

Iridium-Enabled Portable Tide Gauge Setup, Configuration, and Data Export Procedures

Procedure Number: SOP # 5.4.1.1.C2

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- 1) **Title:** Iridium-Enabled Portable Tide Gauge Setup, Configuration, and Data Export Procedures
- 2) **Purpose:** To provide a basic overview of the Portable Tide Gauge (PTG) system and familiarize the user with the gauge's physical setup, 9210B data collection platform (DCP) configuration, data export, and the procedures for setting up communications via Iridium Short Burst Data modem.
- 3) **Background/History:** The Portable Tide Gauge is the next generation of water level measurement system for use by hydrographic field parties and other users for temporary installations in locations without the infrastructure to support a typical full installation. The PTG is a stand-alone water level station housed in a ruggedized weatherproof housing and includes all components necessary to measure, record, and transmit near real-time water levels from anywhere within the Iridium footprint. The PTG uses a pump instead of compressed nitrogen for its bubbler system, which reduces the overall weight and complexity of the system.
- 4) **Scope/Applicability:** This SOP applies to Office of Coast Survey (OCS) Hydrographic Field Units, contractor personnel, and Field Operations Division (FOD). OCS and contractor personnel will utilize the following procedures for preparing and operating PTGs in remote areas, primarily in Alaska.
- 5) **Main Processes:** Setup and connect ancillary components, power system on, configure station specific information, and download data.

Software Installation: Communications with the PTG require use of Xterm.exe. This is a small executable file which does not require administrator privileges to run. This software was provided by CO-OPS and should be available on the ship's server.

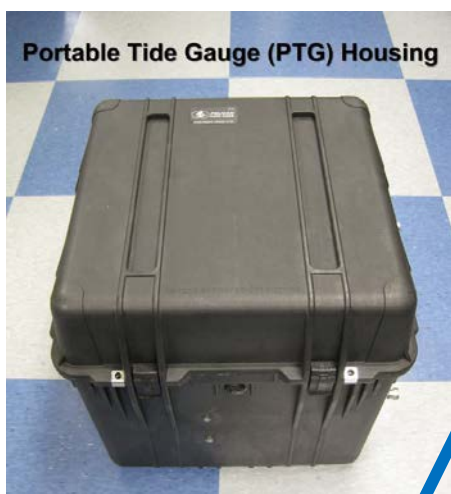
Hardware Required: Complete PTG kit which includes the gauge itself, Iridium antennae and mount, 40W solar panel, 40Ah battery, tripod, orifice, bubbler tubing and necessary cables. Additionally, a computer with an available serial port and a DB-9 serial cable are required to configure the DCP and/or manually download data.

- 6) **Detailed Sub-Processes/Checklists:** Use the following step-by-step procedures to setup and configure the Portable Tide Gauge.

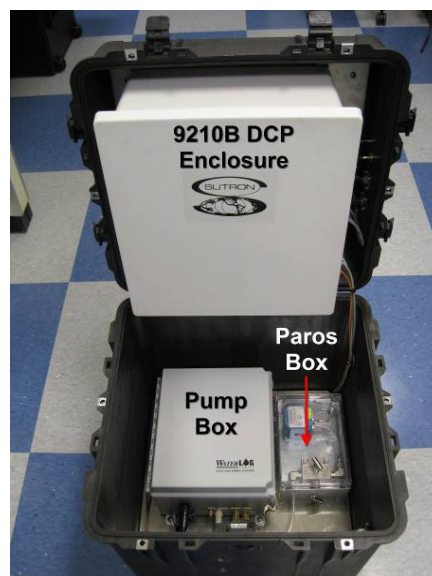
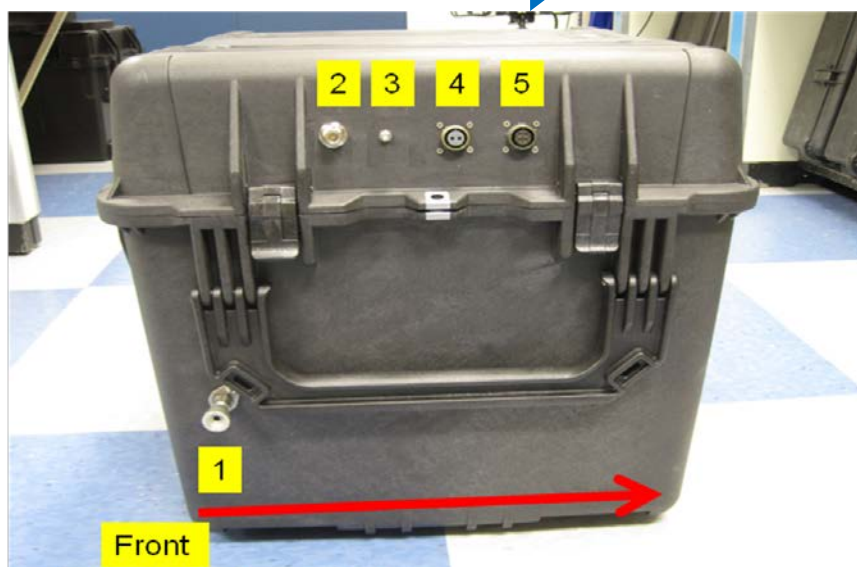
I. Portable Tide Gauge Component Familiarization:

- 1) The Portable Tide Gauge components are housed within a ruggedized, weatherproof housing. Inside the housing are mounted a Sutron 9210B Data Collection Platform (DCP), a WaterLog H-355 Pump, and a Paroscientific 6000-30G pressure sensor. There are five external connections on the outside of the housing for connecting peripheral components.

***NOTE:** To ensure proper opening/closing of the Portable Tide Gauge case, make sure the stays on either side of the housing are in sync with each other before closing. If you get resistance when attempting to close the case, first lift the lid and then lower it. Please do not force the lid closed as it may damage the hinge.

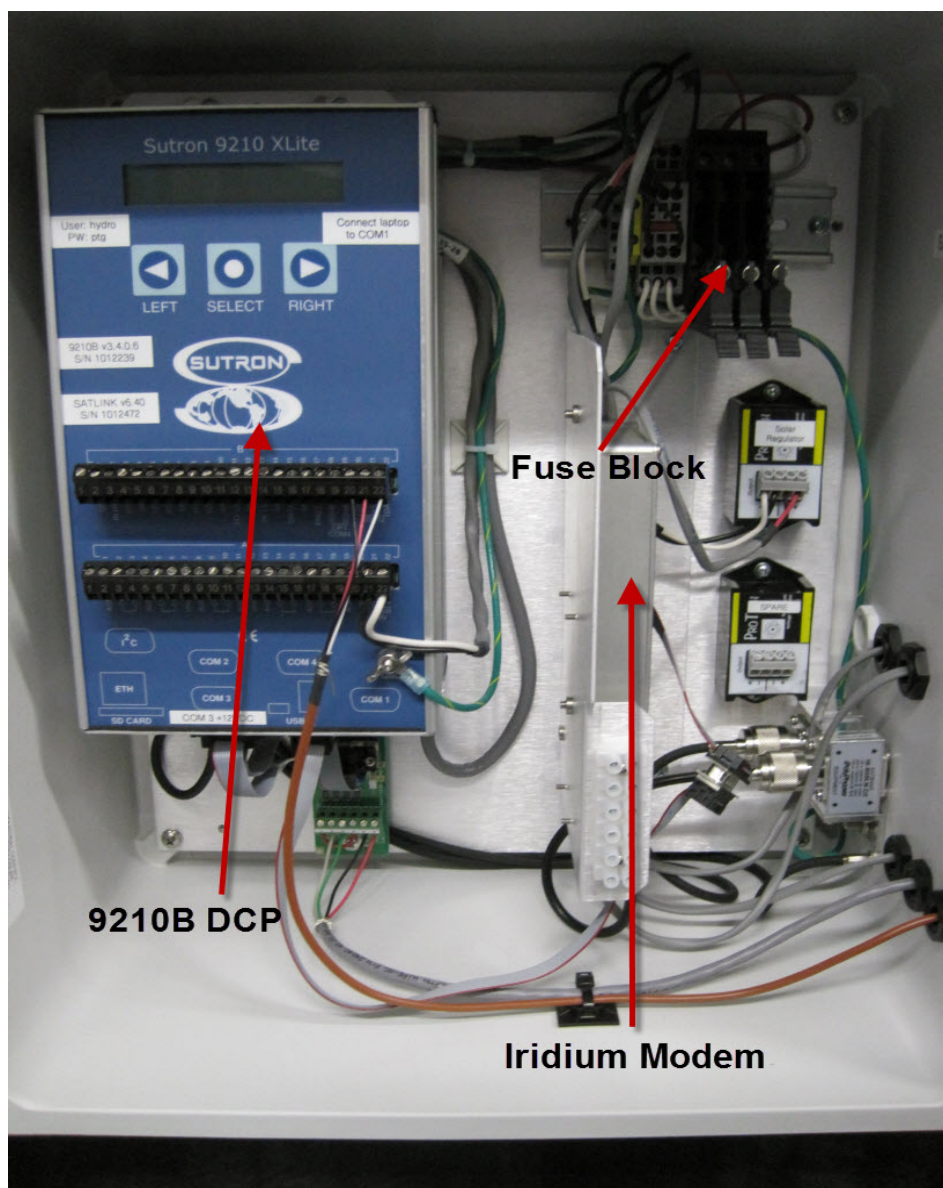


- 1) Orifice quick connect
- 2) Iridium antenna connection (Type-N)
- 3) GPS antenna connection (SMA) – Not used
- 4) Solar panel connection (2 pins)
- 5) Battery connection (4 pins)

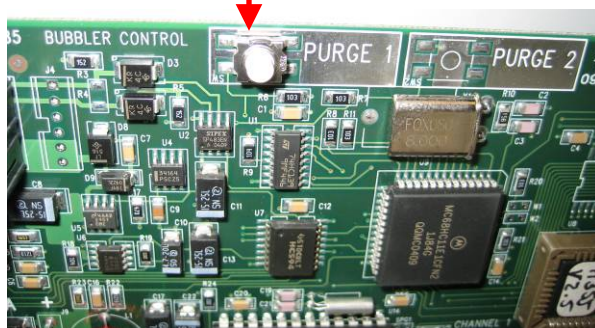


- 2) The DCP enclosure houses a Sutron 9210B DCP module; the data recorder and communications device. Mounted directly behind the 9210B is a Sutron Satlink2 satellite transmitter. Mounted on an aluminum plate next to the 9210B is the Sutron Iridium modem. The fuse block is also located inside the DCP enclosure; there are three fuses 1A for the DCP, 5A for the Pump, and 8A for the Satlink. Push these fuses into the engaged position to power the system up; pull the fuses to disengage and power off the system.

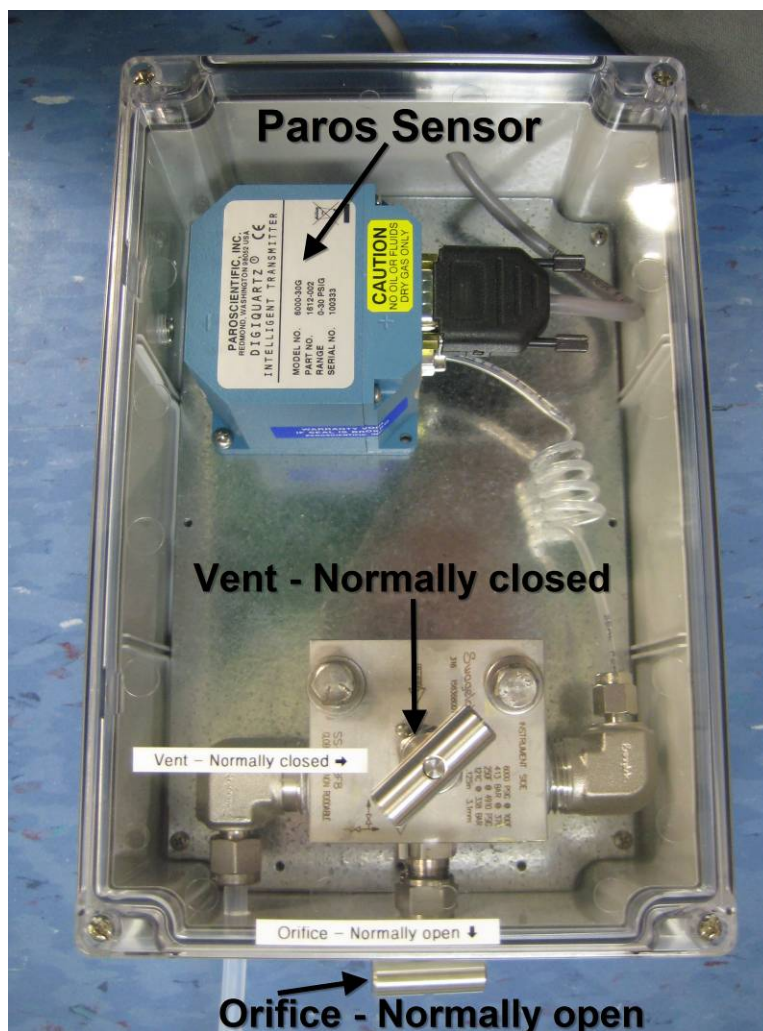
*Note: For Iridium operation the 8A fuse for the Satlink should NOT be engaged.



- 3) The Pump includes a compressor, a compressed air cylinder, and various electronic components. On the left side of the enclosure is a circuit board with a purge button. To purge the system, hold the white button down for several seconds and then release it. The pump will start running and there should be bubbles coming out of the orifice. You may need to repeat the purge several times for long tubing runs.



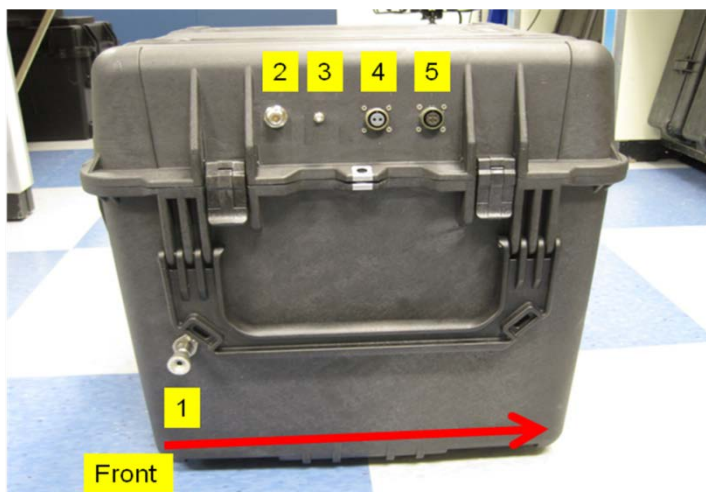
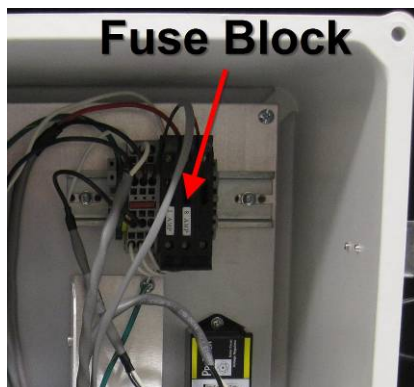
- 4) The Paros box includes the sensor itself as well as a manifold which allows the sensor to be isolated or vented to the atmosphere as opposed to the orifice. Normal operations will be conducted with the valve on the top of the Paros box firmly closed and the valve on the front of the Paros box fully open (open until you meet resistance and then close $\frac{1}{2}$ turn).



II. Physically Setting Up the Portable Tide Gauge:

***Note: Ensure that the fuse block latches are disengaged prior to connecting the battery and solar panel. Engage them after there is power available to prevent possibly blowing one or more fuses.**

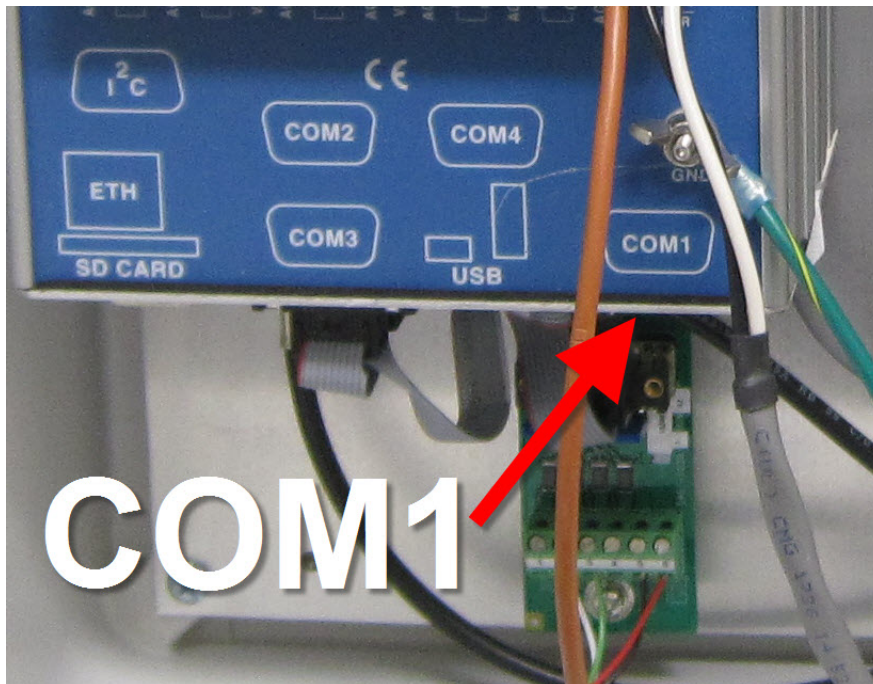
- 1) Connect the four ancillary components, moving front to back:
 - 1) Orifice – Ensure compression fittings are firmly seated, the bubbler tubing is not kinked, and the orifice is mounted to a stable structure.
 - 2) Iridium Antenna – Mount with a clear line of site to the sky.
 - 3) GPS Antenna – Not needed for Iridium transmissions.
 - 4) Solar Panel – Mount facing south with good solar exposure (2 pin connector).
 - 5) Battery – Place upright on stable ground (4 pin connector). Also, please provide a top off charge to the battery prior to operational installation to lengthen the overall battery life.
- 2) If you are configuring the DCP prior to the actual installation it is only necessary to connect the battery and the orifice pigtail. The battery is needed to power the system up and the orifice pigtail is needed to ensure that the system doesn't over pressurize and damage the Paros sensor.



- 3) After the needed connections have been made, engage the two fuses located inside the DCP, thus powering up the DCP and the pump. Do not engage the 8A Satlink fuse as the Satlink is not used and will consume power unnecessarily. The DCP typically takes 5-10 minutes to fully load and allow communications and control.
- 4) If the Station ID was already setup the station is now up and running. If not, please use the procedure below to configure the Station ID.

III. Configuring the Station Specific Information in the DCP

- 1) Once the system has powered up, locate the Sutron 9210B DCP within the DCP enclosure and connect your computer to COM1 on the 9210B using a DB-9 serial cable. COM1 is located on the bottom surface of the bottom right corner of the DCP.



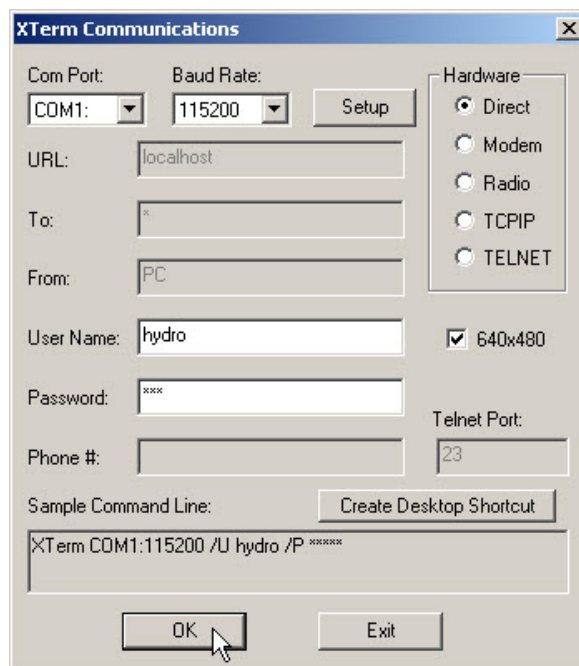
- 2) Open the XTerm.exe application on your computer.



This is a small executable file that does not require admin privileges to run and should be on the ship's server. Alternately, this software can be downloaded from:

<http://www.sutron.com/downloads/software.htm>

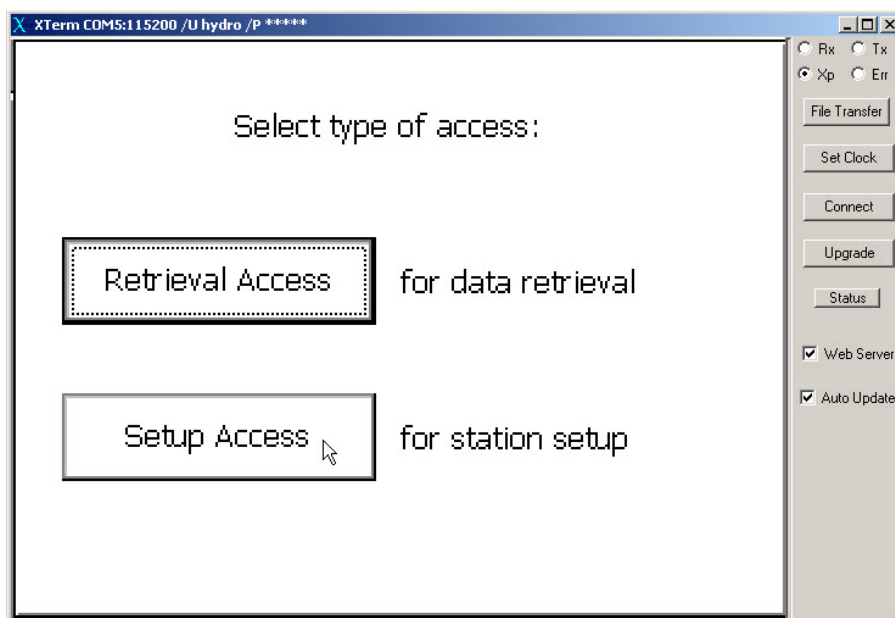
- 3) Verify that the COM port selected corresponds to the COM port being used on your computer (typically COM1 for a laptop), that the Baud Rate is set to 115200, and that Hardware is set to Direct as shown in the below graphic. Enter a User Name of **hydro** and a Password of **ptg** and click **OK**.



The XTerm Communications dialog box is shown with the following settings:

- Com Port: COM1
- Baud Rate: 115200
- Hardware: Direct (selected)
- URL: localhost
- To: *
- From: PC
- User Name: hydro
- Password: ****
- Phone #:
- Telnet Port: 23
- Sample Command Line: XTerm COM1:115200 /U hydro /P ****
- Buttons: OK, Exit, Setup, Create Desktop Shortcut

- 4) This will bring up the GUI interface with the DCP as shown below. Click the **Setup Access** button to proceed with setup.

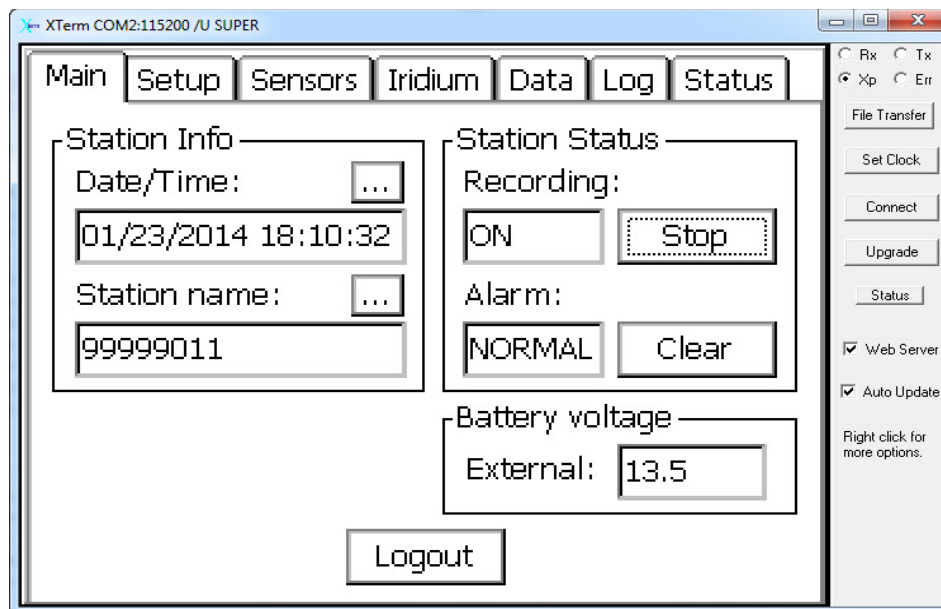


The GUI interface for XTerm COM5:115200 /U hydro /P ***** is shown. It displays the following options:

- Select type of access:
- Retrieval Access for data retrieval
- Setup Access for station setup

Buttons on the right side include: Rx, Tx, Xp, Err, File Transfer, Set Clock, Connect, Upgrade, Status, Web Server, and Auto Update.

- 5) Verify that the Station Status Recording is set to ON (Will not say TX for use with Iridium) and then update the Station Name to be that of the upcoming or current installation by clicking on the ... symbol adjacent to Station name



XTerm COM2:115200 /U SUPER

Main Setup Sensors Iridium Data Log Status

Station Info

Date/Time: ...
01/23/2014 18:10:32

Station name: ...
99999011

Station Status

Recording: ON Stop

Alarm: NORMAL Clear

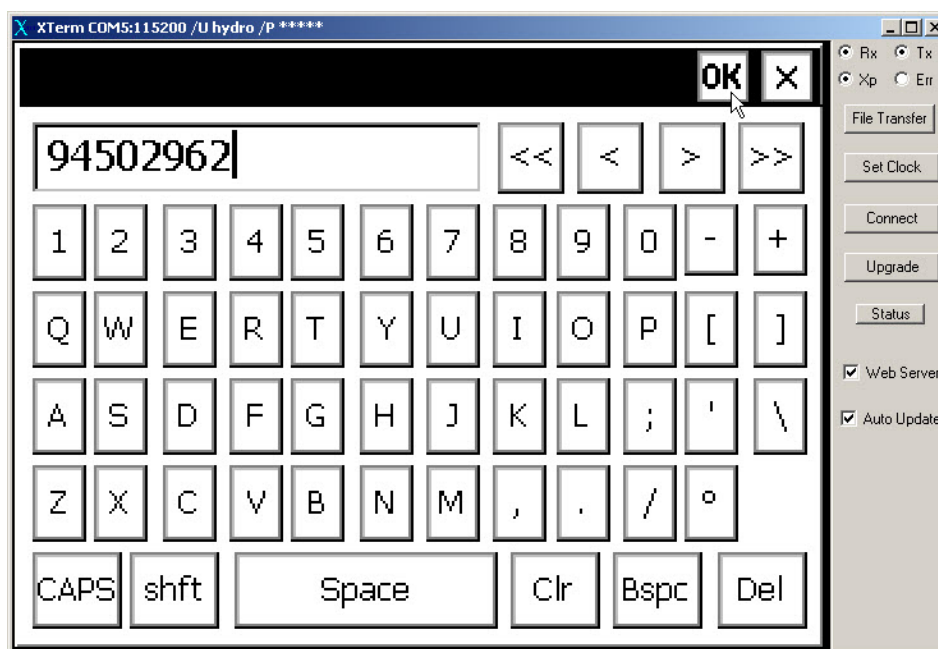
Battery voltage

External: 13.5

Logout

Rx Tx
Xp Err
File Transfer
Set Clock
Connect
Upgrade
Status
Web Server
Auto Update
Right click for more options.

- 6) Enter the correct eight digit Station ID into the field using either the numbers on the top of your keyboard or by clicking on the numbers on the screen (your computer's number pad will not work in this field) and click on **OK**.



XTerm COM5:115200 /U hydro /p *****

OK X

94502962

<< < > >>

1 2 3 4 5 6 7 8 9 0 - +

Q W E R T Y U I O P []

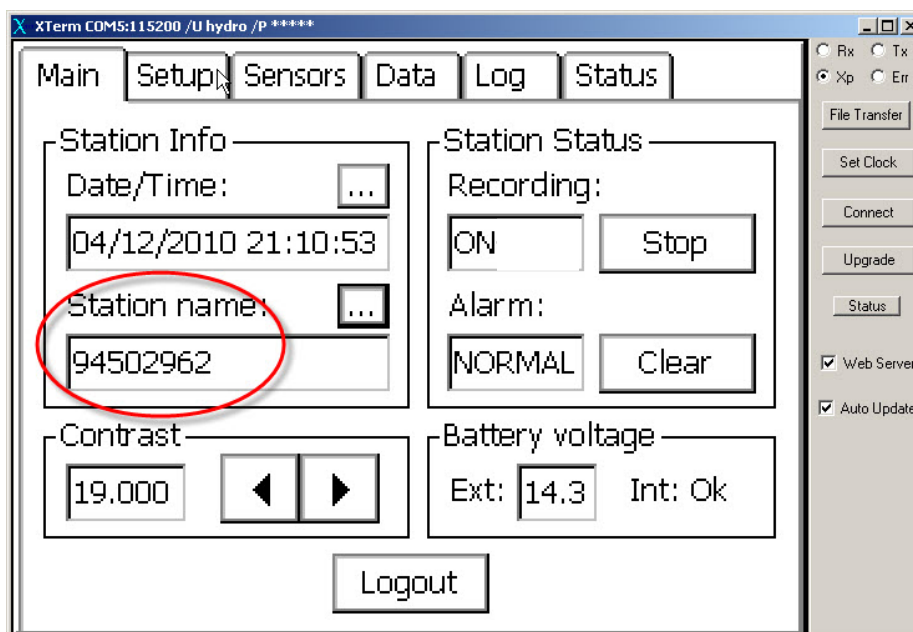
A S D F G H J K L ; ' \

Z X C V B N M , . / °

CAPS shft Space Clr Bspc Del

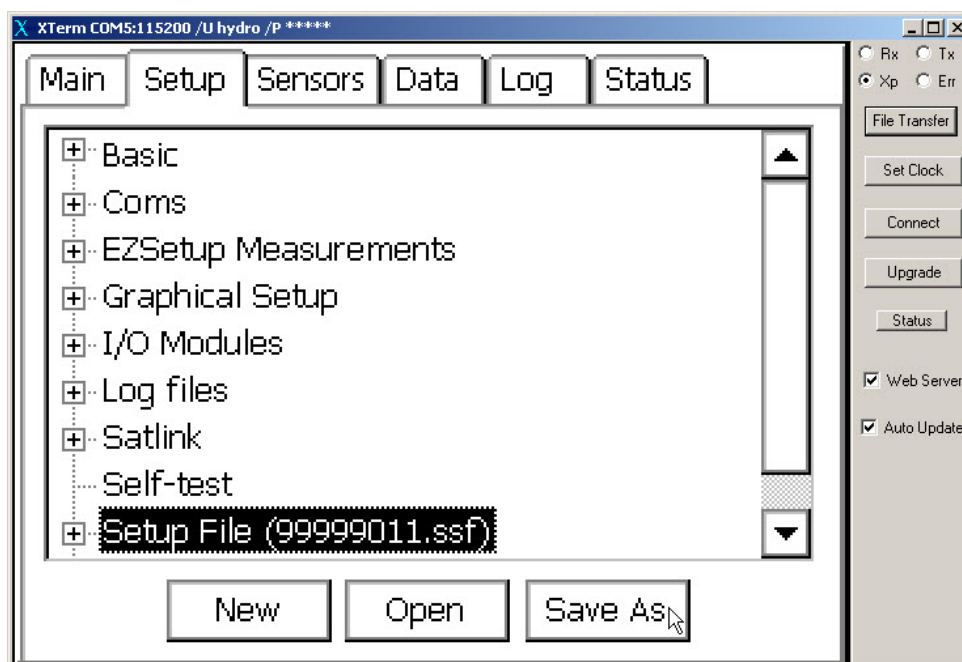
Rx Tx
Xp Err
File Transfer
Set Clock
Connect
Upgrade
Status
Web Server
Auto Update

- 7) Verify that the Station Name is correct and then click on the Setup Tab at the top of the XTerm window



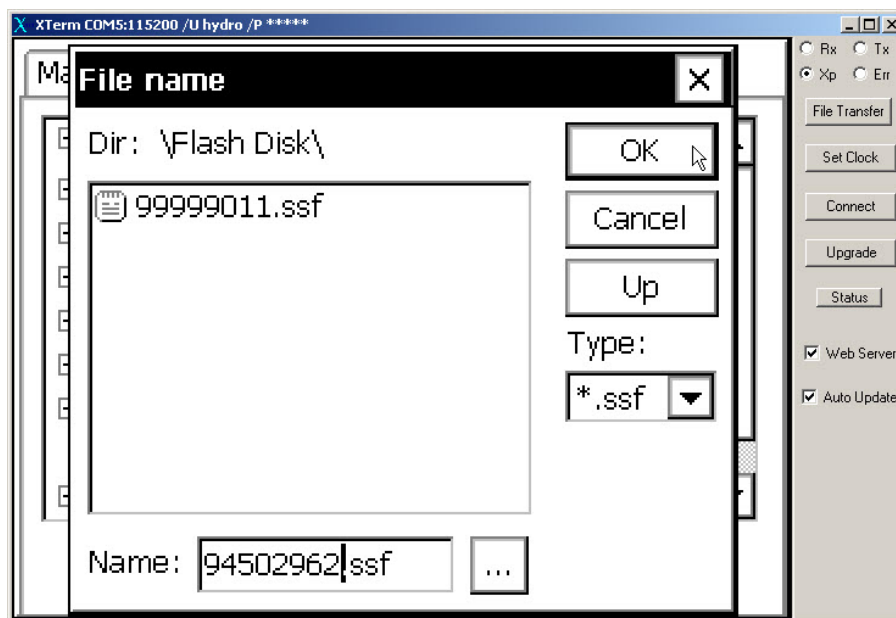
The screenshot shows the XTerm window with the Setup tab selected. The Station name field is circled in red. The Station name is 94502962. The Station Status section shows Recording: ON, Alarm: NORMAL, and Battery voltage: Ext: 14.3, Int: Ok. The Contrast is 19.000. The Logout button is at the bottom.

- 8) Next, save the setup file named with the Station ID. This will ensure that if the station is rebooted or power cycles it will automatically load the setup file upon boot. To do this, click on the words **Setup File** to highlight it and then click the **Save As** button.

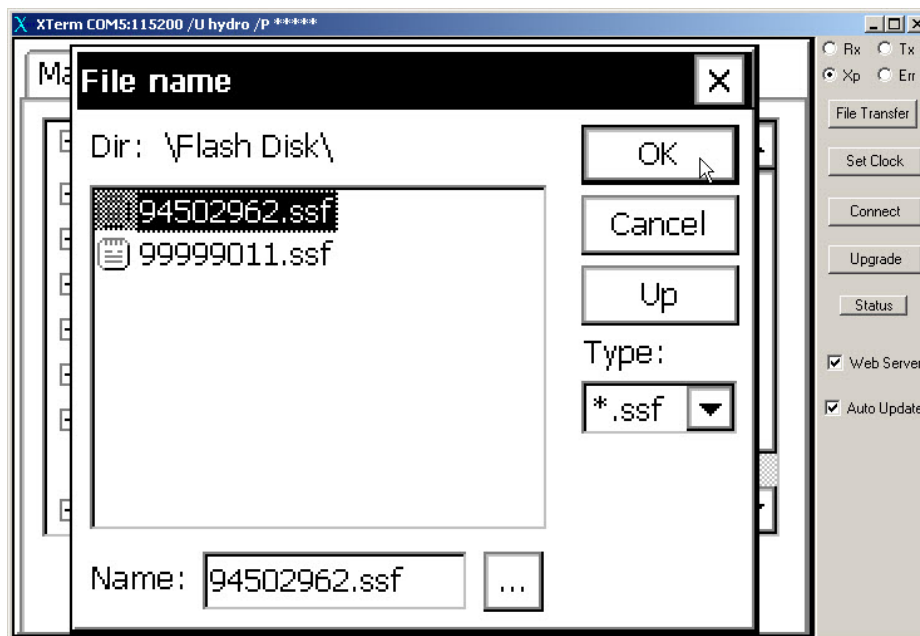


The screenshot shows the XTerm window with the Setup tab selected. The Setup File (99999011.ssf) is highlighted. The Setup File list includes Basic, Coms, EZSetup Measurements, Graphical Setup, I/O Modules, Log files, Satlink, Self-test, and Setup File (99999011.ssf). The Save As button is at the bottom.

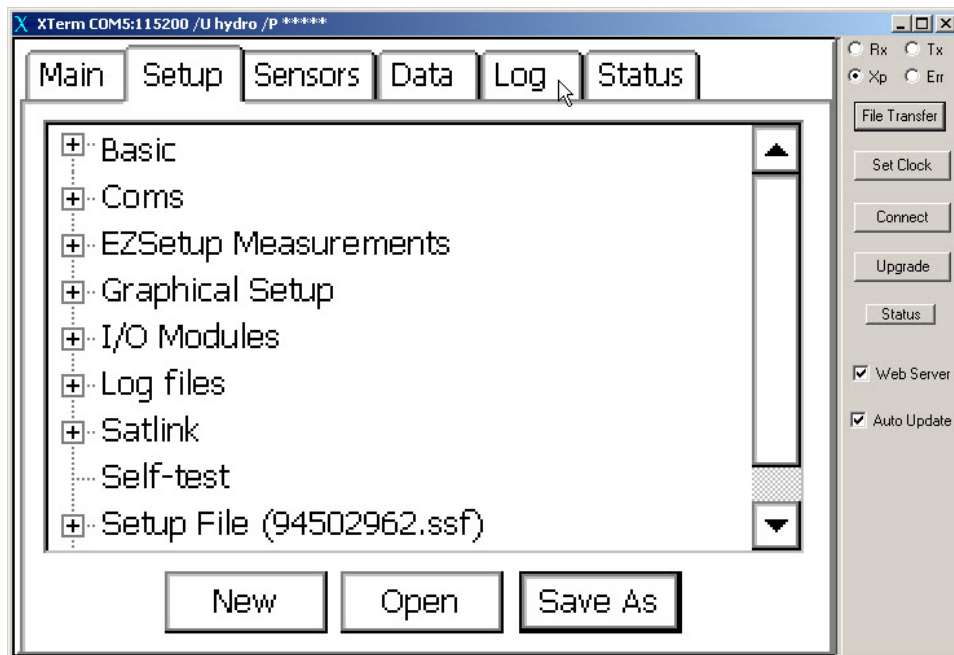
- 9) Now, in the Name field at the bottom of the window use your cursor to highlight the eight numerical digits of the name file and overwrite them with the new Station ID using the numbers at the top of your keyboard. Ensure that the station number is followed by .ssf and click **OK**.



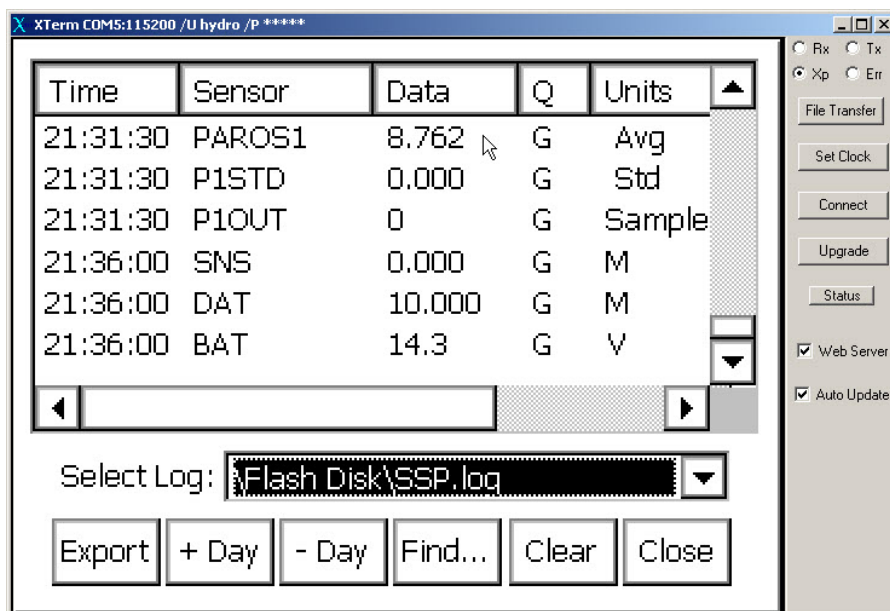
- 10) This will take you back to the Setup tab. Now, to create a backup of the setup file highlight **Setup File** and click the **Save As** button again. This time simply highlight the file with the correct name and click the **OK** button again.



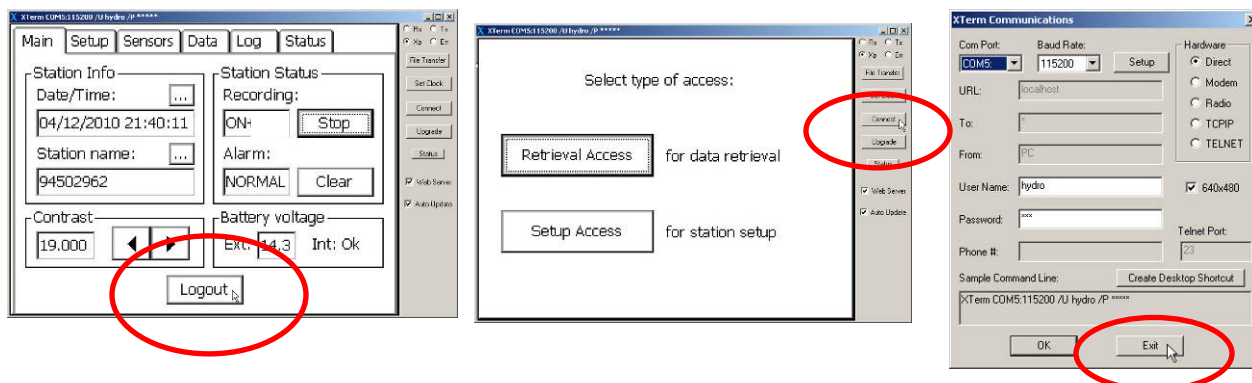
- 11) This will return you to the Setup tab again. Now, to verify that data are being logged click on the Log tab at the top of the screen.



- 12) The system should automatically bring up the SSP.log. If not, click the small down arrow next to the Select Log field to access the dropdown and select SSP.log from the list. This will bring up the water level data that the system is recording. Verify that the Paros1 values are updating. All times are UTC. Note that it may take 6-12 minutes after starting logging for the first data point to appear.



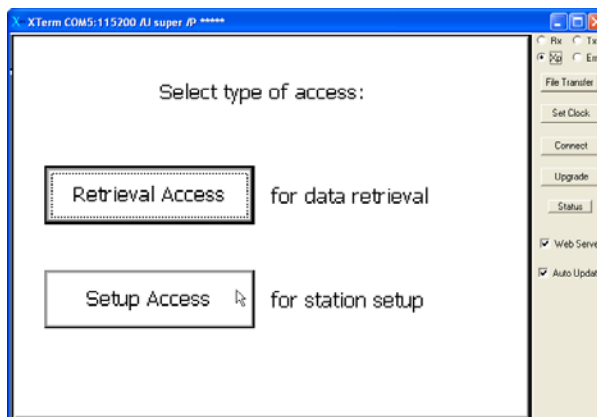
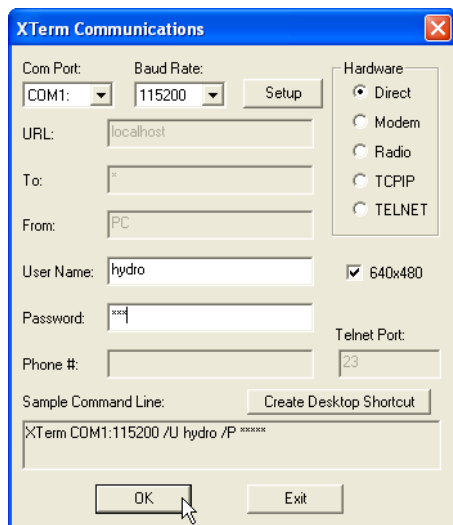
- 13) This completes the configuration of the DCP. To log out of the system click on the close button on the bottom of the Log screen. This will return you to the Main tab. Simply click the Logout button at the bottom of the screen then click the Connect button from the login screen. Close Xterm by clicking the Exit button.



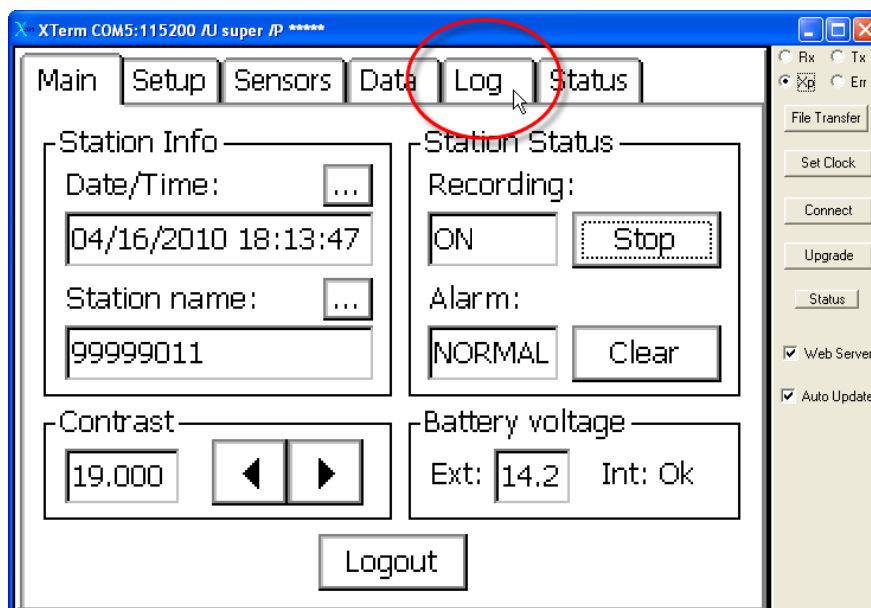
- 14) If you were configuring the system in advance of deployment you should now disengage the fuses to power the system down and detach any ancillary components prior to transport. This concludes the Station Specific Configuration procedure.
- 15) To ensure proper closing of the Portable Tide Gauge case, make sure the stays on either side of the housing are in sync with each other before closing. If you get resistance when attempting to close the case, first lift the lid and then lower it. Please do not force it as this may damage the enclosure hinge.

IV. Exporting Data from the Portable Tide Gauge using XTerm

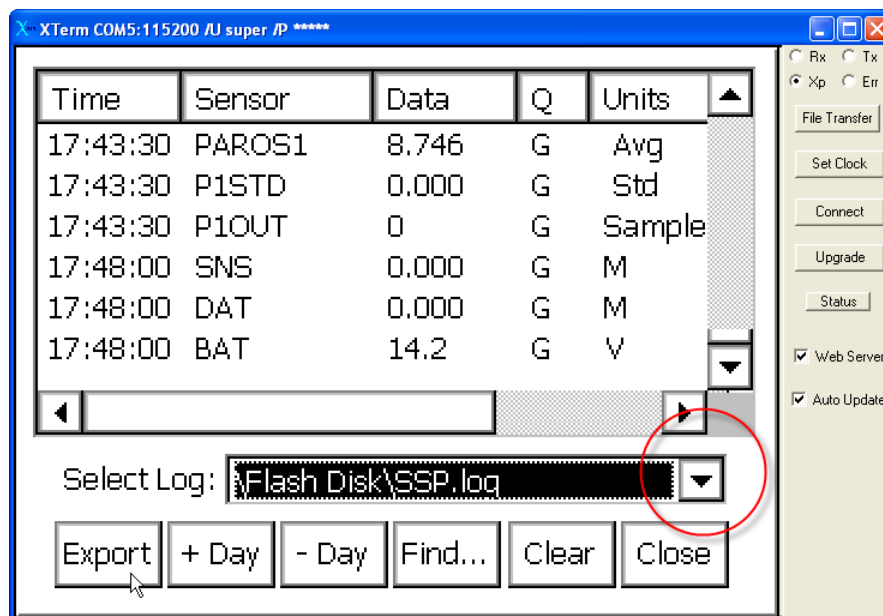
- 1) Connect to the DCP as in step III using Xterm, the appropriate COM port and user name/password combination. As in Step III, choose Setup Access at the “type of access” prompt.



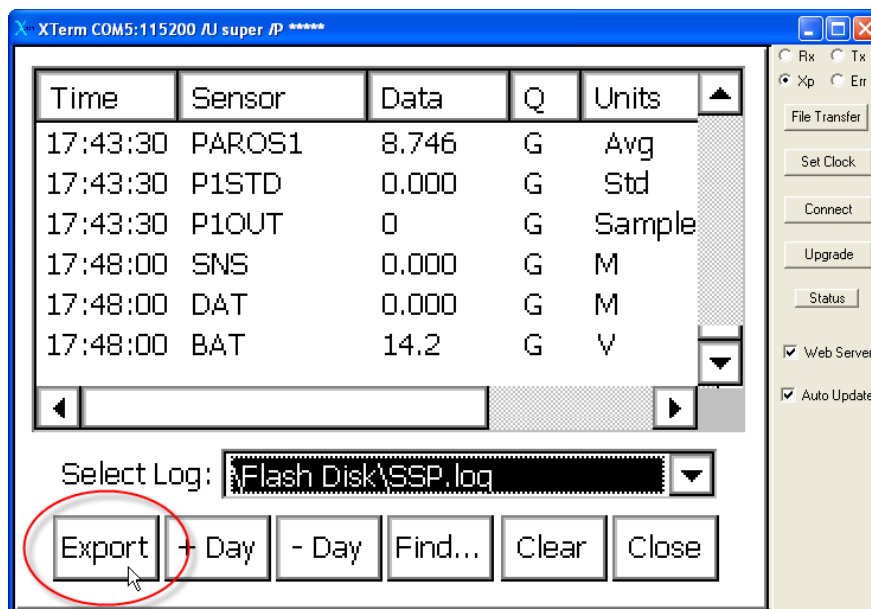
- 2) Once you are logged on, click on the Log tab at the upper right edge of the screen.



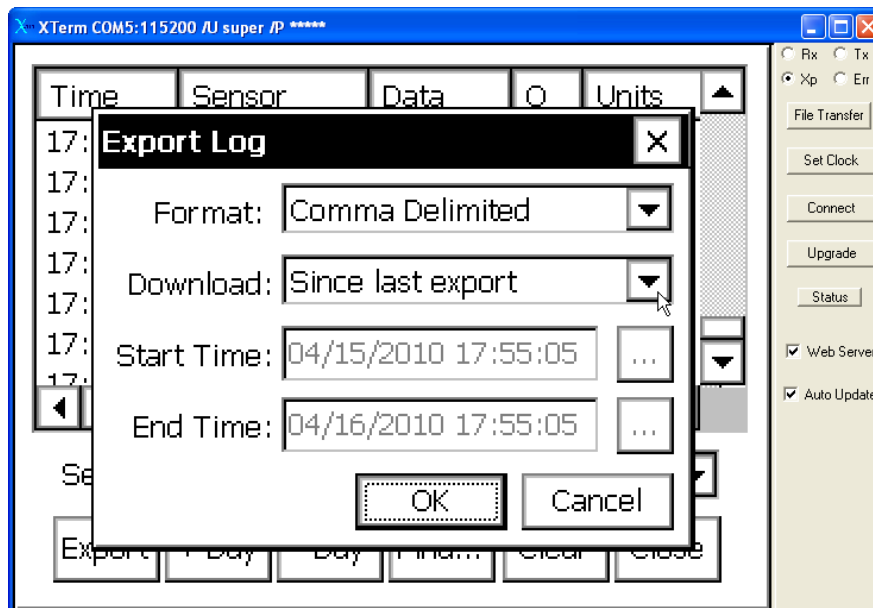
3) Select \Flash Disk\SSP.log from the Select Log dropdown (usually the default)



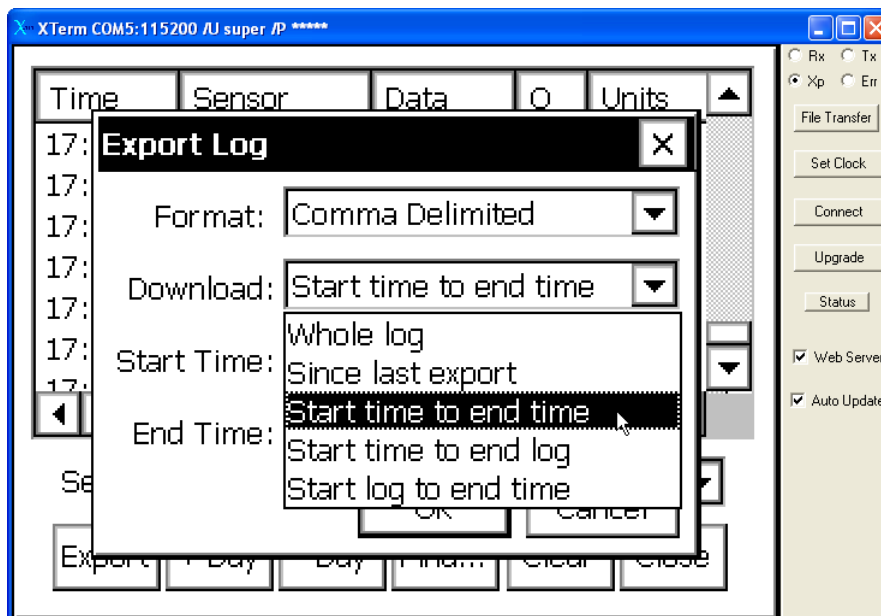
4) Click the Export button at the bottom left



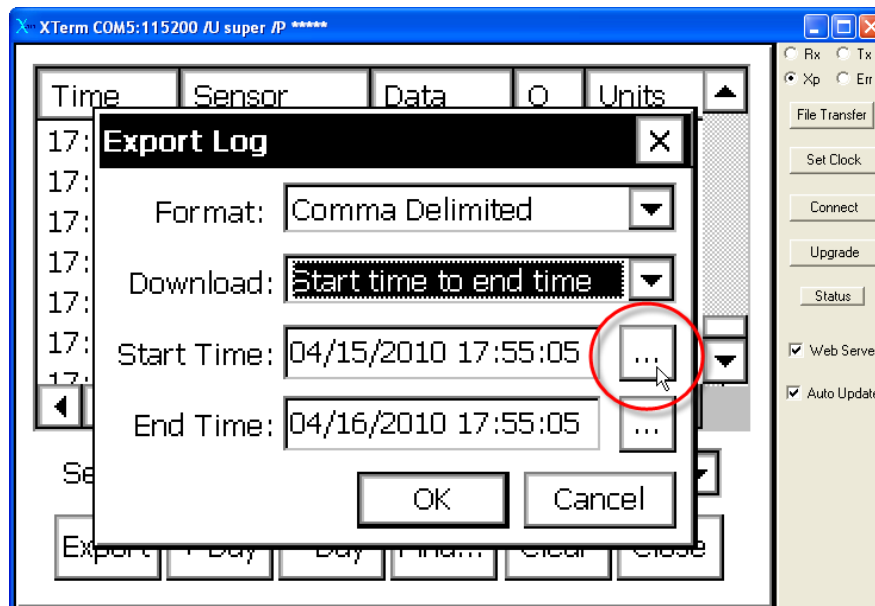
- 5) In the Export Log window you will be able to choose the dates and times of the data you want to export. Keep the default format “Comma Delimited”.



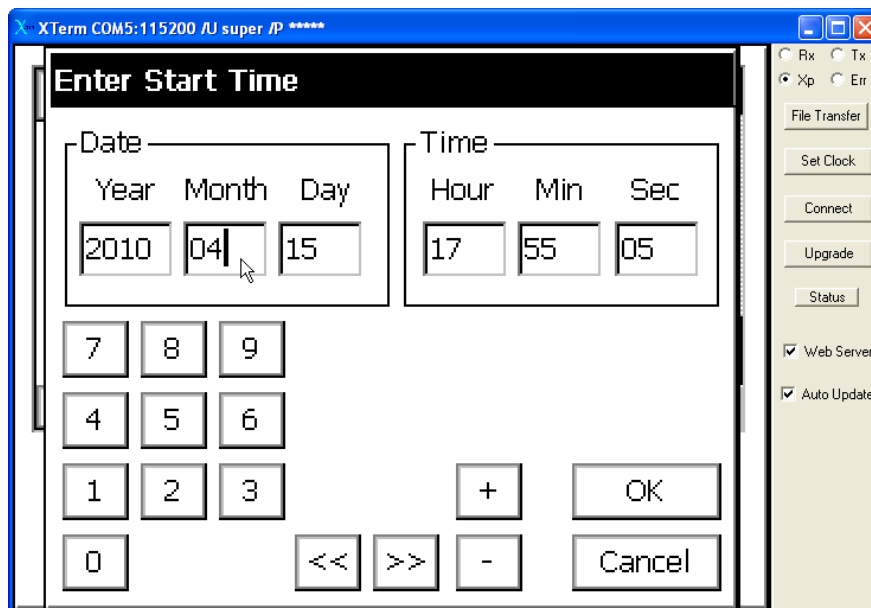
- 6) From the drop down menu next to Download, select “Start time to end time.”



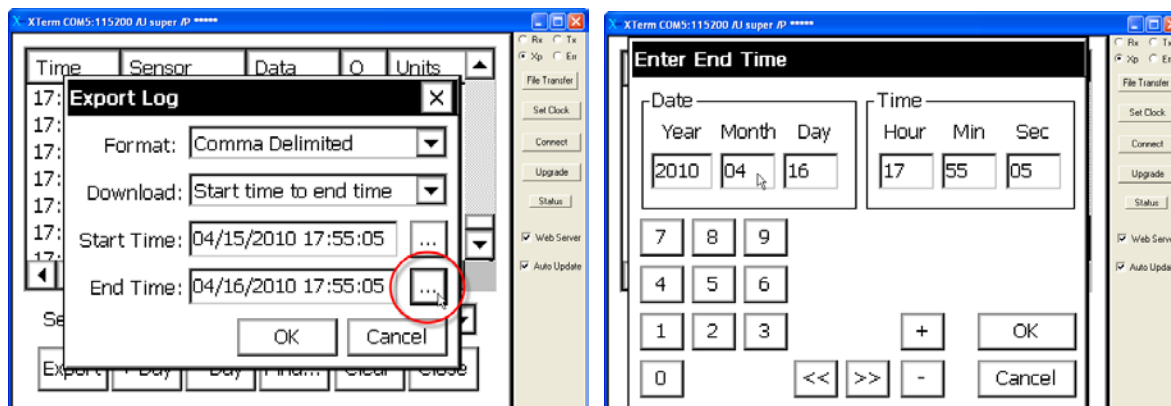
- 7) Click on the three dots (...) next to the Start Time field specify the section of the data you want to download.



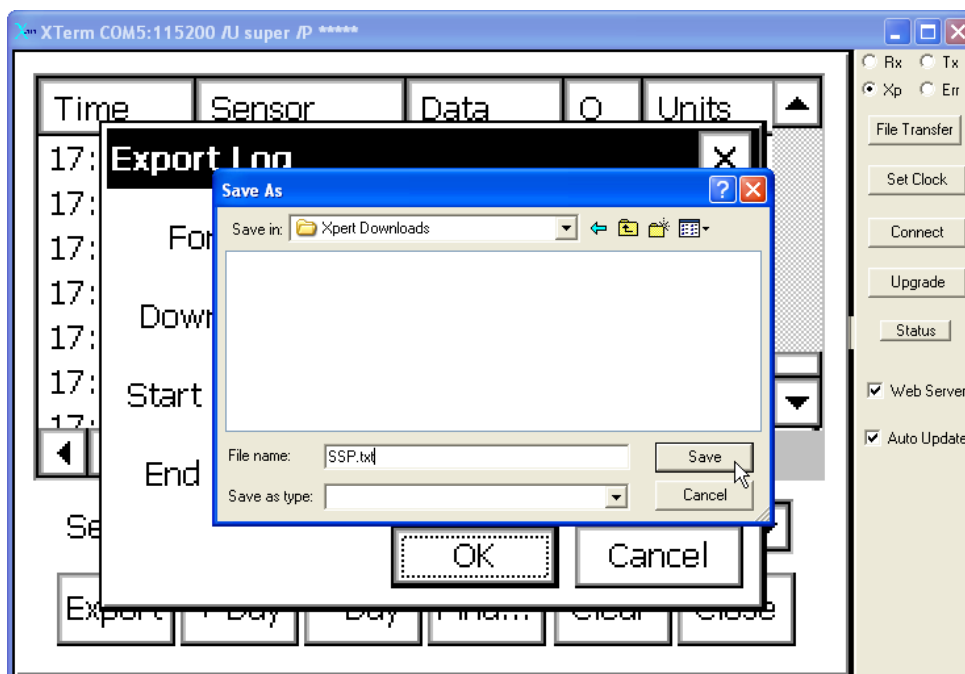
- 8) Enter the Date and Time (UTC) that you would like to start the data from and Click OK.



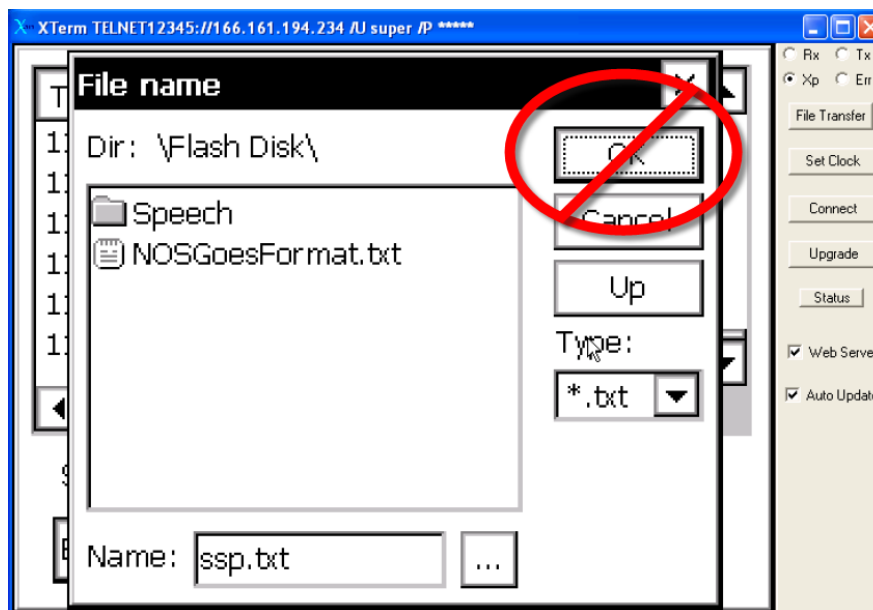
- 9) Click on the three dots (...) next to the End Time field and enter the ending time for the log section. This is only necessary if you want the data to end at an earlier time than now; if you want data until now skip step 9.



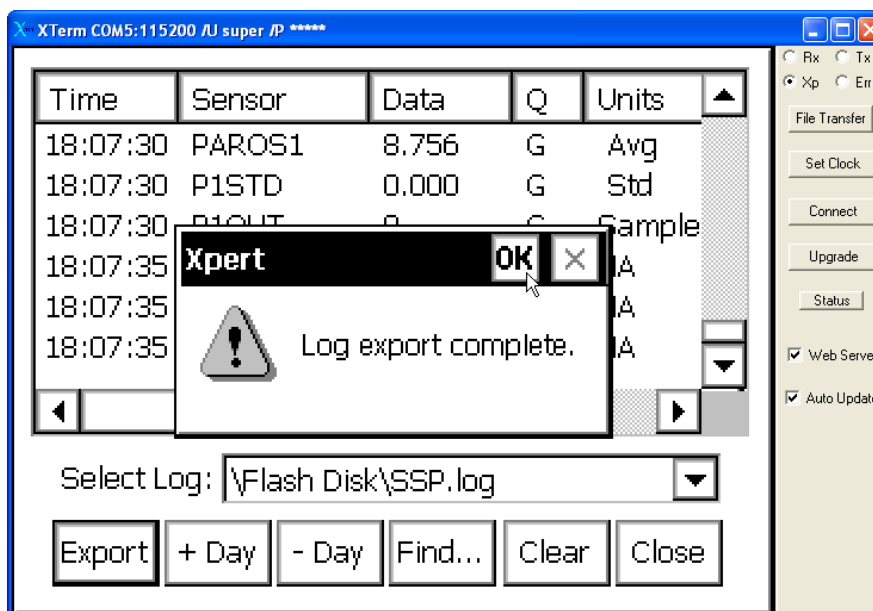
- 10) Browse to a location **on your machine** to save the file. It's recommended to leave the file name as the default SSP.txt until after the download and then change the name to something station specific after the file is on your computer. Click Save.



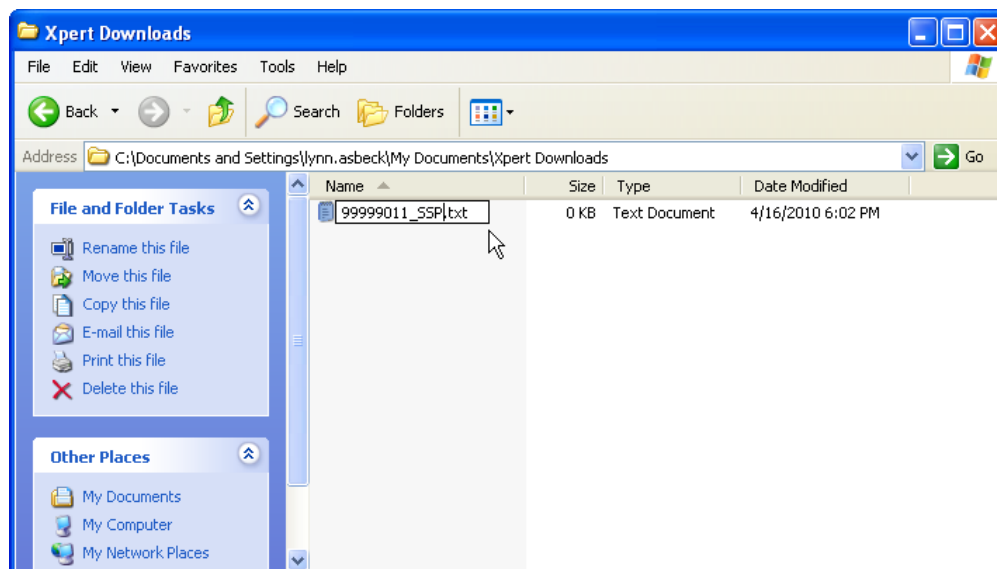
If the Xpert prompts you to save the file to Dir: \Flash Disk\, DO NOT SAVE the file as it can fill the Flash Disk and cause the system to become unstable and/or crash. This is a known glitch in the Xterm software that occasionally happens. If this occurs, simply cancel out of the File Name screen and restart the export procedure.



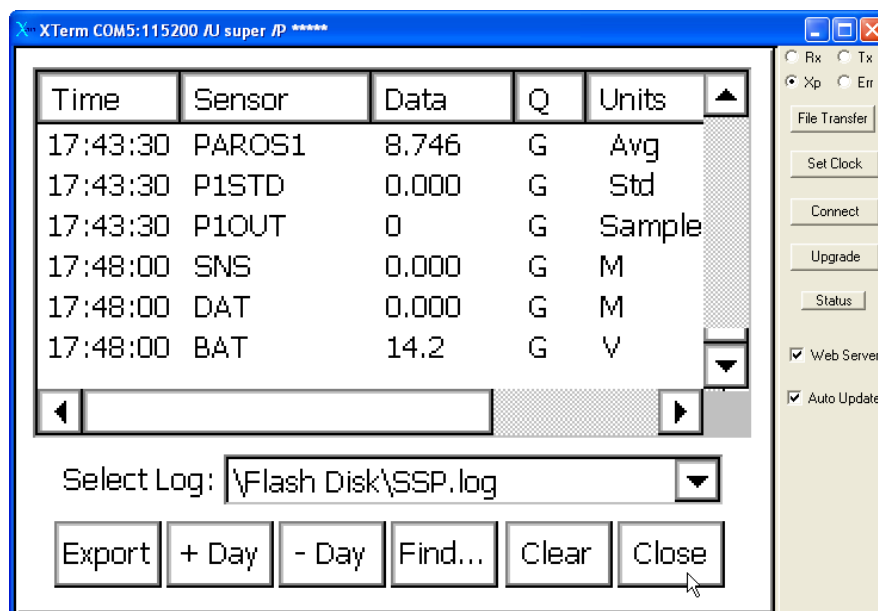
- 11) After your log is saved to the appropriate folder on your computer, click the OK button when notified that the export is complete.



- 12) At this time, you can to browse to the location where the file was saved to verify that the desired data are present in the .txt file. It's also a good time to change the name to something like 99999011_SSP.txt (where 99999011 is the Station ID) so that it will be uniquely identifiable.

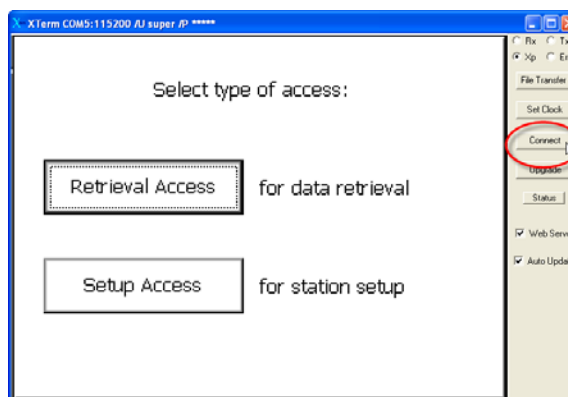
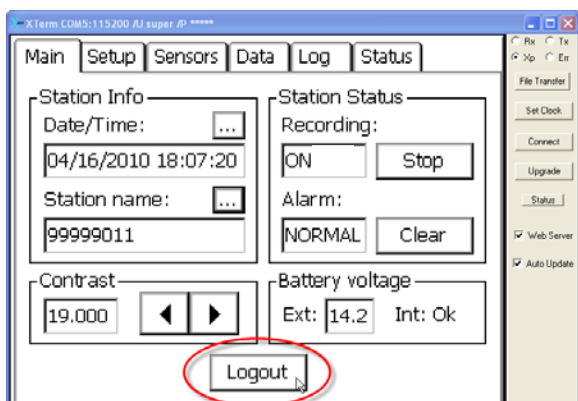


- 13) After you know the data have been exported, go back to Xterm and click the Close button on the bottom right corner of the Log screen. Log export is complete!



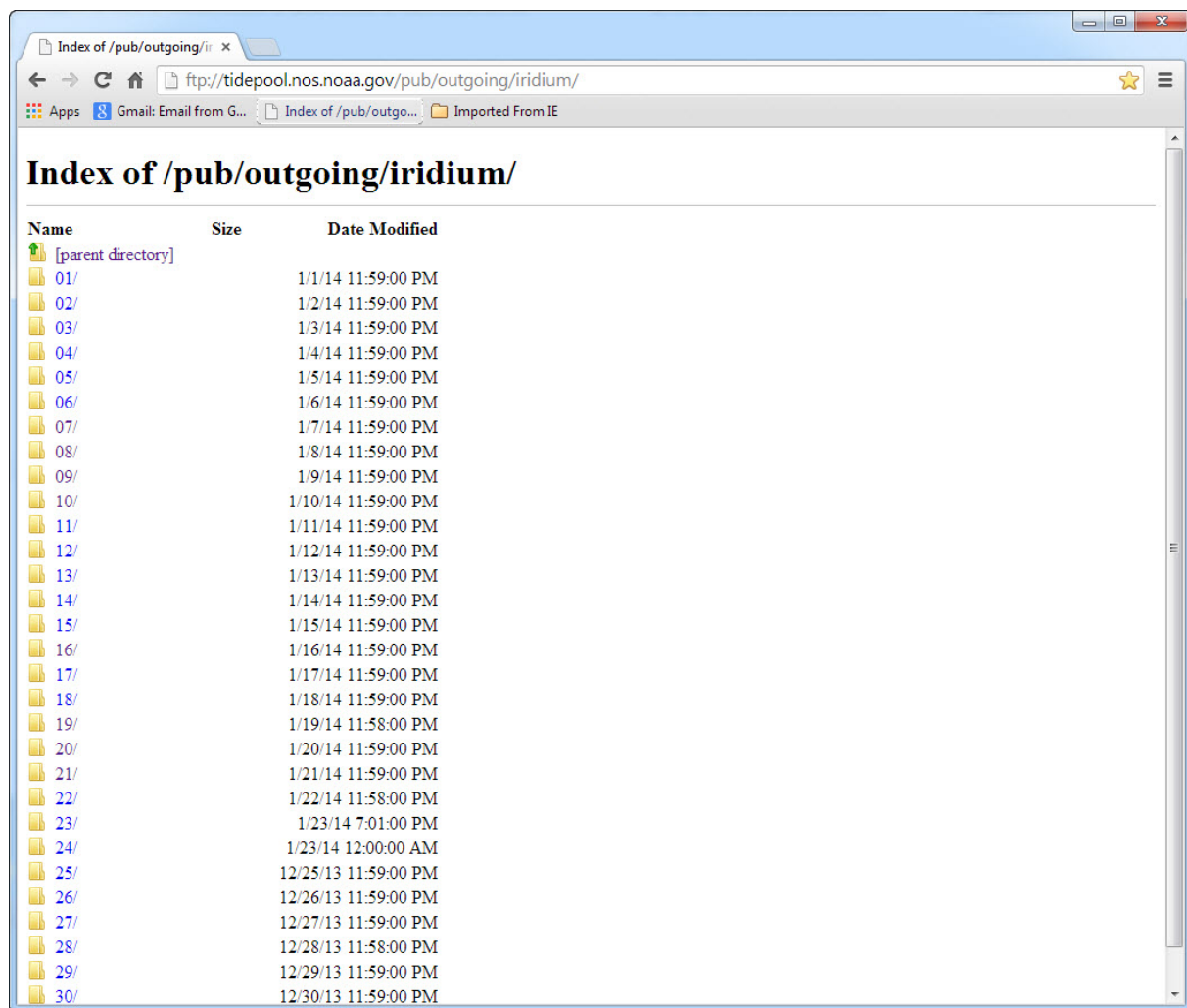
14) Disconnect from the gauge as before:

- Click the Logout button on the bottom of the Main tab
- Click the Connect button on the type of access screen to disconnect
- Close out of Xterm and disconnect your cable. Secure 9210B and Portable Tide Gauge enclosures.



V. Verifying Iridium Transmissions Using TidePool

- 1) Iridium transmissions can be verified via an FTP server called TidePool. This is very much like a standard website and can be accessed via any internet browser by going to <ftp://tidepool.nos.noaa.gov/pub/outgoing/iridium/>



- 2) Once this page is open look for the day of the month that the transmission occurred.
*Note: All times are UTC
- 3) Click on the corresponding folder and you will see a list of messages.

Index of /pub/outgoing/ir x

ftp://tidepool.nos.noaa.gov/pub/outgoing/iridium/23/

Apps Gmail: Email from G... Index of /pub/outgo... Imported From IE

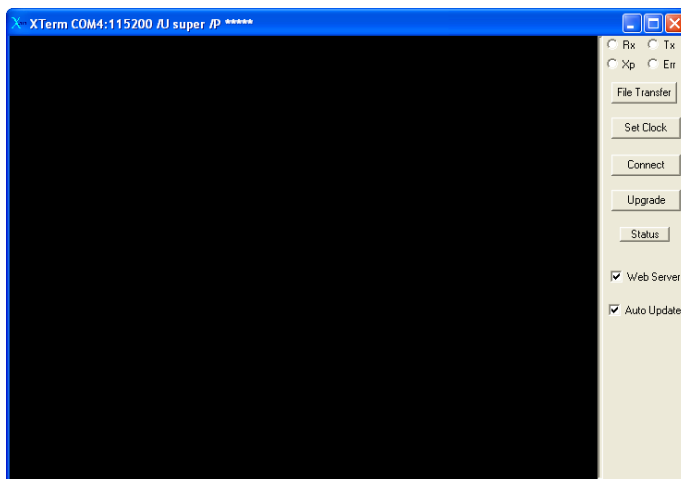
1390498119_300034012340310_5179.sbd	111 B	1/23/14 5:28:00 PM
1390498432_300234060743650_5180.sbd	127 B	1/23/14 5:33:00 PM
1390498481_300034012340310_5181.sbd	111 B	1/23/14 5:34:00 PM
1390498780_300234060743650_5182.sbd	127 B	1/23/14 5:39:00 PM
1390498805_300234060743650_5183.sbd	127 B	1/23/14 5:40:00 PM
1390498835_300034012340310_5184.sbd	111 B	1/23/14 5:40:00 PM
1390499142_300234060743650_5185.sbd	127 B	1/23/14 5:45:00 PM
1390499199_300034012340310_5186.sbd	111 B	1/23/14 5:46:00 PM
1390499502_300234060743650_5187.sbd	127 B	1/23/14 5:51:00 PM
1390499565_300034012340310_5188.sbd	111 B	1/23/14 5:52:00 PM
1390499865_300234060743650_5189.sbd	127 B	1/23/14 5:57:00 PM
1390499916_300034012340310_5190.sbd	111 B	1/23/14 5:58:00 PM
1390500023_3002340119C2710_5191.sbd	196 B	1/23/14 6:00:00 PM
1390500220_300234060743650_5192.sbd	127 B	1/23/14 6:03:00 PM
1390500275_300034012340310_5193.sbd	111 B	1/23/14 6:04:00 PM
1390500591_300234060743650_5194.sbd	127 B	1/23/14 6:09:00 PM
1390500661_300034012340310_5195.sbd	111 B	1/23/14 6:11:00 PM
1390500677_300034012340310_5196.sbd	111 B	1/23/14 6:11:00 PM
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1390501355_300034012340310_5200.sbd	111 B	1/23/14 6:22:00 PM
1390501663_300234060743650_5201.sbd	127 B	1/23/14 6:27:00 PM
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1390502075_300034012340310_5204.sbd	111 B	1/23/14 6:34:00 PM
1390502431_300234060743650_5205.sbd	127 B	1/23/14 6:40:00 PM
1390502438_300034012340310_5206.sbd	111 B	1/23/14 6:40:00 PM
1390502733_300234060743650_5207.sbd	127 B	1/23/14 6:45:00 PM
1390502810_300034012340310_5208.sbd	111 B	1/23/14 6:46:00 PM
1390503101_300234060743650_5209.sbd	127 B	1/23/14 6:51:00 PM
1390503155_300034012340310_5210.sbd	111 B	1/23/14 6:52:00 PM
1390503516_300234060743650_5211.sbd	127 B	1/23/14 6:58:00 PM
1390503518_300034012340310_5212.sbd	111 B	1/23/14 6:58:00 PM
1390503648_3002340119C2710_5213.sbd	78 B	1/23/14 7:00:00 PM

- 4) You can find your message by looking for the IMEI of the Iridium modem. The IMEI is listed on a sticker on the front of the modem and also the equipment. Click on the blue link and this should begin to download of the message or it may prompt you asking where you would like to save the message.

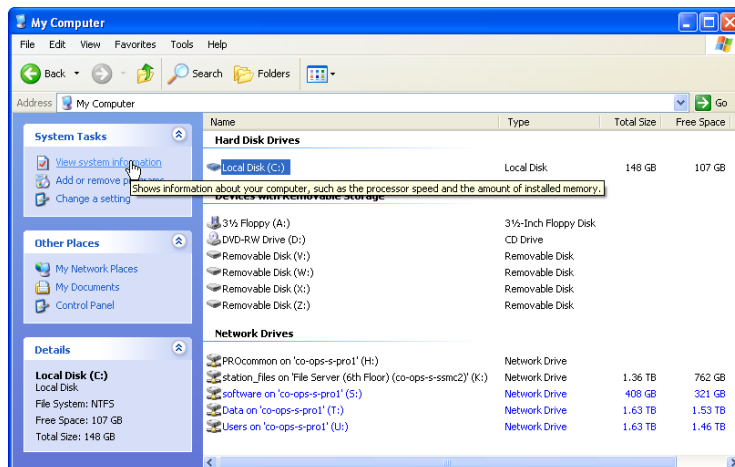
VI. Common Troubleshooting Procedures

Use these procedures to attempt to repair a malfunctioning gauge. Alternately you may contact the Seattle Instrument Lab at SIL@noaa.gov or 206.526.6915 or 206.526.6360.

SYMPTOM: Persistent black screen during boot up (usually accompanied by only the Tx button flashing)



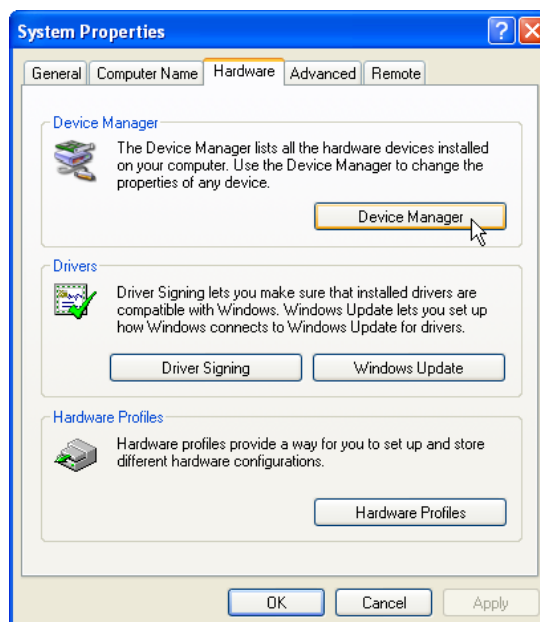
- 1) Check the Xpert to make sure that its fuse is engaged
- 2) Check your cable to make sure you are connected to the Xpert in COM 1
- 3) Check your computer's COM port to make sure that the port you've selected in Xterm is the port you are using. To find out more information about your COM ports:
 - a) Go to My Computer
 - b) Single click on Local Disk (C:) and choose "View system information" on the left hand bar



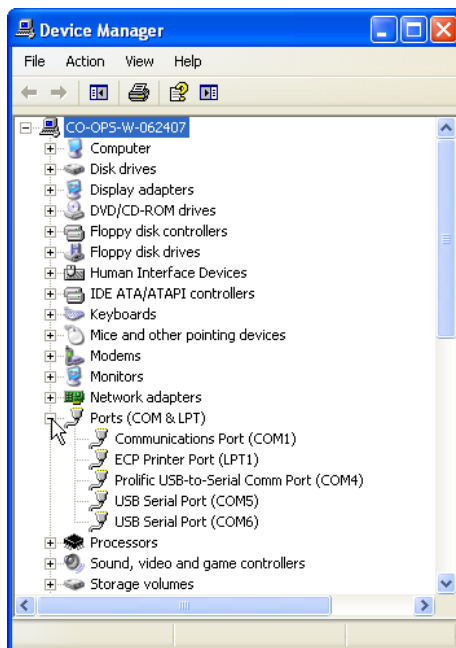
- c) In the “System Properties” window that pops up, choose the “Hardware” tab.



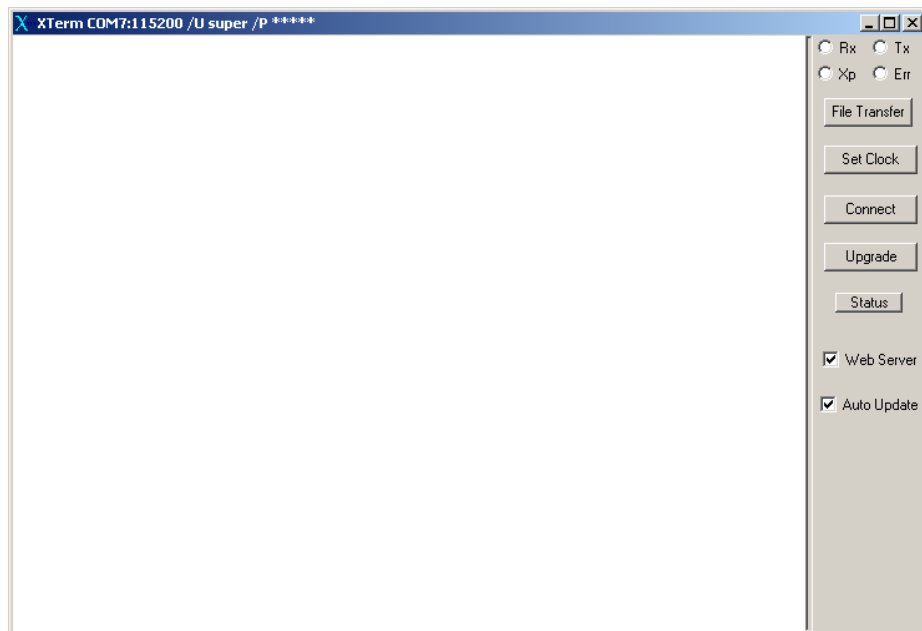
- d) Click on “Device Manager”



- e) Scroll down to “Ports (COM & LPT)” and expand using the [+] box
- f) Ensure that Xterm is set to the appropriate COM Port shown



SYMPTOM: Persistent white screen during boot up

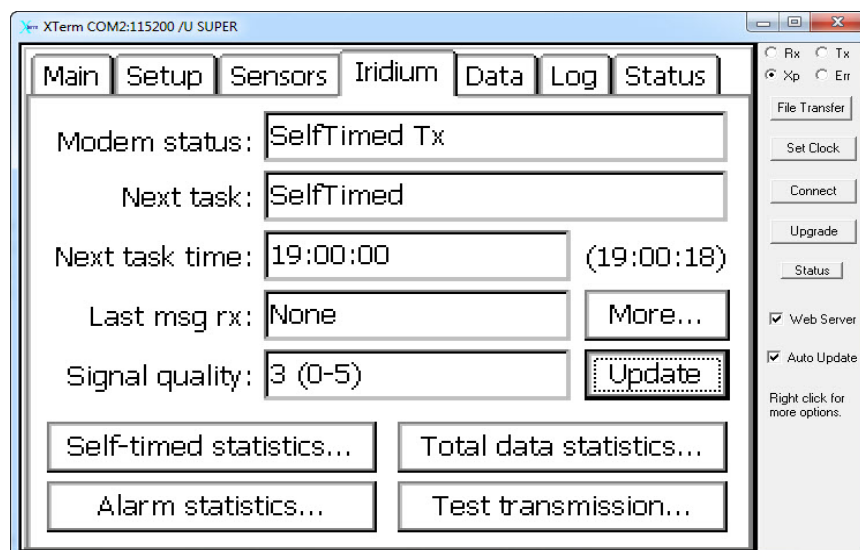


***NOTE:** The Xpert does take a while to boot up and connect. In general, if you see the “Rx” and “Tx” buttons flashing, the Xpert is still booting. If the white screen persists for more than 15 minutes, try the following:

- 1) Perform a “hard reboot” on the Xpert: disengage and reengage the 1 Amp fuse
- 2) Contact the Seattle Instrument Lab at (206) 526-6915 for a walk through of re-loading the Xpert operating system

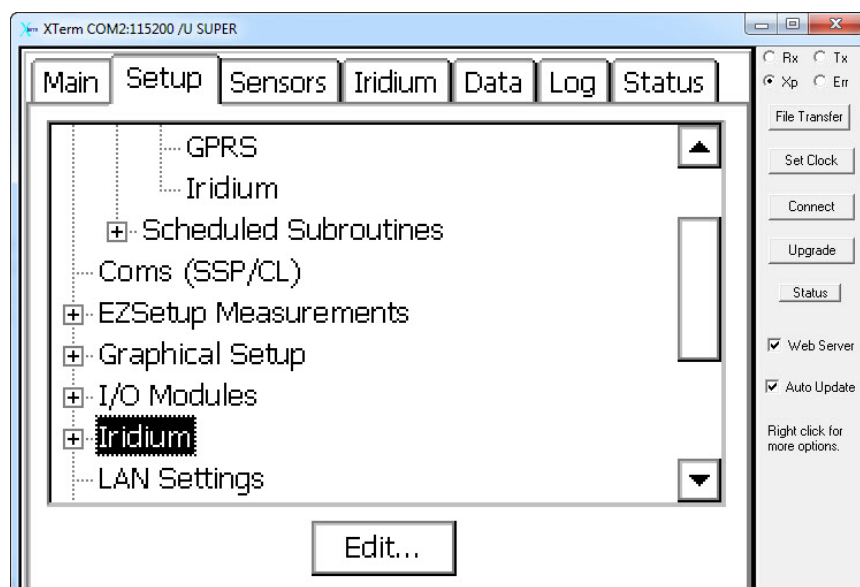
SYMPTOM: Not transmitting via Iridium

- 1) Ensure that the Iridium antenna has a clear view of the sky
- 2) Double check your Iridium cable connections to the antenna and the Portable Tide Gauge enclosure. Also double check the connections inside the PTG enclosure between the Pelican case and the 9210B DCP (small black cable).
- 3) Check the signal strength and status of the Iridium modem, click the tab labeled Iridium. This tab will show the modem status, it's next scheduled transmit time and signal quality. Click update to get the most recent signal strength.



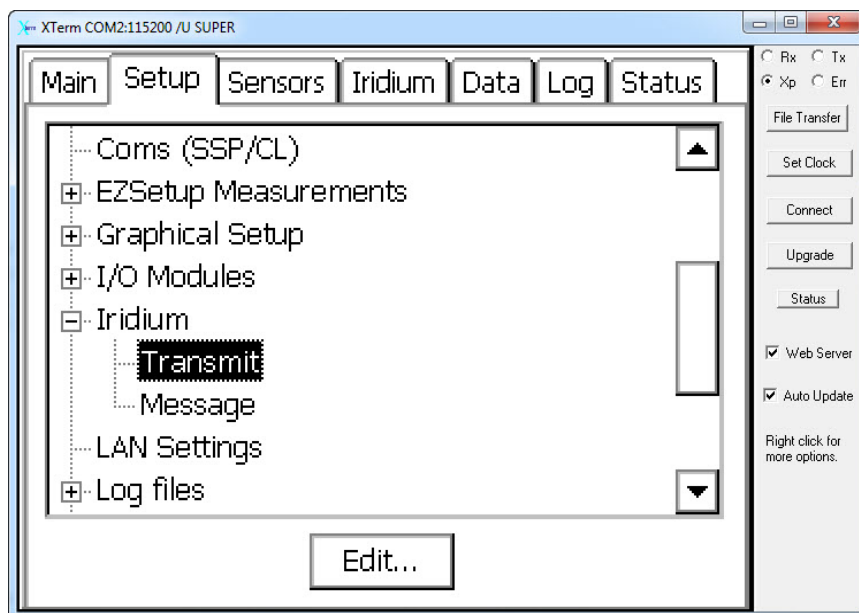
The screenshot shows the 'Iridium' tab in the XTerm software. The 'Modem status' is 'SelfTimed Tx'. The 'Next task' is 'SelfTimed'. The 'Next task time' is '19:00:00' with a timer '(19:00:18)'. The 'Last msg rx' is 'None' with a 'More...' button. The 'Signal quality' is '3 (0-5)' with an 'Update' button. There are also buttons for 'Self-timed statistics...', 'Total data statistics...', 'Alarm statistics...', and 'Test transmission...'.

- 4) Check the other properties of the Iridium transmission.
 - a) Expand Iridium by clicking on the +

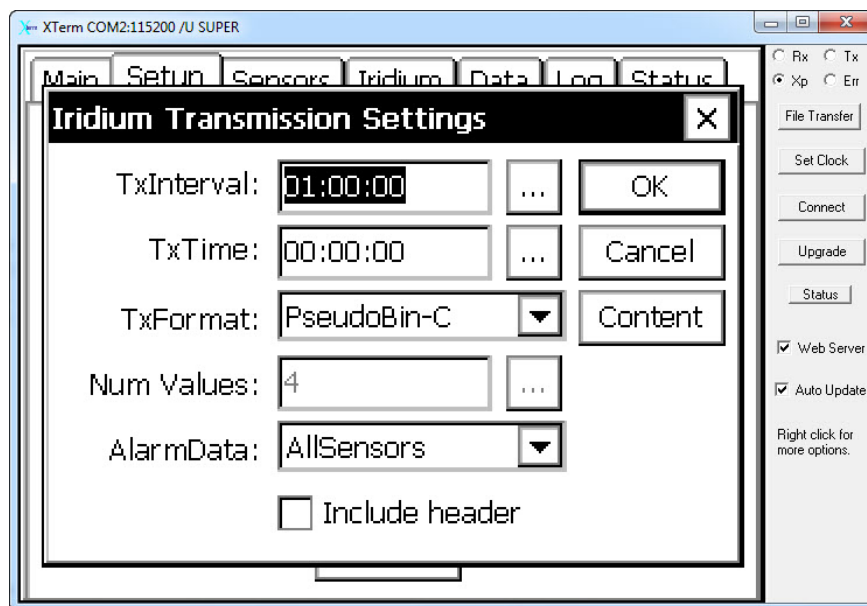


The screenshot shows the 'Iridium' tab in the XTerm software with the tree view expanded. The tree structure includes: GPRS, Iridium (expanded), Scheduled Subroutines, Coms (SSP/CL), EZSetup Measurements, Graphical Setup, I/O Modules, Iridium (highlighted), and LAN Settings. There is an 'Edit...' button at the bottom.

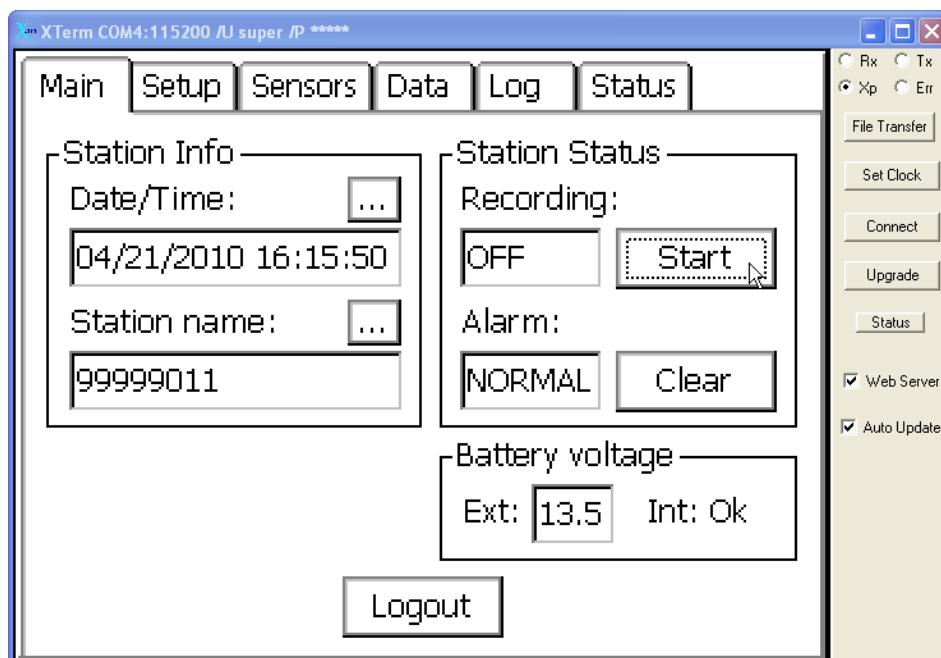
- b) Select “Transmit” and click “Edit...”



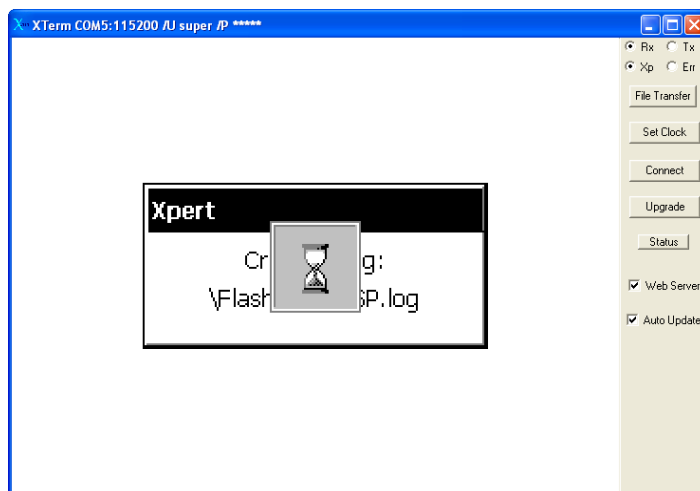
- c) The “Transmit” window contains the Iridium TX interval, transmission time and transmission format. Make sure that Include Header is **NOT** checked.



- d) Return to the Main tab and click on “Start” to start recording and see if your changes have solved the problem.

The screenshot shows a terminal window titled "XTerm COM4:115200 /U super /P *****". The window contains a web-based interface with several tabs: "Main", "Setup", "Sensors", "Data", "Log", and "Status". The "Main" tab is active. It displays "Station Info" with fields for "Date/Time" (04/21/2010 16:15:50) and "Station name" (99999011). The "Station Status" section shows "Recording" as "OFF" with a "Start" button, and "Alarm" as "NORMAL" with a "Clear" button. The "Battery voltage" section shows "Ext: 13.5" and "Int: Ok". A "Logout" button is at the bottom. On the right side, there are checkboxes for "Web Server" and "Auto Update", both of which are checked. Other buttons on the right include "File Transfer", "Set Clock", "Connect", "Upgrade", and "Status".

SYMPTOM: Xpert does not find a log file and creates it on its own



This is fine. This occurs if a log file is deleted from the SD storage card or Xpert flash disk. The Xpert will recreate the missing file for you; however it may take a LONG time. So, go get a cup of coffee or enjoy the scenery while the Xpert works.

- 7) **Quality Assurance/Control:** Problems with the PTG units or any erroneous content in this SOP should be directed to the Seattle Instrument Lab (SIL) via email (sil@noaa.gov) or phone (206-526-6915, 206-526-6923, or 206-526-6360).
- 8) **Management/Responsibility:** The Seattle Instrument Lab (SIL) Team Lead is responsible for maintaining this SOP.