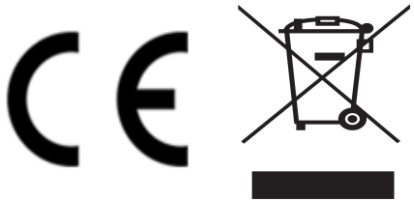
Geo-Acoustic Aware (GAA) Reference Manual



Document Number: ACM0001B

Release Date: May 17, 2019

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REVISION TABLE

Rev.	Revision History	Date	Prepared By	Approved By
A	Initial release	21-Sep-2018	BC, JP	JW
B	Wave Guide specifications added; installation instructions, sensor placement, battery information updated; minor formatting updates.	17-May-2019	JP	JW

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1 INTRODUCTION

Geo-Acoustic Aware (GAA) system is an effective approach to monitor accelerating slope movements by picking up acoustic emission (AE) stress waves. In soil, AE is generated by inter-particle friction of a backfill material and its detection is an indication of deformation. A pipe (waveguide), installed in a borehole backfilled with a granular material, transmits the AE to a sensor mounted near the top of the waveguide. The waves detected by the sensor correlate to a range of slope movement rates. The GAA Slope Monitoring System senses, collects and wirelessly communicates data to a remote computer via the RSTAR network. Figure 1-1 shows the GAA2820 Data Logger with the sensor attached.

FIGURE 1-1 GAA2820 GEO-ACOUSTIC AWARE (GAA) DATA LOGGER AND SENSOR

1.1 WAVEGUIDE SPECIFICATION

If not using RST supplied waveguides, the GAA system should be used with piping consisting of the specifications outlined in Table 1-1. Using piping outside of these specifications will degrade performance.

NOTE: THE WALL THICKNESS AND MATERIAL ARE CRUCIAL TO THE FUNCTIONALITY OF THE SYSTEM. UNDER NO CIRCUMSTANCES SHOULD THESE BE OUTSIDE THE SPECIFICATION.

TABLE 1-1 PIPE SPECIFICATIONS

Property	Value
Pipe wall thickness	2-4 millimetres
Pipe material	Steel (welded or seamless)
Pipe diameter	1.5 inch (nominal) 1.9-inch outer diameter
Pipe length	10 foot or 3 meter sections suggested (Longer sections can be used)
Couplers	Same material and threading style as pipe

2 INSTALLATION

The following section describes how to install the GAA waveguide and the GAA2820 Data Logger plus Sensor to facilitate the best performance from the system.

2.1 INSTALLATION TOOLS AND MATERIALS

The following is a list of tools required for installation:

- Phillips #2 screwdriver
- Flat-head 2.5 mm screwdriver
- Flat-head 5 mm screwdriver
- Two 20 mm open wrenches or small crescent wrenches
- Two vice-grip chain clamp/chain wrench, pipe wrench, or similar tool
- Isopropyl alcohol
- Silicone grease
- An optional Cable Gland Nut Wrench (DT100) may be purchased from RST Instruments for effortless cable gland access. The Cable Gland Nut Wrench (Figure 2-1) improves access to the glands when compared to a standard wrench. Contact RST for more details.

FIGURE 2-1 CABLE GLAND NUT WRENCH

2.2 WAVEGUIDE, SENSOR, AND DATA LOGGER INSTALLATION

RST-supplied waveguides are black steel piping, consisting of an outside diameter of approximately 1.9 inches, come in 10 foot lengths, and are connected via NPT tapered threaded couplings. Boreholes used for waveguide installations should have a diameter of at least 5 inches to allow for adequate backfilling.

NOTE: THE BOREHOLE SHOULD HAVE A DIAMETER OF AT LEAST 5 INCHES TO ALLOW FOR ADEQUATE BACKFILLING.

A waveguide is typically installed in a borehole piece by piece. Although it may be possible to assemble all the pieces of the waveguide together before inserting down-hole, it is not recommended due to the difficulty in controlling a large length of pipe in a vertical orientation.

Depending on the depth of the installation, additional tools may be needed to prevent the waveguide from falling down-hole due to its overall weight. Two people are recommended for installation of the waveguide to ensure there is always a person holding the waveguide while repositioning installation tools.

2.2.1 Installation Steps

NOTE: IF NOT PRE-WIRED, WIRE THE GAA SENSOR TO THE GAA2820 DATA LOGGER IN AN INDOOR ENVIRONMENT BEFORE INSTALLATION. THIS WILL MINIMIZE CONTAMINATION OF THE DATA LOGGER'S ELECTRONICS.

1. Ensure you have all the waveguide sections ready for assembly.
2. Before beginning installation, dig a shallow pit, approximately 17 centimeters deep, and 40 centimeters in diameter, around the collar of the borehole. This area will be used to grout the secondary enclosure in place.
3. Generously apply silicone grease to the male threading at one end of the first waveguide section.

NOTE: THE APPLICATION OF SILICONE GREASE ON ALL THREADED JOINTS IS NECESSARY TO MAXIMIZE THE SIGNAL THROUGH THE COUPLERS OF THE GAA SYSTEM.

4. Attach a coupler onto the greased threading of the waveguide and tighten using chain wrenches by turning the coupler clockwise. Ensure the connection is tight.

5. Lower the waveguide section into the borehole with the coupler at the top end. Make sure to leave a comfortable length of the waveguide section protruding to attach the next section.

6. Clamp the waveguide to keep it from falling down the borehole.

7. Generously apply silicone grease to the male threading at one end of the next waveguide section.

8. Attach a coupler onto the greased threading and tighten using chain wrenches by turning the coupler clockwise. Ensure the connection is tight.

9. Generously apply silicone grease to the male threading at the other end of the same waveguide section.

10. Attach the new waveguide section with coupler to the previously installed clamped section. Tighten using chain wrenches by turning the new waveguide section clockwise. Ensure the connection is tight.

11. Repeat steps 5 to 10 until all sections of the waveguide have been attached. The final waveguide section should protrude approximately 50 centimeters from the collar of the borehole; any excess should be cut off.

NOTE: DO NOT CAP OR SEAL THE TOP END OF THE WAVEGUIDE. THIS WILL DEGRADE THE PERFORMANCE OF THE SYSTEM.

12. Place gravel backfill in the area between the waveguide and the borehole using 0.5-meter lifts and tamp the gravel down to ensure it is compacted. If the installation is shallow enough, a solid rod can be used to tamp down the backfill. For deeper installations, a weight on a wire rope can be use.

NOTE: IF REGIONS OF HIGH PERMEABILITY ARE PRESENT IN THE BOREHOLE, IT IS STRONGLY RECOMMENDED TO A PLACE BENTONITE GROUT PLUG IN THE AREA TO PREVENT ACOUSTIC EMISSIONS DUE TO GROUNDWATER FLOW.

13. Repeat step 11 until the gravel backfill is approximately 1 meter below the collar of the borehole.

NOTE: IF FROST DEPTH IS EXPECTED TO BE DEEPER THAN 1 METER, THE HEIGHT OF THE GRAVEL BACKFILL SHOULD BE LOWERED TO ENSURE THAT IT DOES NOT EXTEND ABOVE THE FROST DEPTH.

14. Confirm the installation depth of the secondary enclosure. When it is grouted in place, the lower portion of the secondary enclosure should sit approximately 17 centimeters into the previously dug pit.

NOTE: IF THE SECONDARY ENCLOSURE IS SIGNIFICANTLY LESS THAN 17 CENTIMETERS DEEP, IT MAY CAUSE SENSOR INSTALLATION ISSUES.

15. Pour a bentonite grout plug from the top of the gravel lift to the collar of the borehole. Fill the shallow pit with bentonite grout.

16. Install the secondary enclosure over the waveguide into the bentonite grout.

NOTE: THE LOWER SECTION OF THE SECONDARY ENCLOSURE SHOULD BE INSTALLED SO APPROXIMATELY 17 CENTIMETERS IS ABOVE GROUND LEVEL.

17. Once the grout has cured, the installation of the sensor can begin. Using isopropyl alcohol, clean an area on the waveguide approximately halfway up the protruding section, approximately 25 centimeters.

18. Wipe any residue away and generously apply silicone grease to a small area the size of the transducer, roughly the size of a quarter (see Figure 2-2). This is where the center of the sensor will sit.

FIGURE 2-2 APPLY SILICONE GREASE ON THE WAVEGUIDE

19. Ensure both hose clamps on the sensor are open wide enough to slide onto the waveguide without interference.

20. While pulling the plunger tube away from the waveguide, lower the sensor to the area where silicone grease was applied (See Figure 2-3). **Gently** release the plunger tube so the sensor sits against the pipe with the silicone grease in between.

NOTE: THE SENSOR SHOULD NOT BE MOUNTED AT THE VERY TOP OF THE WAVEGUIDE. THIS WILL PRODUCE REFLECTIONS THAT WILL INTERFERE WITH PERFORMANCE.

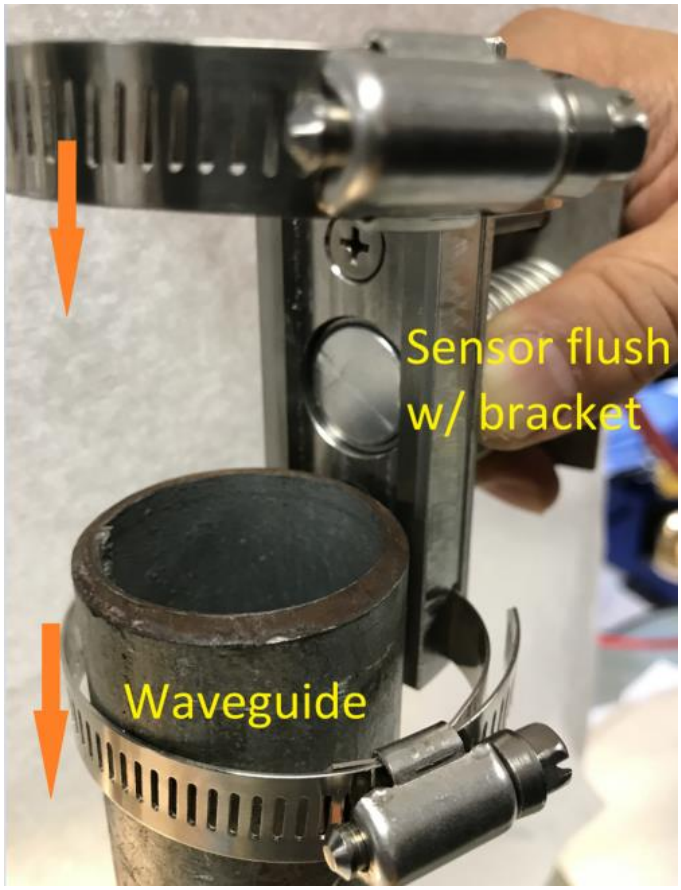

FIGURE 2-3 INSTALLING SENSOR ONTO WAVEGUIDE (W/ CLEARANCE)

NOTE: ENSURE THAT THE SENSOR DOES NOT MAKE CONTACT WITH THE WAVEGUIDE WHEN IT IS SLIDING INTO PLACE.

21. Tighten the hose clamps ensuring that the sensor is located over the silicone grease.

NOTE: MAKE SURE NOT TO OVER TIGHTEN THE HOSE CLAMPS. THE HOSE CLAMPS ONLY NEED TO STOP THE SENSOR FROM SLIDING, AS THE SENSOR IS HELD IN PLACE USING THE PLUNGER SPRING.

2.3 WIRING THE GAA SENSOR NODE

If the GAA sensor node is not currently wired to the GAA2820 Data Logger, wire the sensor to the three-pin terminal block inside the data logger per the following instructions:

CAUTION:

AVOID OPERATIONS WITH THE LOGGER COVER OFF IN RAIN OR SNOW.

DO NOT ALLOW RAIN OR SNOW TO ENTER THE ENCLOSURE.

DO NOT INSTALL IN FLOODABLE LOCATIONS.

THE LOGGER IS RAIN-TIGHT ONLY AND NON-SUBMERGIBLE.

1. Loosen the cable gland of the GAA2820 Data Logger using two 20 mm wrenches or the cable glad nut wrench. Hold the bolt in place with one wrench. Loosen the cap with the other wrench. Refer to Figure 2-4 for proper wrench placement for the two-wrench method. Refer to Figure 2-5 for the cable gland nut wrench placement.

CAUTION:

Ensure the entire nut body does not loosen. Loosen only the gland.

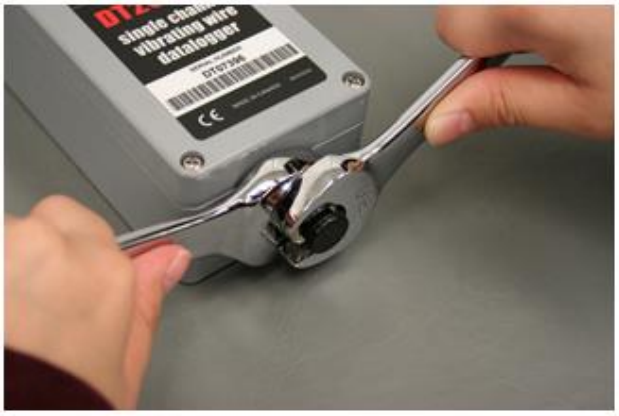

FIGURE 2-4 LOOSEN THE CABLE GLAND USING TWO 20 MM WRENCHES

FIGURE 2-5 LOOSEN THE CABLE GLAND USING THE CABLE GLAND NUT WRENCH

2. Remove the black cable plug from the cable gland. Refer to Figure 2-6.

FIGURE 2-6 REMOVE THE CABLE PLUG FROM THE CABLE GLAND

3. Loosen the 4 Phillips screws on the top of the logger. Lift the cover off.

4. Insert the sensor cable with stripped and crimped wire ends through the cable gland and into the logger. Ensure the cable sheath is inside the enclosure.

NOTE: THE SENSOR CABLE MUST BE CLEAN AND FREE OF DIRT

5. Connect the leads. The Sensor Node is electrically connected to the GAA2820 Data Logger via three wires (from cable type EL380004) to a terminal block (reference designator P2) on the GAA2820 PCBA. See Table 2-1 and Figure 2-7 for more details. Secure the wires to the circuit of the data logger by tightening each wire with a 2.5 mm flat-blade screwdriver

TABLE 2-1 SENSOR NODE INTERCONNECTIONS

Terminal Block P2 (silk screen signals)	Wire Colour (cable type EL380004)
SIG	Red
GND	Black
Sh	Drain wire

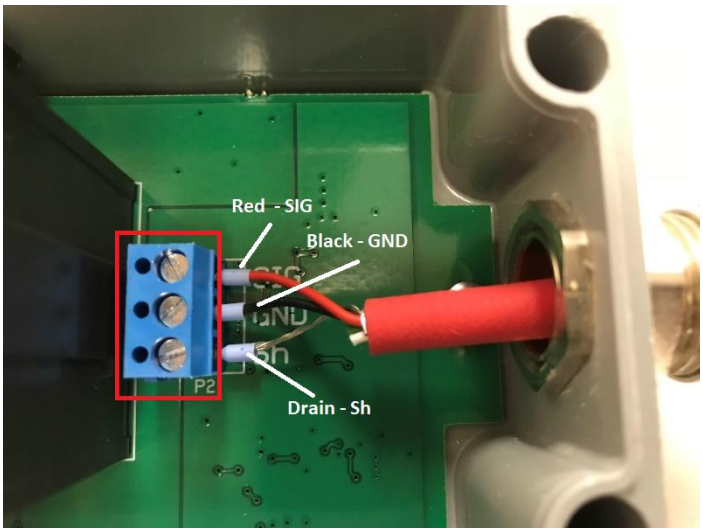

FIGURE 2-7 CONNECTING THE SENSOR NODE TO THE GAA2820 DATA LOGGER

CAUTION: Ensure no bare wires are visible.

6. Tighten the cable gland using the same wrench positioning as step 1. Refer to Figure 2-4. Tug gently on the cable after each half turn to inspect cable mobility.

7. Perform a final half turn once the cable is immobile. Do not overtighten or under tighten.

CAUTION:

OVERTIGHTENING THE CABLE GLAND COULD DAMAGE THE CABLE.

UNDER TIGHTENING THE CABLE GLAND COULD CAUSE A LEAKAGE AND WATER DAMAGE.

8. Replace the lid of the enclosure. Each screw will need to be loosely tightened in the sequence shown in Figure 2-8 before being tightly screwed in the same sequence.

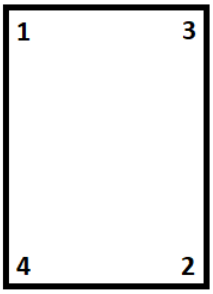

FIGURE 2-8 TIGHTEN SCREWS IN THE FOLLOWING ORDER AND PATTERN

9. Once the unit is ready to be installed in the field, remove the lid from the data logger to gain access to the mounting holes. Attach the GAA2820 Data Logger to the secondary enclosure bracket. The GAA2820 Data Logger is equipped with four mounting holes. Refer to Figure 2-9.

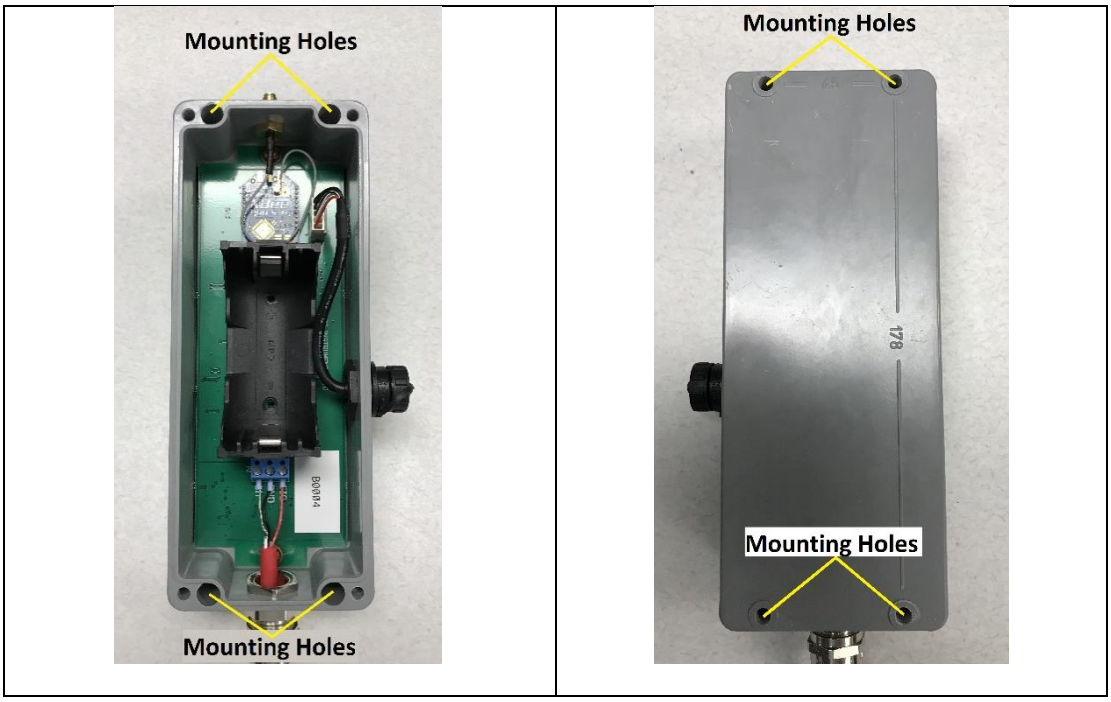

FIGURE 2-9 GAA2820 MOUNTING HOLES (LID REMOVED)

The GAA2820 Data Logger is mounted onto a bracket inside the CPLS 8. Fasteners are listed in Table 2-2.

TABLE 2-2 MOUNTING HOLE SCREW TYPE

Data Logger	Corresponding Screw Type
GAA2820	#8-32

10. Once mounted, replace the lid of the enclosure, following step 8.

11. Put the cover back on the secondary enclosure and twist to lock, then tighten the nut to secure the cover in place.

2.4 DATA LOGGER CONFIGURATION

For proper configuration and operation of the GAA2820 Data Logger, please consult RST Instruments. More detailed information is shown in Section 4.

3 MAINTENANCE

RST GAA Series Data Loggers are housed in weather-resistant, NEMA 4X IP65-rated enclosures. This prevents rain, snow, and dust from entering the enclosure, but only if the Data Loggers are properly installed and sealed. RST GAA Series Data Loggers are not submersible.

RST GAA Series Data Loggers are low maintenance but require some periodic maintenance. Follow the maintenance guidelines provided in this manual to ensure a long lifespan for the Data Loggers.

Note that any service or maintenance involving the exposure of the logger's internal components should be performed in clean and dry conditions.

NOTE: IF APPROPRIATE, MINOR MAINTENANCE (BATTERY REPLACEMENT, ETC.) CAN BE PERFORMED ON THE DATA LOGGER WITHOUT DISMOUNTING THE UNIT

CAUTION:

AVOID OPERATIONS WITH THE LOGGER COVER OFF IN RAIN OR SNOW.

DO NOT ALLOW RAIN OR SNOW TO ENTER THE ENCLOSURE.

DO NOT INSTALL IN LOCATIONS PRONE TO FLOODING.

GAA SERIES DATA LOGGERS ARE RAIN-TIGHT BUT CANNOT BE SUBMERGED.

3.1 BATTERY

Two kinds of batteries are used across the DT Logger range of products: standard and compact. They are summarized in Table 3-1.

TABLE 3-1 BATTERY DEFINITIONS

Battery Name	Standard Battery	Compact Battery
Battery Type	SAFT LSH 20 D-cell	One SAFT LSH 14 light C-cell Or Two SAFT LS 14500 AA

Standard batteries are defined as SAFT LSH 20 D-cell batteries and can be placed directly into the battery holder inside the logger. Standard batteries are recommended for radio-equipped models but may be used with non-radio loggers.

Compact batteries are defined as either one SAFT LSH 14 light C-cell battery or two SAFT LS 14500 AA batteries and require the use of the appropriate adaptor prior to placement in the battery holder. Compact batteries are recommended for stand-alone loggers. Both compact battery options are designed to support the same level of performance in DT loggers and are considered equivalent.

Standard batteries are recommended for all data logger units with RSTAR wireless capability. Compact batteries may be used in loggers that do not have wireless capability.

Battery lifespan is difficult to accurately predict due to the number of variables that can affect it, including measurement interval, number of sensors being measured, radio signal (if applicable), temperature, and humidity, among others.

Although battery voltage data is logged in the GAA Series Data Loggers, lithium-thionyl chloride batteries generally stay at full voltage before suddenly dropping and depleting. This makes it difficult to predict when lithium-thionyl batteries should be replaced. Contact RST Instruments to determine the recommended approximate battery replacement schedule.

It is recommended to disconnect the battery when the GAA Series Data Loggers are not in use as the Data Loggers will continue logging if the batteries are left installed. Store the batteries at room temperature if possible.

3.1.1 Battery Safety

CAUTION:

DO NOT ATTEMPT TO RECHARGE THE BATTERY.

DO NOT REPLACE THE BATTERY WITH AN ALKALINE OR ZINC-CARBON BATTERY.

DO NOT SHIP THE GAA SERIES DATA LOGGERS WITH THE BATTERY INSIDE.

Follow local laws and regulations for your region for battery disposal.

Contact RST for replacement batteries.

3.1.2 Battery Life Expectancy

The sensor of the GAA2820 Data Logger operates continuously and records the ring down count (RDC) once every hour (or 15 minutes, depending on configurations). The on-board battery and memory are designed to accommodate this feature. Table 3-2 provides some estimates of battery life.

NOTE: SHORTENING THE MONITORING PERIOD AND/OR ENABLING RSTAR RADIO SYSTEMS WILL FURTHER REDUCE THE BATTERY LIFE.

TABLE 3-2 TYPICAL BATTERY LIFE EXPECTANCY

Reading interval	RSTAR	Battery Life Expectancy (Standard Battery)	Notes
1 hour	Enabled	1.5 yrs	Life expectancy will vary based on battery capacity and operating temperature
15 mins	Enabled	1.3 yrs	

3.1.3 Changing the Battery

NOTE: AFTER REPLACING THE BATTERIES, IT IS IMPORTANT TO CONNECT TO THE GAA2820 DATA LOGGER AND RE-APPLY THE DATA LOGGER LOGGING SETTINGS. THIS RE-INITIALIZES THE DATA LOGGER AND ENSURES THAT THE TIME SETTINGS ARE CORRECT. FAILURE TO DO THIS COULD RESULT IN IMPROPER TIME STAMPS AFTER THE BATTERIES ARE REPLACED.

The following steps outline the procedure to change the battery:

1. Connect the GAA2820 Data Logger to a laptop via the USB cable and download the data.
2. Disconnect the Data Logger from the computer and remove the top cover by loosening the 4 Phillips screws.
3. Remove the battery from the carrier and replace with a fresh battery.
4. Replace the lid, loosely tighten the screws according to Figure 2-8, then securely tighten each screw in the same pattern.

5. Connect the Data Logger to the PC again and navigate to the Connections screen. Click on the “Advanced” button and then on “Initialize Battery”.

6. Switch to the Logging screen. Verify that the settings are correct and press the “Apply Settings” button. You must press “Apply Settings” to reset the Data Logger regardless of whether any parameters are changed or not.

NOTE: WHEN USING ANY WIRELESS OPTION (E.G., RSTAR), LSH20 BATTERIES ARE HIGHLY RECOMMENDED. WIRELESS CONNECTION WILL NOT WORK WITH LOWER CURRENT BATTERIES.

3.2 MOISTURE PREVENTION

RST GAA Series Data Loggers are housed in weather-resistant, NEMA 4X IP65-rated enclosures. This prevents rain, snow, and dust from entering the enclosure but only if the Data Loggers are properly installed and sealed. RST GAA Series Data Loggers are not submersible.

Each Data Logger has up to four areas of entry for moisture and humidity if not properly sealed:

- Data Logger Lid: The lid of the Data Logger will need to be removed and reinstalled from time to time for instrument wiring and periodic maintenance. It is important to ensure the O-ring is free of debris before reassembling the lid. Refer to Figure 2-8 for the proper sequence to follow when tightening the screws on the Data Logger’s lid.

- Cable Glands: Ensure the cables are clean prior to inserting into the logger to prevent introducing dirt through the gland opening. It is important to ensure all cable glands are sealed. The cable gland plugs should remain secured on any unused cable glands. Cable glands with sensor cables through should be securely sealed. Refer to the “Data Logger Hardware Connections” video for proper sealing guidelines located on the RST website at https://www.rstinstruments.com/Geotechnical-Videos.html or via YouTube directly at https://youtu.be/a5hHQaN1NkI

- USB Connector: Ensure the USB connector cap is firmly screwed in to provide a water-tight seal when the USB is not in use. The cap contains a rubber gasket to seal the USB connector.

- Antenna Connector (if applicable): Plug the antenna connector with the provided rubber connector cap if the antenna is not in use. If the antenna is in use, ensure it is screwed on hand tight and facing upwards.

Moisture intrusion is a possibility if any of these items are not properly sealed.

3.2.1 Desiccant Pack

Note that a desiccant packet is provided inside each Data Logger during point of sale. These packs should be replaced if they ever appear to be moist or if any moisture is present inside the enclosure. It is recommended to replace the desiccant packets each time the battery is replaced or as required if the Data Loggers are installed in climates with high humidity.

Refer to Table 3-3 for the corresponding desiccant packet per Data Logger.

TABLE 3-3 CORRESPONDING DESICCANT PACKET PER DATA LOGGER

Data Logger	Corresponding Desiccant Packet
GAA2820	ULINE S-3902, 1-gram desiccant pack

3.3 MAINTENANCE INFORMATION

Additional service and maintenance may be required depending on site conditions. Inspect the Data Loggers for any signs of moisture or corrosion whenever the battery is replaced. Contact RST Instruments for troubleshooting recommendations if moisture or corrosion is detected.

Inspect the antenna if the diagnostic data shows any issue with the radio signal. Examine the Data Loggers for loose internal and external antenna connections, damage to the antenna, and any moisture inside the enclosure.

Any Data Logger upgrades or repairs should be performed by or under specific direction from RST Instruments Ltd.

Contact RST Instruments for any maintenance and servicing questions.

4 OPERATIONS GUIDE

GAA Series Data Loggers can be connected to a host computer using a USB cable. This section is specific to the GAA2820. For other Data Loggers, refer to document *ELM0080 DT Logger Host Instruction Manual – PC platform*.

The DT Logger Host user interface contains six tabs: Connections, Status, Data View, Monitor, Logging and Sensors. Each tab is explained in the subsections below. Until a successful logger connection is established, only Connection, Status and Data View tabs are accessible. A ‘Help’ button is available on the bottom of the GUI, which launches the appropriate help files when pressed. Refer to Figure 4-1.

4.1 CONNECTIONS TAB

Once connected to the Data Logger, the software should automatically establish communication link and display connected status. Refer to Figure 4-1. If this does

not occur, verify the port number and communication cable or refer to document *ELM0080 DT Logger Host Instruction Manual – PC platform* for more details.

NOTE: WHEN UPDATING GAA2820 SETTINGS WITH THE DT LOGGER HOST SOFTWARE, THE USB CONNECTION IS MOMENTARILY DISCONNECTED WHILE SETTINGS ARE BEING APPLIED AND THE USB CONNECTION IS RESET.

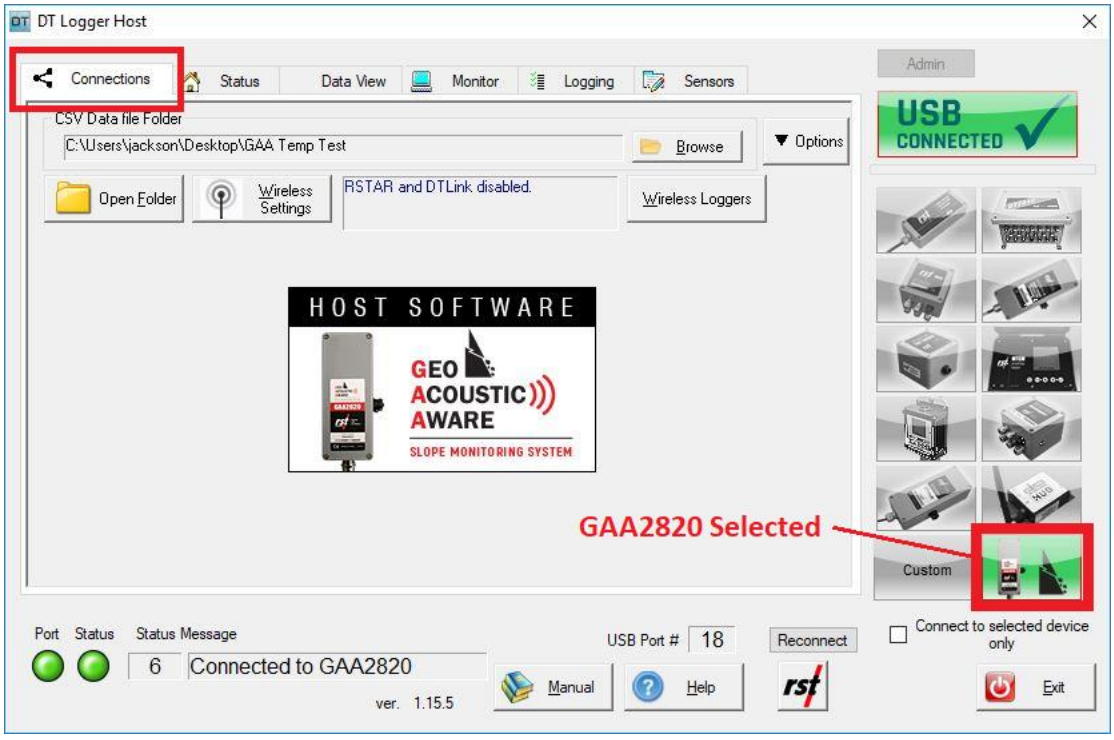

FIGURE 4-1 CONNECTIONS TAB – GAA2820 CONNECTED

4.2 STATUS TAB

The Status tab as shown in Figure 4-2 displays six main components: Logger, Sampling, Battery, Board, Memory and Collect Data. The fields are automatically populated based on information stored in the logger.

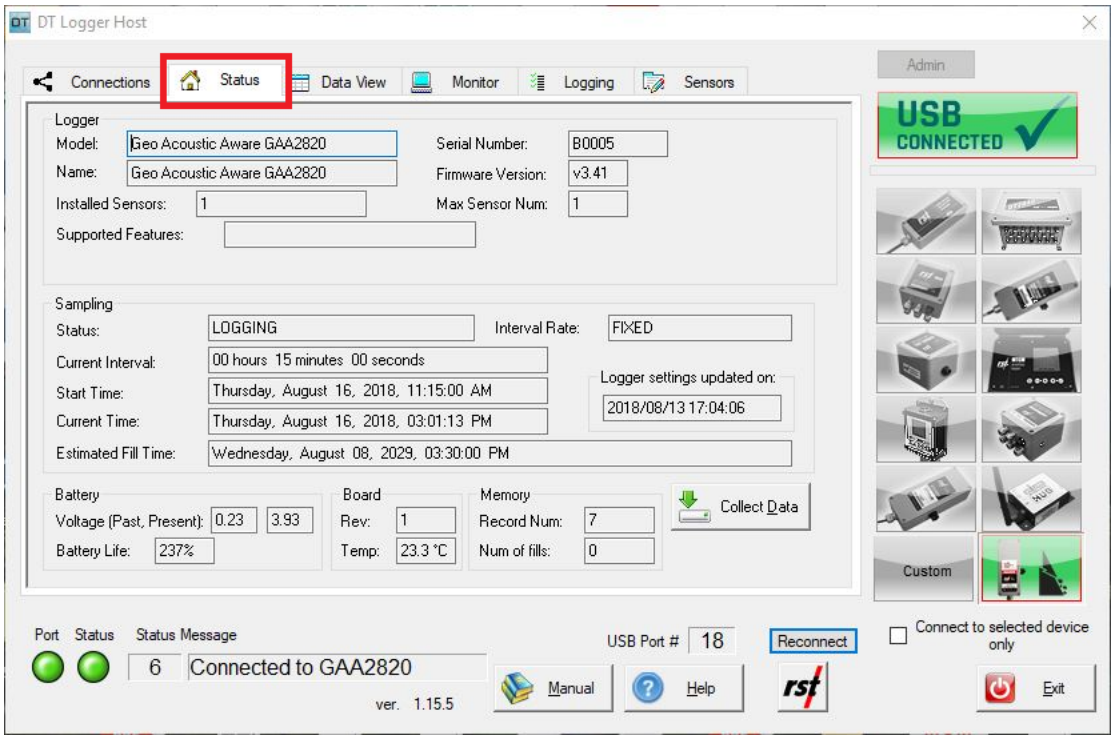

FIGURE 4-2 STATUS TAB

4.2.1 Logger

This component provides information about the currently connected Data Logger. This includes the model, name, serial number, and firmware version. Ensure that the serial number matches what is expected (in this example, it is B0005). If it does not, check the status indicators at the bottom of the screen to ensure a connection with the logger has been established.

4.2.2 Sampling

This component shows the status of the logger. This includes whether it is logging, the log interval, and various time parameters.

4.2.3 Battery

This component displays the current battery voltage, past battery voltage recorded when sample was taken and the estimated battery life. To ensure uninterrupted operation, replace batteries when estimated battery life is getting low. The battery life field turns red when estimated battery life is 20% or less.

NOTE: BATTERY PAST VOLTAGE VALUE DEPENDS ON RECORDED DATA AVAILABILITY AND FIRMWARE VERSION INSTALLED.

RST loggers use special long-life lithium battery (see Section 3.1 for more information and replacement instructions), contact RST for replacement part.

4.2.4 Board

Board revision level is helpful for diagnostic purposes. The actual board temperature is shown.

4.2.5 Memory

This section shows the current logger memory usage.

4.2.6 Collect Data

If the Data Logger has already been configured to collect data at a specified interval, the “Collect Data” button can be pressed. The program will download the data (a progress bar will be displayed) and automatically write it to a *.csv file. Refer to document *ELM0080 DT Logger Host Instruction Manual – PC platform* for more details regarding the *.csv file format.

NOTE: WHEN PRESSING THE ‘COLLECT DATA’ BUTTON, THE PROGRAM WILL GIVE A CHOICE TO KEEP OR ERASE THE DATA CURRENTLY CONTAINED IN THE DATA LOGGER. IF THE DATA LOGGER MEMORY IS NOT ERASED, THE NEXT TIME THE DATA IS COLLECTED (AND NO PARAMETERS HAVE BEEN CHANGED) IT WILL DOWNLOAD THE CURRENT READINGS AND ALL OF THE PREVIOUS DATA TO A *.CSV FILE. THE CURRENT MEMORY CAN ALSO BE ERASED BY PRESSING THE APPLY SETTINGS UNDER THE LOGGING TAB. THE PROGRAM WILL PROMPT YOU TO CONFIRM THE ERASING OF DATA FROM ITS MEMORY.

After successful data download, “View Recent File” button appears. Use this button to quickly display downloaded file in Data View tab.

4.3 DATA VIEW TAB

The Data View tab as shown in Figure 4-3 allows for a quick preview of the logger's data files. Click the "File" button to navigate to and load the desired file.

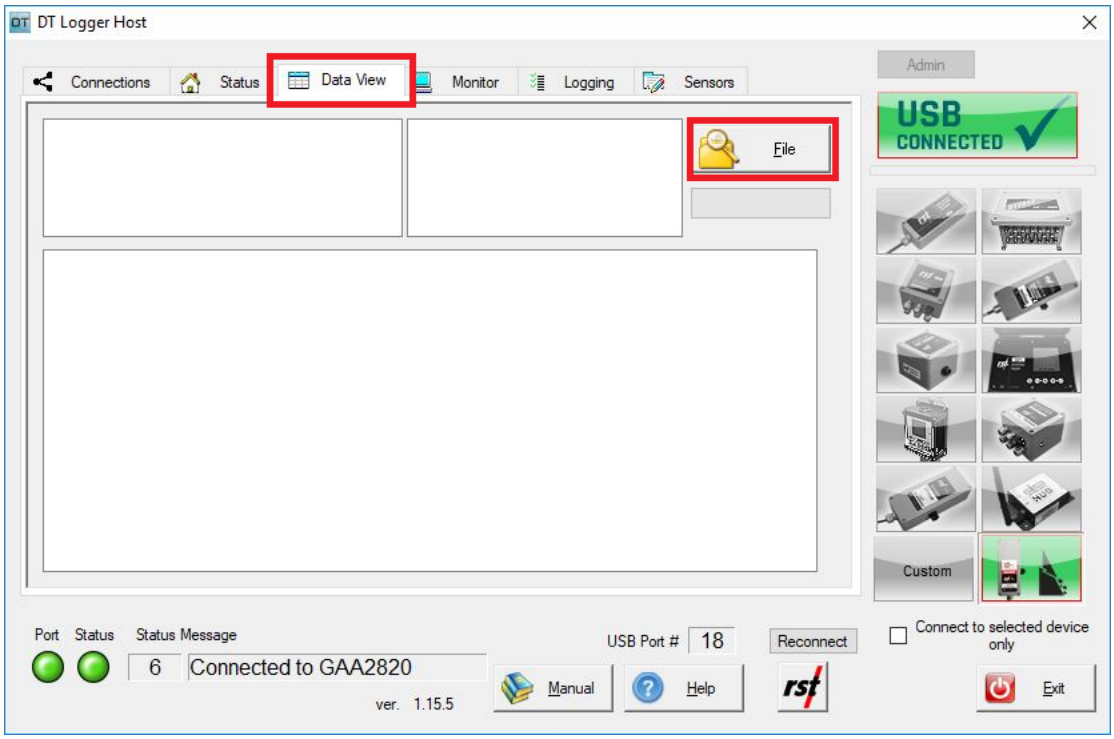

FIGURE 4-3 DATA VIEW TAB

NOTE: DATA VIEW DISPLAYS MAJOR DATA LOGGER SETTINGS AND ALL SAVED DATA RECORDS. USE A TEXT FILE VIEWER OR A SPREADSHEET PROGRAM (I.E. MS EXCEL™) TO SEE THE ENTIRE FILE.

4.4 MONITOR TAB

The Monitor tab displays a real-time view of the Ring Down Count (RDC). One method of displaying the RDC is with the 'per interval' unit. With this method, the count is accumulated in the specified interval, which is set to 15 minutes in Figure 4-4. When the interval has expired, the software clears the RDC before starting another interval. The RDC can also be displayed in either decimal or exponential format. Figure 4-4 displays the RDC in decimal format and Figure 4-5 displays it in exponential format.

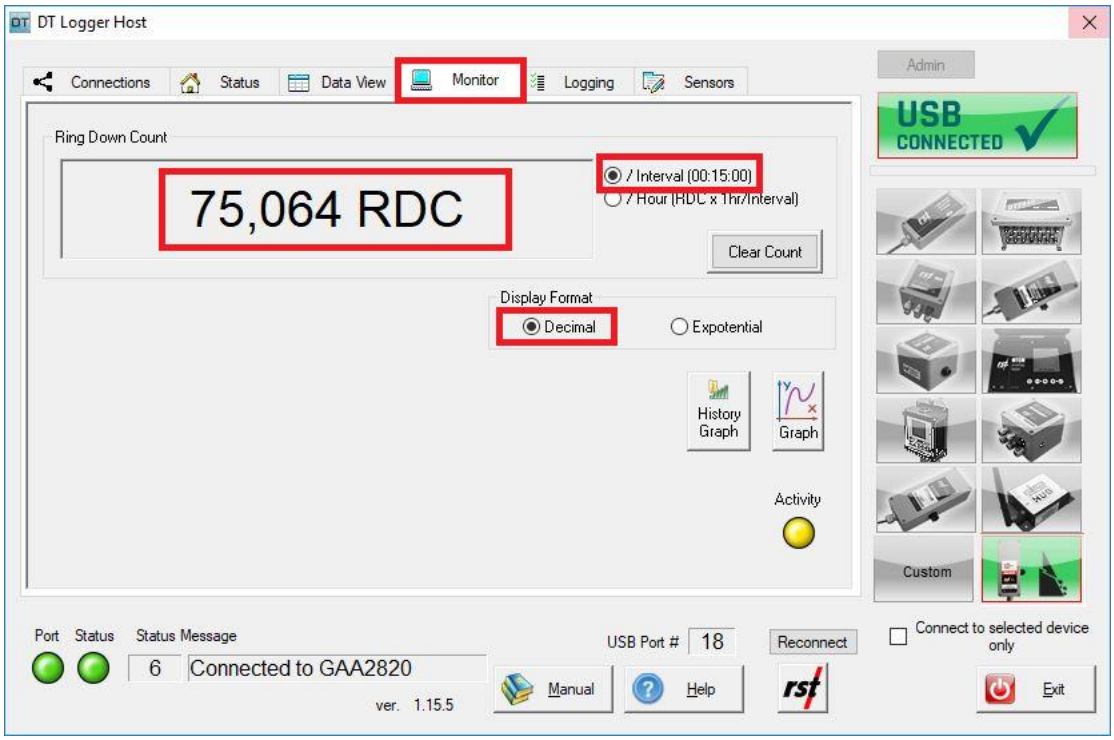

FIGURE 4-4 MONITOR TAB – RDC DISPLAYED IN DECIMAL FORMAT

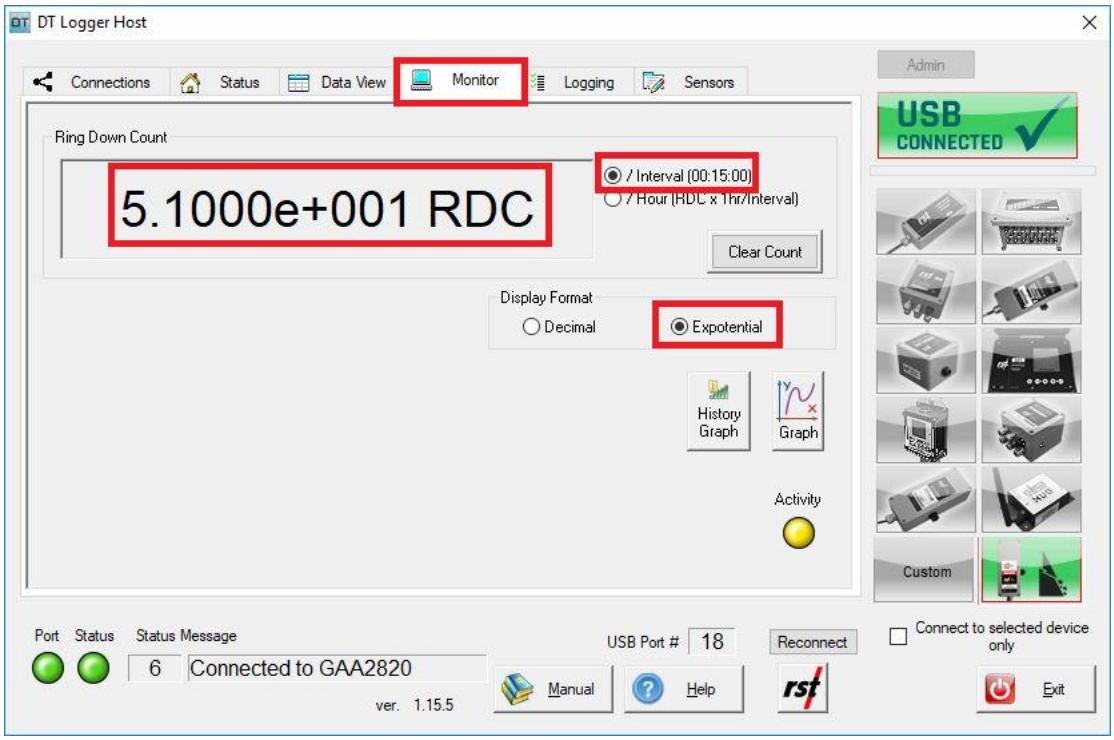

FIGURE 4-5 MONITOR TAB – RDC DISPLAYED IN EXPONENTIAL FORMAT

The DT Logger Host software can also display the RDC in a graphical format. This graphical representation is intended to show trends in the collected data. The graph is updated in real-time and can be accessed by clicking on the “Graph” button under the Monitor Tab. Refer to Figure 4-6.

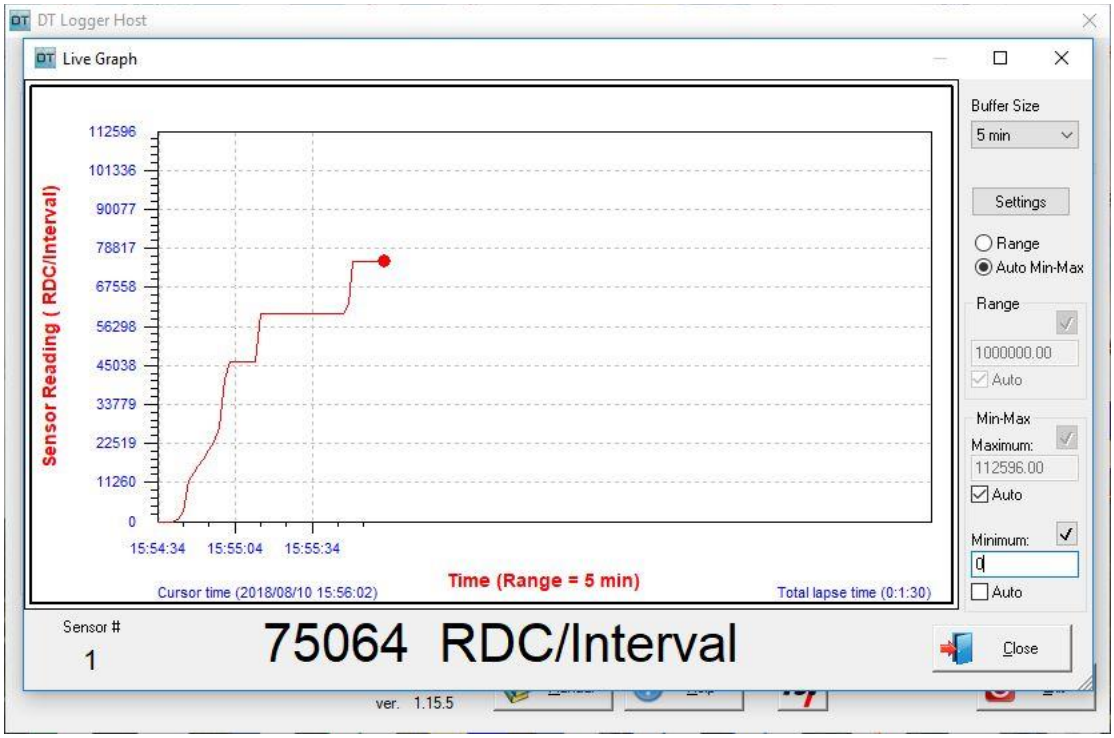

FIGURE 4-6 MONITOR TAB – GRAPHICAL REPRESENTATION OF THE RDC

The RDC can also be displayed per hour, according to the following conversion factor:

RDC x 1hr / Interval

For example, an RDC of 75,064 with an interval of 15 minutes (0.25hr) can be expressed as RDC per hour according to the following:

75,064 x (1 / 0.25) = 300,256 RDC/hr

The relation displayed in decimal format is shown in Figure 4-4 and Figure 4-7.

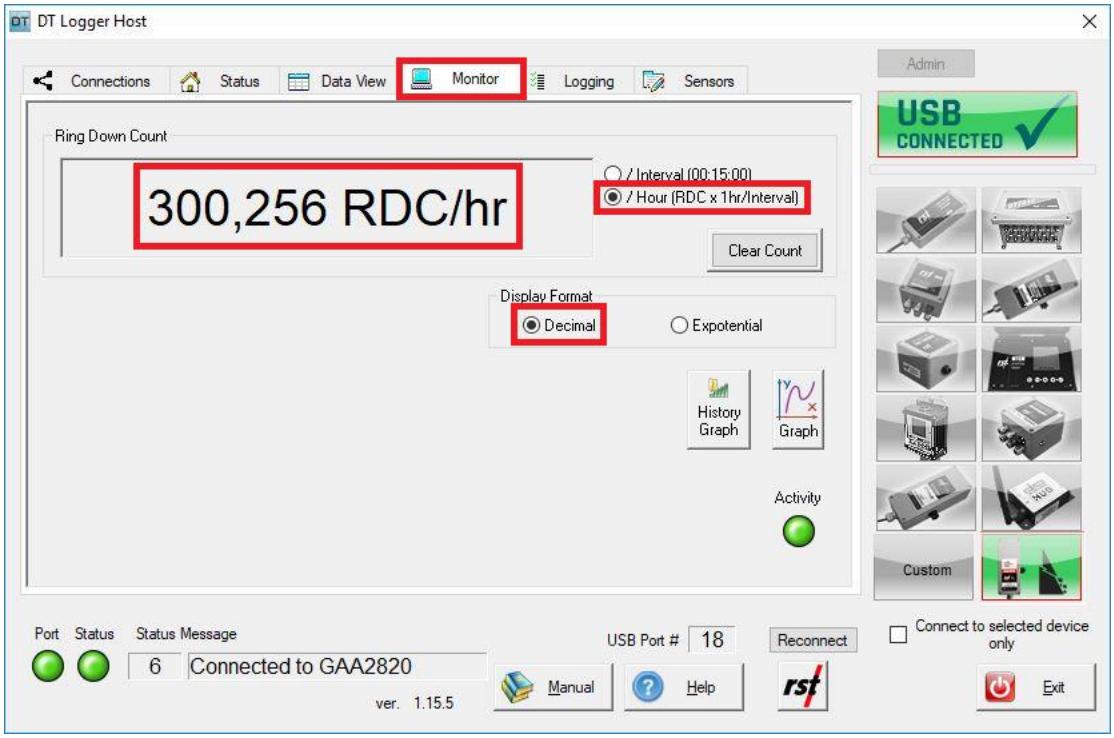

FIGURE 4-7 MONITOR TAB – RDC PER HOUR DISPLAYED IN DECIMAL

To clear the RDC, use the “Clear Count” button as shown in Figure 4-8. A pop-up message appears stating that this could take up to 10 seconds to complete.

NOTE: THE CLEAR COUNT PROCESS CAN TAKE UP TO 10 SECONDS AS THIS ACTION IS NOT INSTANTANEOUS.

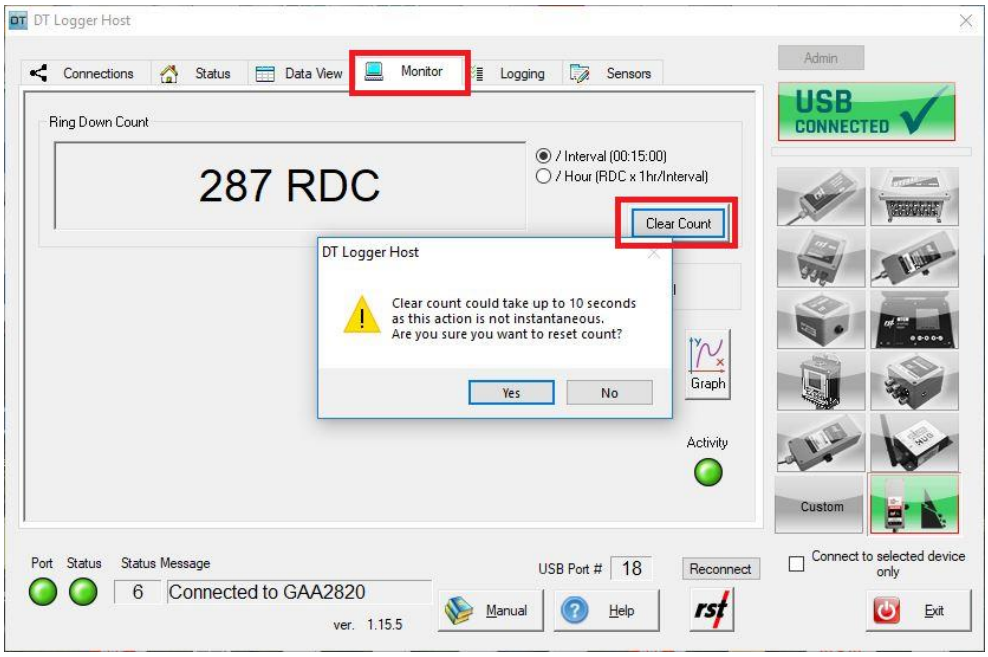

FIGURE 4-8 MONITOR TAB – RDC CLEAR COUNT

The software asks to confirm whether to reset the count. Click “Yes” to continue. Figure 4-9 shows that the RDC has been cleared.

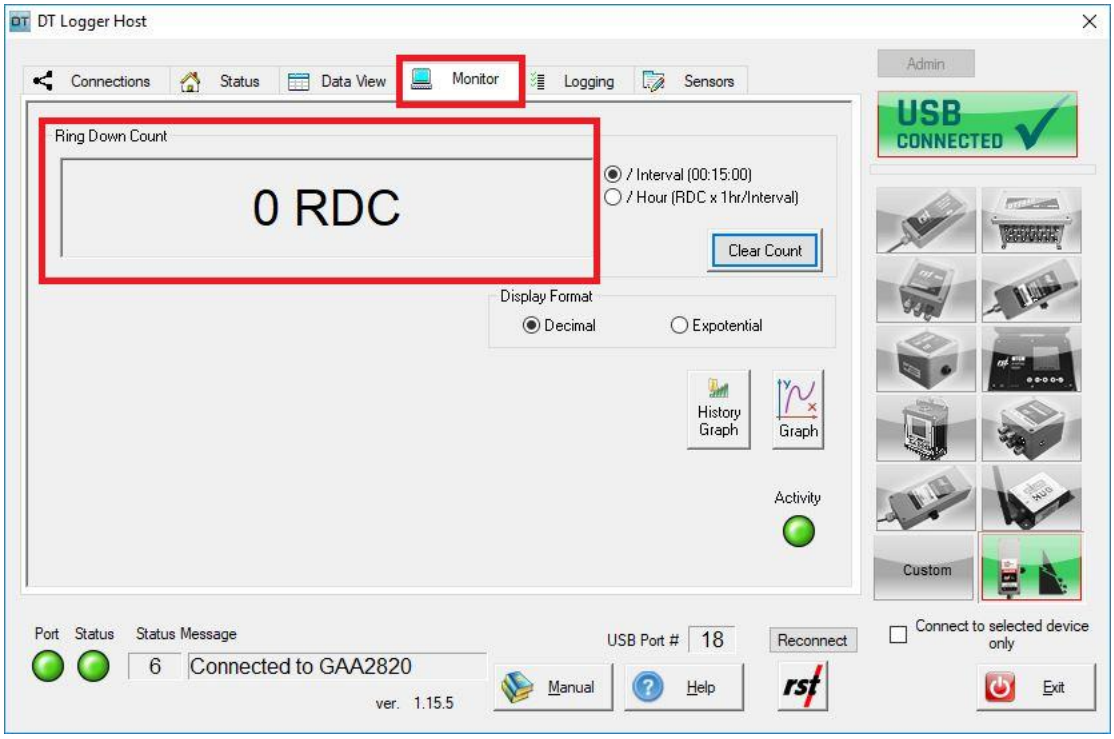

FIGURE 4-9 MONITOR TAB – RDC CLEARED

4.5 LOGGING TAB

As shown in Figure 4-10, the logging tab contains five main components: Interval, Logger Options, Memory Options, Clock Options and Logger Label.

NOTE: WHEN UPDATING GAA2820 SETTINGS WITH THE DT LOGGER HOST SOFTWARE, THE USB CONNECTION IS MOMENTARILY DISCONNECTED WHILE SETTINGS ARE BEING APPLIED AND THE USB CONNECTION IS RESET.

4.5.1 Interval

This subsection is used to set the logging interval. The logging interval can be set in the main setup tab. Arrow buttons allow the user to scroll up or down pre-set values.

NOTE: WHEN THE LOGGER IS IN RSTAR ENABLED MODE, SOME LOGGER CONFIGURATION PARAMETERS WILL BE CONTROLLED BY THE RTU BASE STATION. ANY SUCH PARAMETERS WILL BE INACCESSIBLE BY THE DT LOGGER HOST SOFTWARE.

NOTE: THE RECOMMENDED INTERVAL IS 1 HOUR (OR OPTIONALLY 15 MINUTES). SETTING THE LOGGING INTERVAL TO ANY OTHER VALUE WILL RESULT IN INACCURATE READINGS.

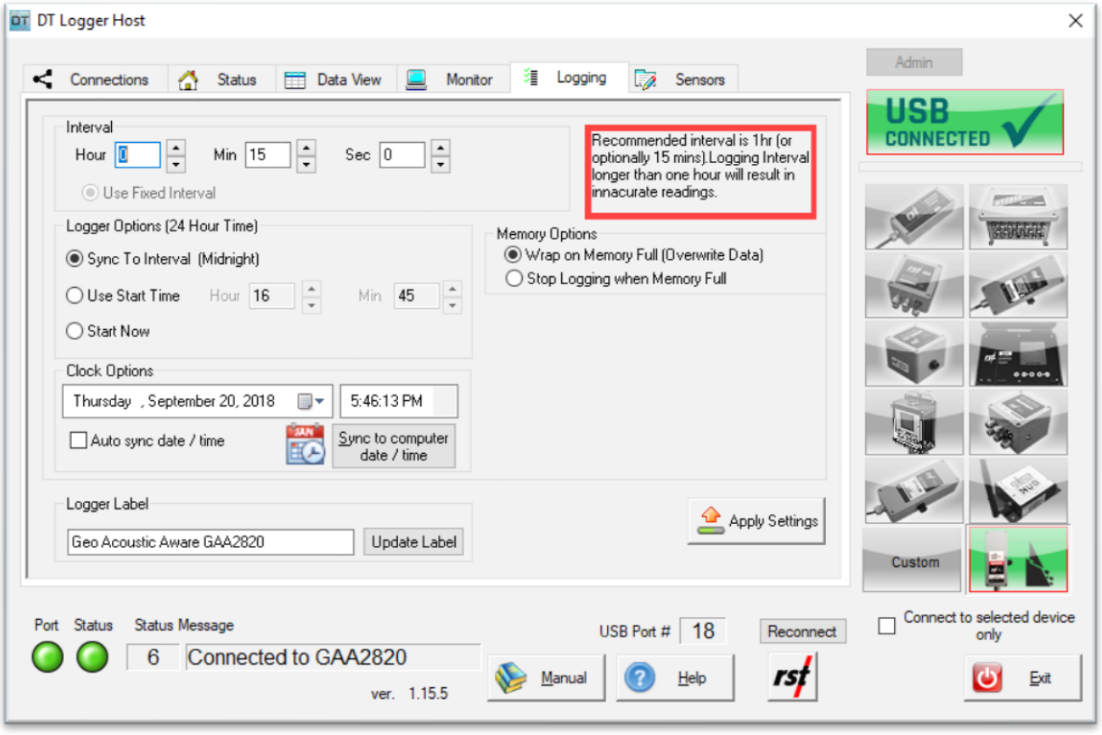

FIGURE 4-10 LOGGING TAB – RECOMMENDED INTERVAL SETTING

4.5.2 Logger Options

Sync to Interval: the interval will be synchronized to ensure data will be taken at midnight.

Use Start Time: the check box can be selected to enable a custom start time. The hour and minute must be entered in 24-hour format.

NOTE: IF A CUSTOM START TIME IS ENTERED AND THIS TIME HAS ALREADY PASSED, THE LOGGER WILL NOT START UNTIL THE SET TIME OF THE NEXT DAY. FOR EXAMPLE, IF THE CURRENT TIME IS 13:01 AND THE START TIME IS SET TO 13:00, THE DATA LOGGER WILL NOT START LOGGING DATA UNTIL 13:00 THE NEXT DAY.

If a custom start time is applied (i.e. for some time in the future) the status will read "Log Pending" until that interval is reached.

4.5.3 Memory Options

Wrap on Memory Full (Overwrite Data): when the Data Logger memory is full, it will overwrite itself.

Stop Logging when Memory Full: When the Data Logger is full, it will stop collecting data.

4.5.4 Clock Options

Allows the user to set the date and time of the Data Logger using the pull-down menus.

Sync to computer date/time: synchronizes the Data Logger's clock to that of the PC it is connected to.

Auto sync date / time checkbox will update the Data Logger's internal clock each time "Apply Settings" button is pressed.

4.5.5 Logger Label

A custom label can be entered if desired.

4.6 SENSOR TAB

Advanced GAA settings can be set in the Sensor tab as shown in Figure 4-11. Click on the “Advanced” button.

NOTE: THE ADVANCED GAA SETTINGS ARE PASSWORD PROTECTED AND CANNOT BE CHANGED WITHOUT THE ASSISTANCE OF RST INSTRUMENTS LTD TECHNICAL PERSONNEL.

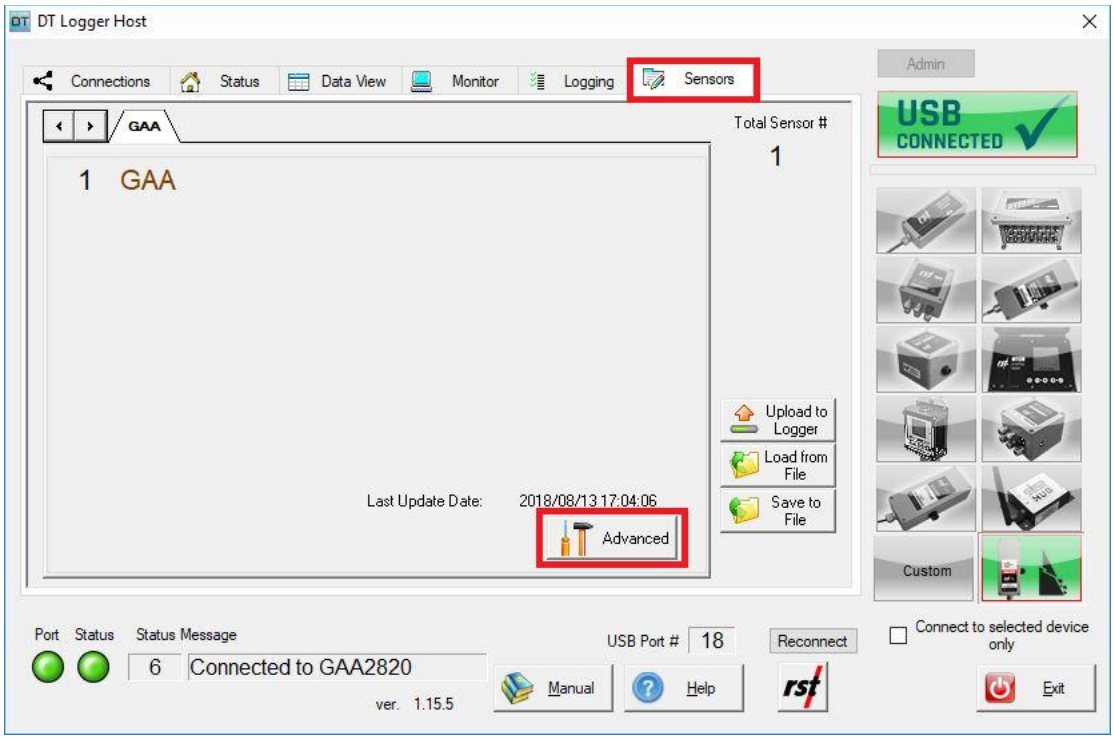

FIGURE 4-11 SENSORS TAB – ADVANCED BUTTON

A pop-up menu appears when the “Advanced” button is clicked. The accessible settings are Gain, Hysteresis and Mask, as shown in Figure 4-12.

Gain is the sensitivity of the incoming signal from the sensor. Increasing this value increases the sensitivity.

Hysteresis is the noise floor threshold. Raising the hysteresis value (mV) improves the noise immunity of the sensor but reduces the sensitivity at the same time.

Mask hides the background noise in the data. All readings below this value are shown as zeroes in the .csv file.

RST factory default settings are:

Gain: 40
Hysteresis: 66mV (100,000 ohms)
Mask: 100 – Auto Mask Off

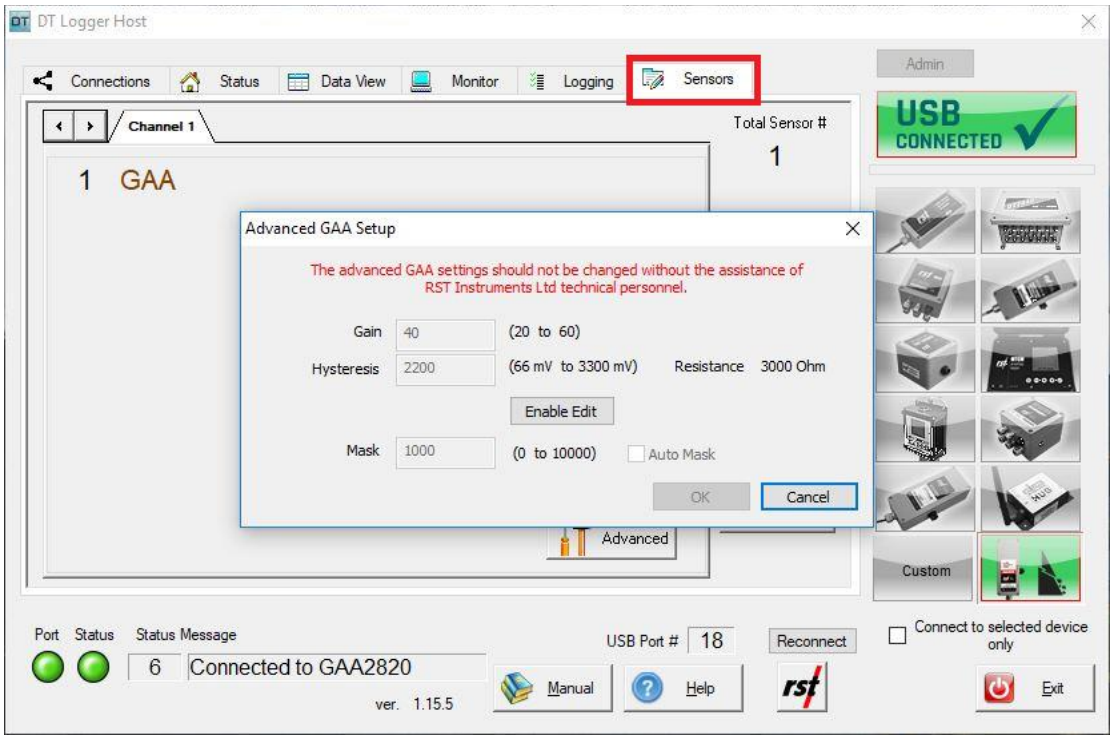

FIGURE 4-12 SENSORS TAB – ADVANCED SETTINGS

Click the “Enable Edit” button to update the Gain, Hysteresis and Mask values. A password is required for editing these values. Contact RST Instruments for assistance. Refer to Figure 4-13 and Figure 4-14.

NOTE: THE ADVANCED GAA SETTINGS ARE PASSWORD PROTECTED. VALUES SHOULD NOT BE CHANGED WITHOUT THE ASSISTANCE OF RST INSTRUMENTS LTD TECHNICAL PERSONNEL.

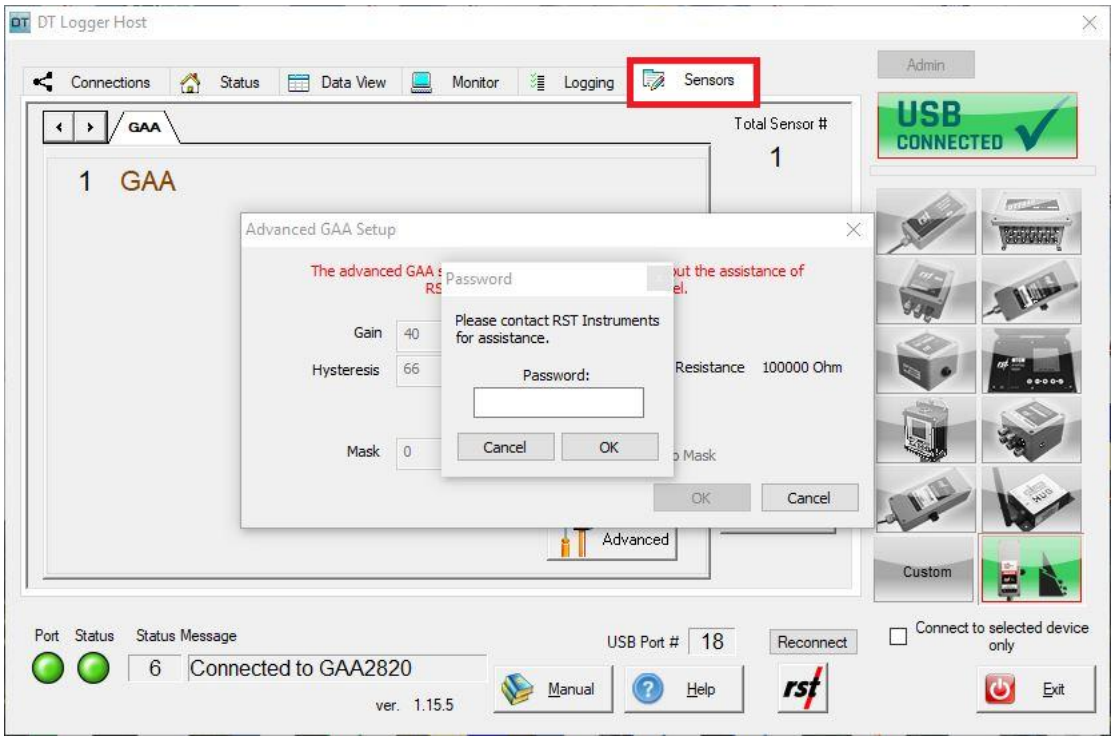

FIGURE 4-13 SENSORS TAB – PASSWORD PROTECTED

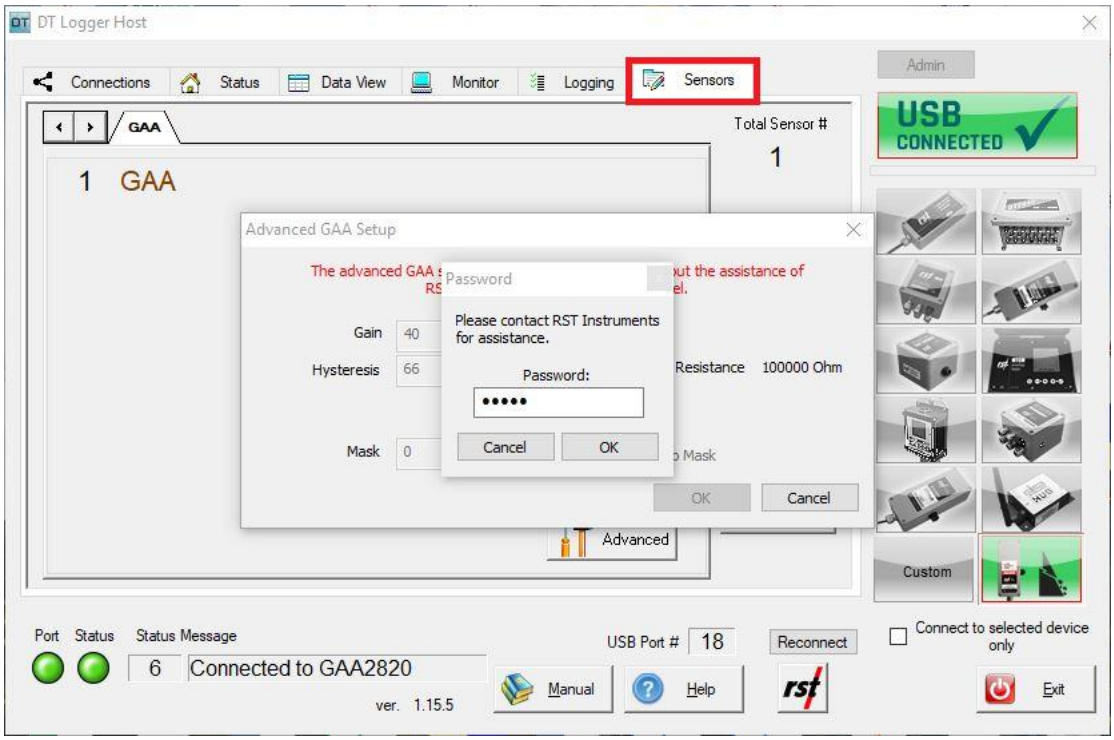

FIGURE 4-14 SENSORS TAB – ENTER PASSWORD

After updating the values, a warning pop-up menu appears. Click “Yes” if you want to proceed with the setup. Refer to Figure 4-15.

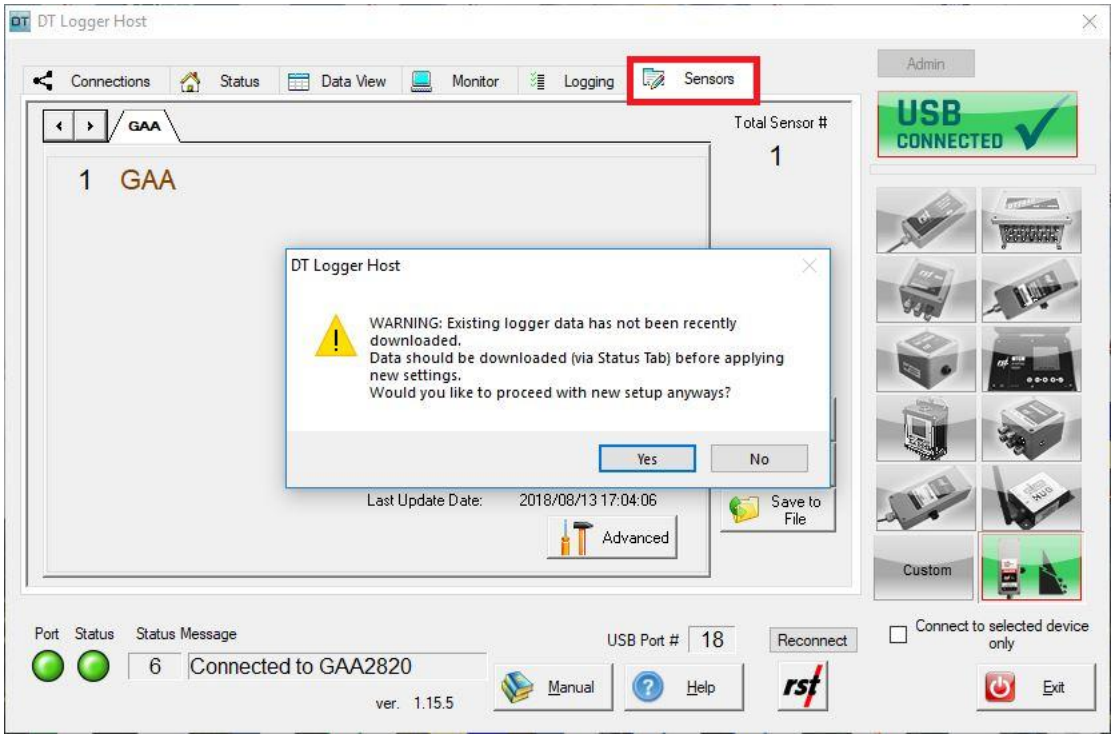

FIGURE 4-15 SENSORS TAB – WARNING

Click on “Upload to Logger” to update the advanced parameters to the logger.

NOTE: WHEN UPDATING GAA2820 SETTINGS WITH THE DT LOGGER HOST SOFTWARE, THE USB CONNECTION IS MOMENTARILY DISCONNECTED WHILE SETTINGS ARE BEING APPLIED AND THE USB CONNECTION IS RESET.

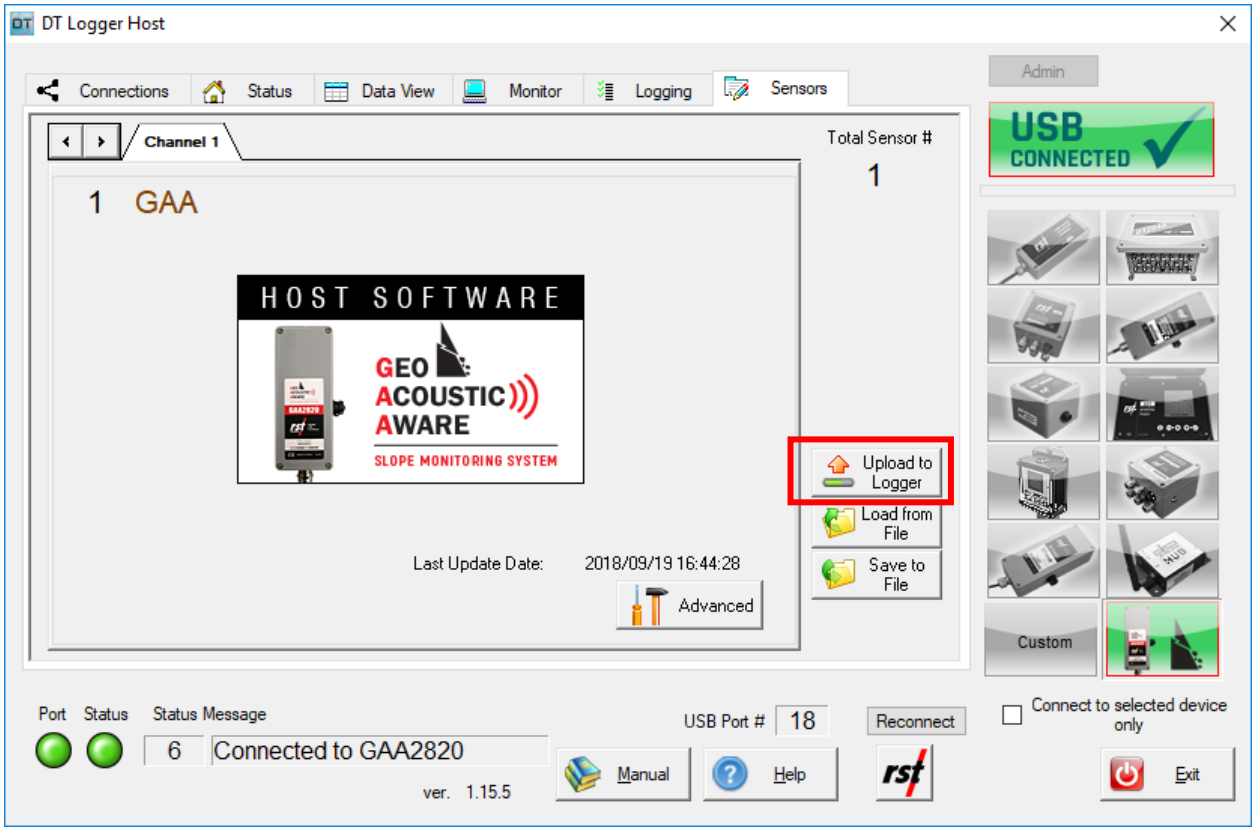

FIGURE 4-16 SENSORS TAB – UPLOAD TO LOGGER

5 SERVICE AND REPAIR

The product contains no user-serviceable parts. Contact RST for product service or repair not covered in this manual. See the RST website www.rstinstruments.com for contact information.

6 REFERENCES

Document Number	Description
ELM0080	DT Logger Host Instruction Manual – PC Platform