Installation of Firmware Updates on H-2221 GOES Transmitters

INTRODUCTION

The intent of this document is to provide **WaterLOG H-2221 GOES transmitter** customers with instructions for updating the transmitter's firmware in order to restore communications with the GOES satellite. Some transmitters stopped communicating with the satellite on 21 October 2018 due to an issue with a GPS receiver on the circuit board that delivers time information to both the logged data and the transmissions. The satellite will not receive transmissions whose time stamp is not consistent with its own.

The H-2221 transmitters are most often used as an integrated component of the WaterLOG H-522+ dataloggers, and this document is written about that specific system. However, any system, such as a Storm 3, that may be using the H-2221 GOES transmitter may have experienced interrupted transmissions, and the transmitter can be updated using instructions herein.

H-522+ dataloggers manufactured prior to October 2014 are the most susceptible to this interruption, because the integrated transmitters contain an older GPS receiver technology than more recent models. It may be necessary in the future, however, to update all models, and these same instructions could be used for that purpose. Customers are always welcome to send dataloggers in to a YSI repair center for the firmware upgrade, but this may incur service charges.

In the interest of saving both time and money for customers, and since the procedure is a safe one when performed by a skilled technician, we decided to provide these instructions rather than requiring that the upgrades be performed by a YSI repair center technician. Technical support is always at the service of customers who want to ask questions about this procedure, however, and customers uncomfortable with handling electronics are not advised to proceed.

H-522+
Datalogger

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HOW DO I KNOW IF MY UNIT NEEDS THE UPDATE?

The most obvious answer is that a unit lost transmission while it was deployed in the field. However, not all units require this update. To help customers prioritize their workflow, and avoid doing unnecessary updates or repairs, we have prepared a decision chart to help identify affected units. In general, units manufactured before October 2014 are affected. But there are exceptions, such as if a unit has previously been in for repair and had a board replaced, or is so old (e.g., 2009) that it actually has a different transmitter technology. In all cases the best way to tell is to test its ability to transmit. Selecting units to test can also be prioritized using the decision chart provided here.

Does the serial number on the H-522+ indicate a pre-October 2014 (14J...) date of manufacture?

- **YES** → Does the label say "GOES Transmitter..."?
  - **NO** → Does the label say "H-2221..."?
    - **NO** → Can it transmit?
    - **YES** → Can it transmit?

WATER**LOG** SERIES H-522+ Model
Goes Transmitter With Integral Data Logger
S/N: 2072   Rev: P
Baud Rate: 1200
Max Ant. Gain: 10dB
Design Analysis Associates, Inc.
75 West 100 South, Logan, Utah 84321

WATER**LOG** a xylem brand H-522P-V2
H-2221-V2 Transmitter With Integral Data Logger
S/N: 13M100416   Rev: Y
Baud Rate: 300, 1200
Max Ant. Gain: 10dB CE
Design Analysis Associates, Inc.
75 West 100 South, Logan, Utah 84321

- **NO** (top right) → Can it transmit?

Can it transmit?
- **YES** → No Update Needed
- **NO** → Do the Update

- **YES** (H-522+ GOES) → No Update Needed

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SAFETY PRECAUTIONS

ESD stands for ElectroStatic Discharge, the common phenomenon that most of us call a "shock," such as when one walks across a carpeted room and touches a door knob. While one might feel this effect very briefly, it is not dangerous to our personal health.

If you have been advised by your doctor to be careful about such discharges (*e.g.*, if you wear a pacemaker), you should take that into consideration when choosing to perform this procedure.

For electronic equipment, the electronic components on the circuit board are sensitive to ESD and if they receive a shock it can do permanent damage.

Personnel performing this firmware installation will access a circuit board, and thus should operate in accordance with ESD training provided by their organizations.

Some guidelines that are helpful for protecting the equipment include:

• Apply all effort to not touch the circuit board

• Touch something tied to earth ground before opening equipment (e.g. metal water line, system grounding wire, etc.)

• Personnel may choose to wear an ESD wrist strap that is connected to earth ground

• Operate in an environment of humidity above 20%

• Prevent letting dust or debris get into the equipment during disassembly and reassembly to access the board.

Finally, note that loggers and transmitters older than two years are no longer under warranty, and any damage that may occur during this procedure is not covered under the original warranty. The user assumes all risks for such damages, but as described above the primary mitigation steps regard avoidance of ESD. Other considerations are that the inside of the machine is kept clean and dry during the installation process.

CAUTION

All work should be done following proper ESD protocols.

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HARDWARE REQUIRED

In order to successfully update firmware on the H-221 GOES transmitter, you will need to have access to the H-522 datalogger as well as a 12V DC power supply or battery. Part of the update involves cycling power to the system. Additionally, the following tools and parts are needed:

• 1/8 inch hex key (Allen wrench)

• USB-A Male to USB-B Male cable

• PC with Windows 7 or 10 OS

After the firmware update is complete, you can verify that it was successful by communicating with the datalogger using a terminal emulator on your PC. The communication cable and NULL modem adapter included with the data logger will be needed for this verification:

• RS-232 serial cable

• NULL modem adapter

• Serial to USB adapter (if your computer does not have a serial port)

Serial to USB adapter
RS-232 serial cable
NULL adapter
USB-B cable
1/8 inch hex key

Hardware required for the firmware update.

SOFTWARE REQUIRED

The recommended PC operating system is either Windows 7 or Windows 10. While another version of Windows may work, YSI has not verified any other operating systems for this update.

• H-2221 Firmware Update Utility V2.2.6 or later
  (found here: https://www.ysi.com/goes-support)

• Terminal emulation program (Tera Term or HyperTerminal)
      • Tera Term is recommended as it is a free download and
        should not require admin privileges
      • HyperTerminal is another option which may already be
        installed on some computers; however, it is not free to
        download

4

DOWNLOADING FIRMWARE

The first version of this software, V2.2.6, requires administrator access to your operating system. Later versions in development at the time of publication of this document are expected to not have that requirement. Those versions will be downloaded in the same manner.

In order to run the firmware installer, this specific version of **Java software** must be installed on your PC.

It is HIGHLY recommended that you download, install, and launch the **Update Utility** in the office BEFORE going to the field to ensure that it is installed successfully and running.

10 Steps to Download and Install the Firmware Update Utility:
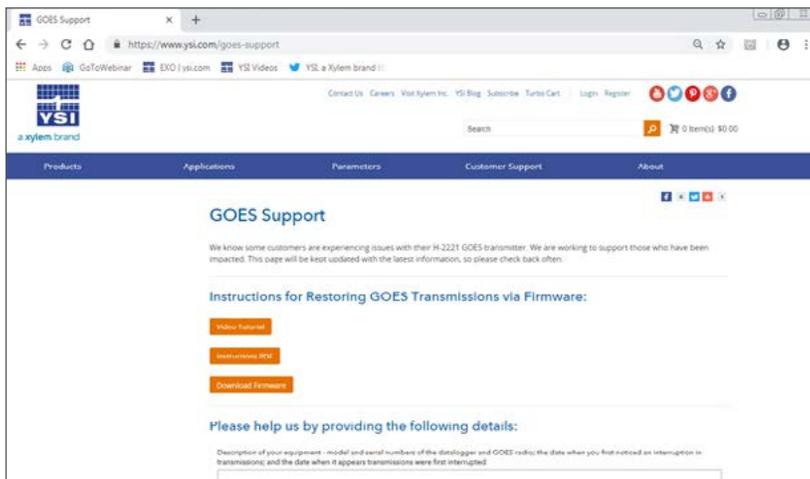
1 Navigate to the YSI GOES Support page
https://www.ysi.com/goes-support

2 Click on the **Download Firmware** link in the firmware column of the download page and save to your PC.

5
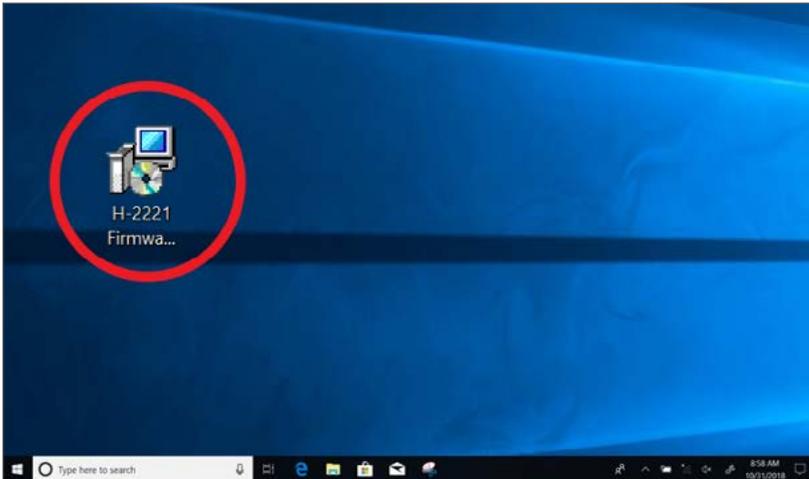
3 Click on the **H-2221 Firmware Setup.exe** to begin the installation of the Update Utility.
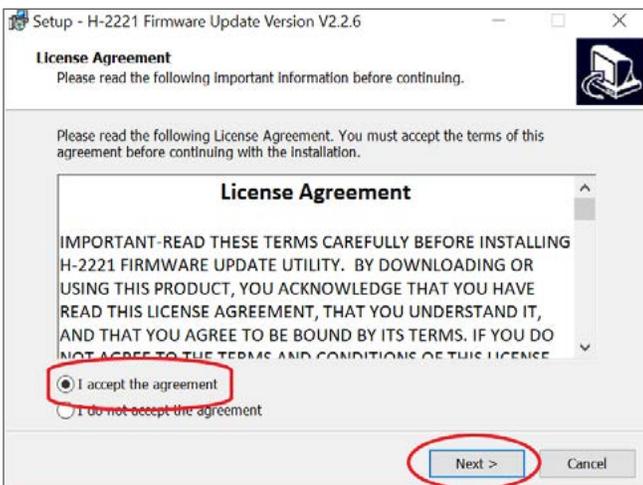
4 A new window will appear with the License Agreement. Select "I accept the agreement" and click **Next**.
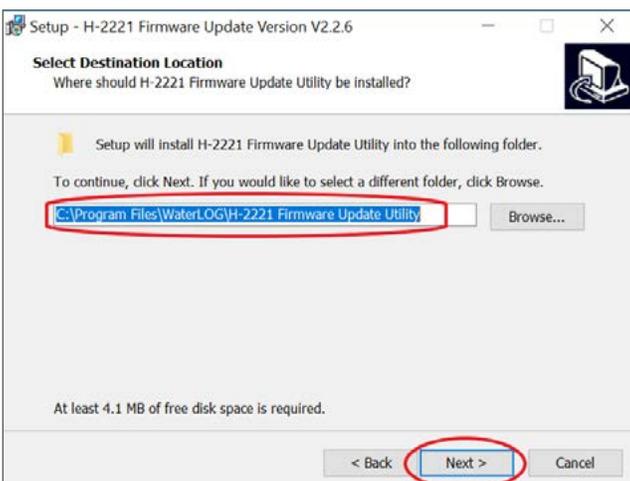

5 Take note of or modify the install location for the program. The location must be on the local PC hard drive. After the location is determined, click **Next**.
*Not all computers will show this step.*

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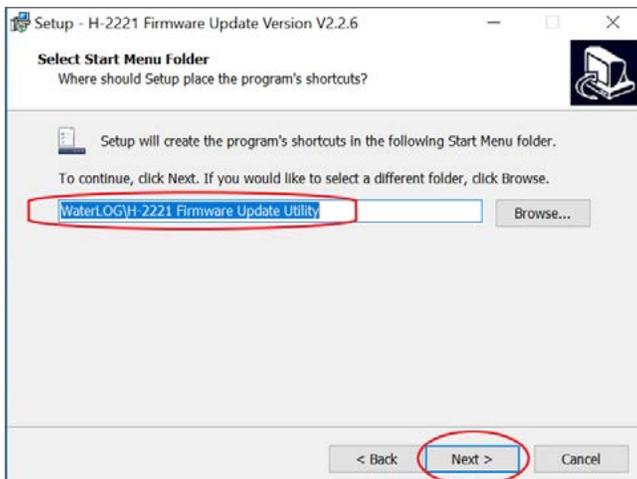
6 Take note of or modify the location for the shortcut on the Start Menu, and click **Next**. *Not all computers will show this step.*
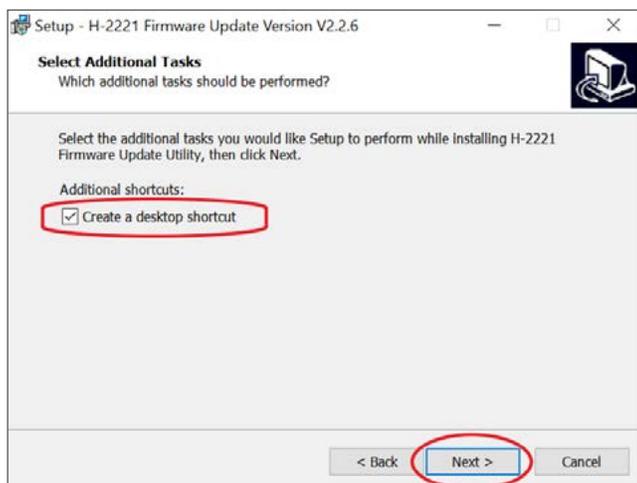
7 If you would like a shortcut to appear on your desktop, check the box next to "Create a desktop shortcut" and click **Next**.
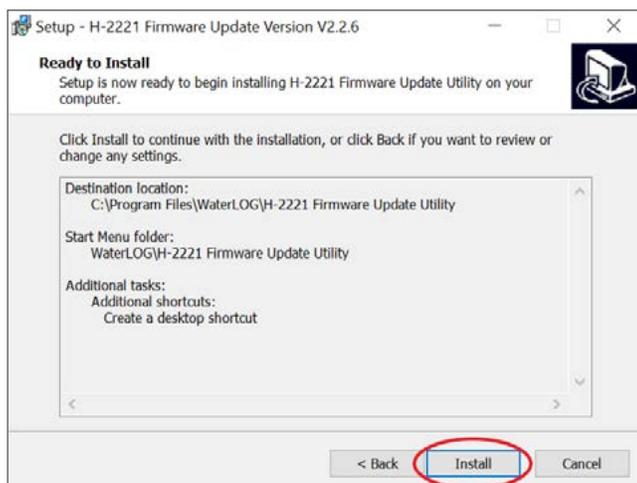

8 Confirm that your installation settings are correct and click **Install**.

7
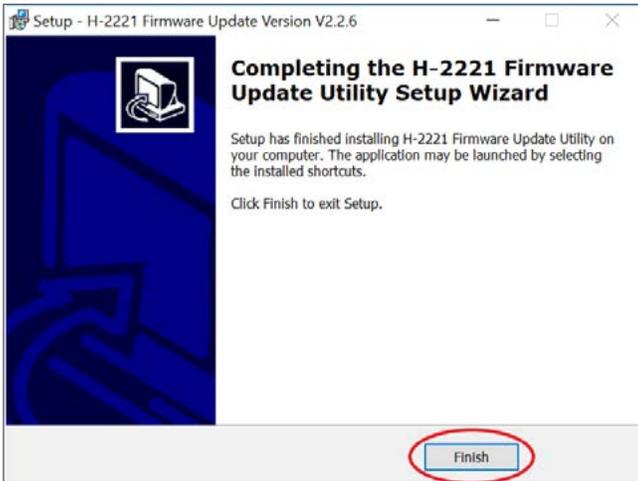
9 Once the installation is complete, click **Finish**.
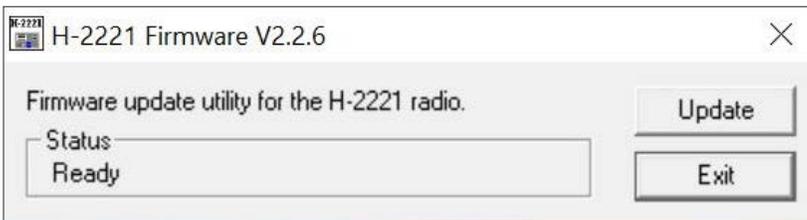
10 Launch the **Update Utility** from your desktop shortcut or wherever you installed it. Verify that it successfully runs, but do not try to perform the update. Rather, just close this window – the update will be performed when you are connected to the transmitter.

REMINDER: These steps should be completed BEFORE going to the field to perform the update.

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FIRMWARE INSTALLATION

The following section provides disassembly instructions for H-522 and H-522+ data loggers to gain access to the internal H-2221 GOES transmitter. If you have a separate H-2221 enclosure, you can disregard the H-522 disassembly instructions.

> ⚠ **CAUTION**
> **This update involves gaining access to the inside of the datalogger and exposing circuit boards. Make every effort to ensure no debris or liquids make contact with these sensitive internal components. Also, try your best to ground yourself before proceeding. Electrostatic can damage these components.**

14 Steps to Perform the H-2221 Firmware Update:

**1** Remove the power supply from the main terminal on the bottom of the datalogger.

2 Remove the 4 screws using a 1/8" Allen wrench. You may need to puncture or remove the Void Warranty sticker.

9

Corner standoffs

Host ribbon
(Disconnected)
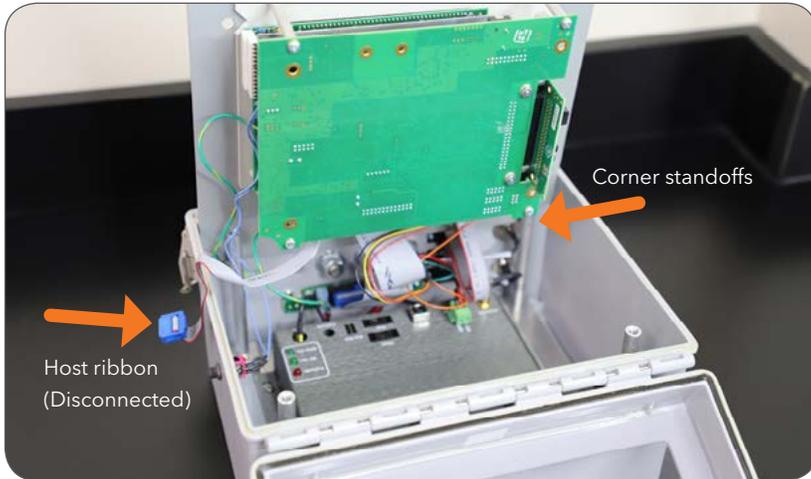
3 Lift up the display panel and carefully wedge it between the standoffs and the bottom of the enclosure as shown. The "Host" ribbon cable can be unplugged for more wiggle room.


USB-B
(Connected)

Power cable
(Disconnected)
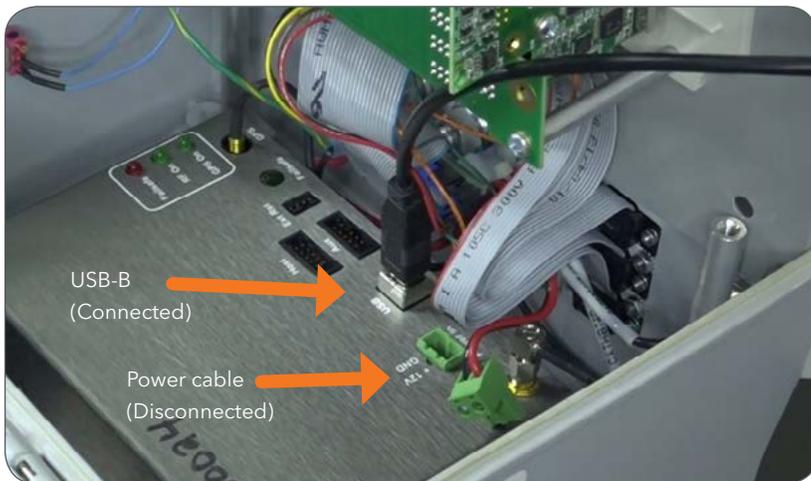
4 Remove the power cable from the terminal on the transmitter. Then plug the USB-B cable into the USB port on the transmitter and a PC containing the H-2221 Firmware Update utility.


5 Apply power back to the **main terminal** on the bottom of the datalogger.

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Failsafe button
(Depressed)

Power cable port
(Needs reconnected)
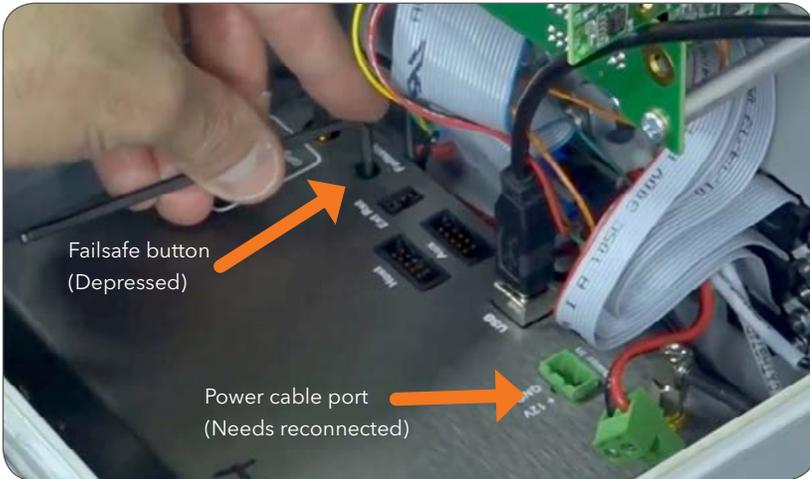
6 Press and hold the **Failsafe button** while reconnecting the power cable to the terminal on the transmitter (should feel a click when depressed). After power has been reconnected, release the Failsafe button.
If successful, NO lights should be on or flashing on the transmitter.

7 Plug the other end of the USB cable (USB-A connector) to your PC. The first time you perform this step, you will see the driver installation window pop up. There is no action you need to take.

H-2221 Firmware V2.2.6   ✕

Firmware update utility for the H-2221 radio.   Update
Status
Ready   Exit
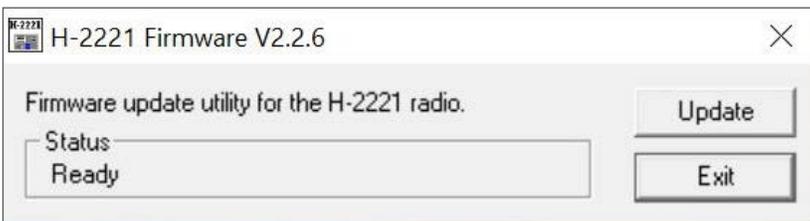
8 Run the H-2221 Firmware Update Utility using the shortcut that installed onto your desktop. Press **Update**.

11

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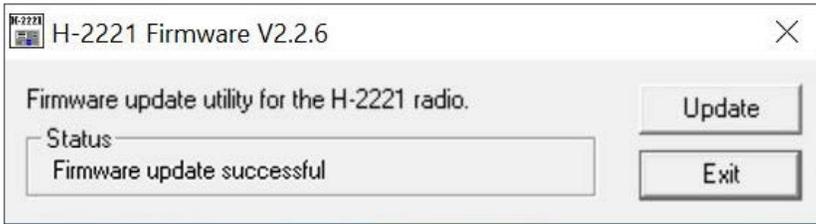
9 Make sure you get "Firmware update successful" in the status field. Click **Exit**.

Power cable
(Connected)

10 Disconnect power from the main terminal on the bottom of the datalogger.

Power cable
(Connected)

USB cable port
(Disconnected)
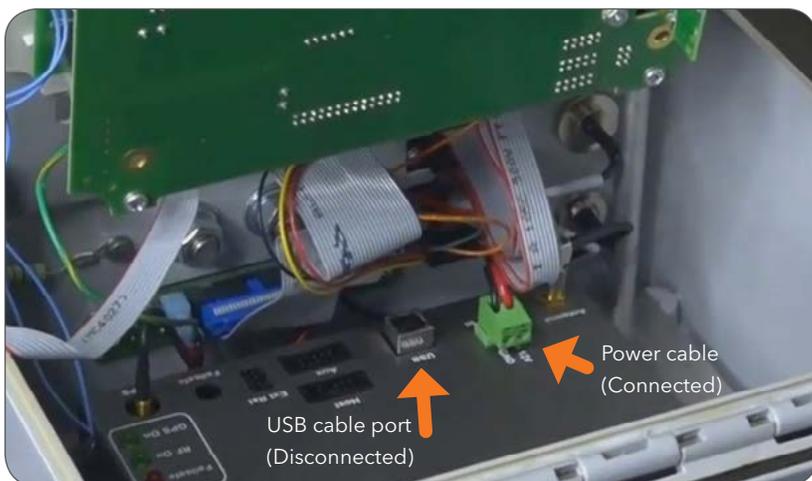
11 Disconnect the USB-B cable from the transmitter, and plug in any internal cables that may have been disconnected during this process (such as the Host ribbon cable).

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12 Carefully lay the display panel back in place while making sure the internal cables are not going to be pinched by the USB board or standoffs.

13 Replace the 4 screws using a 1/8" Allen wrench.

14 Apply power back to the main terminal on the bottom of the datalogger.

The H-2221 transmitter has now been updated to Firmware V2.2.6. In order to verify that the update was successful and perform a test transmission, proceed to the next section.

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VERIFICATION AND TESTING

In this section, you will verify that the GOES transmitter is updated and functioning properly. The transmitter must be updated prior to performing these steps. This section covers three parts:

• Verification that the firmware update was successful

• Verification of GPS sync

• Verification of successful transmission (testing the GOES transmitter after performing the firmware update)

It is HIGHLY recommended to test the transmitter prior to leaving the site or reinstalling in the field.

Connect the Datalogger to Your PC

1 Apply power back to the datalogger if it is not already on.

2 Connect the serial cable with NULL modem adapter to the datalogger. These parts were included with the datalogger purchase.

14
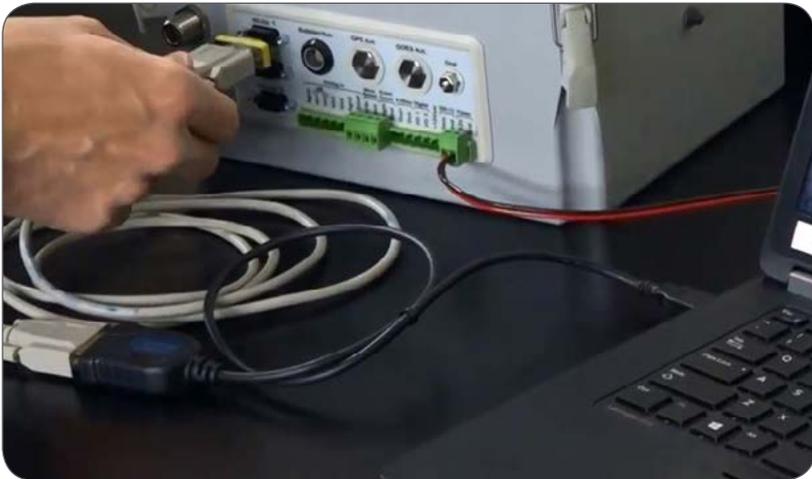
3 Connect the other end of the serial cable to your PC. You may need to use a serial-to-USB adapter to accomplish this.
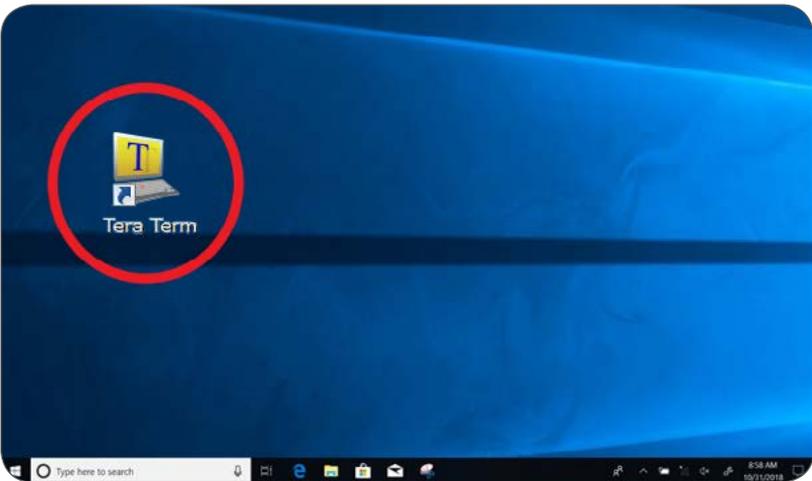
4 Open a terminal emulator on your PC (Tera Term is recommended).
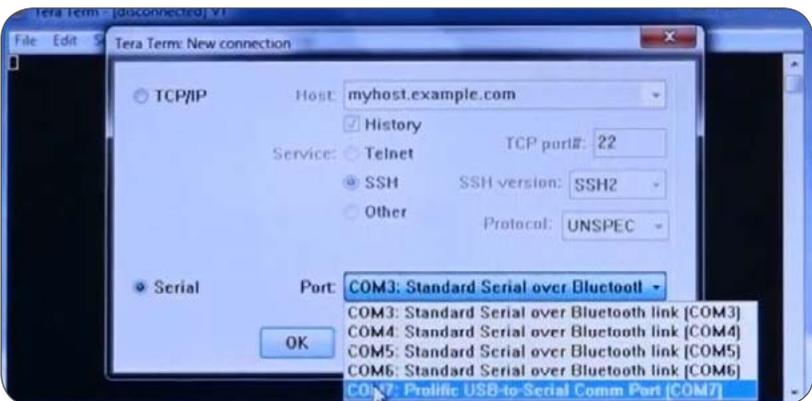
5 Select the proper Com Port and click **OK**. Press the Enter Key to get to the main menu.

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Verify the H-2221 Firmware Update

6 From the **Main Menu**, perform the following key strokes:
i. Press 'O' for Output Options
ii. Press 'G' for GOES Radio Options
iii. Press 'D' for Diagnostic Menu
iv. Press 'S' for View General Radio Status

7 On the **View General Radio Status** screen, you can see the Transmitter Firmware Rev=V2.2.6.

Transmitter Firmware Rev=V2.2.6

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Verify the GPS Sync


```
GOES Radio Options          <Esc to Return>

GOES Radio Type: H-2221V2
Time To ST Txd:
Next ST Txd At:

M - Mode:        Off
A - Address:     12345678
    Time (UTC): 14:24:14
S - Self Timed Options
R - Random Options
D - Diagnostic Menu
F - Reset GOES Options To Factory Default

Enter Option > █
```

Time (UTC): 14:24:14

8 Press the Esc key twice to return to the GOES Radio Options screen; here you can check that **Address** is correct and that the **Time** is showing the correct UTC. *If sync has not yet occurred; Time will read 00.00.00. Sync may take up to 20 minutes after the datalogger is powered on.*


```
GPS Receiver Status
Last GPS Sync=10/31/2018 14:23:44
GPS STATE=Online
Latitude (DMS)=39 47' 14" N
Longitude (DMS)=83 54' 7" W
Altitude=314.60 meters
Satellites in view=10
Current leap second count=18
GOES West azimuth/elevation=242.69/20.73
GOES East azimuth/elevation=166.25/43.05
Difference on last synce between internal time and UTC=N/A
█
```

Last GPS Sync=10/31/2018 14:23:44

9 From the **GOES Radio Options** screen, press 'D' for Diagnostic Menu, then press 'R' for View GPS Receiver Status, and confirm that the Last GPS Sync date and time is correct.

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Test Transmission

```
GPS Receiver Status

Last GPS Sync=xx/xx/xxxx xx:xx:xx
GPS STATE=Acquiring fix
Latitude (DMS)=0 0' 0"
Longitude (DMS)=0 0' 0"
Altitude=-999.00 meters
Satellites in view=0
Current leap second count=acquiring
GOES West azimuth/elevation=N/A
GOES East azimuth/elevation=N/A
Difference on last synce between internal time and UTC=N/A


     Waterlog H-522-Plus Main Menu

     V - View Status
     I - Sensor Input Options
     D - Data Options
     O - Output Options
     S - Scan Options
     C - Configure System
     A - Accessory Setup
     E - Enter Command Mode
     X - Exit

     Enter Option > ▮
```

```
     Output Options        (Esc to Return)

     L - Logging Options
     P - Auto Print: Off
     G - GOES Radio Options
     R - Remote Display Options
     V - Voice Modem Options
     A - Alert Radio Options
     F - 4-20 MilliAmp Output Options
     C - Alarm Call Out Options
     M - Modbus Out Options

     Enter Option >
```

```
     GOES Radio Options        (Esc to Return)

     GOES Radio Type: H-2221V2
     Time To ST Txd:
     Next ST Txd At:

     M - Mode:         Off
     A - Address:      315003BE
         Time (UTC):   12:53:54
     S - Self Timed Options
     R - Random Options
     D - Diagnostic Menu
     F - Reset GOES Options To Factory Default


     Enter Option > ▮
```

10 From the **GPS Receiver Status** screen, perform the following key strokes:
i. Press the Esc key twice to return to the Main Menu screen
ii. Press 'O' for Output Options
iii. Press 'G' for GOES Radio Options
iv. Press 'S' for Self Timed Options

```
Self Timed Options        (Esc to Return)

C - Channel Number:       130
R - Transmit Rate:        01:00:00
O - Tx Offset Time:       00:55:00
W - Self Timed Window:    15
I - Center data In Window: Yes
B - Self Timed BaudRate:  300
F - Data Format:          SHEF
D - Data Order:           SCAN
N - Data Sent First:      Newest
H - Send SHEF Headers:    No
A - Append 1 Battery Scan: Yes
S - Redundant Data Sets:  1
T - Transmit Options
U - View XL Buffer Data

Radio Buffer Byte Count: 0
XL Buffer Byte Count:    5 of 519 Bytes Max
Estimated Transmit time: 1 Seconds

Enter Option > ▯
```

11 Verify that the Self Timed settings are correct, then press Esc to return to GOES Radio Options.

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```
GOES Radio Options          (Esc to Return)

GOES Radio Type: H-2221V2
Time To ST Txd:
Next ST Txd At:

M - Mode:        Off
A - Address:     315003BE
    Time (UTC): 00:00:00
S - Self Timed Options
R - Random Options
D - Diagnostic Menu
F - Reset GOES Options To Factory Default

Enter Option > Select GOES Mode [Timed ]
```

12 Press 'M' to adjust the GOES Mode. Use the up/down arrow keys to select Timed, then press the Enter Key.

Wait for next Self Timed Transmission (which can be viewed in the Self Timed Options screen).
This will be your standard Tx Offset Time.

PLATFORM FIELD TEST

DCP ADDRESS (REQUIRED)

GO BACK [ ] HOURS

RETRIEVE

13 At this point you should be able to see your transmitted data. One way to do this is to view the transmitted data at the following URL:
https://dcs1.noaa.gov/account/fieldtest

14 After confirming the transmission, you can simply close the program and disconnect the cables.

For more information:

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+1 (937) 767-2772

Email
info@ysi.com

Live Chat
at YSI.com