) Tag
2) Long Tag
3) Device Information Menu

Detailed Setup Menu
1) Output Condition Menu
2) Device Information Menu

Revision #'s Menu
1) Universal Rev
2) Fld Dev Rev
3) Software Rev
4) System Firmware Rev

Review Menu
1) Model
2) Write Protect
3) Manufacturer
4) Dev ID
5) Tag
6) Long Tag
7) Descriptor
8) Message
9) Date
10) Final Asmbly Num
11) Universal Rev
12) Fld Dev Rev
13) Software Rev
14) Poll Addr
15) Loop Current Mode
16) Num Req Preams
17) Num Resp Preams

Analog Output Menu
1) Loop Current
2) Loop Current Mode

Output Condition Menu
1) Analog Output Menu
2) HART Output Menu

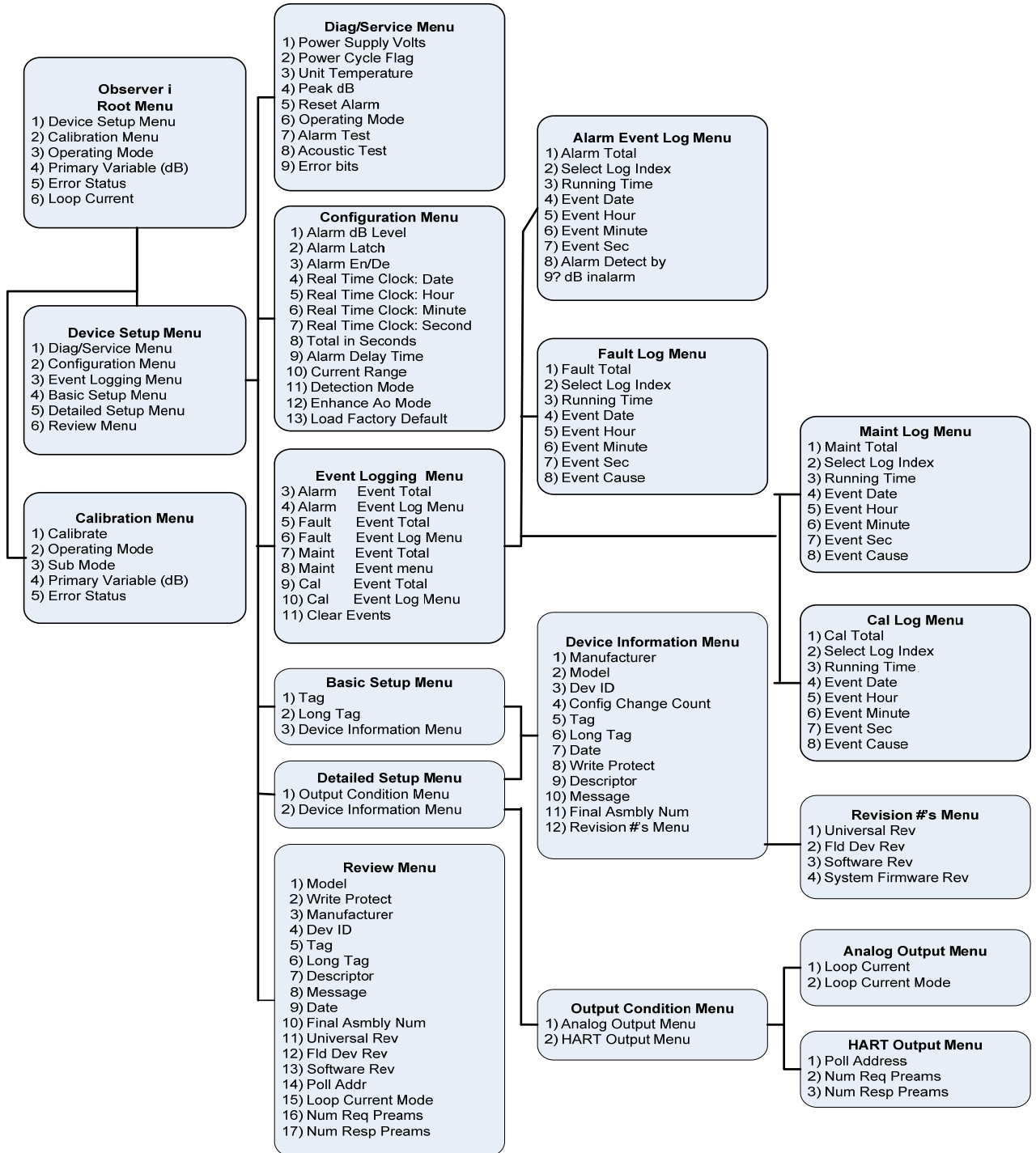**HART Output Menu**
1) Poll Address
2) Num Req Preams
3) Num Resp Preams

Figure 2: Gassonic Observer-*i* Device Description Menu