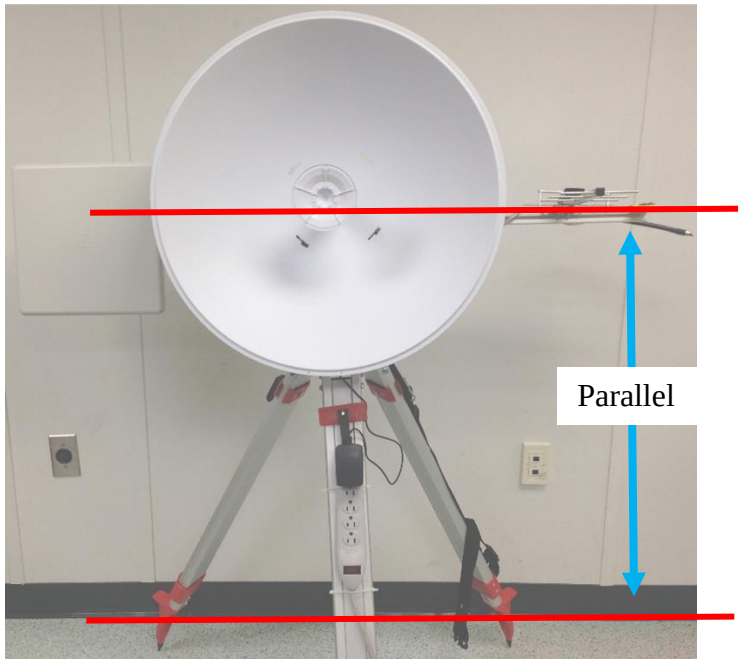
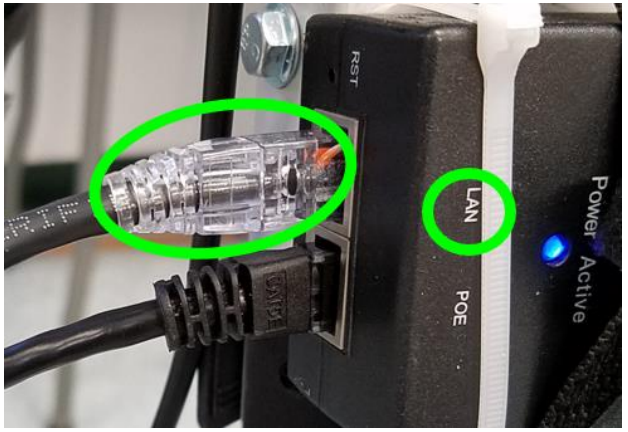
Checklist for Eclipse Payload Power Up and Testing

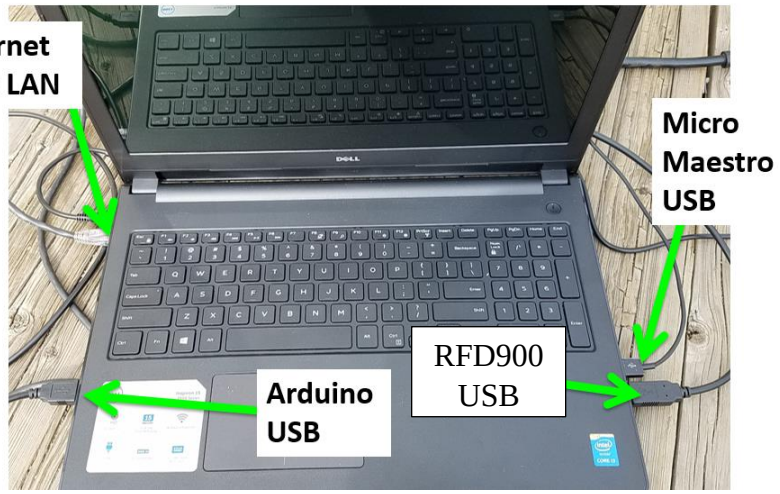
Reference Table	
IMEI #	
Arduino COM Port #	
Maestro COM Port #	
RFD900 COM Port #	

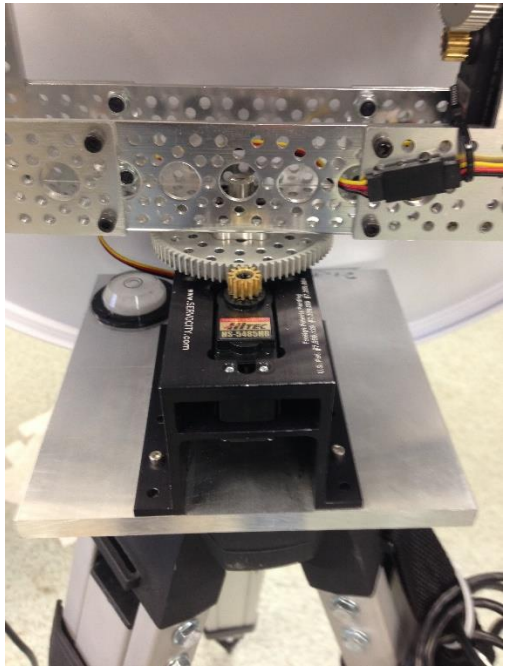
Name _____

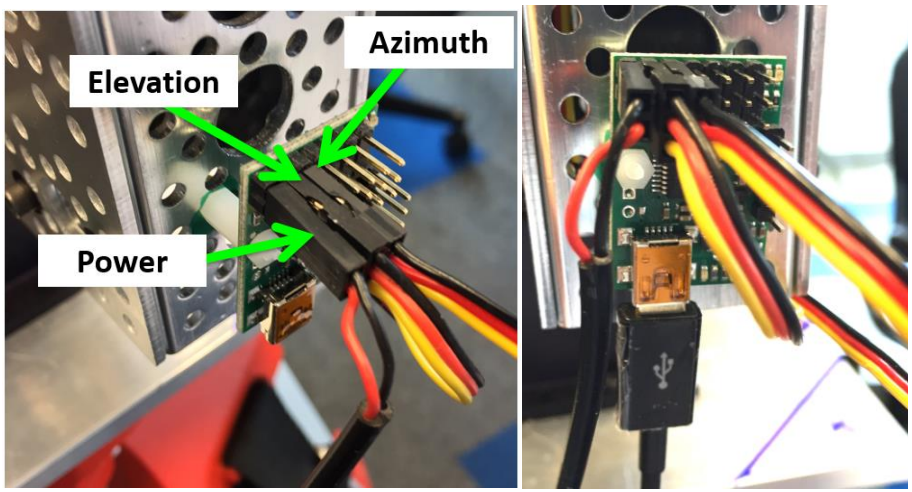
Team # _____

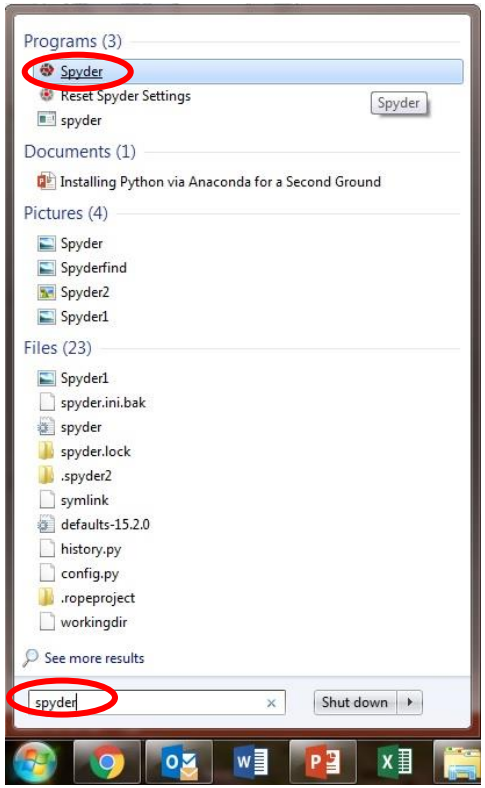
Step #	Ground Station		Done?
GS 1	Firmly plant the three feet of the tripod in/on the ground while using the bubble level to ensure that the baseplate is parallel to the ground.		

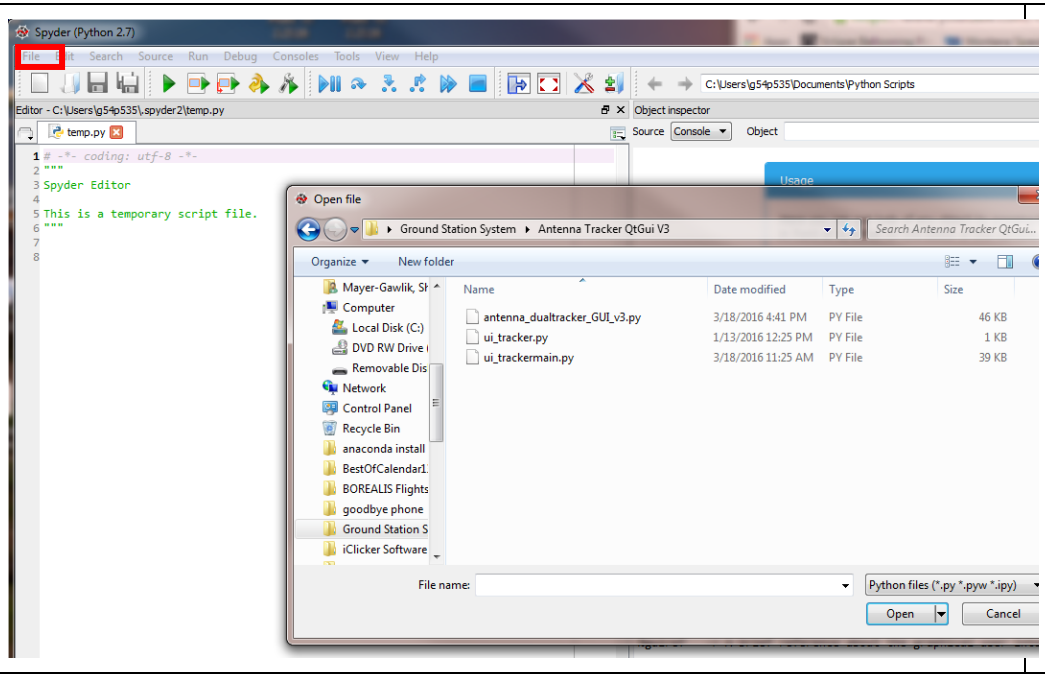
GS 2	Plug the power strip into the outlet that you are using and verify that the LED in the switch is on. Nothing should be plugged into it yet.		
GS 3	Connect one end of the Ethernet cable to the LAN port on the Power adapter.		

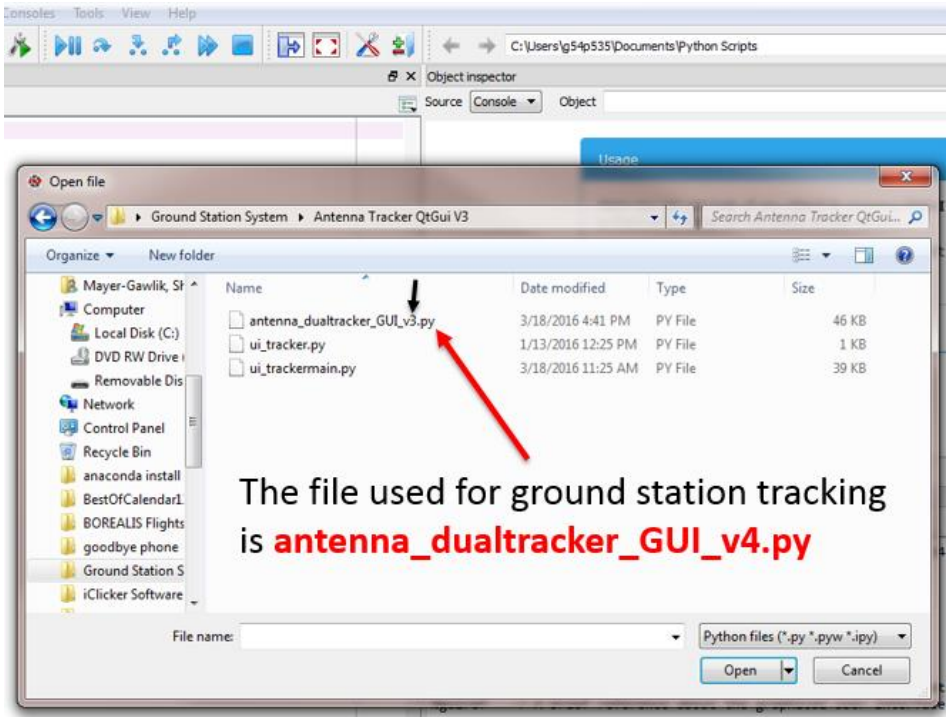
GS 4	Plug into the computer the: 1. Other end of the Ethernet cable 2. the Arduino USB 3. the Micro Maestro USB 4. the RFD900 USB NOTE: The computer charger doesn't need to be plugged in but it is recommended.		
GS 5	Power on the laptop		

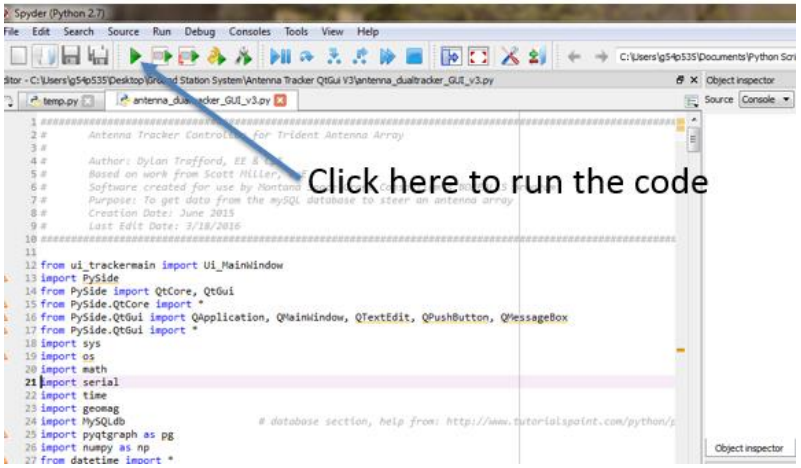
GS 6	Align the dish with the baseplate so that when the servos are powered the ground station doesn't swivel around to find zero. NOTE: The ground station will move slightly if centered, and a lot if not centered so watch out!		
GS 7	Use a compass to align the front of the baseplate to point in one of the 4 cardinal magnetic directions.		

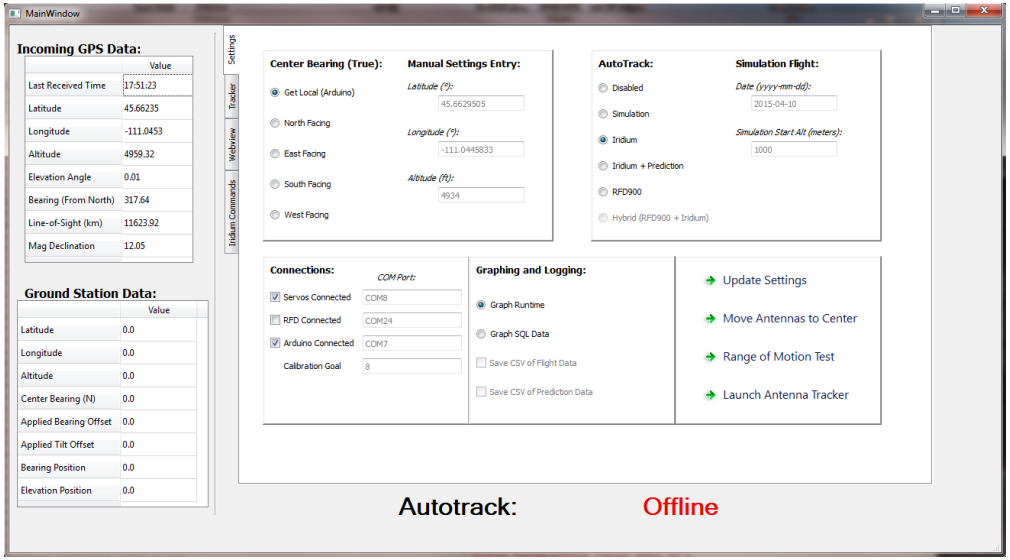
GS 8	Make sure that the Micro Maestro power transformer and both servos are plugged into the Micro Maestro board.		
GS 9	Plug the power transformer into the power strip. NOTE: The ground station will automatically move to zero so be sure to watch out!		

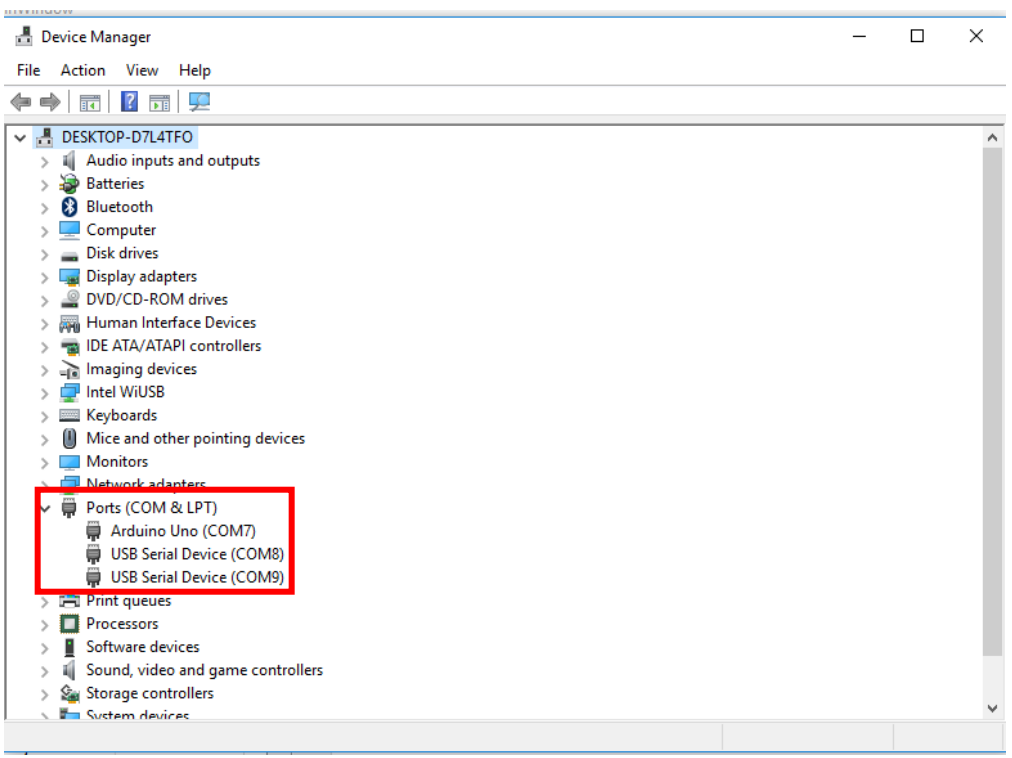
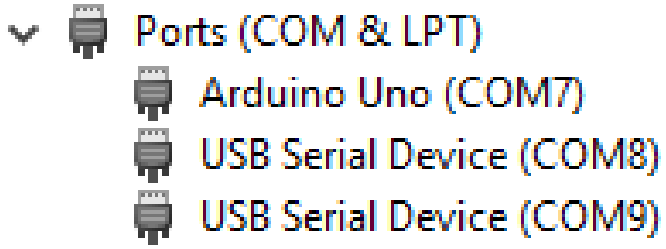
GS 10	Pause here and finish the Iridium payload steps (IP 1- IP 10) before continuing.		
GS 11	On the ground station laptop open the start menu, search for and open the "**Spyder**" application.		

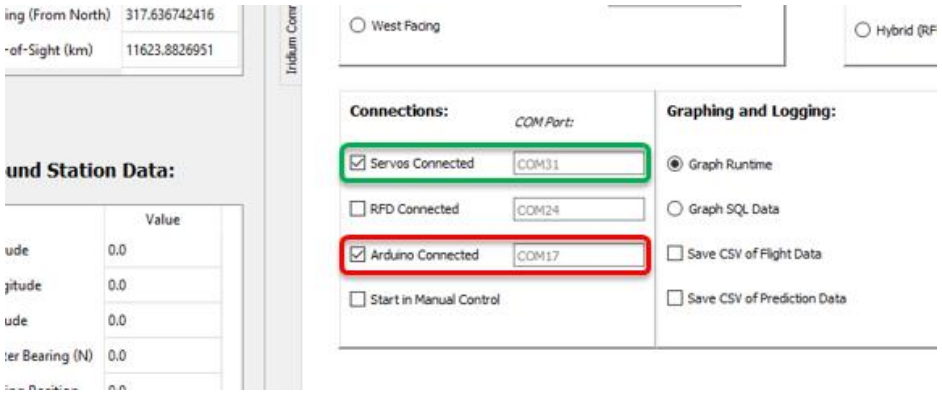
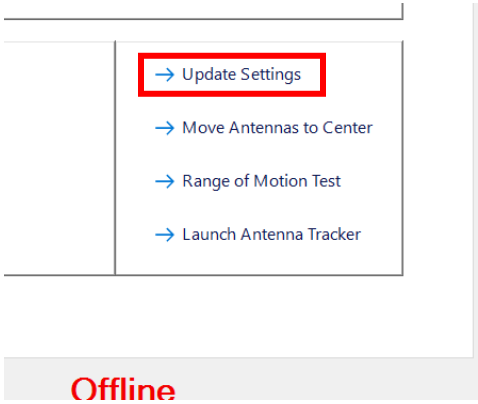
GS 12	Once it opens go to “**File**” → “**Open**”	

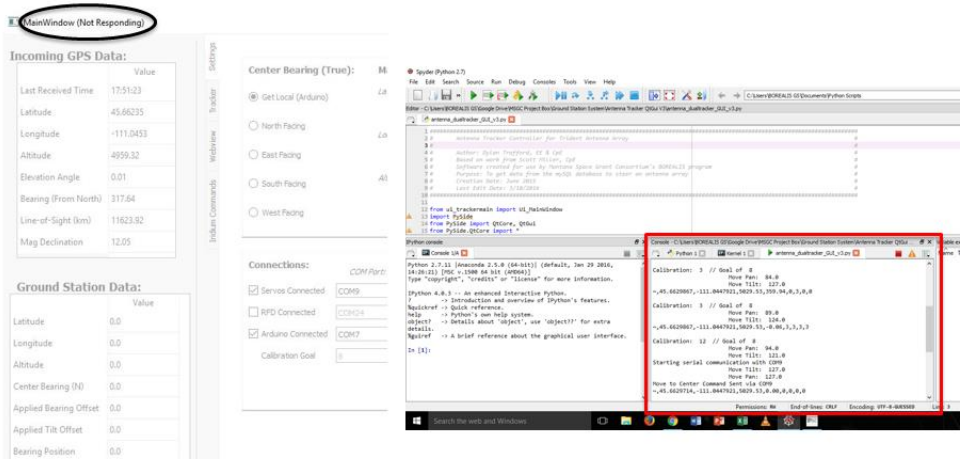
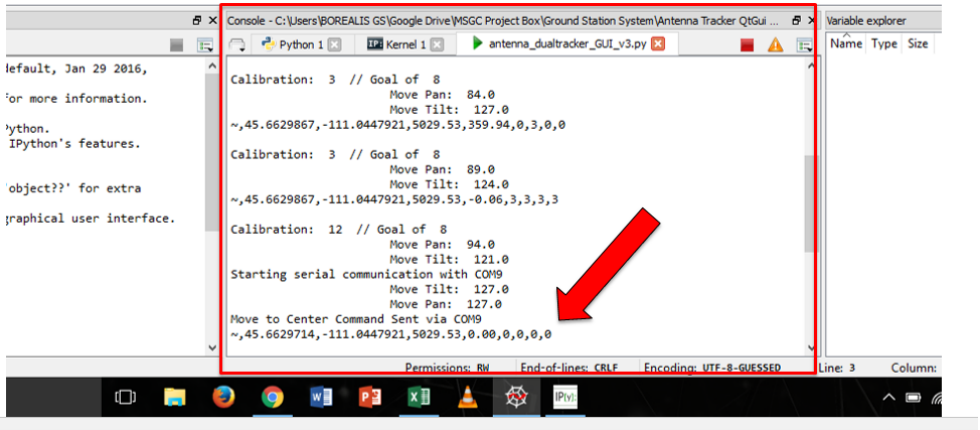
GS 13	Open the file called "**antenna_dualtracker_GUI_v4.py**"		
GS 14	Your Ground Station Laptop should already have this set, but if you are using a new computer or if you are having problems check this setting. **"Tools -> Preferences -> Consoles -> External Modules -> PyQt Libraries ->"** Change from **"Default"** to **"PySide"**		

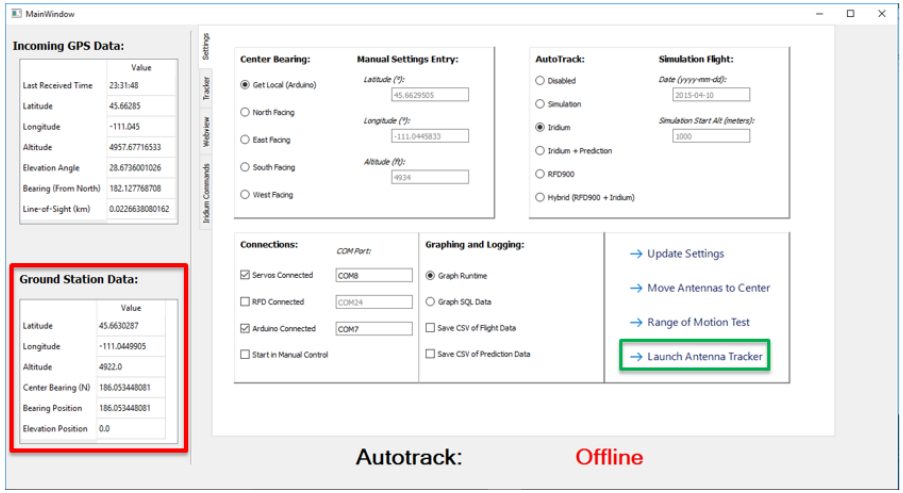
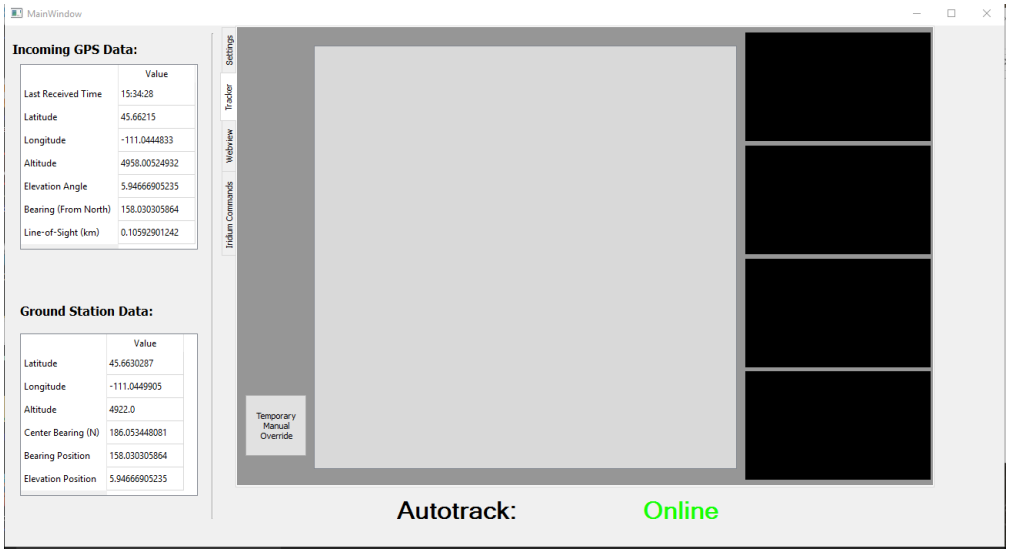
GS 15	Click on the “Play” button in the upper left to start the program.		
GS 16	If Spyder gives you an error or GUI doesn’t open there are a few common errors.	1. OperationalError: (2003, “Can’t connect to MySQL server on ‘153.90.202.51’ (3306)”) • Check your internet connection • Make sure you have the MySQLdb package installed (see python and packages installation instructions) • Download the MySQLdb .whl file from *https://pypi.python.org/pypi/mysqlclient* • Open Anaconda Prompt and install the .whl file with the following Anaconda Prompt command: **pip install mysqlclient-1.3.7-cp27-none-win_amd64.whl** (make sure you are in the right folder with the .whl file, **c:\Users\BOREALIS GS\Desktop\mysql>** for example) • Server may not be active (contact Montana Space Grant) 2. Make sure PyQtgraph package is installed (see python and packages installation instructions) • Open Anaconda Prompt and use the command: “**pip install pyqtgraph”**	

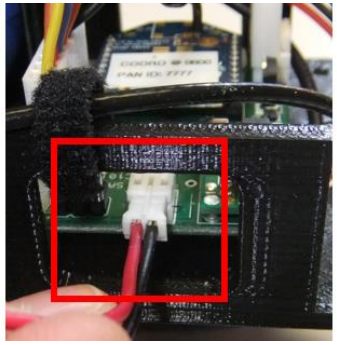
GS 17	If there were no errors then the tracking and calibration GUI should pop up.		

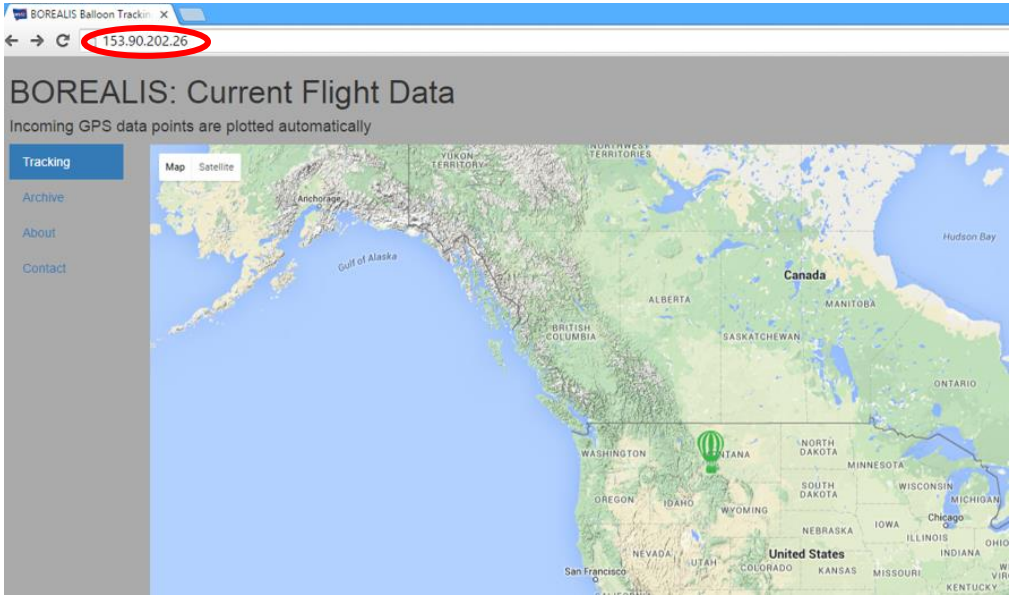
GS 18	On the ground station laptop open Device Manager and open the "**Ports (COM & LPT)**" drop down menu.		
GS 19	Record the COM port numbers of the Arduino and the Micro Maestro. NOTE: In this case the Arduino is on COM7 and the maestro is on COM8		

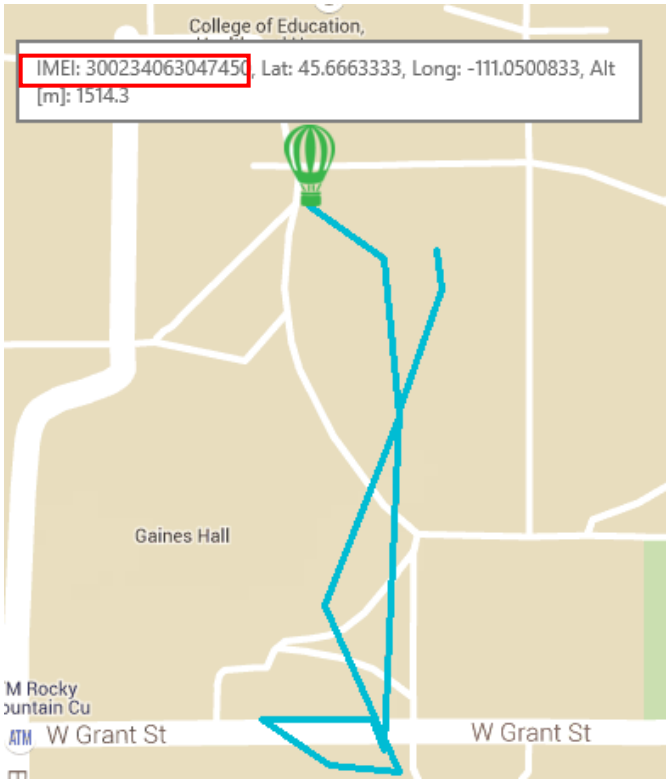
GS 20	Back in the GUI edit the COM ports for "**Servos Connected**" (where the maestro is plugged in) and "**Arduino Connected**" (where the Arduino uno is plugged in)		
GS 21	The next step will cause the ground station to move so be sure to clear it of all obstructions and that no cords will get tangled or cut.		
GS 22	Click on "**Update Settings**" to start the auto calibration.		

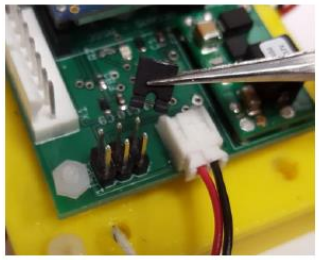
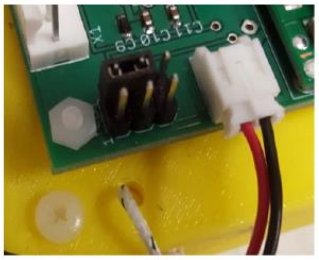
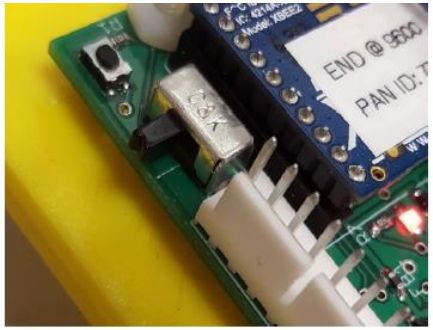
GS 23	If the GUI freezes up after clicking on "**Update Settings**" then check the Spyder console.		
GS 24	Should you notice a string of zeros below the "**Move to Center Command Sent via COM9**" then the IMU has lost its calibration. Eventually this will time out and the GUI will return to normal and you can click on "**Update Settings**" again.		

GS 25	If there were not any issues then check under "**Ground Station Data**" to make sure that the antenna will point where you think it should, specifically the "**Bearing Position**" and the "**Elevation Position**". If these look correct then click on "**Launch Antenna Tracker**".		
GS 26	If all works then the GUI should update and the antenna should be pointing at the Iridium payload.		
GS 27	Congratulations, the ground station is ready for the launch!	Verified by: _____ and _____	

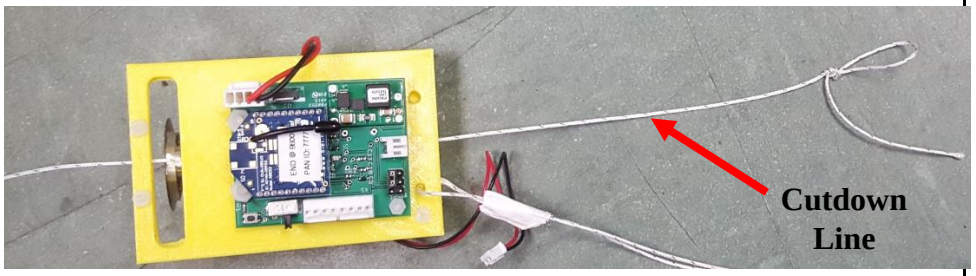
Step #	Iridium Payload		Done?
IP 1	Record the IMEI number on the side of the Iridium modem.		
IP 2	Power on the Iridium modem by plugging in the lithium battery to the Iridium OCCAMS board. The green LED on the Iridium modem should turn on.	 	

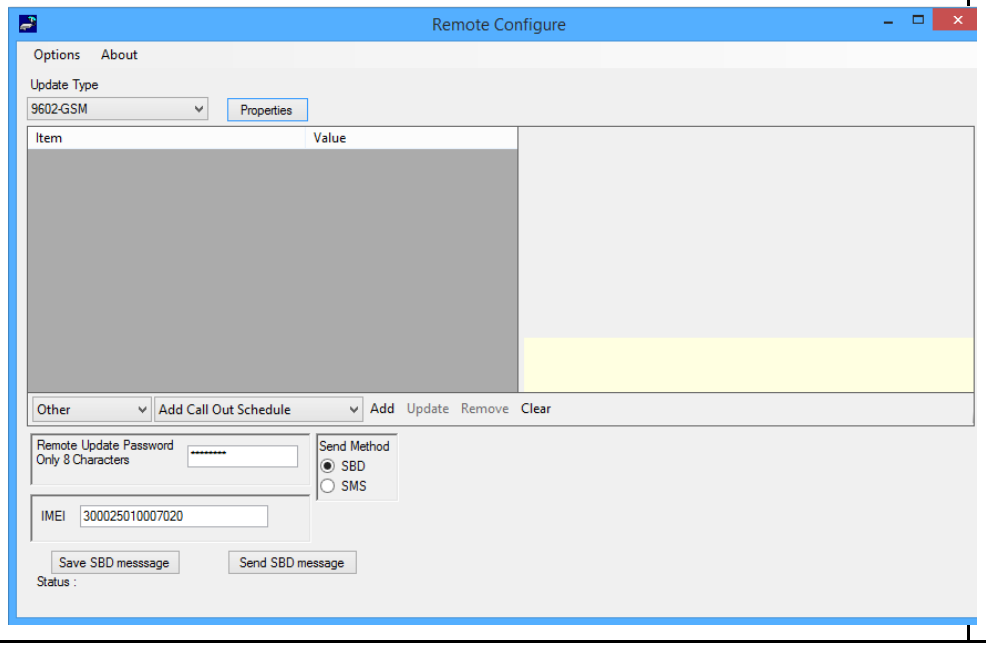
IP 3		Iridium Flashing = 1-2 bars connection Solid = 3-5 bars connection Off = No Connection found (0 bars) GPS Flashing = 2D Connection Solid = 3D Connection Off = No GPS Fix Status Flashing or off = Modem isn't responding due to no Iridium or GPS lock Solid = Modem successfully sent the last packet	
IP 4	Verify that the website is receiving the correct GPS data by opening a browser (chrome, firefox, etc.) and going to the following address: **153.90.202.26**		

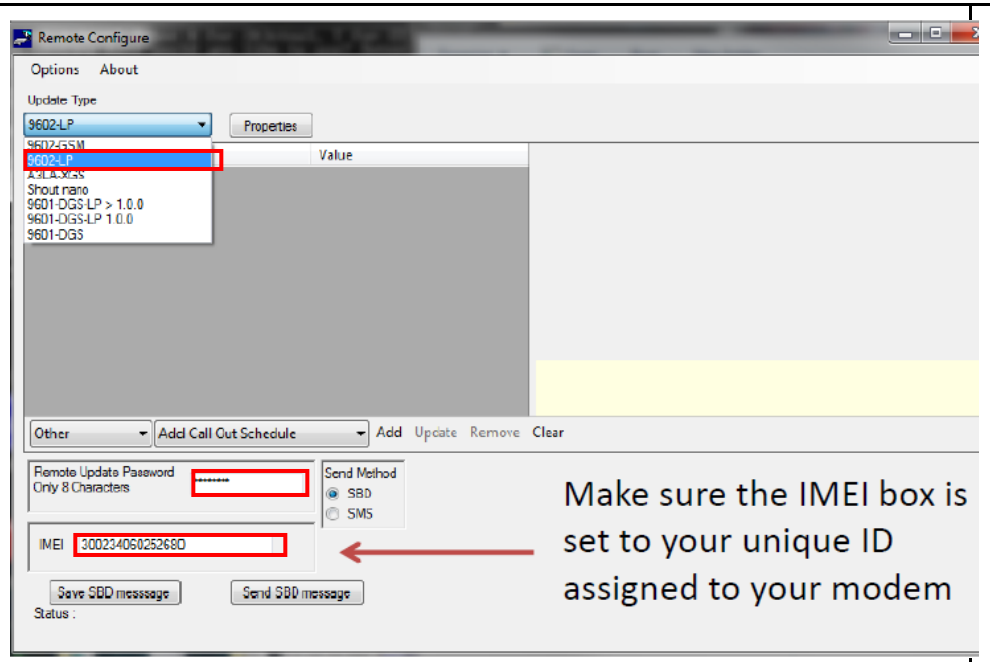
IP 5	Zoom in on the map to get a better picture of where your balloon is. NOTE: You can tell which balloon is which by hovering over the balloon icon with your mouse and looking at its IMEI number.		
IP 6	Both the Iridium OCCAMS and the cutdown OCCAMS need to be reset at the same time!	After being reset the timer will count up to 4 hours before it stops working. If the board is turned off while the timer is running then the timer only pauses, POWERING OFF THE BOARD DOES NOT RESET THE TIMER! When the board is powered on again the timer will start counting up from the point that it left off at.	

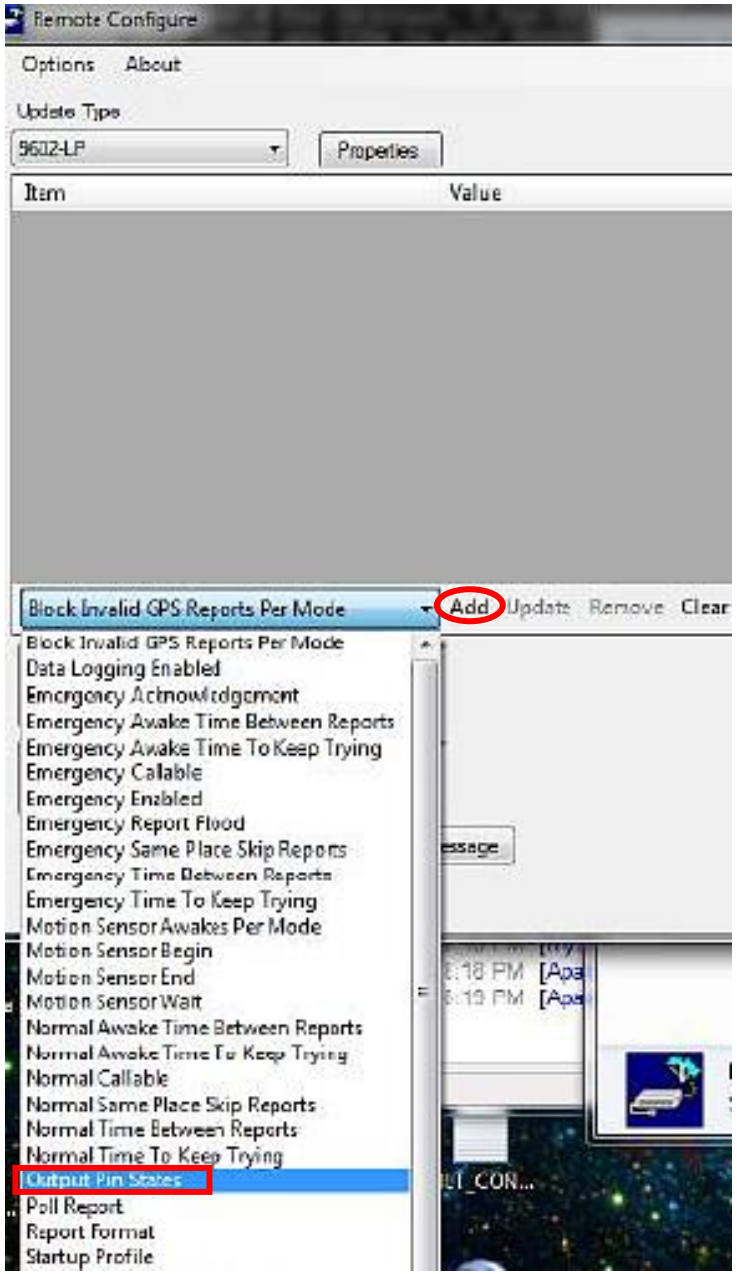
IP 7	Reset the onboard timer by first moving the shunt jumper to the reset position.	Reset Position   	
IP 8	Move the slide switch to the reset position.	 Reset Position	

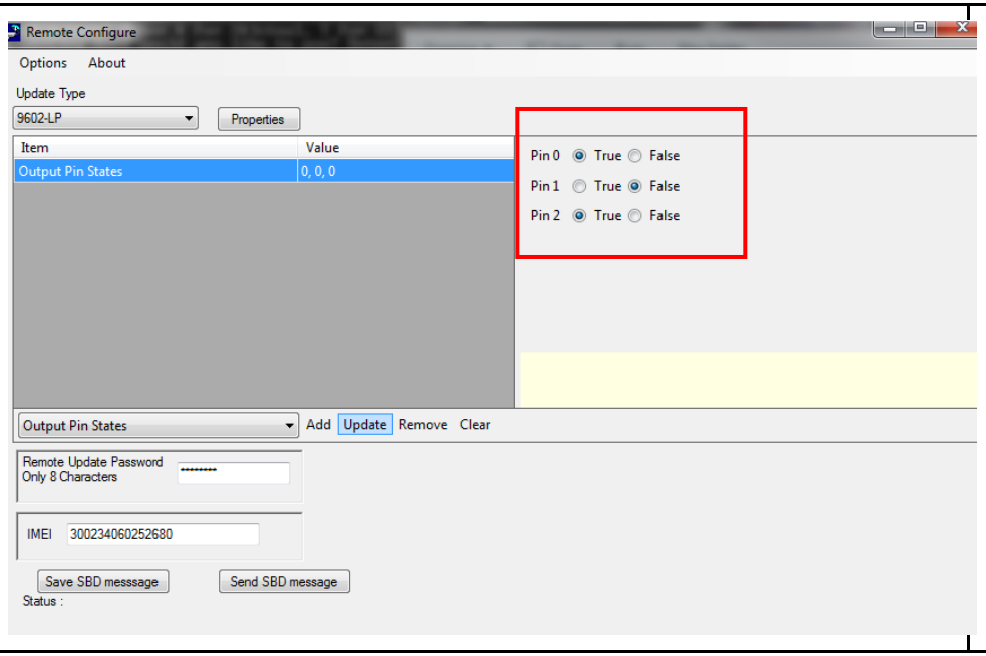
IP 9	Return the slide switch to the off position and the shunt jumper to the normal position.	 Off Position Normal Position  	
IP 10	Place the Iridium payload 20 feet away from the ground station. NOTE: You don't need to do this for an actual flight, only when testing.		
IP 11	Congratulations, the Iridium payload is ready for launch!	Verified by: _____ and _____	

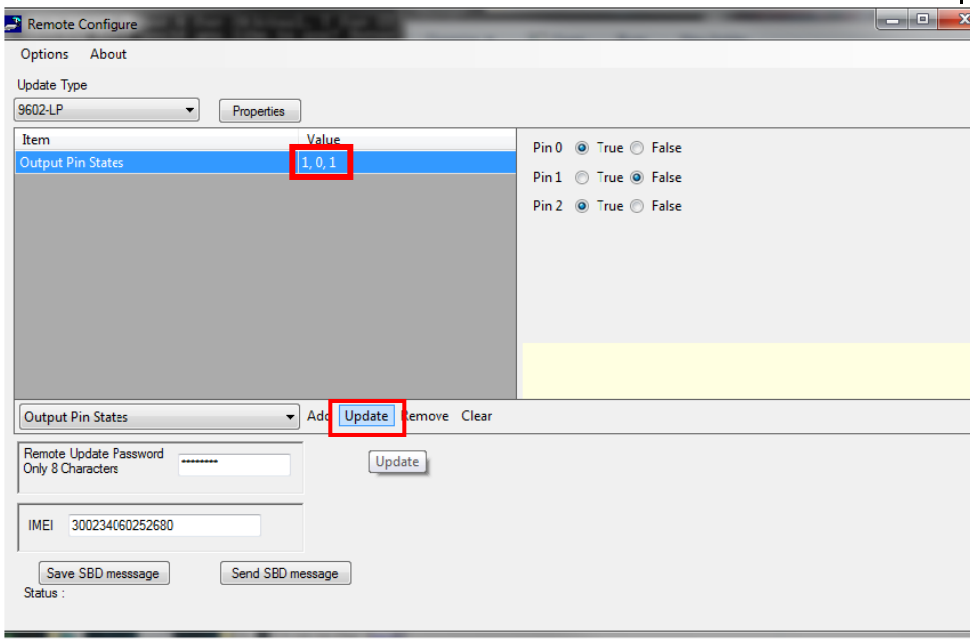
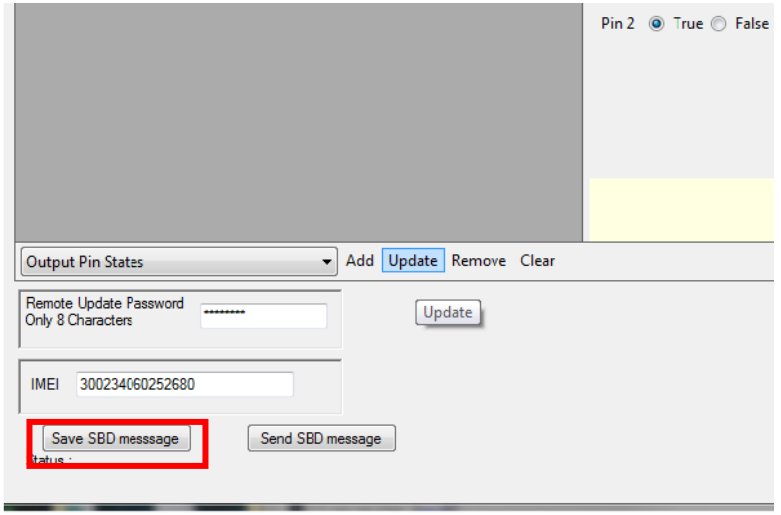
Step #	Cutdown Payload		Done?
CP 1	If it is not all ready, then feed the cutdown line through the cutdown payload. NOTE: The cutting blade should be attached but COVERED! You don't want to cut the cord yet or yourself ever.		
CP 2	Power on the cutdown payload by plugging in the lithium battery. The red LED will flash and there will be a beep.		

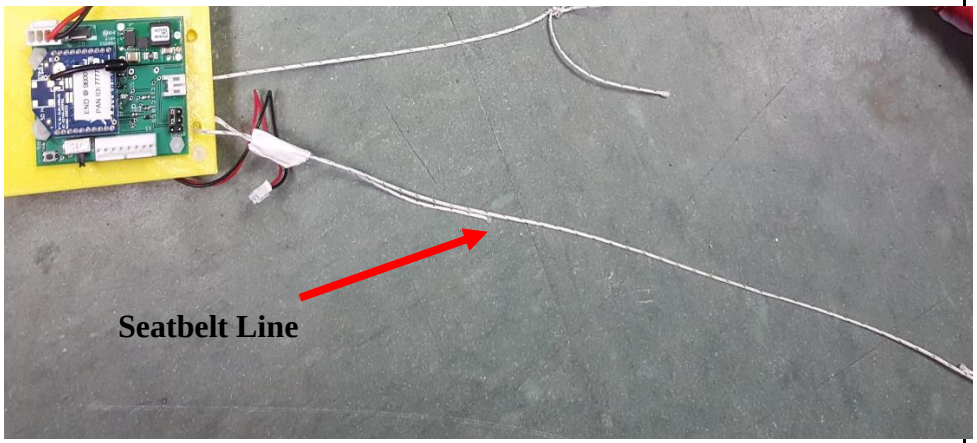
CP 3	Loop the cutdown line out of the way of the still covered blade.		
CP 4	If you have already made the idle and cutdown commands then skip to step CP 11.		
CP 5	Start the "**Remote Configure**" application on the ground station laptop.		

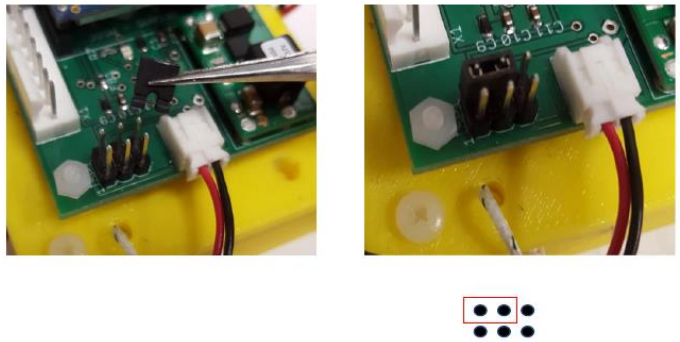
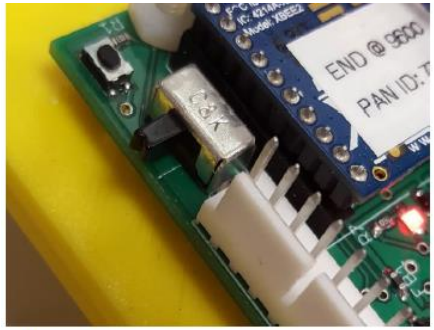
CP 6	Under "**Update Type**" select "**9602-LP**" from the drop down menu. The default password (12345678) should already be put in, change this only if you are using a different password. Lastly, put in the IMEI # of your modem.	

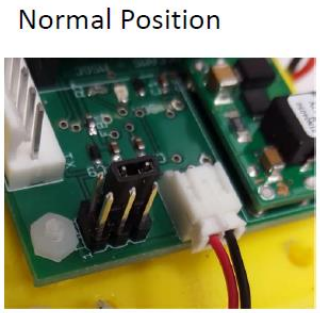
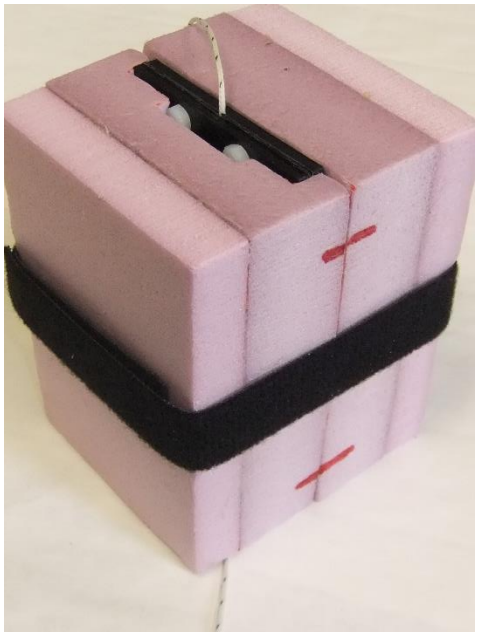
CP 7	In the drop down menu select "**Output Pin States**" and then click on "**Add**" to add the item to the packet.		

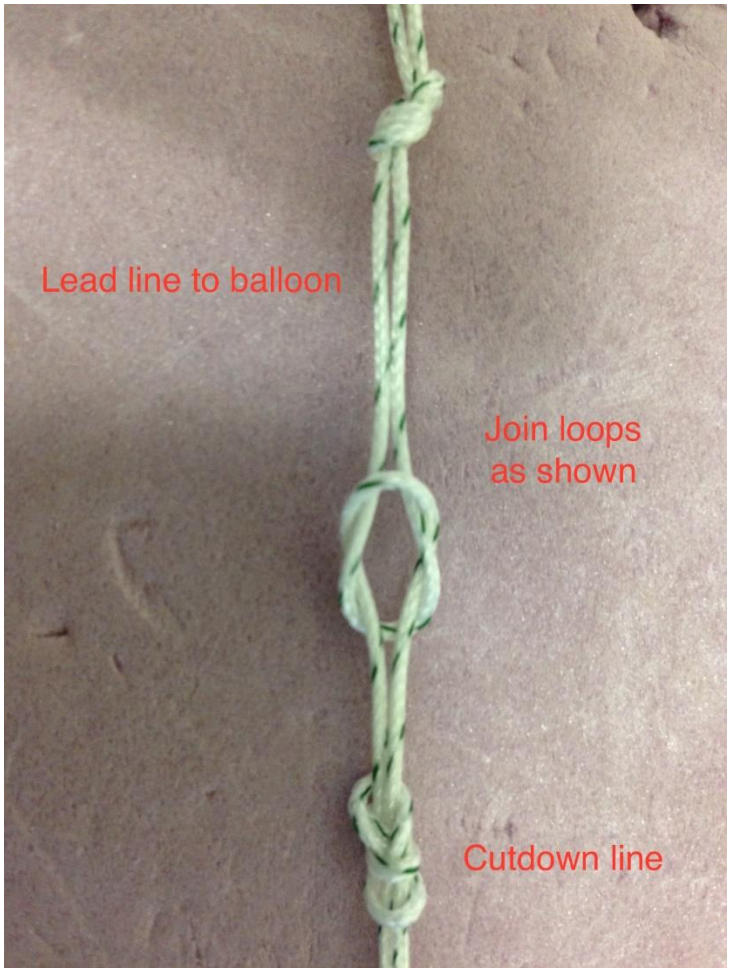
CP 8	Here you can change the states that the command will set the three output pins to.	

CP 9	Clicking on "**Update**" will change the pin values.		
CP 10	Click on "**Save SBD message**" to save the command as a .sbd file.		

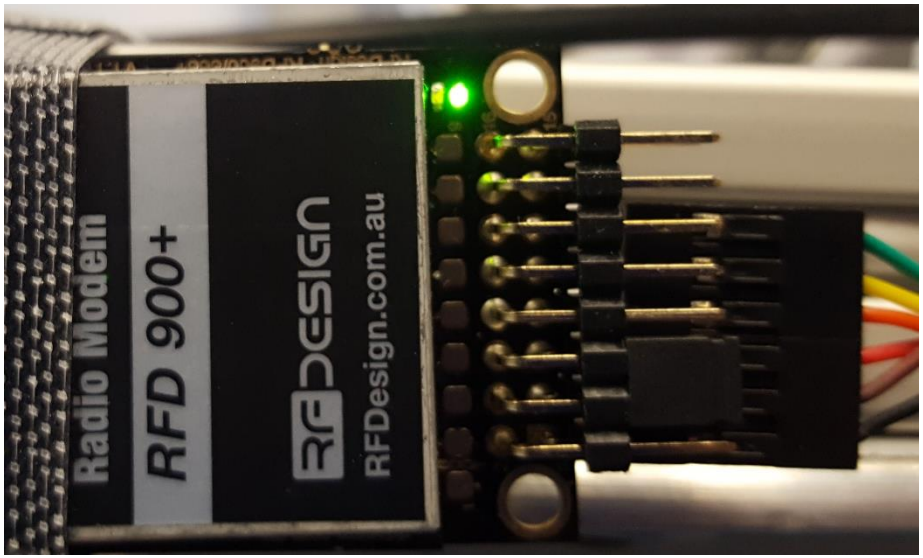
CP 11	The only two commands that you will be using are idle (000) and cutdown (001). You need to create a .sbd file of both commands.	Idle Pin 0 = False Pin 1 = False Pin 2 = False Cutdown Pin 0 = False Pin 1 = False Pin 2 = True	
CP 12	Send an email with the primary cutdown .sbd (001) command as an attachment to the Iridium payload.	Set data@sbd.iridium.com as recipient. Set the subject line of the email to the IMEI number of modem (on side of modem and writen above). Attach the .sbd file that you made earlier.	
CP 13	Send an email with the idle .sbd (000) command attached to the Iridium payload so that all 3 command bits are reset to zero and verify that the blade stops spinning.		
CP 14	Attach the seatbelt line to both the cutdown payload and the parachute.		
CP 15	Move the blade arm out of the way of the cutdown cord.		

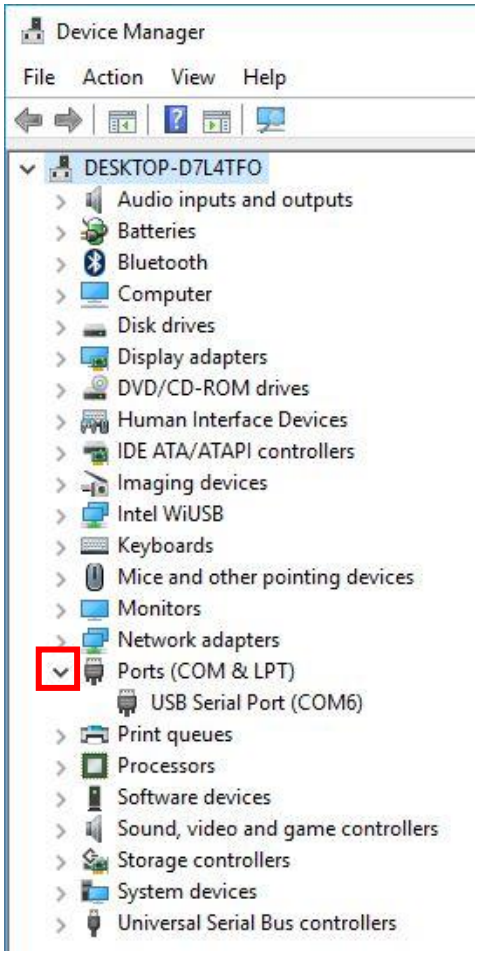
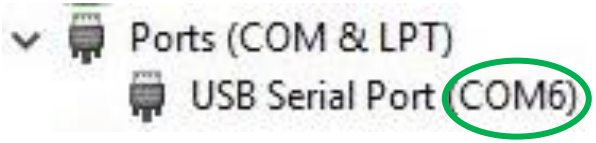
CP 16	Both the Iridium OCCAMS and the cutdown OCCAMS need to be reset at the same time!	After being reset the timer will count up to 4 hours before it stops working. If the board is turned off while the timer is running then the timer only pauses, POWERING OFF THE BOARD DOES NOT RESET THE TIMER! When the board is powered on again the timer will start counting up from the point that it left off at.	
CP 17	Reset the onboard timer by first moving the shunt jumper to the reset position.	Reset Position 	
CP 18	Move the slide switch to the reset position.	 Reset Position	

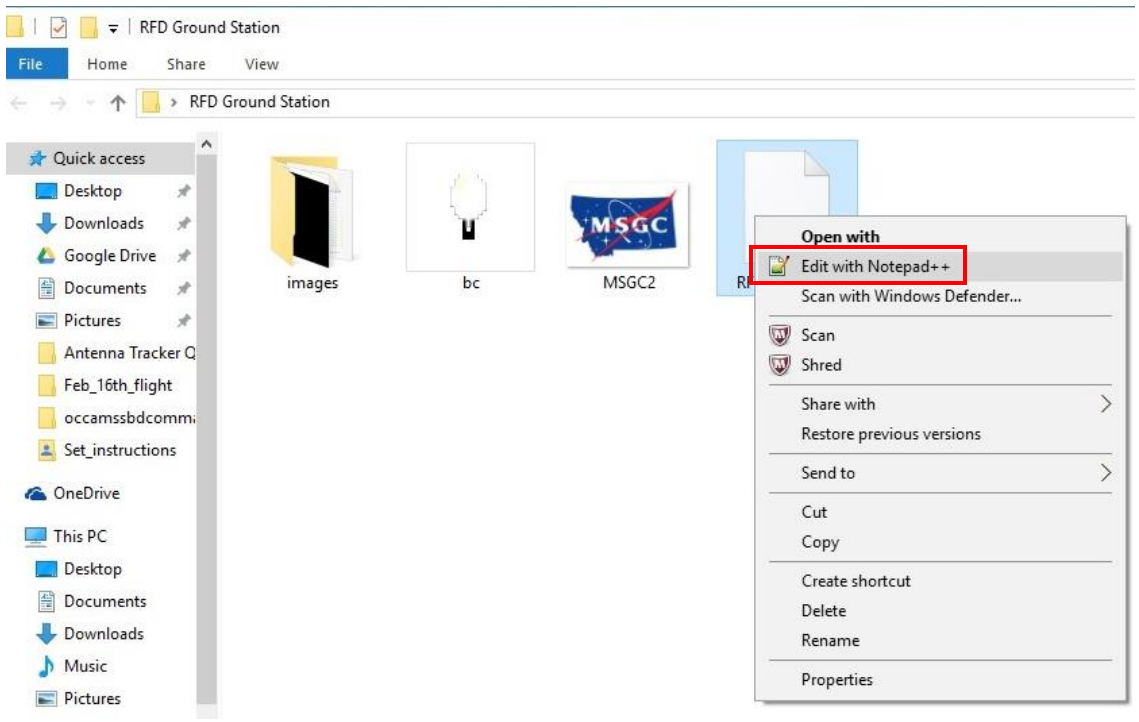
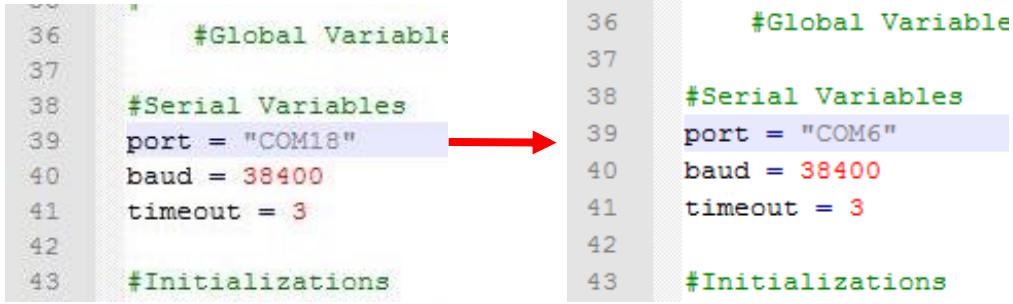
CP 19	Return the slide switch to the off position and the shunt jumper to the normal position.	 Off Position  Normal Position 	
CP 20	Seal up the cutdown payload		

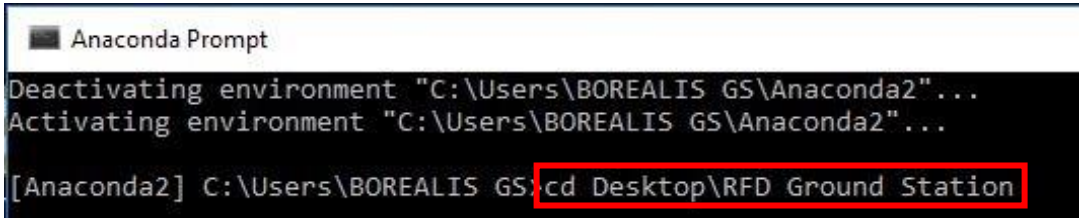
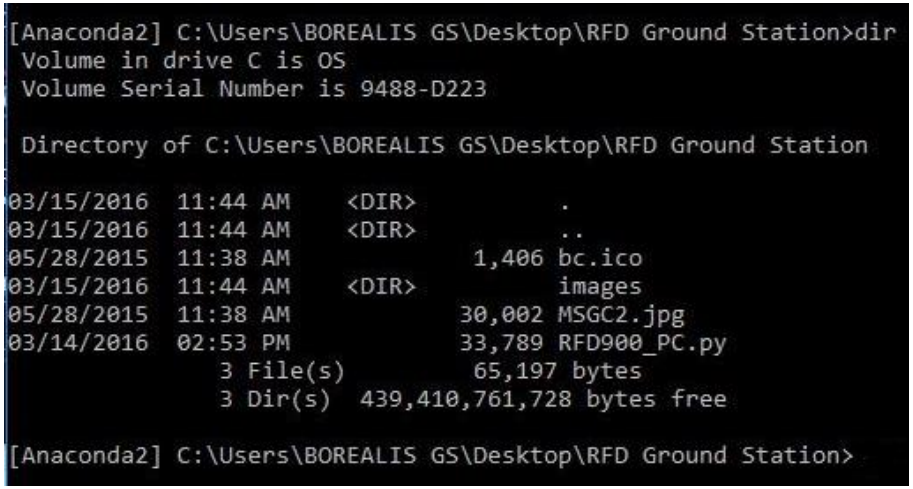
CP 21	Attach one end of the cutdown cord to the parachute line and the other end to the flight string.		
CP 22	Congratulations, the cutdown payload is ready for launch!	Verified by: _____ and _____	

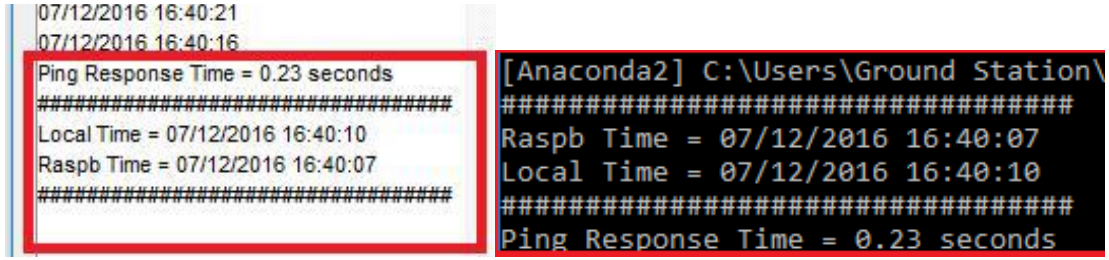
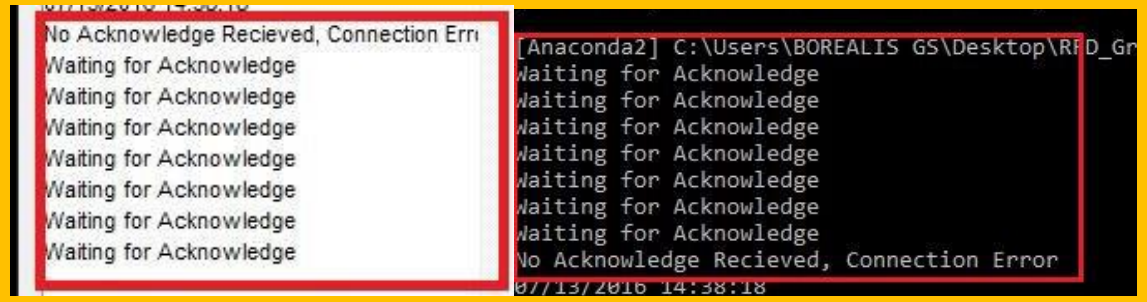
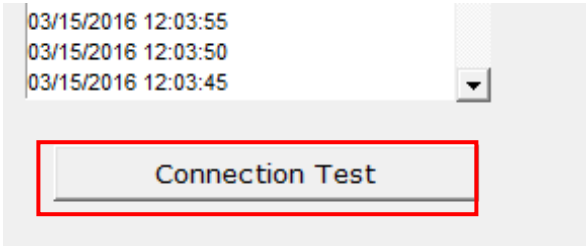
Step #	Still Image Payload		Done?
SI 1	Check that both antennas are plugged into the modem and screwed into the ground plate before turning the payload on. NOTE: The still image payload should already be sealed up and structurally ready for flight.	 	
SI 2	Turn on the still image payload by turning the power switch to the ON position. NOTE: Make sure the still image payload is on and running **BEFORE** the RFD ground station program is running.		

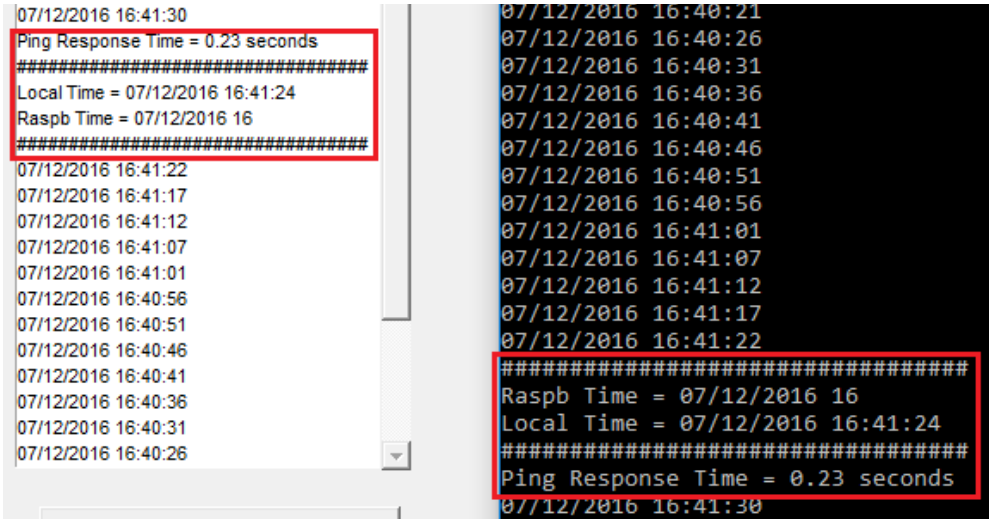
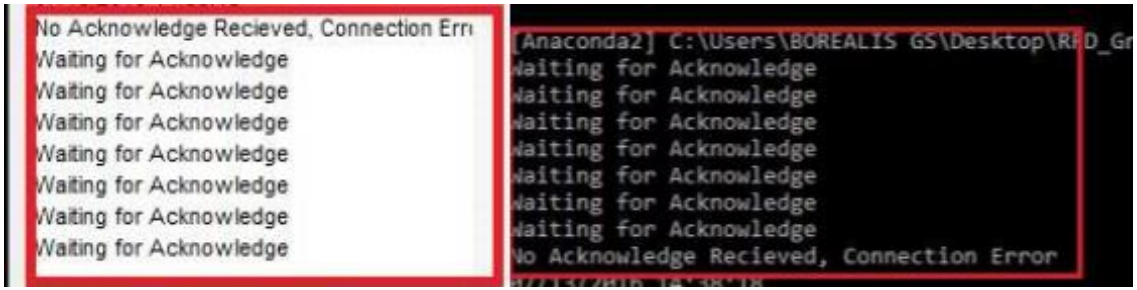
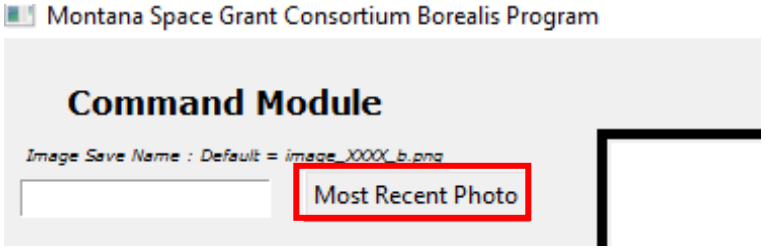
SI 3	Power on the ground station RFD900 receiver by plugging the USB cable from the ground station modem into the laptop.			
SI 4	If the two RFD900 modems are connected to each other then you may move on to the next step. If the two modems are not connected to each other then unplug the USB cable in step SI 3, turn off the image payload (see below) and go back to step SI 1.	<u>Solid light</u> Both modems are connected to each other	<u>Blinking or unsteady light</u> The modems are not properly connected	

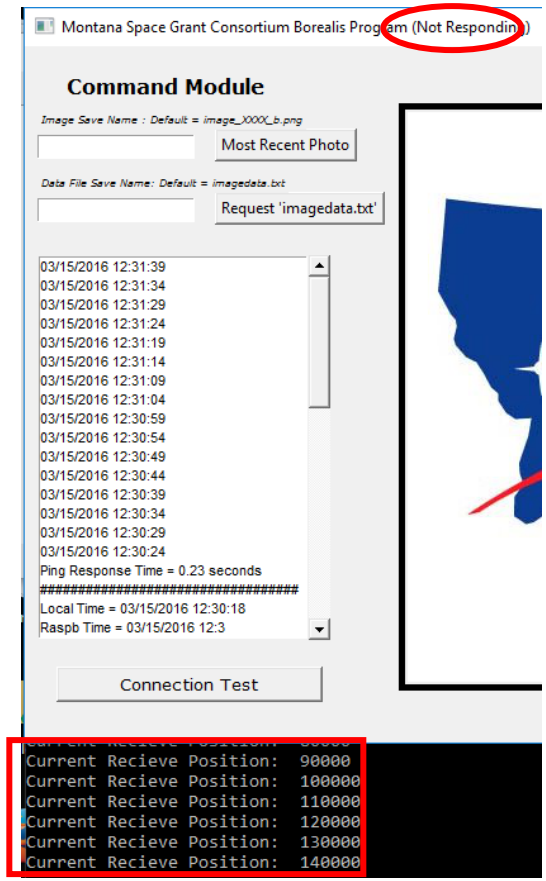
SI 5	On the ground station laptop open Device Manager and open the "**Ports (COM & LPT)**" drop down menu.		
SI 6	Record the COM port number.		

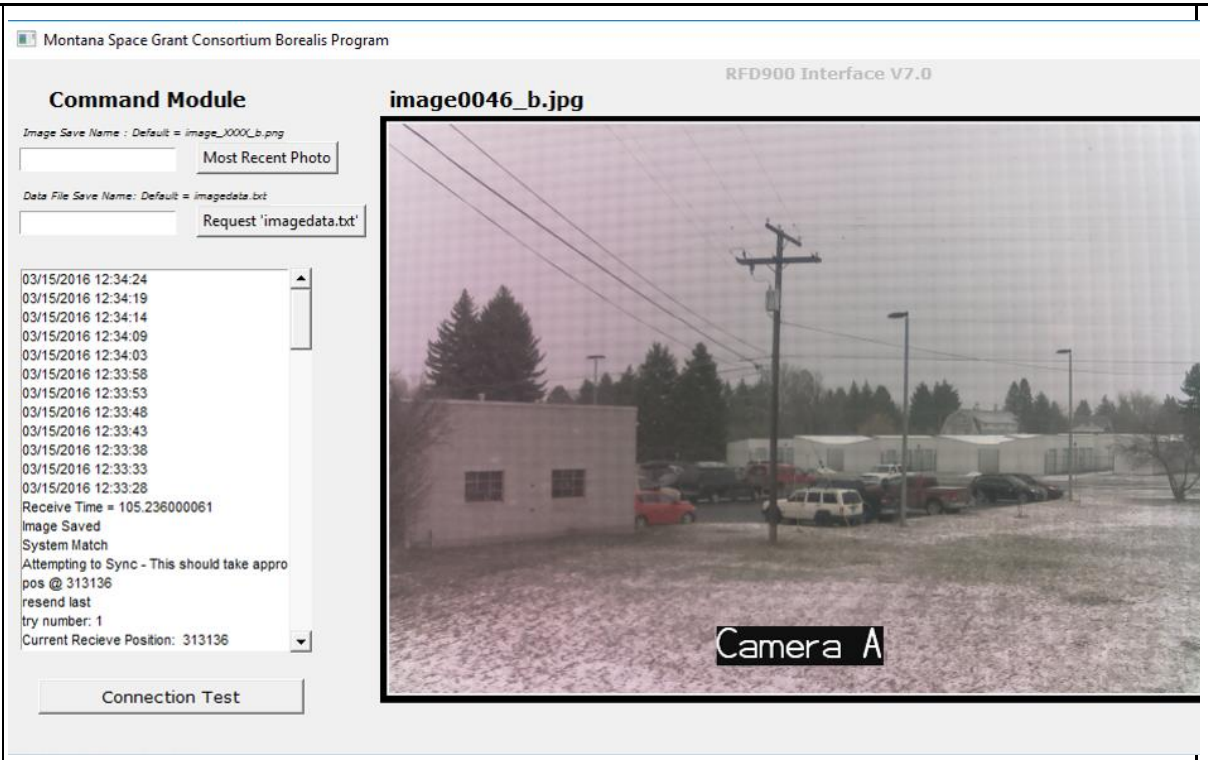
SI 7	From the laptop desktop open the "**RFD Ground Station**" folder. Right click on the file called "**RFD900_PC.py**" and click on "**Edit with Notepad++**"		
SI 8	In Notepad++ at line 39, edit "**port = "COM18"**" to the port number you found in Device Manager and recorded earlier (Example: COM18→COM6)		
SI 9	Save the changes and close Notepad++		

SI 10	Open the "**Anaconda Prompt**" program and something similar to the following will be displayed: "**[Anaconda2] C:\Users\BOREALIS GS>**" Type in "**cd Desktop\RFD Ground Station**" and then hit [ENTER]. NOTE: Yours will be slightly different because your computer has a different name.		
SI 11	Type in "**dir**" and hit [ENTER] to list all of the contents of the folder.		

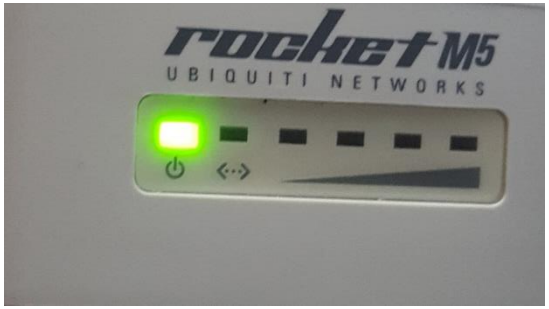
SI 12	Finally, to start the still image GUI type in "**python RFD900_PC.py**" and hit [ENTER]		
SI 13	A Blank RFD GUI will start up. If you see both time stamps in the GUI and a ping time in Anaconda then the two radios are connected and you can skip to step SI 14.	 **GOOD**	
SI 14	If it says "**Waiting for Acknowledge**" and "**No Acknowledge Received, Connection Error**" when the GUI opens then the two radios are not connected. Go back to step SI 4.	 **BAD**	
SI 15	To verify that the ground station is indeed connected to the still image payload click in the "**Connection Test**" button.		

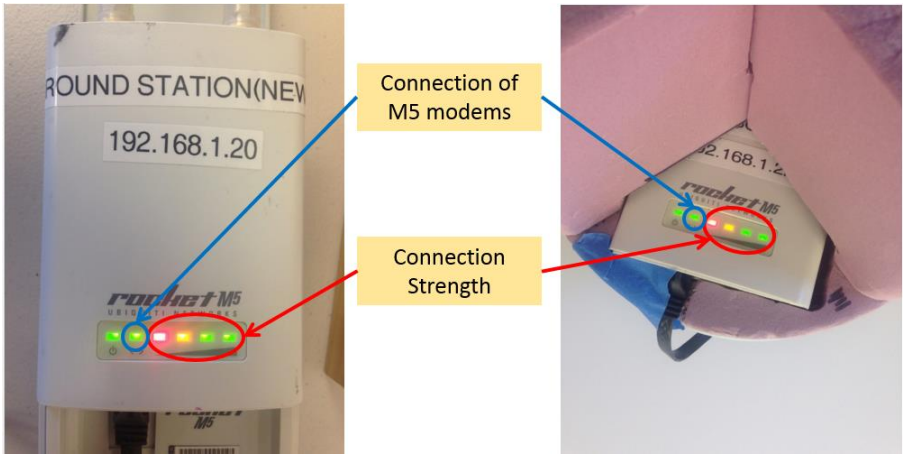
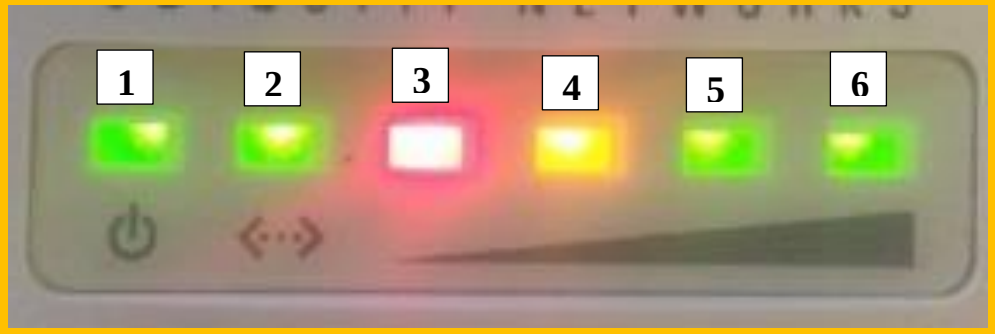
SI 16	If the connection test was successful then you will see a ping time and two time stamps in both the GUI and Anaconda.		
SI 17	If the connection test was unsuccessful then the GUI and Anaconda will say “**Waiting for Acknowledge**” and “**No Acknowledge Received, Connection Error**”		
SI 18	To request the most recent picture taken click on the “**Most Recent Photo**” button.		

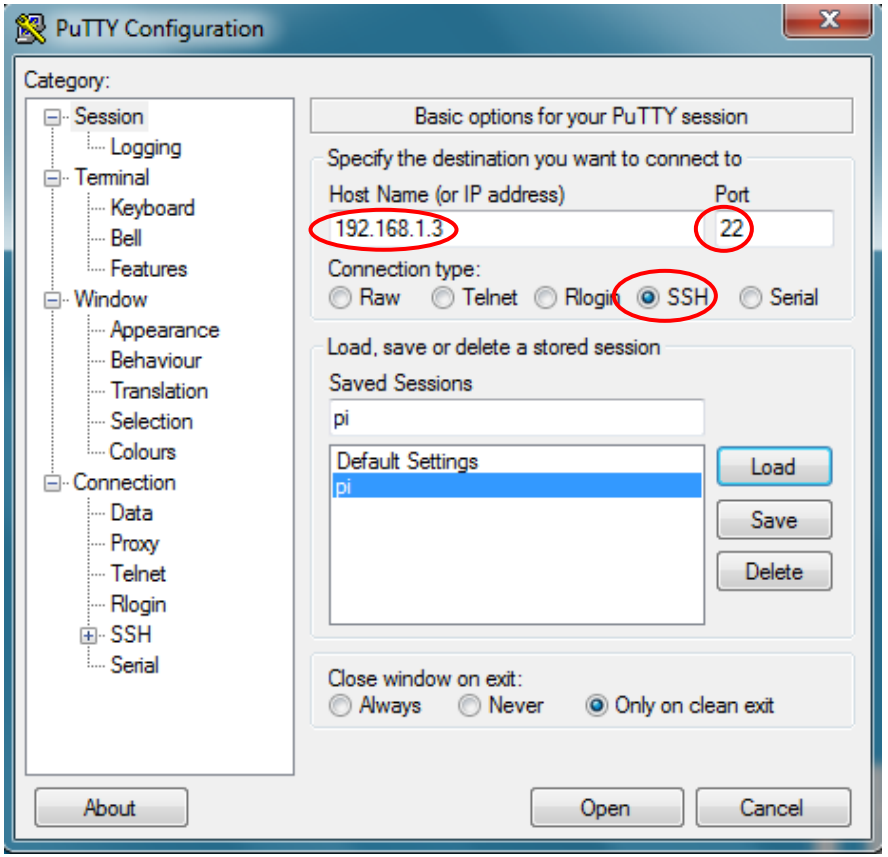
SI 19	While the most recent image is being downloaded "**(Not Responding)**" will be displayed at the top of the window and the anaconda window will show how many bits (in 10,000 bit increments) have been downloaded.		

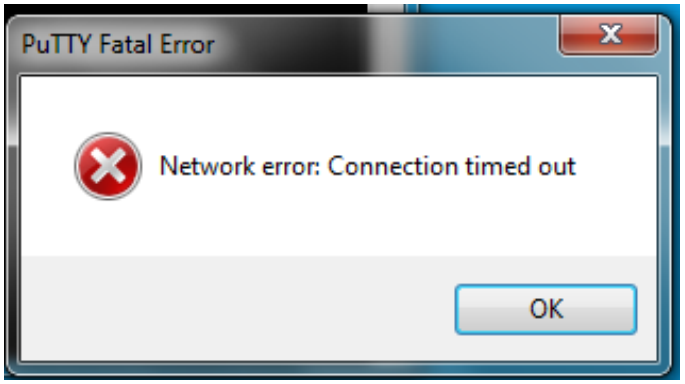
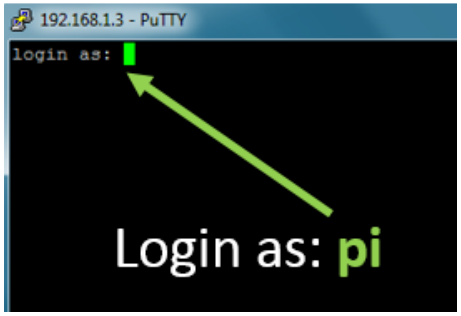
SI 20	Once the most recent image has been downloaded, the GUI will update and display the image.		
SI 21	Congratulations, the still image payload is working and is ready for launch!	Verified by: _____ and _____	

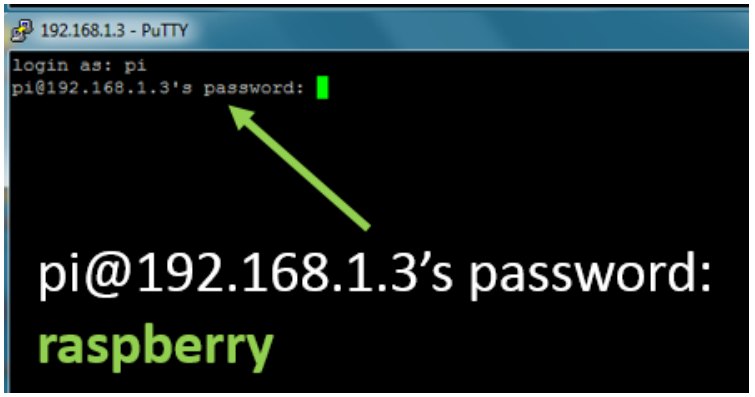
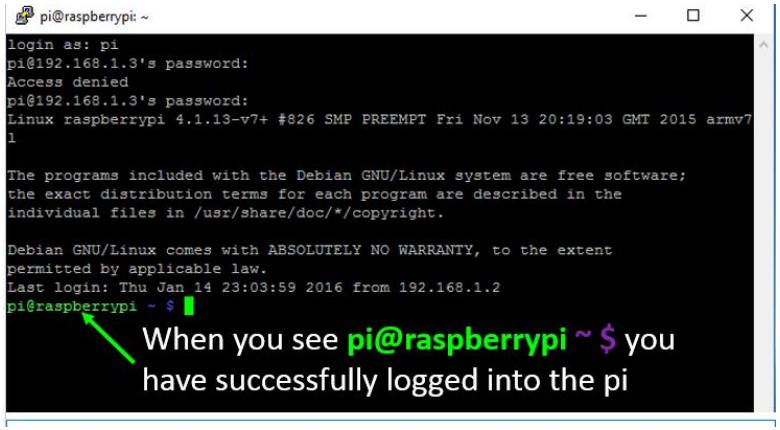
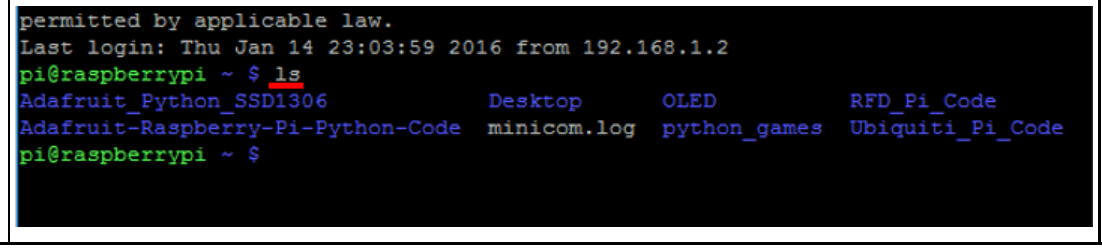
Step #	Video Payload		Done?
VP 1	Check that both antennas are screwed into the modem before turning the payload on.		

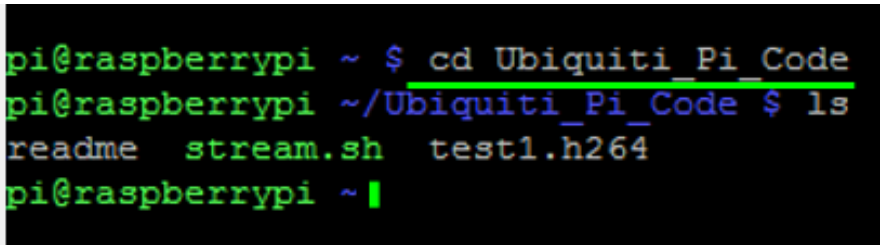
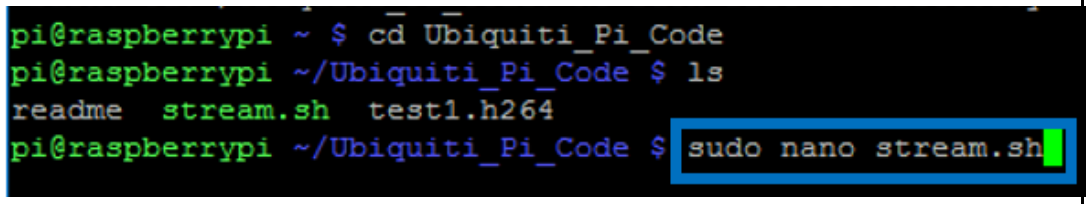
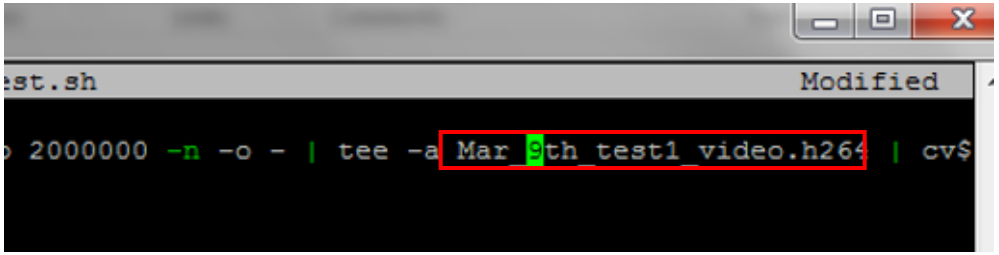
VP 2	Turn on the video payload by turning the power switch to the ON position. NOTE: The video payload should already be sealed up and structurally ready for flight.		
VP 3	Verify that the system is on with the green power LED if it is accessible.		
VP 4	Power on the ground station M5 modem by plugging the POE converter into the power strip on the side of the ground station. The green power LED should light up on the ground station modem.		

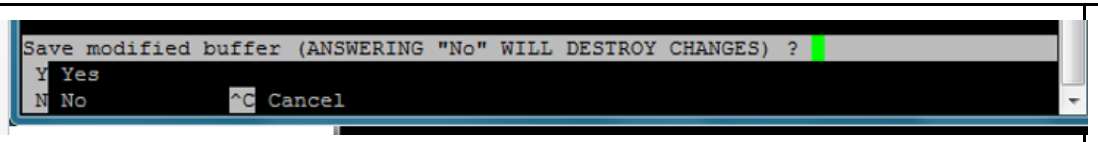
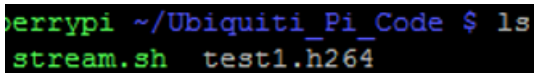
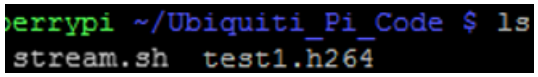
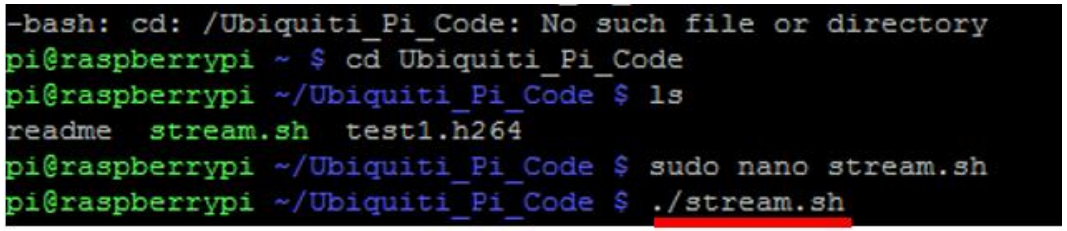
VP 5	Check the connection status of the ground station and video payload M5 modems.		
VP 6	1. Modem is powered 2. Modem is connected to another modem 3. Weak connection 4. Medium connection 5. Good connection 6. Strong connection If the two modems are not connected then unplug the POE converter, turn off the video payload and go back to step VP 1.		

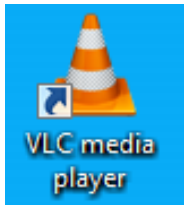
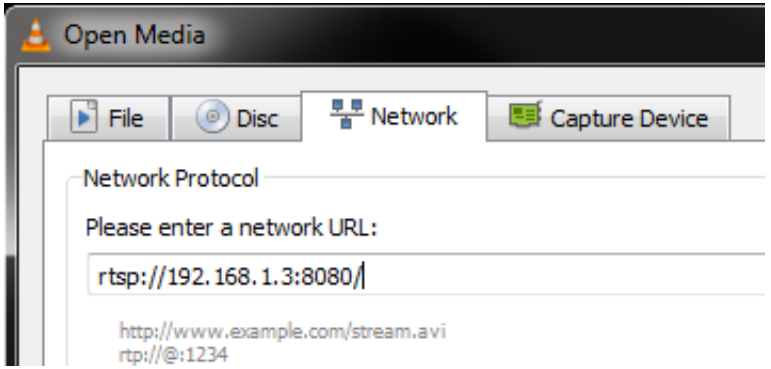
VP 7	On the ground station laptop start putty.exe and enter/verify the connection type, the IP address and the port number and then click on Open. Connection type: "**SSH**" IP address: "**192.168.1.3**" Port: "**22**"		

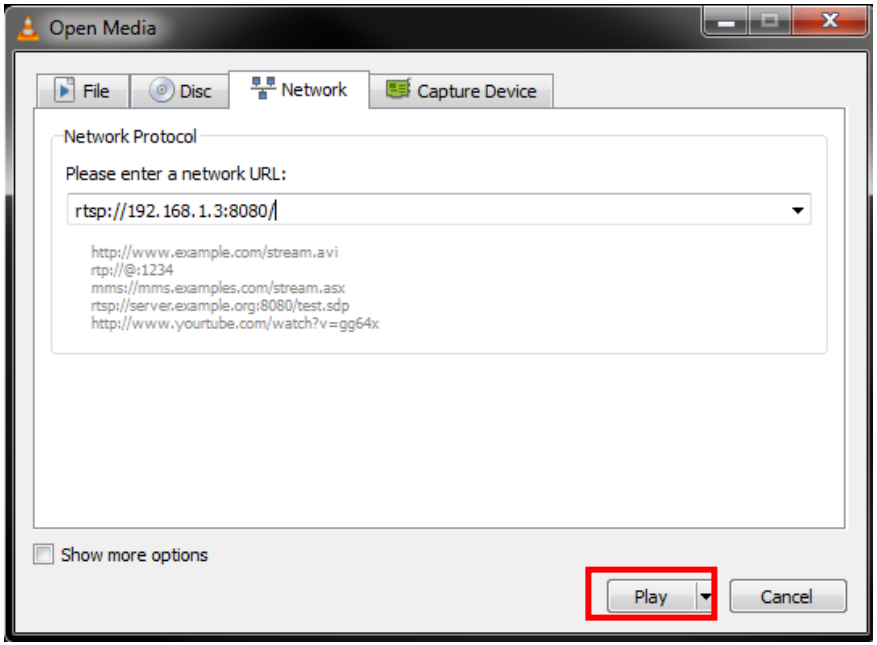
VP 8	If you get the error: PuTTy Fatal Error "**Network error: Connection timed out**", then proceed to the next step. If you don't get an error then skip to step VP 12.		
VP 9	Go back to step VP 6 and check that both modems are connected.		
VP 10	If both modems are connected then check to see if the pi has an sd card.	1. Open the start menu and type in "**cmd**" and click on "**Command Prompt**". 2. Type in "**Ping 192.168.1.3**" to see if the pi and the laptop are on the same network. 3. If it says "**Reply from 192.168.1.3**" then the pi has an sd card installed.	
VP 11	Go back to step VP 7 and try PuTTY again.		
VP 12	At the prompt that says "**login as:**" type in "**pi**" and hit [ENTER].		

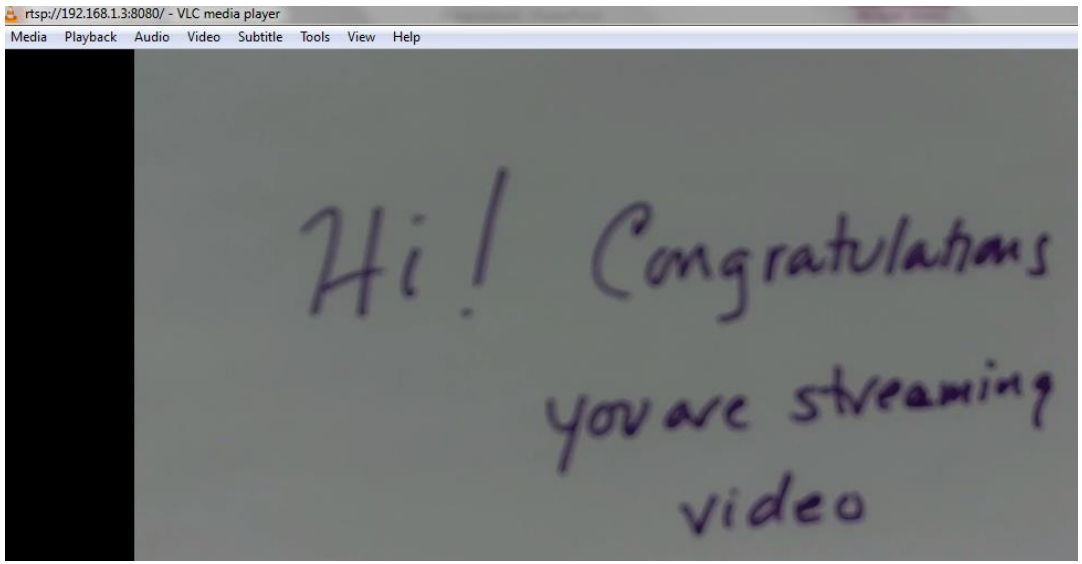
VP 13	When prompted for a password type in "**raspberry**" and hit [ENTER]. NOTE: Nothing will appear as you type in the password, this is normal.		
VP 14	Once logged in to the pi you should see "**pi@raspberrypi~$**"		
VP 15	Type in "**ls**" (lower case L and lower case S) and then hit [ENTER] to list the available files and directories.		

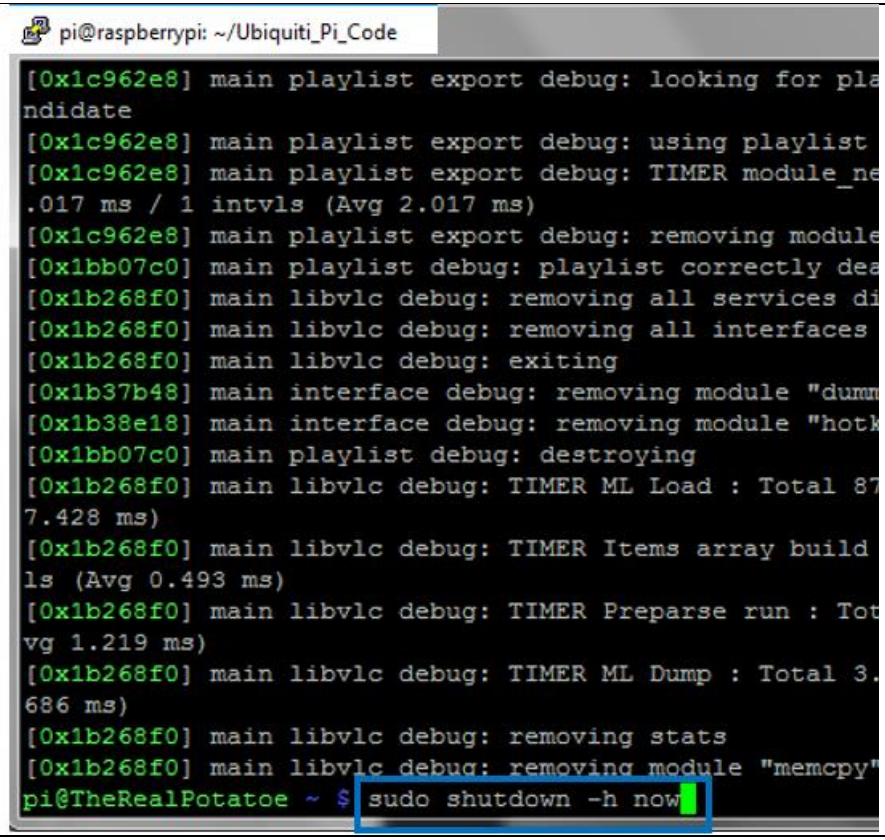
VP 16	Type in "**cd Ubiquiti_Pi_Code**" and then hit [ENTER] to navigate into the Ubiquiti_Pi_Code directory and then type in "**ls**" and hit [ENTER] again to see all of the files in this directory.		
VP 17	In order for the video payload to work we need to change the file name where the onboard files will be stored. Type in "**sudo nano stream.sh**" and then hit [ENTER] NOTE: you will be editing the command so be careful what you change!		
VP 18	Using the right arrow key move the cursor to the right just past "**| tee -a**" and change the file name to something like: **May_18th_test1_video.h264** OR **Aug_21st_flight4_video.h264** Once the name is changed hit [CTRL]+[X] to save and exit the editor.		

VP 19	When prompted to save the modified buffer type "**y**" and then hit [ENTER]		
VP 20	Next when it says "**File Name to Write: stream.sh**" simply hit [ENTER] to keep the file name the same.		
VP 21	Type in "**ls**". If "**stream.sh**" is not green then type in "**sudo chmod +x stream.sh**" to make the file a script that can be run.	 Good	 Bad
VP 22	Finally type in "**./stream.sh**" and then hit [ENTER] to begin streaming live video.		
VP 23	Place the video payload 20 feet away from the ground station. NOTE: You don't need to do this for an actual flight, only when testing.		

VP 24	Open VLC media player		
VP 25	Click on the play button to open the "**Open Media**" window. Under the "**Network**" tab enter the following URL: "**rtsp://192.168.1.3:8080/**"		

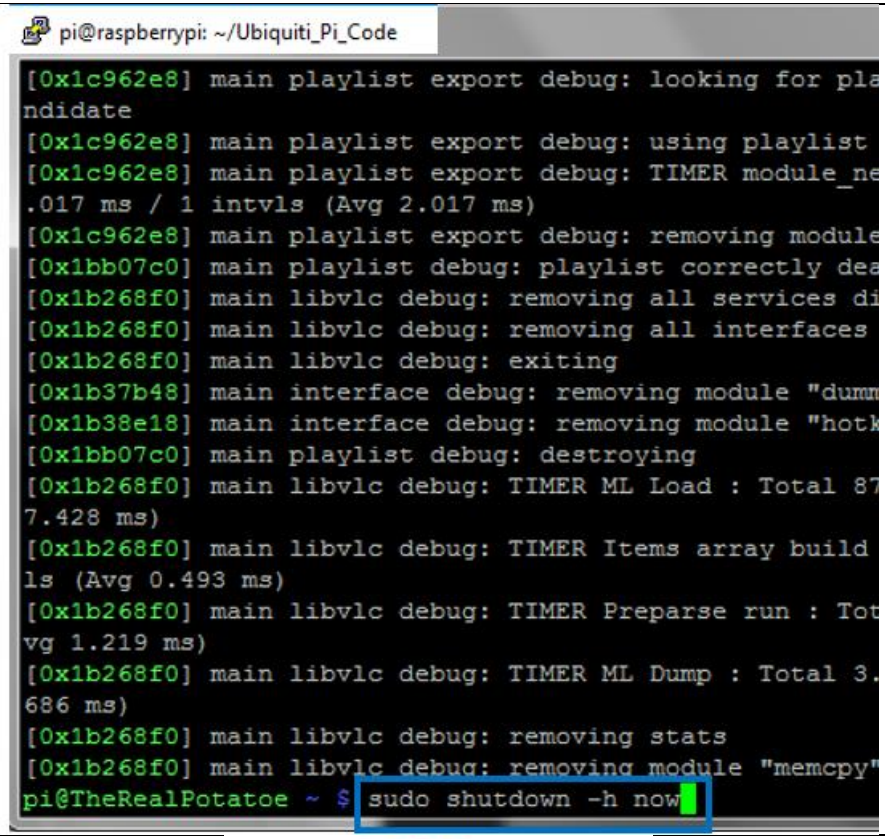
VP 26	Click on the "**Play**" button.		

VP 27	You should see live video being streamed.		
VP 28	Congratulations, the video payload is streaming video and is ready for launch!	Verified by: _____ and _____	

Step #	Shutting down the Video Payload Pi		Done?
VS 1	If not already logged in, use PuTTY to log into the pi as described in steps VP 7 – VP 11		
VS 2	Hit [CTRL]+[C] to stop streaming		
VS 3	Type in "**sudo shutdown –h now**" to shutdown the pi.		

VS 4	You can now safely turn the power switch to the off position.		

Step #	Shutting down the Image Payload Pi		Done?
IS 1	If not already logged in, use PuTTY to log into the pi.		
IS 2	Hit [CTRL]+[C] to stop the camera.		

IS 3	Type in "**sudo shutdown –h now**" to shutdown the pi.		
IS 4	You can now safely turn the power switch to the off position.