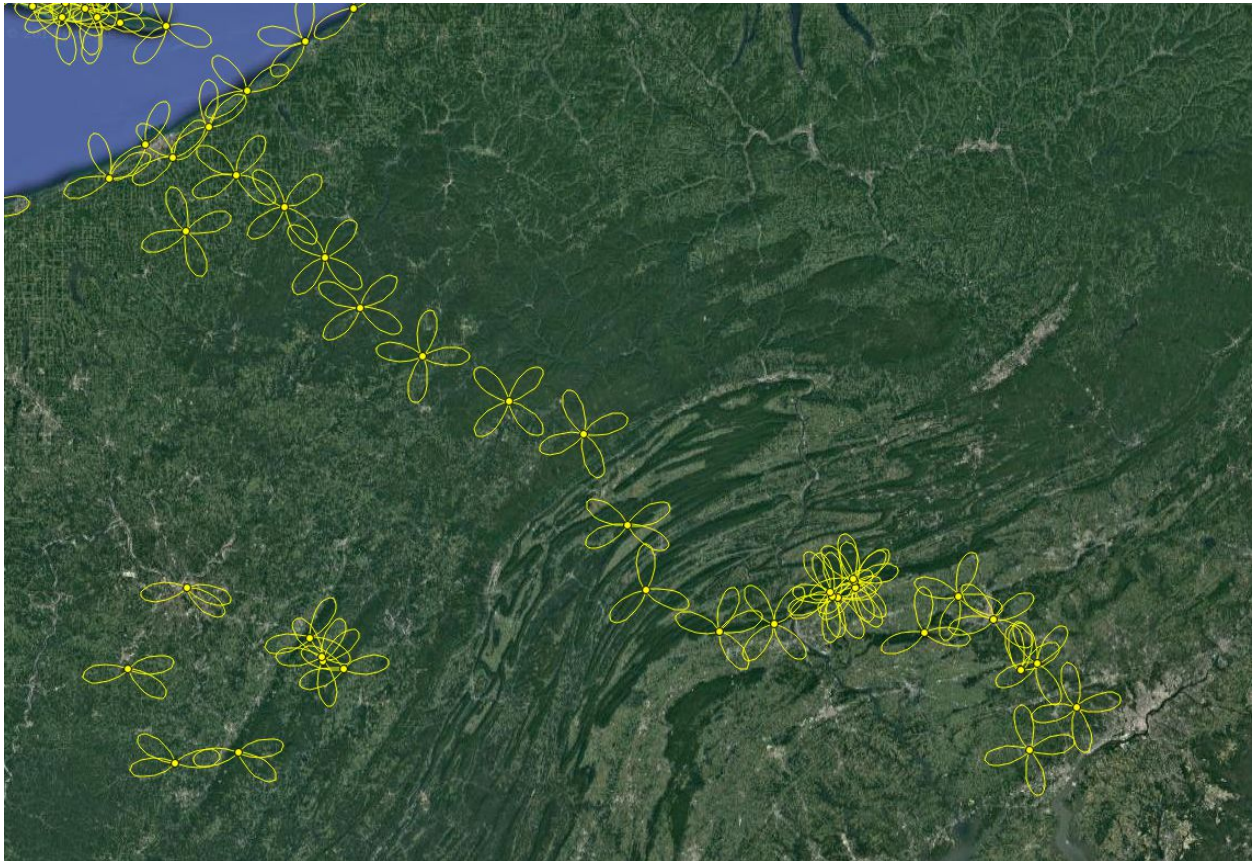




# Site Visitation Guide



## Minimum Necessary Equipment

Laptop (PC or MAC), Ethernet cable, card reader, small bottle of glass cleaner & soft cloth or paper towels, 5 amp blade fuses, electrical tape

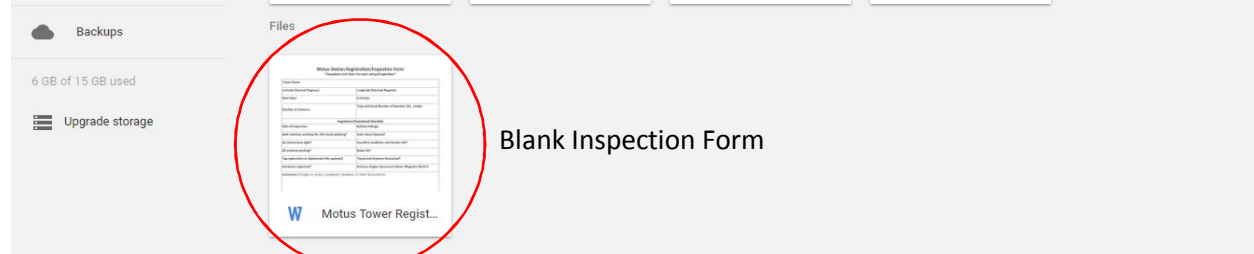
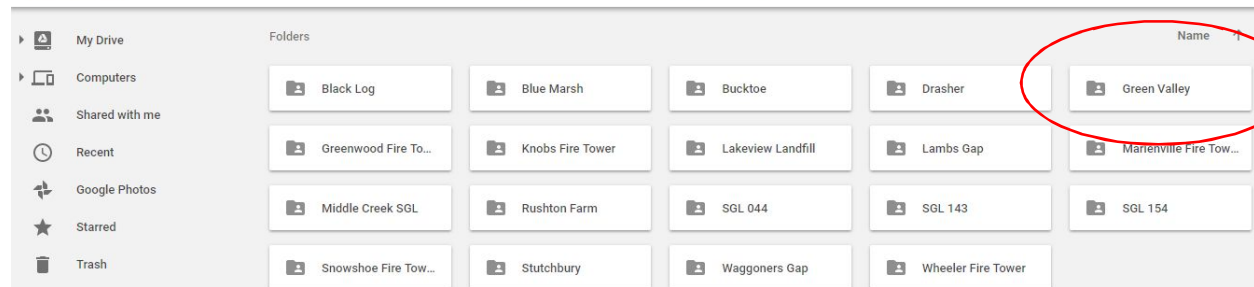
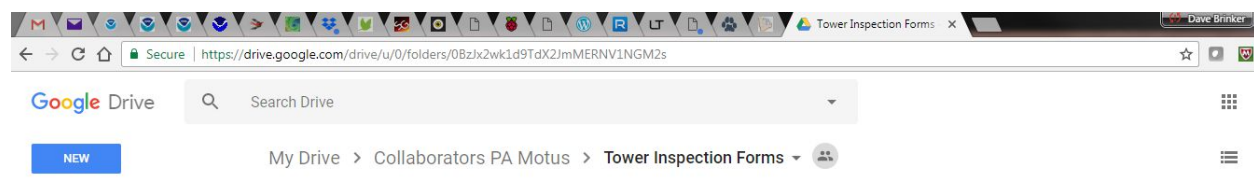
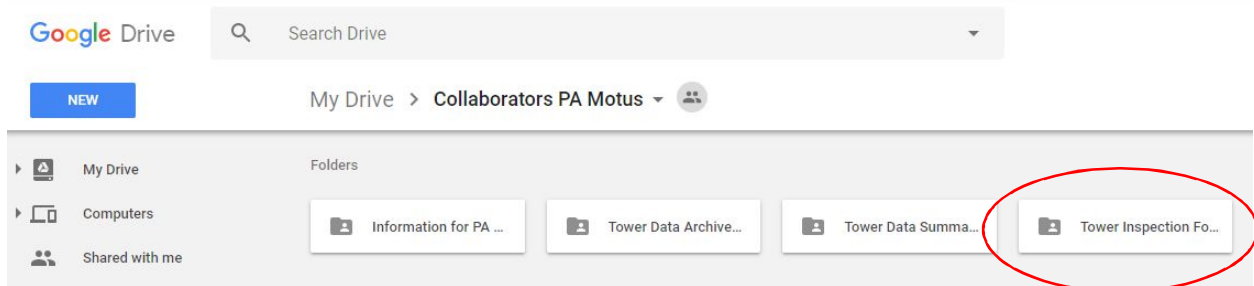
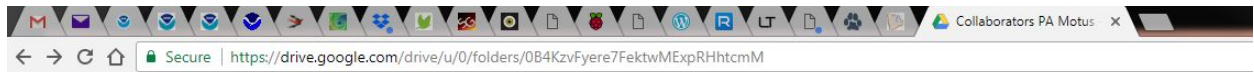
## Software Requirements!

Google Chrome or Firefox

Apple iTunes

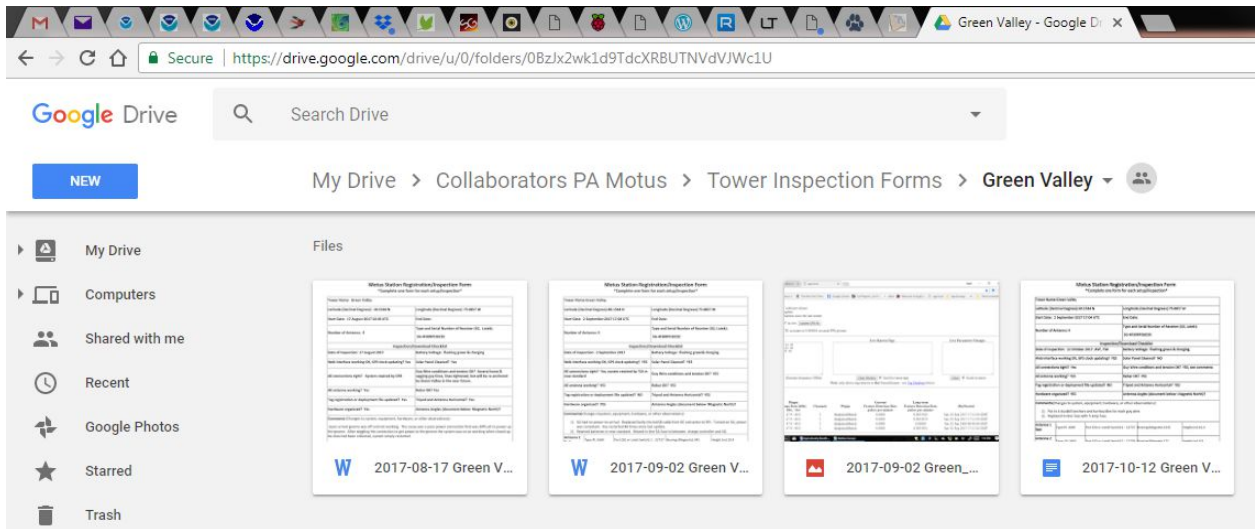
## Preparation for a Site Visit

- 1) Go to the “Collaborators PA Motus” Google drive and download the most recent site inspection form. The form will be found in the “Tower Inspection Forms” folder under the sub folder for the site that you will be visiting (example below is for Green Valley).

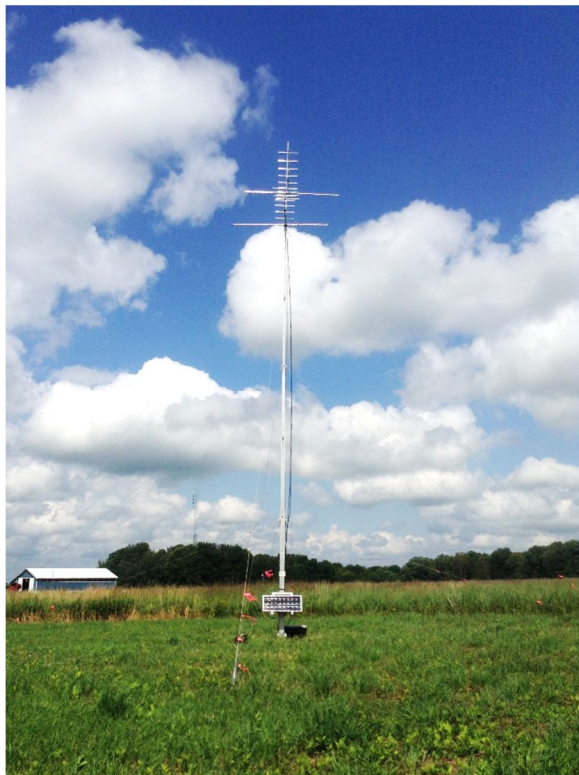


Blank Inspection Form





- 2) Review the form and note any items from the previous site visit that may need attention during the site visit. Print the form and bring it with you on the site visit. Also bring a blank form to record information from your site visit. An example site inspection form from a visit to the Stutchbury tower follows on the next page. The yellow highlight indicates a couple of items needing attention at the next visit.



## Motus Station Registration/Inspection Form

\*Complete one form for each setup/inspection\*

<b>Tower Name: Stutchbury</b>				
<b>Latitude (Decimal Degrees): 41.7858</b>		<b>Longitude (Decimal Degrees): 79.9504</b>		
<b>Start Date: 30-Aug-2017</b>		<b>End Date:</b>		
<b>Number of Antenna: 4</b>		<b>Type and Serial Number of Receiver (SG, Lotek):</b> SG – 7A27RPI34AE0		
<b>Inspection/Download Checklist</b>				
<b>Date of Inspection: 9-9-2017</b>		<b>Battery Voltage:</b>		
<b>Web interface working OK, GPS clock updating? YES</b>		<b>Solar Panel Cleaned? YES</b>		
<b>All connections tight? YES</b>		<b>Guy Wire conditions and tension OK? YES</b>		
<b>All antenna working? YES</b>		<b>Rebar OK? YES</b>		
<b>Tag registration or deployment file updated? NO</b>		<b>Tripod and Antenna Horizontal? YES</b>		
<b>Hardware organized? YES</b>		<b>Antenna Angles (document below- Magnetic North)?</b>		
<b>Comments</b> (Changes to system, equipment, hardware, or other observations):				
Data downloaded.				
Anchors and guys switched to duckbills with steel clips, turnbuckles and rope thimbles; guy lines tensioned				
Still requires coax cable organization and hose hanger				
<b>Antenna 1 Red</b>	Type: PL-1669	Port (SG or Lotek Switch): 1	Bearing (Magnetic):170	Height (m): 18
<b>Antenna 2 Yellow</b>	Type: PL-1669	Port (SG or Lotek Switch): 2	Bearing (Magnetic): 260	Height (m): 17.5
<b>Antenna 3 Green</b>	Type: PL-1669	Port (SG or Lotek Switch): 3	Bearing (Magnetic): 350	Height (m): 17
<b>Antenna 4 Blue</b>	Type: PL-1669	Port (SG or Lotek Switch): 4	Bearing (Magnetic): 80	Height (m): 16.5

## What to do at the Site

- 1) Inspect the site and tower environs for any unusual conditions. Refer to the site inspection form and check items like the solar panel, guy anchors, guy line tension and coax cables (also check for mammal chewing). When possible correct any conditions that need attention. Note corrected items and any that need further attention on the site inspection form. On some visits the solar panel may need to be cleaned, especially when rain has been insufficient to wash bird excrement and other debris off of the solar panel. We have already had a case where a mammal dug a large hole immediately next to a guy line anchor.



- 2) Open the Action Packer (image at right, black and gray container), the lock combination is 2468. There are locks on both the right and left hand sides of the Action Packer. Use some caution as on rare occasions there may be wasps, bees, ants or other insects



that have adopted the Action Packer as home. Inside the

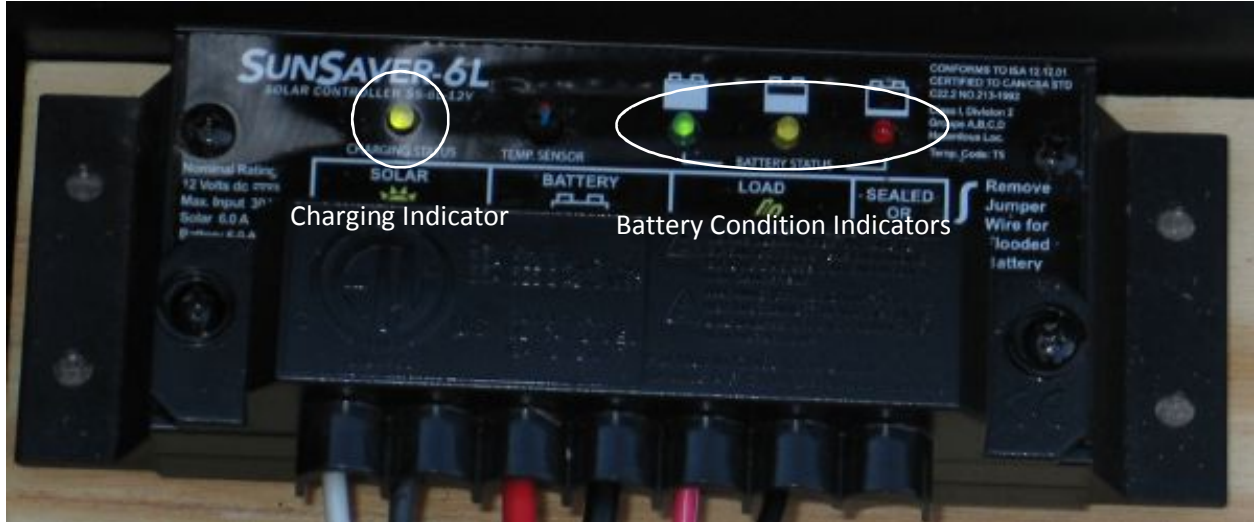


Action Packer you will find the SensorGnome case (image at left) sitting on top of a piece of plywood that separates the gnome case from two 12 volt batteries underneath the plywood. There is also a SunSaver charge controller screwed to the piece of plywood, usually in the upper left hand corner of the Action Packer.

- 3) Check the overall condition/operation of the charging system and batteries by looking at the indicator lights on the SunSaver (image below). The left most white indicator light monitors charging status. During daylight hours this light should be on with a heartbeat of short off flashes. At night the white indicator light should be off with short on flashes. If the batteries are fully charged, then the green indicator light will be on with a heartbeat of short off flashes. If the batteries are in good condition, but not totally charged, then the green indicator light will be on steady with no heartbeat. If the batteries are not well charged, then the yellow indicator light will be one, if the batteries are discharged then the red light will be on. Record the charging status of the system and condition of the batteries on the Site Inspection Form. When all is well this will



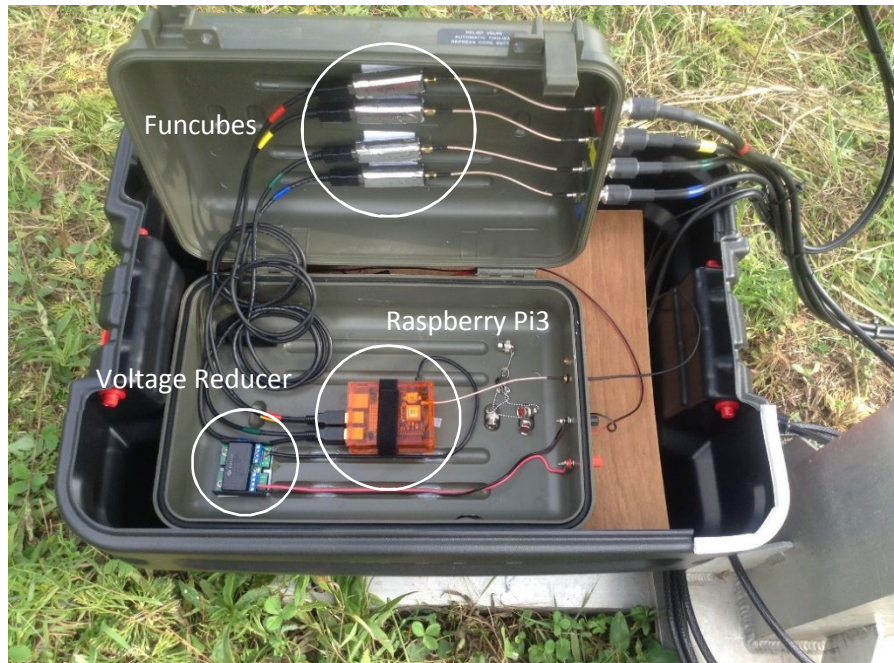
either be “charging with flashing green” or “charging with solid green.” A yellow light is only acceptable during the period from 1 December through 1 March if the area has experienced a long series of days (over a week) of cloudy, stormy weather. If a yellow or red light status occurs on the SunSaver, contact the PA Motus coordinator as soon as possible.



- 4) There should be sufficient extra cable to reposition the SensorGnome case as necessary to place the case in a convenient working position. Depress the pressure equalization button (image at right) on the SensorGnome case to remove any vacuum that has developed over time within the SensorGnome. This will make the SensorGnome case easier to open. Carefully open the SensorGnome case.

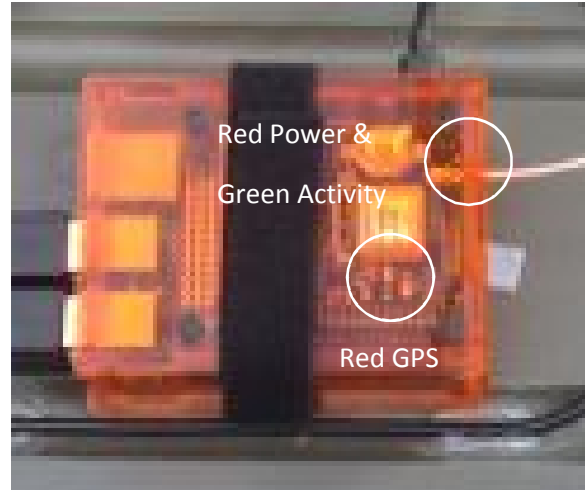


- 5) Inside the SensorGnome you will find the essential guts of a SensorGnome (image at right). There is a voltage reducer to convert the 12 volt power source to the 5 volts required by the mini-computer.

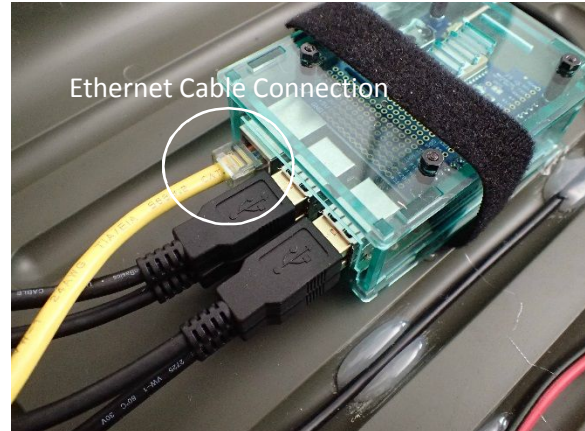


The mini-computer is a Raspberry Pi3, this is both the brain and the heart of the Motus installation. Finally there are three or four “Funcubes,” these USB based radio receivers are the ears that monitor the antennas and produce the data that the Raspberry Pi records.

- 6) Once inside the SensorGnome case the first thing to do is to check the three indicator lights on the Raspberry Pi (image at right). There are two lights on the right side. The first, a red power light should be on constantly. Next to the red power light is the green activity light. The green activity light should randomly periodically flash on. Sometimes it may take as much as a minute or two, maybe even longer, before you notice a green flash. The third indicator light is on top of the Raspberry Pi on the GPS chip. When the GPS is functioning normally this light will flash red once every 10 seconds. If all lights flash as described, then the gnome should be operating normally. If light patterns are not as expected, then the gnome might not be operating properly. Please make a note on the inspection form about what lights were not properly functioning. It is not necessary to record normal indicator light operation on the inspection form.



- 7) Boot up the laptop. Once the laptop is done booting up connect the laptop and Raspberry Pi with the Ethernet cable.
- 8) Open up a web browser (Chrome or Firefox, NOT Internet Explorer). Go to <http://sgpi.local> to view the operating status of the SensorGnome. The web interface may take a minute or two to load and sometimes it takes more than one try or refresh of the web interface before the SensorGnome interface loads up. Be patient, and/or refresh the web browser, if necessary.



9) Once the web browser is up the interface should look something like this.

**I am your SensorGnome**

My machine ID is AC15RPI3C3A2.  
 I'm running the Sat, 29 Apr 2017 18:54:12 GMT software release.  
 I have restarted 18 times since the last software update.  
 I have been running for 5 days, 4 hours, and 4 minutes since the last restart.

I am located at 38.1385° N 75.189° W -2 m elev. [Update GPS fix](#)

My clock says it is 2017-10-30 22:03:11.062 UTC accurate to 0.000001 seconds PPS present

**Live Pulses**

```
22:02:49.010 p3 -4.373 kHz -60.39 / -67.28 dB
22:02:49.010 p1 -3.82 kHz -55.17 / -61.99 dB
22:02:49.597 p3 4.093 kHz -60.72 / -69.21 dB
22:02:49.643 p3 3.843 kHz -60.68 / -70.3 dB
22:02:19.597 p1 5.098 kHz -55.12 / -63.18 dB
22:02:49.643 p1 -3.16 kHz -54.74 / -63.7 dB
```

[Clear Window](#)  Scroll to latest pulses  Absolute frequency (MHz)

**Live Known Tags**

[Clear Window](#)  Scroll to latest tags

**Live Parameter Changes**

[Clear](#)  Scroll to latest

Note: only shows tags known to this SensorGnome - see [Tag Database](#) below.

**What I'm doing now:**

USB Port #	Hardware Frame Rate (kHz) Obs. / Set	Plugin Frame Rate (kHz) Obs. / Set	Channels	Plugin	Current Feature Detection Rate pulses per minute	Long-term Feature Detection Rate pulses per minute	(Re)Started
1	47.9 / 48.0	47.9 / 48.0	2	findpulsefdbatch	0.0000	0.248943	Wed, 25 Oct 2017 18:00:44 GMT
2	47.8 / 48.0	47.8 / 48.0	2	findpulsefdbatch	0.0000	0.486143	Sat, 01 Jan 2000 00:00:09 GMT
3	47.9 / 48.0	47.9 / 48.0	2	findpulsefdbatch	0.0000	0.180968	Wed, 25 Oct 2017 18:00:44 GMT

Devices

Capture a screen shot of the web interface and save it in case there are questions later about the status of the gnome upon arrival. Save the screen shot file as either a png or jpg file and name the file “**year-month-day site\_name arrival**”. Portable network graphic file (png extension) is the preferred file type. For example “2017-10-06 Blue\_Marsh\_arrival.png”

10) There are two items to check in the “I am your SensorGnome” header section of the display to verify that the gnome is working properly. Check the number of restarts in the third line of the header information. When the power supply has operated well this

My machine ID is AC15RPI3C3A2.  
 I'm running the Sat, 29 Apr 2017 18:54:12 GMT software release.  
 I have restarted 18 times since the last software update.  
 I have been running for 5 days, 4 hours, and 4 minutes since the last restart.

number will be the same as the restart number when the SensorGnome was closed up on the last site visit (refer to the previous site inspection form). If the power has been interrupted, either by a long cloudy period for solar sites or a power outage for AC powered sites, then the restart number will increment each time the gnome reboots.

**Record, on the site inspection form, the restart number upon opening.** The GPS should be providing the current date and time (UTC) in the last line of the header section.

I am located at 38.1385° N 75.189° W -2 m elev. [Update GPS fix](#)

My clock says it is 2017-10-30 22:03:11.062 UTC accurate to 0.000001 seconds PPS present

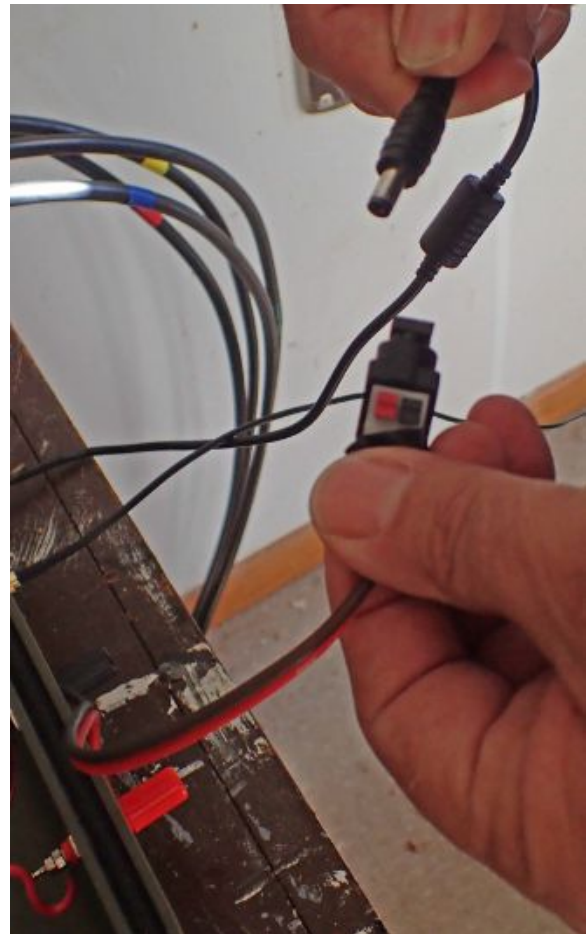


11) Next in the “What I’m doing now:” section of the web display check that the “Hardware Frame Rate” and “Plugin Frame Rate” values change every few seconds. These values typically bounce around a value of 48.0.

USB Port #	Hardware Frame Rate (kHz) Obs. / Set	Plugin Frame Rate (kHz) Obs. / Set	Channels
1	47.9 / 48.0	47.9 / 48.0	2
2	47.8 / 48.0	47.8 / 48.0	2
3	47.9 / 48.0	47.9 / 48.0	2

12) If the above three checks are as described, then all is good and the gnome should be operating normally. Now it’s time to actually retrieve the accumulated data.

13) Unplug the Ethernet cable from the Raspberry Pi. For battery operated gnomes, turn off the gnome by removing the blade fuse in the power feed to the SensorGnome case (left image below). For gnomes that are operated from a 120 v AC power source (wall plug) unplug the power jack from the connector on the outside of the SensorGnome case (right image below).

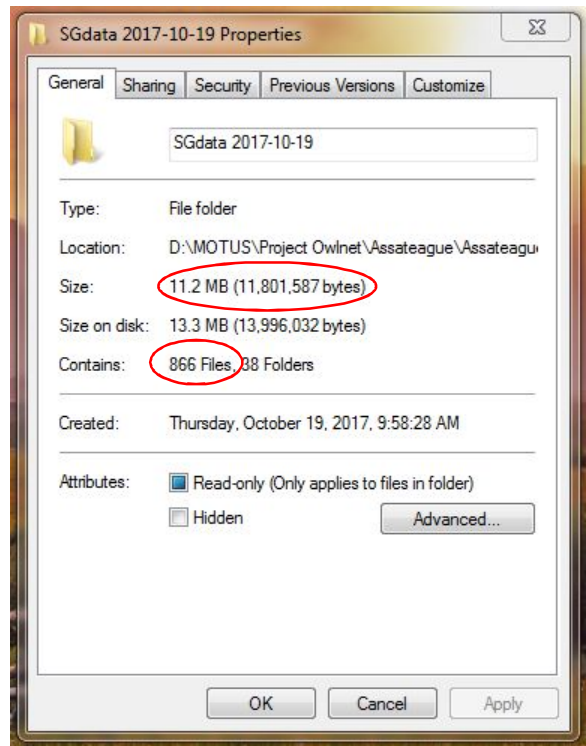
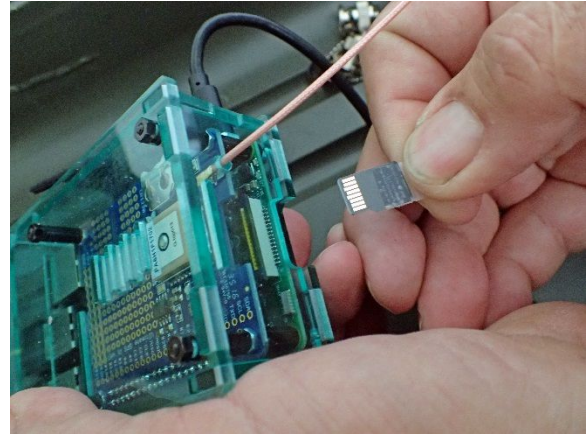


14) Remove the SD card, which is simply pulled straight out – unlike many SD cards in cameras, it does not have a push-in-then-pop-out feature. Place the SD card into the card reader so that the data files can be copied to the laptop’s hard drive.

15) On the laptop, go to the root of the SD card. Find the directory named “SGDATA”. Copy and then paste the SGDATA directory and **all** of its sub files to the hard drive of the laptop. (For Mac users, the card will likely appear as “NO NAME” on the desktop – open this. Drag the entire SGDATA folder to the hard drive to copy it). Rename the SGDATA folder on the laptop to “**year-month-day SGDATA site\_name**”. Use file properties to determine the **size of the data download and the number of files that were downloaded. Record these values on the site inspection form.**

16) Check and double-check that the data files have been written to the laptop hard drive. Delete the SGDATA folder from the SensorGnome SD card.

17) Reinsert the micro SD card into the Raspberry Pi with the gold metal contacts facing up.



18) Repower the SensorGnome by reinserting the fuse in the power feed (or reconnecting the power supply jack) so that the gnome will restart. As the SensorGnome restarts the red power indicator light will immediately come on.

The Green activity indicator light should flash irregularly as the Raspberry Pi boots up.

The red indicator light on the GPS will flash rapidly until the GPS acquires satellites. Once the GPS has acquired satellites then the GPS indicator light flash rate will change to once flash every 10 seconds. Wait for one or two minutes more for the gnome to complete the rebooting process.

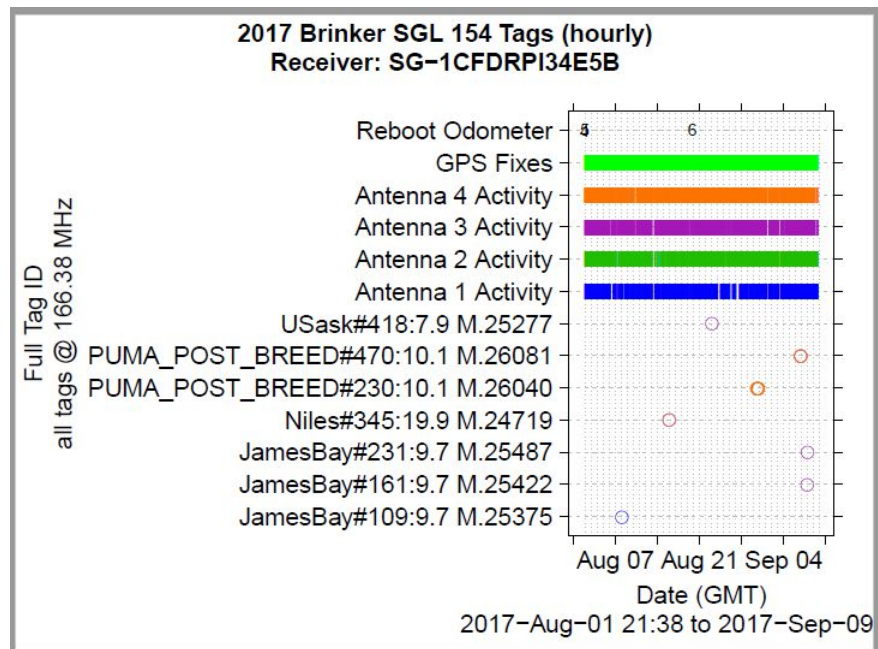
- 19) Reconnect the Ethernet cable to the Raspberry Pi. Open up the web browser and again go to **<http://sgpi.local>**. Once the web interface is back up the restart count should have incremented by a value of one. Wait to make certain that the GPS initializes the clock and that the clock time recovers to more than 0.01 second accuracy (0.000001 sec is preferred but sometimes the GPS requires a while to reach this level of clock accuracy). The hardware and plugin frame rates should also be updating just as prior to shut down. **Record the restart number on the site inspection form.**
- 20) Make certain that the web interface has been scrolled back to the top and take a screen shot of the laptop display. Save this file, as you did with the opening screen shot, but name the file "**year-month-day site\_name departure**".
- 21) The data download is finished. Disconnect the Ethernet cable and close up the SensorGnome and Action Packer.





## Back in the Office

- 1) Fill out a site inspection form and upload it to the PA Motus Google drive in the **“Tower Inspection Forms”** folder under the subfolder for the site. A blank site inspection form can be found in the root portion of the **“Tower Inspection Forms”** folder. The file should be named **“year-month-day site\_name Inspection”**, for example **“2017-10-06 Drasher Inspection”**. Consistent use of PA Motus Collaboration naming conventions by all cooperators will make searching for files easier. An example completed site inspection form follows on the next page.
- 2) Upload the opening and closing screen shots to the appropriate site subfolder in the **“Tower Inspection Forms”** folder on the PA Motus Google drive. The naming convention for those files is **“year-month-day site\_name arrival”** and **“year-month-day site\_name departure.”**
- 3) Upload a copy of the data that was downloaded to the appropriate site subfolder in the **“Tower Data Archive”** of the PA Motus Google drive. Keep the file name as earlier **“year-month-day SGDATA site\_name”** and upload the folder to the subfolder for the site.
- 4) Send an e-mail to the PA Motus coordinator to let us know that a new data download file and site inspection form were uploaded to the Google drive for the site that you care take. Please include any important observations about the site, especially out of the ordinary observations and items that may need further attention at the site.
- 5) The PA Motus coordination team will upload the data to the Motus web site within a day or two of receiving your e-mail. Once the data has been processed by the Motus team at Bird Studies Canada a summary graphic will be produced for the station by the Motus data management software. The PA Motus coordination team will then forward a copy of that summary graphic to you so that you can see what has been detected by the Motus station that you are care taking (image to the right). These summary graphics are also available on the Google drive in the **“Tower Data Summaries”** sub folder.



## Motus Station Registration/Inspection Form

\*Complete one form for each setup/inspection\*

<b>Tower Name: SGL 143</b>				
<b>Latitude (Decimal Degrees): 41.8787 N</b>		<b>Longitude (Decimal Degrees): 79.4567 W</b>		
<b>Start Date: 01 August 2017 09:20 UTC</b>		<b>End Date:</b>		
<b>Number of Antenna: 4</b>		<b>Type and Serial Number of Receiver (SG, Lotek): SG-C97DRPI3B84D</b>		
<b>Inspection/Download Checklist</b>				
<b>Date of Inspection: 8 September 2017 – Dave Brinker</b>		<b>Battery Voltage: flashing green &amp; charging</b>		
<b>Web interface working OK, GPS clock updating? Yes</b>		<b>Solar Panel Cleaned? Yes</b>		
<b>All connections tight? Yes</b>		<b>Guy Wire conditions and tension OK? Yes, see comments</b>		
<b>All antenna working? Yes</b>		<b>Rebar OK? Yes</b>		
<b>Tag registration or deployment file updated? No</b>		<b>Tripod and Antenna Horizontal? Yes</b>		
<b>Hardware organized? Yes</b>		<b>Antenna Angles (document below- Magnetic North)?</b>		
<b>Comments</b> (Changes to system, equipment, hardware, or other observations):				
<p>RPI case loose in the SensorGnome case. A bear had moved the Action Packer! All cables rearranged and placed on a hose hanger. Rope thimbles added to all guy cables and cables re-tensioned. This station is now up to system standards.</p> <p>Upon arrival restart count @6, downloaded data, 25.4 MB &amp; 529 files</p> <p>Sensorgnome @ 7 restarts when system closed up.</p>				
<b>Antenna 1 Red</b>	Type: PL-1669	Port (SG or Lotek Switch): 1 - 22896	Bearing (Magnetic): 330	Height (m): 15.1
<b>Antenna 2 Yellow</b>	Type: PL-1669	Port (SG or Lotek Switch): 2 - 22897	Bearing (Magnetic): 60	Height (m): 14.6
<b>Antenna 3 Green</b>	Type: PL-1669	Port (SG or Lotek Switch): 3 - 22894	Bearing (Magnetic): 150	Height (m): 14.1
<b>Antenna 4 Blue</b>	Type: PL-1669	Port (SG or Lotek Switch): 4 - 22895	Bearing (Magnetic): 240	Height (m): 13.6

## **Trouble Shooting!**

The Motus effort (<https://mostu.org>) is cutting edge wildlife tracking technology. Any cutting edge project, especially one that relies on off the shelf technology that is combined to build a low cost affordable system, will encounter glitches that need to be addressed. As the Motus effort grows, new equipment that reduces cost and improves performance often gets incorporated into routine operating situations. The PA Motus line is the first wide spread deployment of Raspberry Pi3s as the brains of the SensorGnome. Most other existing Motus stations are either based upon expensive commercial receivers (Lotek) or an alternative mini-computer called the Beagle Bone. System wide the Motus effort is deliberately moving to Raspberry Pis for a number of technical reasons that relate to system growth and performance. The Motus software version that supports the Raspberry Pi was first released in April 2017. Motus software updates are released regularly and major upgrades occur at least annually.

Given the nature of our Motus stations and the relative newness of our hardware and software, we realize that station data downloads will occasionally not go precisely as described in these instructions. This section will do its best to provide descriptions of the known glitches and irregularities that we have encountered that directly affect data download/station operation and how to solve them. We presume that new ones will occasionally appear. When that happens, please keep good notes so that we can help solve any new situations. We are all working to the same objective, monitoring migrating wildlife so that better science/data based conservation decisions can be made. We need your help to improve the PA Motus system as much as you need our support with how to do your part of this effort.

This section of the Site Visitation Instructions is intended to help you trouble shoot various contingencies not covered in the basic general instructions. Do not hesitate to call the PA Motus coordinator for assistance when these trouble shooting suggestions do not help you solve the problem at hand.

### **Ants, Bees, Spiders & Wasps**

Insect issues at Motus sites are uncommon, but on occasion they do occur. The Action Packer and SensorGnome present attractive nuisances as a refuge for a variety of insects. The SensorGnome case is a sealed and waterproof case that should deter insects. The Action Packer is not sealed and is thus relatively easy for insects to invade. Always be cautious when opening an Action Packer. During autumn as the temperature drops the Action Packer may attract insects looking for a place to overwinter, especially some paper wasps. Ants may be attracted to the Action Packer's environment as a safe place to incubate eggs or tend larvae and pupae. For a location that has continual insect issues leather gloves may be useful. Ant and wasp infestations may require occasional use of an insecticide.



## **Bears**

There is a playful aspect of bored or territorial Black Bears that on occasion causes problems with field equipment. Bears may swat at, push, move or overturn the Action Packer. The 90 pounds of battery in the bottom of the Action Packer provide some resistance, but any bear that seriously wants to move an Action Packer can do so. The batteries are sealed spiral gel cells that will not leak electrolyte, so if an Action Packer is tipped over there should not be any spilled electrolyte inside. Jostling of the Action Packer might cause severed wires, loose connections and/or other problems. Loose or broken wires may require specialized attention by someone capable of repairing electrical connections. Bears might chew on Action Packers. A possible solution to discourage repeated bear chewing is using Tabasco sauce or another product with Cayenne pepper in it on the outside of the Action Packer. If an Action Packer is repeatedly seriously moved by a bear this can be thwarted by strapping the Action Packer to the ground with earth anchors and webbing chinch straps.

## **Blown Fuse**

The normal current draw of the SensorGnome will not blow the system fuse. Blown fuses are a highly unlikely situation at Motus stations. A blown fuse is an indication of a current surge that exceeded the amperage of the fuse. The only conditions that will blow a fuse are a short circuit or a current surge resulting from a nearby lightning strike. As a first step replace the blown fuse. If it immediately blows upon replacement, then there is a short circuit in the system that must be located and repaired before the SensorGnome can be successfully restarted. Locate the short circuit, repair it and then restart the SensorGnome. If the short circuit cannot be located, contact the PA Motus coordinator.

## **Digging Mammals**

Digging mammals, primarily woodchucks and foxes, may occasionally cause problems at Motus stations. When holes are dug at guy line anchors the holes can compromise the guy anchors and in a worst case situation risk tower failure in windy conditions if the hole allows a guy anchor to fail. Any and all holes should be filled in. Holes can be filled with soil or rocks. Holes dug underneath the base of a tower also need to be filled. If a serious hole is encountered at a guy anchor, obtain a cell phone picture and contact the PA Motus coordinator.

## **(Re)Started Date/Time**

When SensorGnome restarting goes smoothly all four USB ports will report the same restart date and time in the "What I am doing" section of the web display. The time will be the time when the SensorGnome last restarted. Occasionally one of the USB ports will report "Sat, 01 Jan 2000 00:00:00 GMT" or a time within 10-30 seconds of 00. When this happens there is no predictability which USB port will report a 01 Jan 2000 date and time. This may be OK, but it

can none the less be disconcerting. If the USB Port hardware and plugin frame rates are updating periodically, it is currently presumed to be OK to ignore the incorrect date. If it is ever necessary to reset the time stamp, disconnect the Funcube connected to the port that has the incorrect time stamp. After a couple of seconds reconnect the Funcube and when it restarts the time stamp will update to the current date and time. You may also have to reset the radio frequency when you do this type of hot restart. Go to the “Devices” section of the web interface and check to see that all the active USB ports are set to 166.376007 MHz. If the frequency is not 166.376007 then reset the frequency by entering 166.376007 in the empty box and click on the “Set Freq. In MHz” button to set the Funcube to the correct receiving frequency.

### **Loose Connections/Shorts**

While the Motus stations have been well constructed, nothing is perfect. Loose connections, disconnected wires, and/or shorts, are an infrequent gremlin that may be encountered. If something is not working look for loose connections. Solution of the problem can be as simple as identifying where the loose wire belongs and then securely reconnecting it. Sometimes, the solution is often as simple as disconnecting and then reconnecting the suspected loose connections. Shorts are harder to locate and may require additional assistance. If assistance is needed, or the problem cannot be solved, contact the PA Motus coordinator.

### **No GPS Signal**

The GPS chip in the SensorGnome maintains the gnome’s clock to near perfect time. For the GPS to function it is necessary for the GPS chip to have an external antenna. If the GPS is not performing, the most likely problem is a compromised or severed antenna wire. The wire is thin and easily compromised. Broken or severed wires are difficult to repair and the simplest solution is to replace the GPS antenna. If it is necessary to replace the GPS antenna, contact the PA Motus coordinator.

### **Raspberry Pi Power**

The power connector to the Raspberry Pi is small and awkward to connect and disconnect. To avoid inadvertent damage to the power connector on the Raspberry Pi, it is not normally disconnected and reconnected. This is an obviously critical connection. If it has to be disconnected and reconnected, do so carefully. If a power cable fails and needs to be replaced, contact the PA Motus coordinator to obtain a replacement Raspberry Pi power cable.

### **Restarting**

Restarting the SensorGnome is normally a simple straight forward routine. When a restart fails, the green activity light does not flash at irregular intervals. If the green light does not begin flashing in 30-60 seconds, depower the gnome and start again. A second, or very

rarely a third, restart will generally be successful. The other reason for a failed restart is when the SD card is not reinstalled in the Raspberry Pi. The SD card contains the operating system and Motus software and must be inserted for the Raspberry Pi to restart and operate.

## **Rodents**

Rodents, from mice, to chipmunks, to squirrels, to porcupines, have gnawing teeth and are good at using them. When inspecting the Motus system check for rodent damage to the various cables leading from the Action Packer to the various external components. If rodent chewing is found on any of the cables and the SensorGnome is still operating then the chewing has probably not damaged the cables. Repair the damage to the cable by wrapping the damaged area with electrical tape to seal out moisture. Cables that are totally severed as a result of mammal chewing will need to be repaired or replaced. Contact the PA Motus coordinator if a cable needs repair or replacement.

## **SunSavers & Battery Maintenance**

The SunSaver is a critical component essential to managing battery recharging and power supply to the SensorGnome. SunSavers have a good track record of reliable operation over long periods of time. If the SunSaver fails the batteries will discharge or the power supply to the SensorGnome will be interrupted. Besides monitoring charging and battery voltage level, the indicator lights on the SunSaver are also used to indicate error conditions by various flashing patterns other than charging heartbeat or the full battery heartbeat. If the SunSaver ever presents unusual indicator flashing light patterns then there is a problem with the charging and power supply to the SensorGnome. In situations where the SunSaver is presenting error codes the SensorGnome is not likely to be functioning properly. There is probably no remedy to this other than replacing the SunSaver. While a replacement SunSaver is being obtained the batteries will need to be recharged prior to restarting the SensorGnome. Contact the PA Motus coordinator to obtain a replacement SunSaver and further instructions on what needs to be done to recover the Motus receiver.

## **Water & Leaks**

The Action Packers are designed to keep water out and when not modified are pretty good at keeping the interior dry. The most important part of keeping the Action Packer dry is careful routing of the antenna and other cables into the Action Packer when it is closed up after each inspection and data download. Routing the cables into the Action Packer required small modifications to the Action Packer that may allow a small amount of water into the interior of the Action Packer. If there is water accumulating in the bottom of the Action Packer the simplest solution is to drill a ¼ inch hole in one or two of the lowest corners in the Action Packer. If the leaking is more serious, it might be necessary to place foam weather stripping in the area where the Action Packer was modified to route the cables into the Action Packer.



## Web Interface

As our way to connect to and monitor the activity of the Raspberry Pi, the web interface of a laptop is critical to maintaining and operating a SensorGnome. To connect to the Raspberry Pi via a web browser the field laptop must have a current copy of Apple's iTunes installed on it. It is not necessary to have an active iTunes account, just the software that connects to iTunes. This is because one of the software routines that is part of Apple's iTunes manages the web interface with the Raspberry Pi. Windows Internet Explorer software does not work for connecting to the Raspberry Pi. To connect to the Raspberry Pi the laptop must use either the Google Chrome or Firefox web browsers. If there are connection problems to the Raspberry Pi, the first step in diagnosing the issue is to make certain that the necessary software is available on the laptop. When the appropriate software is present on the laptop, connection to the Raspberry Pi via a web interface is usually routine with few if any problems. The Ethernet connection to the Raspberry Pi is much more reliable and stable than the USB connection process used on the older Beagle Bone mini-computers. When the web interface does not successfully connect to the Raspberry Pi refreshing the browser screen or closing the web browser and then reconnecting to the Raspberry Pi is usually successful. Often it is just a matter of a little patience while the Raspberry Pi finishes booting and then trying to connect again. If connection issue persist after a few refresh attempts, contact the PA Motus coordinator for assistance.

### I am your SensorGnome

My machine ID is 0425RPI3CAF9.  
 I'm running the Sat, 29 Apr 2017 18:54:12 GMT software release.  
 I have restarted 8 times since the last software update.  
 I have been running for 0 days, 0 hours, and 1 minutes since the last restart.

I am located at 40.4107° N 76.0796° W 101 m elev. [Update GPS fix](#)

My clock says it is 2017-10-06 15:02:15.090 UTC accurate to 0.000001 seconds PPS present

#### Live Pulses

```

15:02:11.854 p2 -4.468 kHz -75.27 / -81.81 dB
15:02:12.200 p2 -5.083 kHz -73.52 / -81.69 dB
15:02:12.259 p2 3.205 kHz -69.65 / -82.28 dB
15:02:12.320 p2 -2.272 kHz -70.28 / -81.88 dB
15:02:12.380 p2 -3.684 kHz -69.17 / -82 dB
15:02:12.440 p2 2.657 kHz -69.79 / -82.23 dB
15:02:12.500 p2 -1.894 kHz -71.6 / -82.2 dB
15:02:12.560 p2 -4.987 kHz -72.79 / -82.14 dB
15:02:12.620 p2 -4.286 kHz -75.06 / -82.07 dB
                    
```

[Clear Window](#)  Scroll to latest pulses  Absolute frequency (MHz)

#### Live Known Tags

[Clear Window](#)  Scroll to latest tags

Note: only shows tags known to this SensorGnome - see [Tag Database](#) below.

#### Live Parameter Changes

```

15:01:09.800 ant 4 set lna_gain = 1
15:01:09.800 ant 4 set mixer_gain = 1
15:01:09.800 ant 4 set if_filter = 0
15:01:09.800 ant 4 set rf_filter = 6
15:01:09.800 ant 4 set if_gain = 6
15:01:31.000 ant 4 @ 166.376007 MHz
                    
```

[Clear](#)  Scroll to latest

---

### What I'm doing now:

USB Port #	Hardware Frame Rate (kHz) Obs. / Set	Plugin Frame Rate (kHz) Obs. / Set	Channels	Plugin	Current Feature Detection Rate pulses per minute	Long-term Feature Detection Rate pulses per minute	(Re)Started
1	49.7 / 48.0	49.7 / 48.0	2	findpulsefdbatch	0.0000	0.650287	Fri, 06 Oct 2017 14:58:01 GMT
2	49.7 / 48.0	49.7 / 48.0	2	findpulsefdbatch	0.0000	4.98733	Fri, 06 Oct 2017 14:58:01 GMT
3	47.8 / 48.0	47.8 / 48.0	2	findpulsefdbatch	0.0000	0.650758	Fri, 06 Oct 2017 14:58:01 GMT
4	47.8 / 48.0	47.8 / 48.0	2	findpulsefdbatch	0.0000	0.00000	Fri, 06 Oct 2017 15:01:09 GMT

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### Devices

Internal: micro SD card with size = 32GB; Used = 6%  
 Directly Attached: Adafruit GPS hat with PPS  
 USB Hub Port 1: funcubeProPlus tuned to 166.376007 MHz [Listen](#)  [Set Freq. in MHz](#)