

Model
H-339

SDI-12 “TimeKeeper”
GPS Time / Location Sensor



Owner's Manual
Revision 1.10

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User Agreement/ *WATERLOG*[®] Warranty

1. NATURE OF THE PRODUCT

This agreement accompanies a pressure measuring system comprising micro-coded circuitry and other electronic equipment sealed in an enclosed housing, and packaged together with written instructional materials. The packaged electronic circuitry and instructional materials herein are collectively referred to as the “PRODUCT.” The PRODUCT is made available from DESIGN ANALYSIS ASSOCIATES, INC., of 75 West 100 South, Logan, Utah 84321 (hereinafter referred to as “DESIGN ANALYSIS”), and contains information and embodies technology that is confidential and proprietary to DESIGN ANALYSIS, and the availability and use of the PRODUCT is extended to you, the USER, solely on the basis of the terms of agreement which follow.

2. ACKNOWLEDGMENTS BY USER

Opening the package which encloses the accompanying PRODUCT indicates your acceptance of the terms and conditions of this agreement and constitutes an acknowledgment by you of the confidential and proprietary nature of the rights of DESIGN ANALYSIS in the PRODUCT.

3. DUTIES OF YOU, THE USER

In consideration for the access to and use of the PRODUCT extended to you by DESIGN ANALYSIS and to protect the confidential and proprietary information of DESIGN ANALYSIS, USER agrees as follows:

- (a) USER agrees that they will not open the sealed housing of the PRODUCT, and that they will take all necessary precautions to prevent their employees, agents, sub-contractors and resellers from doing so.
- (b) USER agrees that they will not remove from the exterior of the housing of the PRODUCT any warnings against opening or notices of proprietary interest placed thereon by DESIGN ANALYSIS, and that they will take all necessary precautions to prevent their employees, agents, sub-contractors, and resellers from removing such markings therefrom.
- (c) USER agrees to treat the PRODUCT with the same degree of care as USER exercises in relation to their own confidential and proprietary information.
- (d) USER agrees to return the PRODUCT to DESIGN ANALYSIS if and when the PRODUCT is deemed to be no longer of use. In return therefore, USER will receive from DESIGN ANALYSIS a redemption fee of \$10.00.

4. TERM

USER may enjoy these rights only as long as their possession of the PRODUCT shall continue to be rightful. These rights will cease if the PRODUCT is returned to DESIGN ANALYSIS under the terms of any redemption offer, warranty, or money-back guarantee, or if USER transfers the PRODUCT to another party on terms inconsistent with this agreement.

5. LIMITED WARRANTY

(a) What is Covered

DESIGN ANALYSIS warrants that for a period of twenty four months from the time of purchase the functions to be performed by the PRODUCT will be substantially in compliance with USER documentation. DESIGN ANALYSIS also warrants that the PRODUCT will be free from defects in materials and workmanship for a period of TWO YEARS from the date of purchase.

(b) What USER Must Do

If the product fails to satisfy the above warranty, USER must notify DESIGN ANALYSIS in writing within the applicable period specified above and reasonably cooperate with the directions they received from DESIGN ANALYSIS.

(c) What DESIGN ANALYSIS Will Do

DESIGN ANALYSIS will repair the PRODUCT or will endeavor to provide a replacement of same within a reasonable period of time. In the event that DESIGN ANALYSIS is unable to make the necessary repairs or replacement within a reasonable period of time, the original purchase price will be refunded upon the return of the PRODUCT to DESIGN ANALYSIS.

(d) Limitations

- (i)*** THIS LIMITED WARRANTY IS VOIDED WHERE THE SEALED HOUSING OF THE PRODUCT HAS BEEN OPENED.
- (ii)*** THE ENTIRE REMEDY FOR BREACH OF THIS LIMITED WARRANTY SHALL BE LIMITED TO REPLACEMENT OF THE DEFECTIVE PRODUCT OR REFUNDING OF THE PURCHASE PRICE, AS SET FORTH ABOVE. IN NO EVENT WILL THE LIABILITY OF DESIGN ANALYSIS TO USER OR TO ANY OTHER PARTY EXCEED THE ORIGINAL PURCHASE PRICE OF THE PRODUCT, REGARDLESS OF THE FORM OF THE CLAIM.

- (iii) EXCEPT FOR THE EXPRESS WARRANTIES ABOVE, DESIGN ANALYSIS SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, INCLUDING, WITHOUT LIMITATION, ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
- (iv) UNDER NO CIRCUMSTANCES WILL DESIGN ANALYSIS BE LIABLE FOR SPECIAL, INCIDENTAL, CONSEQUENTIAL, INDIRECT, OR ANY OTHER DAMAGES OR CLAIMS ARISING FROM THE USE OF THIS PRODUCT, THIS INCLUDES LOSS OF PROFITS OR ANY OTHER COMMERCIAL DAMAGES, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT WILL DESIGN ANALYSIS BE LIABLE FOR ANY CLAIMS, LIABILITY, OR DAMAGES ARISING FROM MODIFICATION MADE THEREIN, OTHER THAN BY DESIGN ANALYSIS.
- (v) Should the exclusive remedy stated in subparagraph 6 (d) (ii) above be determined by a proper court of law to have failed of its essential purpose, the limitation of the obligations of DESIGN ANALYSIS stated in subparagraphs 6 (d) (iii) and (iv) shall remain valid.
- (vi) THIS LIMITED WARRANTY GIVES USER SPECIFIC LEGAL RIGHTS. USER MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS OR THE EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THOSE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY.

6. BINDING AGREEMENT

This is a binding agreement, and if not understood, USER should seek competent legal advice. By paying for the PRODUCT and opening the package, USER acknowledges to have read this Agreement and have agreed to be bound by its terms and conditions.

7. GOVERNING LAW

This Agreement and its validity and interpretation shall be governed by the laws of the State of Utah, notwithstanding any choice of law rules of Utah or any other state or jurisdiction.

8. U.S. GOVERNMENT RESTRICTED RIGHTS

Use, duplication, or disclosure by the United States Government is subject to restrictions set forth in paragraph (c) (1) (ii) of the rights in Technical Data and Computer Software clause at 52.227-7013. The Contractor-manufacturer is DESIGN ANALYSIS ASSOCIATES, INC., 75 West 100 South, Logan, Utah 84321.

Introduction

The **WATERLOG**[®] H-339 is a smart SDI-12 sensor that returns date, time and position information. It is easy to use and works with any data recorder / logger with an SDI-12 interface. The “Serial-Digital Interface” is ideal for data logging applications with the following requirements:

- Battery powered operation with minimal current drain
- Low system cost
- Up to 200 feet of cable between a sensor and the data recorder

The H-339 has the following features:

- Reports date, time and position
- Low power for battery powered applications
- Fast time and position acquire times.

The H-339 consists of a GPS module with a 10 foot cord, an SDI-12 interface board, GPS Utility Software, and this manual.

When bought by itself, the H-339 SDI-12 interface board is packaged in a rugged, water resistant enclosure. Wire feed through connectors (Hubble Connectors) located on each end provide easy access to the internal terminal block connectors. One for the GPS module cable and the other provided for an SDI-12 cable.

When bought with an H-222SE-300 GOES radio system, the H-339 SDI-12 interface board is mounted inside the GOES radio enclosure. This GOES radio enclosure will have two extra Hubble connectors for the GPS module cable and for an SDI-12 cable.

Installation

The GPS module must be mounted where it has a clear view of the sky. Power lines and other minor obstructions are not a problem, however thick tree cover can and will prevent the receiver from acquiring valid time and position data. Mount it as flat as possible to give it the best view of the sky.

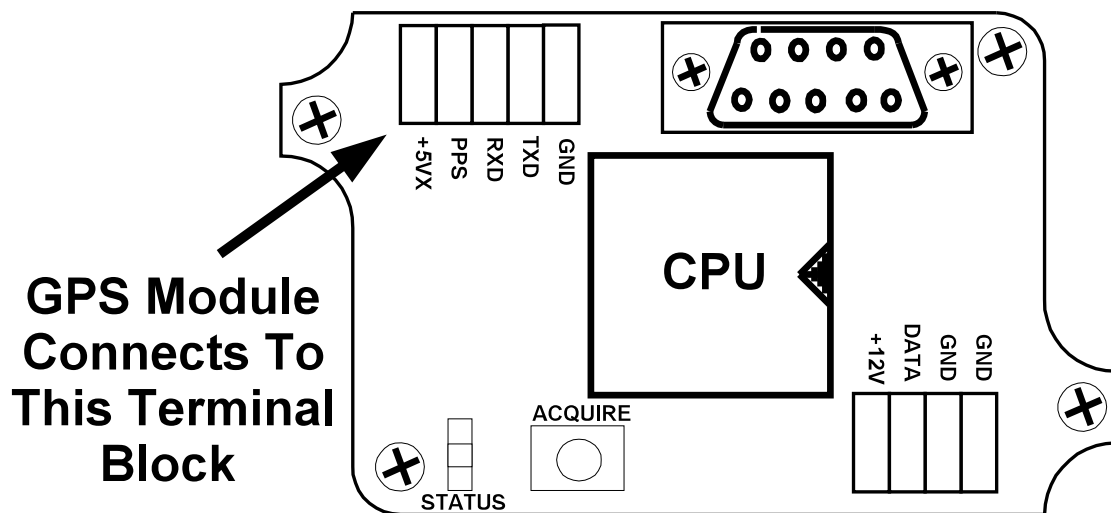
If the H-339 main interface is not packaged with the GOES radio, it may be mounted near the GPS module or near the data logger. If it is packaged with the GOES radio then the GOES radio placement dictates the location of the H-339 SDI-12 interface board.

GPS Module Connections

The GPS module should be connected first. Slide the GPS cable through the Hubble connector until enough wires are exposed to make the proper connections to the screw terminals. Tighten the Hubble connector hand tight to make a secure seal around the cable. Connect the other wires as listed in table # 1. Notice that some of the wires have been cut off and are not used. Make sure there are no bare wires touching the PC board or any components on it.

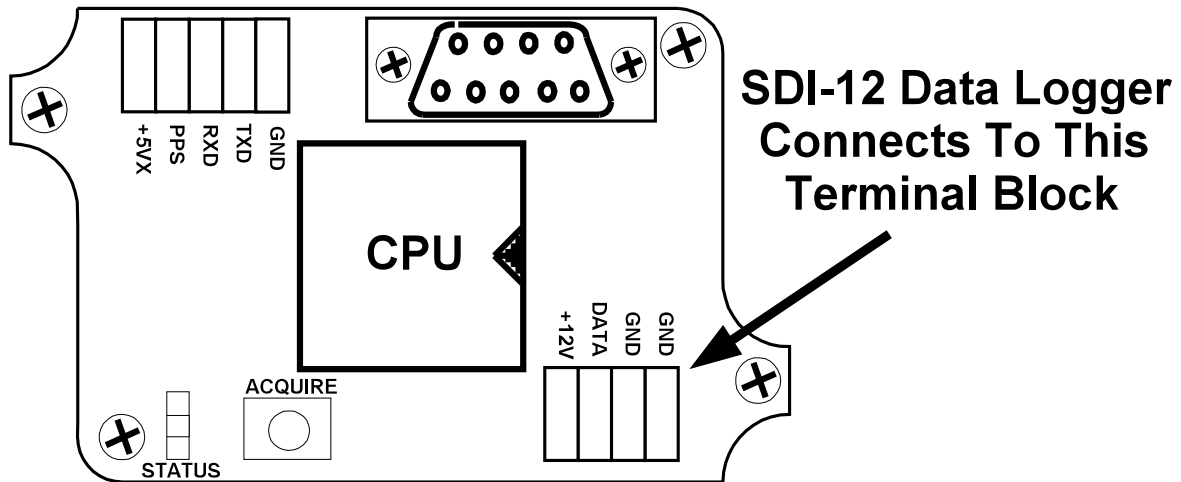
GPS MODULE WIRE	TERMINAL BLOCK
Black	GND
Blue	TXD
White	RXD
Gray	PPS
Red	+5VX

Table # 1



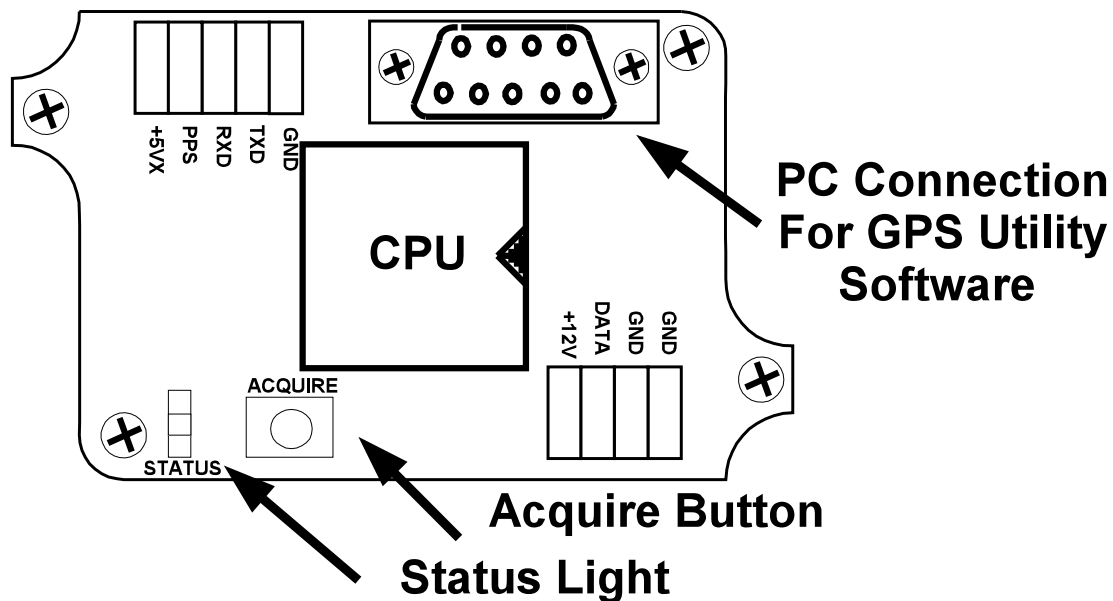
SDI-12 Connections

To connect the SDI-12 data logger, slide the cable through the Hubble connector until enough wires are exposed to make the proper connections to the screw terminals. Tighten the Hubble connector hand tight to make a secure seal around the cable. Connect the wires to the terminal block as labeled. Make sure no bare wires are touching the PC board or any components on it.



First Time Acquire

Once the H-339 is installed and powered, the user can press the 'Acquire' button on the main interface board to start an acquire operation, see figure # 1. The first time acquire may take longer than normal as the position (location on earth) will be unknown. After the H-339 has acquired a valid time and position, it will remember this location allowing it to acquire faster in the future. The 'Status' light will blink while it is trying to gain a fix to the satellites. Once it has locked on to 3 or more satellites with sufficient signal strength, valid data will be available and the light will stay on steady. After pressing the Acquire button the H-339 will try to acquire for approximately four minutes.



If the H-339 does not acquire after using the 'Acquire' button a few times, then use the 'GPS Utility' software to see how many satellites are in view and what signal strength is coming from them. With the 'GPS Utility' software running and a cable between the PC and the 9 pin connector on the interface board, press the 'Acquire' button to start the process. The H-339 will try to acquire as long as this software is running and the cable is connected. It is now possible to reposition the GPS module to see if a better view of the sky can be found. See appendix B for an overview of the GPS Utility software.

Operation

The H-339 includes an integrated GPS module capable of tracking up to 12 satellites at a time. The SDI-12 section of the H-339 handles power management and all communication between the data recorder and the GPS module. During normal operation, the data recorder sends an address together with a command to the H-339 sensor. The H-339 wakes up from its low power sleep mode, turns on and collects data from the GPS module and stores the data in its data buffer. Once the data is ready, the data recorder collects the data from the H-339's data buffer.

Programming the H-339

The H-339 comes from the factory with its address set to '0'. This is the only option that can be programmed on the H-339. Use the change address command explained in chapter 2 to change the address. The address is stored in EEPROM within the H-339 and will not be lost if the power is disconnected. If more than one sensor is to be connected to the SDI-12 bus, make certain each sensor has a unique sensor address.

The H-339 will also ALWAYS respond to valid commands with an address of 'g'. The H-339 was mainly developed for use with the *WATERLOG*[®] Series of data logger providing a means to keep the time clocks as accurate as possible. The data logger will always use 'g' as the address for communicating with the H-339.

Programming the Data Recorder

Even though the H-339 was mainly developed for use with the *WATERLOG*[®] series of data logger, it may be used with any data logger that has an SDI-12 interface. The following describes both applications.

Generic Data Logger: You must prepare your data recorder to receive and record the H-339 data. Since data recorders differ widely, refer to your recorder manufacturer's directions. In general, program the data recorder to measure and record up to 9 values from the H-339 sensor via the SDI-12 port. Your data recorder must issue an "aM!" command then collect the data with a "aD0" and "aD1" commands, as explained in Chapter 2.

WATERLOG® Series Using H-339 for Time Sync: The **WATERLOG®** Series of data loggers have a menu option that allow the user to enable or disable time sync from the H-339. When enabled the **WATERLOG®** data logger will try to sync to the GPS time once a day just after midnight, universal standard time. Time updates will happen as listed in the following table.

CONFIGURATION	TIME UPDATE PROCESS
Data Logger Only, No GOES Radio	The data logger time clock is updated.
Data Logger and SE-100 or SE-300 Radio	The data logger and the GOES radio time clock are both updated.
Data Logger and SE-1200	The SE-1200 has a built in GPS system to keep its time accurate, and the data logger can sync from this system making the H-339 unneeded for this configuration.
Data logger and Telonics GOES radio.	The data logger time is updated but the Telonics radio will not allow its time clock to be changed once the radio is enabled.

Table # 2

Position Data

The position data is returned in a format of DDMM.mmmm for the latitude and DDDMM.mmmm for the longitude. This format stands for Degrees, Minutes, Decimal Minutes. For example a value of 3851.3334 is 38 degrees, 51 minutes, and 3334/10,000 minutes.

To convert this to degrees, minutes, seconds; take the .mmmm portion of the value and multiply by 60. For example, take the value 3851.3334, and multiply 0.3334 by 60 to obtain seconds;

$$0.3334 * 60 = 20.004 \text{ seconds}$$

Now 3851.3334 DDMM.mmmm Equals 38 degrees 51 minutes and 20.004 seconds.

Time Accuracy

When the data logger requests data from the H-339, the H-339 responds to the data logger with a message indicating it can take up to 240 seconds to get valid data. The H-339 can have valid data in as little as 30 seconds. Soon after the data is valid, the H-339 sends a service request to the data logger so the data logger can collect the data. The service request will come sometime between 30 seconds and 240 seconds. The service request is synchronized to a timing pulse from the GPS module to provide very accurate timing possibilities. This timing pulse is called 'Pulse Per Second' or 'PPS' and is one of the wires from the GPS module. The time returned to the data logger is the exact time (within nanoseconds) at the rising edge of this pulse. The service request is sent to the data logger typically at 115 microseconds after the PPS pulse, (± 10 microseconds). Figure # 4 shows these pulses.

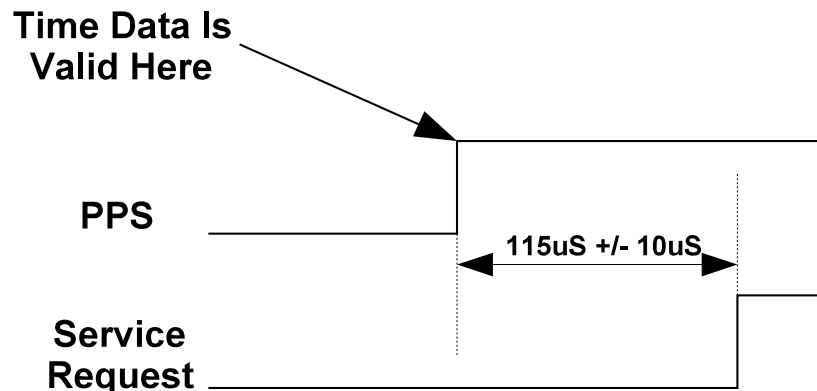


Figure 5

As long as the data logger can read the data from the sensor consistently time wise, a time offset can be established to give accuracies to less than one second. The H-339 will never return a valid time with the value for seconds equal to X8 (08, 18, 28 etc) or higher so the data logger can increment the seconds data without having to be concerned with roll over. This makes generating a time offset easier as long as the offset is 2 second or less.

Words of Caution

- Keep the lead wires as short as possible.
- Use shielded cables in noisy environments.
- Always clean and inspect the GPS module when at the site.
- Never count on the time or position accuracy if the valid flag is not set.

Chapter 2

SDI-12 Command and Response Protocol

SDI-12 Command and Response Protocol

This is a brief description of the Serial Digital Interface (SDI-12) Command and Response protocol used by the **WATERLOG**[®] Series Model H-339 sensor. Included is a description of the commands and data format supported by the H-339.

Refer to the document "A SERIAL DIGITAL INTERFACE STANDARD FOR HYDROLOGIC AND ENVIRONMENTAL SENSORS". Version 1.2 April 12, 1996 Coordinated by the SDI-12 Support Group, 135 East Center, Logan, Utah.

During normal communication, the data logger sends an address together with a command to the H-339 sensor. The H-339 then replies with a "response". In the following descriptions, SDI-12 commands and responses are enclosed in quotes. The SDI-12 address and the command/response terminators are defined as follows:

- "a" Is the sensor address. The following ASCII Characters are valid addresses: "0-9", "A-Z", "a-z", "*", "?". Sensors will be initially programmed at the factory with the address of "0" for use in single sensor systems. Addresses "1 to 9" and "A to Z" or "a to z" can be used for additional sensors connected to the same SDI-12 bus. Address "*" and "?" are "wild card" addresses which select any sensor, regardless of its actual address. Unique to the H-339 is that it will always respond to address 'g'.
- !" Is the last character of a command block.
- "<cr><lf>" Are carriage return (0D) hex and line feed (0A) hex characters. They are the last two characters of a response block.

Notes:

- All commands/responses are upper-case printable ASCII characters.
- Commands must be terminated with a "!" character.
- Responses are terminated with <cr><lf> characters.
- The command string must be transmitted in a contiguous block with no gaps of more than 1.66 milliseconds between characters.

Measure Command

The Measure Command causes a measurement sequence to be performed. Data values generated in response to this command are stored in the sensor's buffer for subsequent collection using "D" commands. The data will be retained in the sensor until another "M", "C" or "V" command is executed.

Command	Response	Description
"aM!"	"atttn<cr><lf>"	Initiate measurement

Where: a is the sensor address ("0-9", "A-Z", "a-z", "*", "?").

M is an upper-case ASCII character

ttt is a three digit integer (000-999) specifying the maximum time, in seconds, the sensor will take to complete the command and have measurement data available in its buffer.

n is a single digit integer (0-9) specifying the number of values that will be placed in the data buffer. If "n" is zero (0), no data will be available using subsequent "D" commands.

Upon completion of the measurement, a service request "a<cr><lf>" is sent to the data logger indicating the data is ready. The data logger may wake the sensor with a break and collect the data anytime after the service request is received or the specified processing time has elapsed.

Example of a H-339 "aM!" command:

Command	Response	Time	Values	Description
"aM!"	"a2409<cr><lf>"	240 sec	9	Get Time / Position Data

Subsequent Command Response

"aD0"	a+ss+mm+hh+DD+MM+YY<cr><lf>
"aD1"	a+DDMM.mmmm+DDDMM.mmmm+F<cr><lf>

Where:

ss = Seconds, mm = Minutes hh = Hours DD = Date MM = Month YY = Year
 DDMM.mmmm = Latitude DDDMM.mmmm = Longitude F = Pass / Fail Flag

Concurrent Measurement Command

This is a new command for the Version 1.2 SDI-12 Specification. A concurrent measurement is one which occurs while other SDI-12 sensors on the bus are also taking measurements. This command is similar to the "aM!" command, however, the nn field has an extra digit and the sensor does not issue a service request when it has completed the measurement. Communicating with other sensors will NOT abort a concurrent measurement. Data values generated in response to this command are stored in the sensor's buffer for subsequent collection using "D" commands. The data will be retained in the sensor until another "M", "C" or "V" command is executed.

Command	Response	Description
-----	-----	-----
"aC!"	"atttnn<cr><lf>"	Initiate measurement

Where: a is the sensor address ("0-9", "A-Z", "a-z", "*", "?").

C is an upper-case ASCII character

ttt is a three digit integer (000-999) specifying the maximum time, in seconds, the sensor will take to complete the command and have measurement data available in its buffer.

nn is a two digit integer (00-99) specifying the number of values that will be placed in the data buffer. If "n" is zero (0), no data will be available using subsequent "D" commands.

The data logger may wake the sensor with a break and collect the data anytime after the specified processing time has elapsed.

Send Data Command

The Send Data command returns sensor data generated as the result of previous "aM!", "aC!" or "aV!" commands. Values returned will be sent in 33 characters or less. The sensor's data buffer will not be altered by this command.

Command	Response
----- "aD0!" through "aD9!"	----- "apd.d ... pd.d<cr><lf>"

- Where:
- a is the sensor address ("0-9", "A-Z", "a-z", "*", "?").
 - D0..D9 are upper-case ASCII characters.
 - p Is a polarity sign (+ or -)
 - d.d represents numeric digits before and/or after the decimal. A decimal may be used in any position in the value after the polarity sign. If a decimal is not used, it will be assumed to be after the last digit.

For example: +3.29 +23.5 -25.45 +300

If the number of values returned by a "aD0!" command is less than the number specified by the result of the previous "M" or "V" command, the rest of the data must be collected using "aD1", "aD2!" "aD9!" until all values specified have been collected. If one or more values were specified and a "aD0!" returns no data (a<CR><LF> only), it means that the measurement was aborted and a new "M" command must be sent. The following is an example of the "aD0!" and "aD1!" supported by the H-339.

Example of a H-339 "aD0!" command:

Previous command	Response
----- "aM! "	----- "a0022<cr><lf>"
Subsequent Command	Response
----- "aD0!" "aD1!"	----- a+ss+mm+hh+DD+MM+YY<cr><lf> a+DDMM.mmmmm+DDDMM.mmmmm+F<cr><lf>

Where:
 ss = Seconds, mm = Minutes hh = Hours DD = Date MM = Month YY = Year
 DDMM.mmmmm = Latitude DDDMM.mmmmm = Longitude F = Pass / Fail Flag

Initiate Verify Command

The Verify Command causes a verify sequence to be performed. The result of this command is similar to the "aM!" command except that the values generated are fixed test data and the results of a diagnostic checksum test. The data generated in response to this command is placed in the sensor's buffer for subsequent collection using "D" commands. The data will be retained in the sensor until another "M", "C" or "V" command is executed.

Command	Response	Description
"aV!"	"atttn<cr><lf>"	Initiate verify sequence

Where: a is the sensor address ("0-9", "A-Z", "a-z", "*", "?").

V is an upper-case ASCII character.

ttt is a three digit integer (000-999) specifying the maximum time, in seconds, the sensor will take to complete the command and have data available in its buffer.

n is a single digit integer (0-9) specifying the number of values that will be placed in the data buffer. If "n" is zero (0), no data will be available using subsequent "D" commands.

Example of a H-339 "aV!" command:

Command	Response	Time	Values	Description
"aV!"	"a0013<cr><lf>"	1 sec	3	Return fixed data and diagnostic data for testing purposes.

Subsequent Command	Response
"aD0"	a+123.456+78.9+y<cr><lf>

Key	Description	Units
+123.456	Fixed test data	
+78.9	Fixed test data	
y	ROM checksum test	0 = Failed, 1 = Passed

Send Identification Command

The Send Identification command responds with sensor vendor, model, and version data. Any measurement data in the sensor's buffer is not disturbed.

Command	Response
----- "aI!"	----- "allccccccmmmmmvvxx...xx<cr><lf>"

Where: a is the sensor address ("0-9", "A-Z", "a-z", "*", "?").

I is an upper-case ASCII character.

ll is the SDI-12 version compatibility level, e.g. version 1.2 is represented as "12".

cccccc is an 8 character vendor identification to be specified by the vendor and usually in the form of a company name or its abbreviation.

mmmmm is a 6 character field specifying the sensor model number.

vvv is a 3 character field specifying the sensor version number.

xx...xx is an optional field of up to a maximum of 13 characters to be used for serial number or other specific sensor information not relevant to operation of the data logger.

Example of a H-339 "aI!" command:

```
"a12 DAA H-339vvvS#nnnnnnVkkk<cr><lf>"
```

H-339 implementation of the optional 13 character field:

S#nnnnnnVkkk (12 bytes total)

Where:

"nnnnnn" is a six character sensor serial number

"kkk" is a three digit sensor firmware revision level

Send Acknowledge Command

The Send Acknowledge Command returns a simple status response which includes the address of the sensor. Any measurement data in the sensor's buffer is not disturbed.

Command	Response
----- "a!"	----- "a<cr><lf>"

Where: a Is the sensor address ("0-9", "A-Z", "a-z", "*", "?").

Change Sensor Address

The Change Sensor Address Command allows the sensor address to be changed. The address is stored in non-volatile EEPROM within the sensor. The H-339 will not respond if the command was invalid, the address was out of range, or the EEPROM programming operation failed.

Command	Response	Description
----- "aAn!"	----- "n<cr><lf>"	----- Change sensor address

Where: a is the current (old) sensor address ("0-9", "A-Z", "a-z", "*", "?"). An ASCII "*" may be used as a "wild card" address if the current address is unknown and only one sensor is connected to the bus.

A is an upper-case ASCII character.

n is the new sensor address to be programmed ("0-9", "A-Z", "a-z", "*", "?").

NOTE: To verify the new address use the "Identify Command."

Appendix A Specifications

Power Supply

Voltage:	9.6 to 16.0 Volts DC
Current:	
Sleep Mode:	250 microamps
Active:	150 mA maximum

Measurement Time

SDI-12:	240 seconds max
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SDI-12 Output

Baud Rate:	1200
Protocol:	SDI-12, 7-bit even parity, 1 stop bit
Output Voltage Levels:	
minimum high level:	3.5 volts
maximum low level:	0.8 volts
maximum cable length:	500 ft.

Environmental

Operating Temperature:	-40° to 50°C
Storage Temperature:	-50° to 70°C
Humidity:	Condensing Tolerant

Connectors

SDI-12 Output:	Hubble weather tight connector with internal screw terminal block
GPS Module:	Hubble weather tight connector with internal screw terminal block

Warranty

The **WATERLOG**® H-339 is warranted against defects in materials and workmanship for one year from date of shipment.

Appendix B

GPS Utility Software

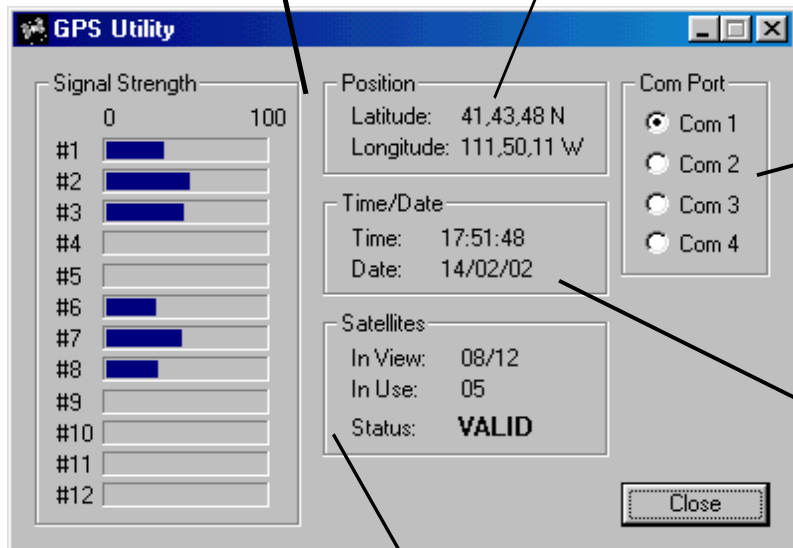
Overview

The GPS Utility program allows a user to easily monitor the status of a GPS unit. The program connects to a GPS unit through COM1 and communicates at 4800 baud.

Functionality

The Signal Strength is a signal to noise ratio for each satellite. These bars

Position of the GPS unit. Both latitude and longitude are in degrees, minutes and decimal



Select a Communication port to use with the H-339.

The Time and Date are synchronized to the international standard GPS time.

The number of satellites which are currently in view out of 12. The number of satellites which are being used to extrapolate data. If 3 or more satellites are being used, the Status may be VALID, otherwise it is INVALID.