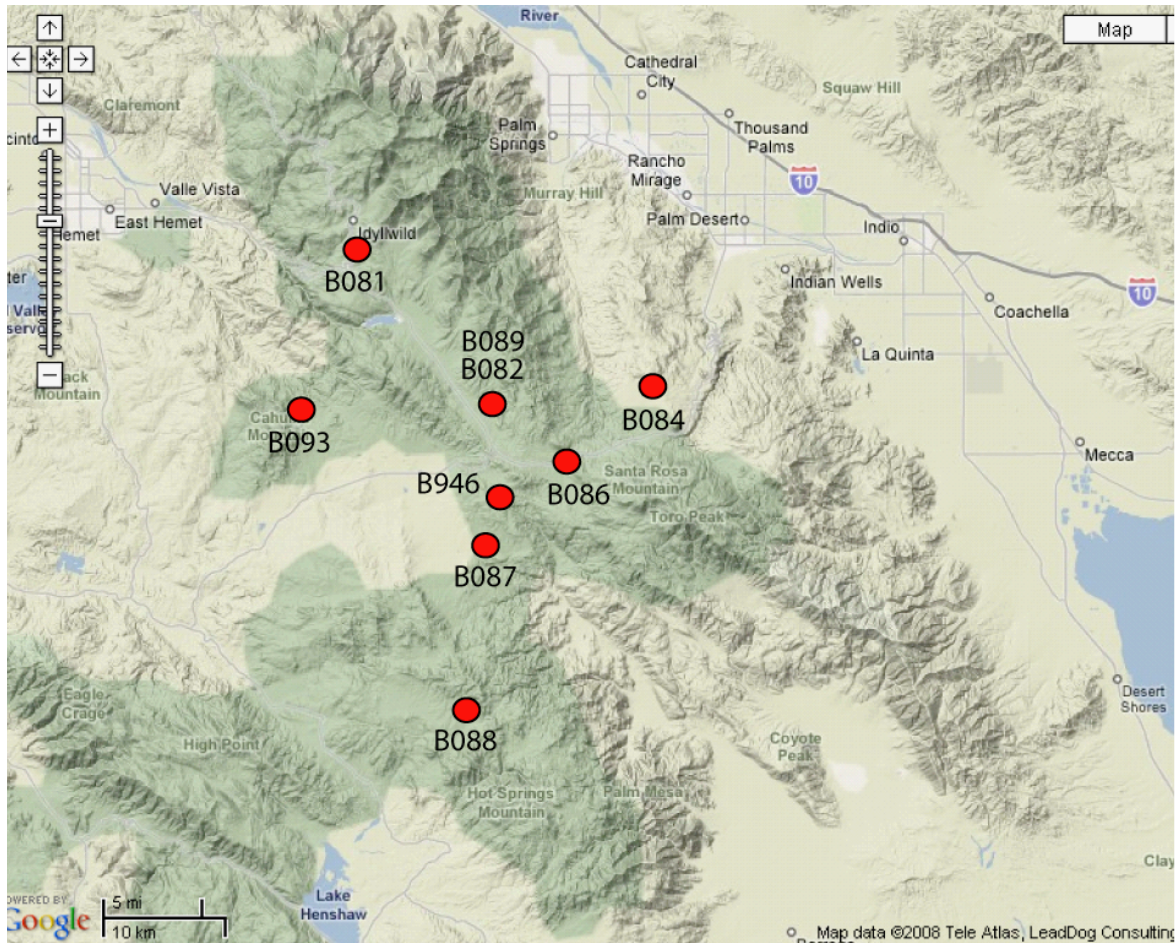


### Station Notes for B082, pathfi082bcs2006

|                             |  |
|-----------------------------|--|
| Latitude:                   | 33.598 (WGS 84)  |
| Longitude:                  | -116.596 (WGS 84)  |
| Elevation:                  | 1374.95 m / 4511 ft  |
| Install Depth:              | 242.6 m / 796 ft   |
| Orientations:               | CHO=324.8, CH1=264.8, CH2=204.8, CH3=174.8   |
| Install Date:               | 10 June 2006   |
| GTSM Technologies #:        | US14   |
| Executive Process Software: | Version 1.14   |
| Logger Software:            | Version 2.12   |
| Home Page:                  | <a href="http://www.unavco.org/instrumentation/networks/status/nota/overview/B084">www.unavco.org/instrumentation/networks/status/nota/overview/B084</a> |
| Notes Last Updated:         | September 14, 2018   |

·Install depth is from the top of the casing to the bottom of the strainmeter.

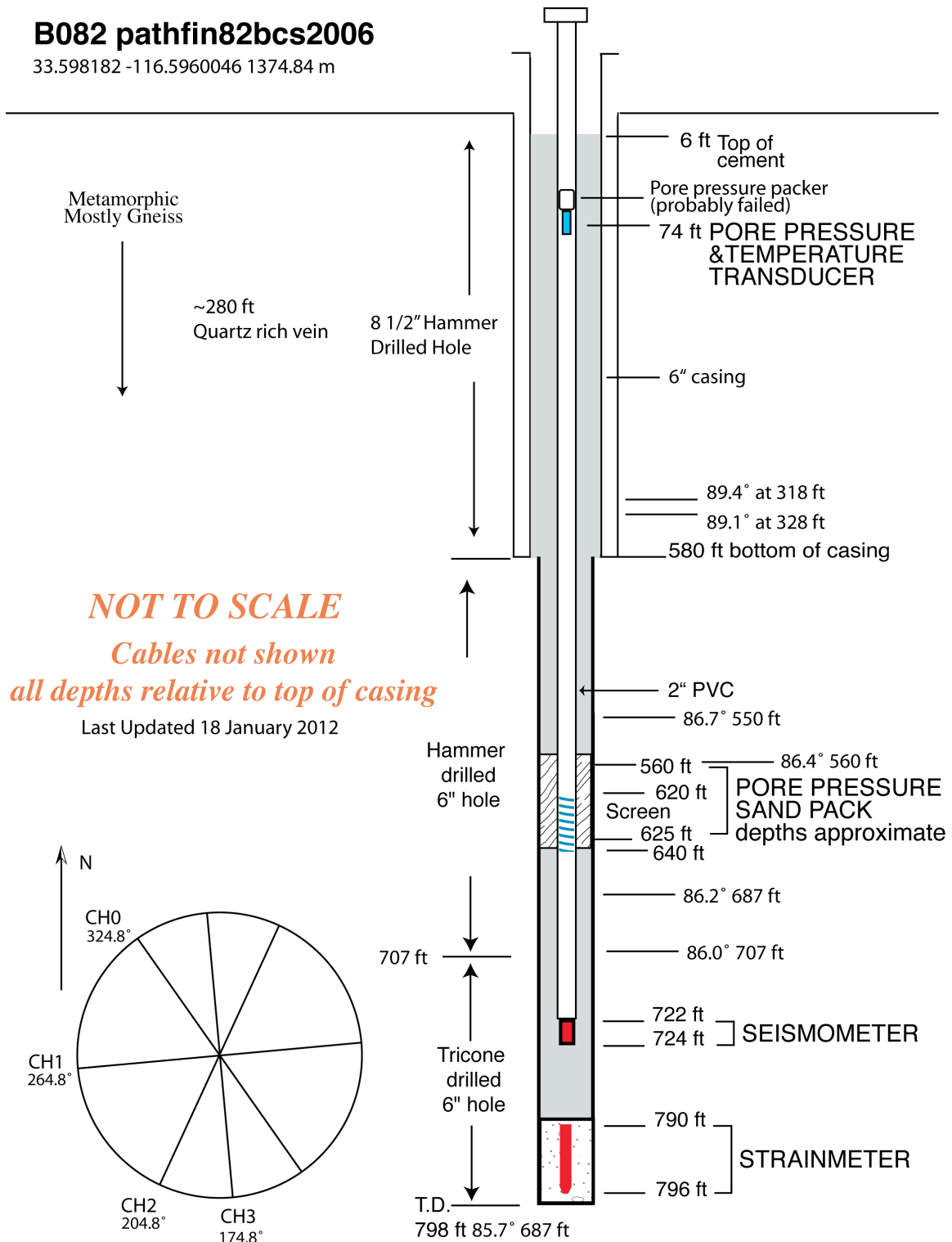
·Orientations are in degrees East of North.



Anza PBO strainmeter network, July 2010.

# B082 pathfin82bcs2006

33.598182 -116.5960046 1374.84 m



### Instrumentation at Strainmeter

| Instrument                   | Units            | Bottle/ASCII Scale Factor  | SEED Scale Factor |
|------------------------------|------------------|----------------------------|-------------------|
| Pore Pressure                | Hecto Pascals    | 1.0                        | N/A               |
| GTSM Barometer               | Kilopascals      | 1.0                        | 0.0001            |
| Rain Gauge                   | Millimeters/hour | 1.0                        | 0.252             |
| Down hole Temperature Sensor | Degrees Celsius  | 1.0                        | 0.0001            |
| Logger Temperature Sensor    | Degrees Celsius  | 1.0                        | 0.0001            |
| Setra Barometer              | Hecto Pascals    | Not installed at this time |                   |

## 1. Installation notes

Site is located on the northeast side of Garne valley. Nothing unusual occurred during install.

## 2. General Information

- This strainmeter is part of a 2-strainmeter cluster. Strainmeter B082 is sited a few 100 meters from B089
- On August 29, 2006 the logger clock jumped ahead by 1024 weeks during an onsite procedure when the short power outage occurred without a prior logger standby request. This problem was fixed by Mick Gladwin on 7 December 2006.
- A change in strain rate on both Pathfinder strainmeters beginning January 2, 2007 was caused by 100 to 150 tons of dirt being placed next to the strainmeter sites.



B089, Pathfinder Ranch January 8, 2007. View is to the southwest.

- April 24, 2007 – Most of the dirt has been removed from the site. There are still two piles of dirt near the top of the Pathfinder-2 site but all other dirt has been moved.
- Pumping began on April 25, 2007, producing a saw tooth like strain signal.
- Sensitivities of all EH channels corrected in the dataless on March 4, 2010.
- The pore pressure sensor is installed at 74 feet with the packer inflated directly above the sensor. However, the packer has probably failed.

- A new well was drilled 900 ft north west of B082 and 500 ft west of B089. The well was completed by March 21, 2014. Mud drilling was used to a depth of 290'. Grade to a depth of 160' was through coarse sand and crystal, and took 9 hours to drill. 160' to 290' was coarse sand and granite, drilled at a rate of 50' per 8 hours. At 290' the drilling mud kept disappearing and the progress stopped. Ground water started seeping in the hole at about 20' below grade sending the drilling mud to the bottom of the hole filling it up to 270'. The well was flushed out, producing 22 GPM at 100'. At the depth of 260 feet 30 GPM was produced. They will install a pump in 6 to 8 weeks.

### 3. Strainmeter Maintenance

- December 7, 2006 - Michael Gladwin and Jim Wright corrected the date and time. For that system (US14) the restart could only be done with a complete power down.
- January 8, 2007. Mike Hasting performed the following tasks,
  1. Replaced the US14PB Power Box with a new one, US303PB to fix the GPS timing problem it had when it went to 2026.
  2. Upgraded the GPS firmware with 135\_309.s3 .
  3. Checked the firmware on the RT controller board, all running V1.17, latest release.
  4. Adjusted the barometric pressure gauge to read 2.727V, which should put it within range at Pathfinder which is about 5000ft or above the 1500m elevation.
  5. Tested the rain gauge to make sure it works.
  6. Checked all battery terminals for tight fit, some had worked loose over the months.
  7. Partially cleaned up wiring in the enclosure.
  8. Cleaned out trash in enclosure, coffee cups and such.
- January 15, 2007 – Mike Hasting installed a Marmot
- January 22, 2007 – Wade Johnson visited the site, he didn't make any changes
- January 24, 2007 – Wade Johnson visited the site to swap CH0 RT board with CH1's RT board
- February 15, 2007 – B082 has been upgraded with the new electronics rack
- April 19, 2007 – This station was configured to record pore pressure, and began recording data at 20:56 UTC.
- April 24, 2007 – Mike Hasting replaced the blue strainmeter cable with a spare black cable. He also noted that Most of the dirt has been removed from the site. There are still two piles of dirt near the top of the Pathfinder-2 site but all other dirt has been moved.
- July 25, 2007 – Steve Smith visited the pathfinder sites.
  - 3:00 pm (PST) - Arrive at Pathfinder Ranch
  - 3:29 - Arrive at B082
  - 3:35 - Doors open
  - 3:38 - SYSTEM light on IDU is OFF
  - 3:40 - Power cycled IDU, system comes back on
  - 4:05 - Checked battery connections -- one on BSM side is a little loose

4:28 - Doors closed  
 4:45 - Doors open  
 4:50 - Battery voltages @ 13.54  
 4:52 - BSM voltage @ 13.65  
 5:45 - Diags taken on Intuicom --  
     Master VSWR @ 12 (hmm)  
     Noise @ 45  
     Slave VSWR @ 9  
     Signal @ 88  
     Noise @ 35  
     Decode Success @ 99  
 5:58 - Loose connection on Intuicom found (5 full turns to firm)  
 6:02 - Changed out antenna cable  
 6:20 - Doors closed  
 6:27 - Leaving the area

- July 26, 2007 – Steve Smith continues work at the Pathfinders sites.  
 12:36 PM (PST)– Doors opened  
 12:54 - Jumper cables removed from some batteries on supporting equipment side (swapping in at B089)  
 12:58 - Completed, everything running  
 1:02 - Breaker off on ISO block (not being used)  
 1:06 - GTSM wired into ISO block  
 1:08 - Breaker ON on ISO block  
 1:09 - Removed Mick's White Lab Power Supply  
 1:30 - RAIN -- closed doors and retreated to car  
 2:35 - RAIN STOPS  
 2:57 - Determined BAD ISO block  
 3:25 - Mick's Lab Power Supply reinstalled and charging  
 3:31 - Doors closed  
 3:35 - Left site  
 3:52 - Left Pathfinder Ranch
- July 27, 2007 – Steve Smith finishes up work at the pathfinder sties.  
 10:13 - Arrive at site  
 10:15 - Doors open  
 10:20 - Work started -- breaker for ISO block flipped off  
 10:24 - All wires removed from ISO block  
 10:33 - Unit out  
 10:49 - New Unit installed  
 10:56 - Unit wired -- throw ISO block breaker  
 10:57 - Verified 16 volts out of ISO block -- SUCCESS!  
 11:03 - GTSM hooked up  
 11:07 - Still have 16 volts, drawing 2.6A  
 11:12 - Power off the Cisco  
 11:16 - Wired up Cisco to terminal blocks -- attached to BLUE positive  
 11:20 - Removed AC cord and white "Lab" power supply  
 11:21 - Cisco back up. Connectivity & VPN restored  
 12:25 - Removed UPS -- had to powercycle VSAT IDU  
 12:27 - Plugged in IOTA via power strip (needed cable length)

- 12:32 - Volts/Amps check -- All currents are as expected
  - 2.7A through ISO block
  - 5.A or so through IOTA
  - Network side at 13.5 Volts
  - BSM side at 13.62 Volts
- 12:34 - Basic housekeeping -- checked for stuff on the ground, loose wires, etc
- 12:42 - Closed doors
- 1:03 -- Doors opened
- 1:05 -- Got word from Warren that all is well
- 1:06 -- Doors closed
- 1:30 -- Leaving Pathfinder Ranch
- November 14, 2007 UTC
  - 14:45 – Tim Dittmann and Tyson transferred out the black fiber-optic modem for a new one. Battery voltages- 13.3V (comms), 14.4V (GTSM). All clear from Warren gave the all clear at approximately 15:15.
- February 19, 2008 UTC
  - 10:20 – Per Dave Mencin's request, Tim Dittmann shut down all electronics and power input other than the GTSM. The GTSM is running on 4 batteries and the plan is to leave the remaining electronics off for >24 hrs. This was done by unplugging the Iota charge controller, switching off all breakers on the backpanel, and unplugging the "solar" input on the GTSM power box.
- February 20, 2008 UTC
  - 23:23 - On site.
  - 23:30 - Swapped fiber modem.
  - 23:35 - Restarted all uphole electronics besides the GTSM, caulked hut, and tightened battery lugs.
  - 23:52 - Adjusted quadratures, noticed lots of noise in scope. Moved Cisco off of top of GTSM, no change. Shut down Cisco and VSAT, no change.
  - 00:00 - Shut down marmot, no change.
  - 00:02 - Shut down Q330, no change.
  - 00:08 - Powered off radio, noise was eliminated.
  - 00:10 - Moved antenna to other side of the enclosure, and restored power to the antenna, scope looked much cleaner.
  - 00:20 - Off site.
- March 8, 2008 UTC
  - 00:40 - On site. Cannot connect to internet via IDU. Power cycle IDU, now it is working properly. Look at timer, display is not responsive so replace timer. Program station so that it will shut off IDU for 15 minutes daily (0:00 to 0:15). 01:00 - Off site.
- April 10, 2008 – Could not connect to internet via IDU. Power cycled IDU. IDU working properly. Looked at Timer, display was not responsive, replaced with new timer. Set to turn off IDU for 15 minutes daily (0:00 to 0:15).
- April 25, 2008 UTC
  - Mike Gottlieb visited the site to swap the logger board on B082, as well as investigate recent comms problems.
  - 19:30 - On site, VSAT IDU system light is off, cycle power and site comes back online.

19:34 - Swap US39LG board into system, removing US14LG.  
 19:40 - Rename board and set IP.  
 19:45 - Adjust downhole temperature from 1.8 V to 1.245 V.  
 19:50 - Notice system light is back off and 3 week old timer is not working properly. Power cycle the IDU and system light comes back on.  
 20:30 - IDU down again, this time it is not possible to get it back on. Off site. (Site still needs new IDU and timer)

- 24 July 2008 PST

11:06 - Open enclosure and switch out old IDU for new IDU. Disconnect cables from IDU and ODU to conduct the Ohm test as directed by Wade. The cable connectors are bad, clip them off. Do the same Ohm test on the cable alone, and it passes as good.  
 11:50 - Leave site for cable tools.  
 16:00 Return to site to replace cable connectors and hook up to new IDU. Leave site to PING which results in the message "request timed out".  
 17:10 - Return to the site and hook up a laptop to the IDU to get a status report, but no luck. Perform another Ohm cable test and the new connectors are good. Replaced the ODU, but no luck. Also try switching the old and new IDU out.  
 18:30 - Lock enclosure and leave site to call for advice.

- 25 July 2008 PST

13:40 - Open enclosure.  
 13:48 - Hook up new IDU to laptop, no communication to laptop. Try calling for advice.  
 14:00 - Leave for better cell reception and get a shorter cable in case it is necessary to re-point dish.  
 16:15 - Back on site.  
 16:45 - Lock enclosure and bring IDU along to change laptop settings to be able to communicate with the IDU.

- 26 July 2008 PST

11:00 - Open enclosure.  
 11:06 - Hook up new IDU to laptop. On new IDU the only blue lights that come on are LAN, Receive, and Power. Work on troubleshooting the problems.  
 11:40 - Leave site to ping IDU. While in cell service call Dave and discuss the problem.  
 12:30 - Return to site and all V-SAT lights are on, connectivity test reads ok. Only concern is the TCP Acceleration Status (within System Status) reads "Impaired".  
 13:00 - Open GTSM box and begin removing Logger board.  
 13:00 - Wade calls and says he can communicate with the V-Sat, but nothing else. Move power off old IDU back over to the power supply controlled by the timer.  
 13:30 - New logger board in.  
 13:40 - Lock up site, realize a serial port adapter is needed to program new logger board.  
 17:00 - Return to site and begin programming new logger board. Change the names in the files and reboot logger, but after 1 hour and 30 minutes the logger still has not finished rebooting. Call Wade, he is concerned that the reboot may have run right on the half hour.  
 19:30 - Hit stand by on Logger board and turn off.  
 19:33 - Turn on logger board and reboot. Speak with Wade, concerned that whole logger board may be bad. He also cannot communicate past the IDU, so we check all the connections between the router and hardware, which are all in the correct slots.  
 20:00 - Close GTSM box and lock up site.

- 27 July 2008  
In the morning receive e-mail confirmation from Dave that he can see all the equipment in B082, as well as an e-mail from Mike G the GTSM is up with a problem from the GPS clock.
- June 17, 2009.  
RTs upgraded to 1.20 on 6/17/09 at 1105 PST. Powerbox is US303PB.
- February 18, 2009.  
Mike Gottlieb visited the site to get it back online. He found the GFI tripped, and everything powered off. There was no sign of moisture inside the enclosure. He reset the GFI, and everything came back up. This includes the shared coms link with B089. They recovered all missing data from B089, but have lost about 30 days at B082 due to this power outage.
- November 23, 2010  
A septic field was dug up near B089.
- February 22, 2011  
Dirt will be moved near B089 this week.
- April 19, 2011 – Pathfinder Ranch will be moving logs and dirt next to B089 this week and next week. April 29, 2011 they will be getting a large Alpine climbing tower installed close to B089. It will sit above ground and weigh about 80,000 lbs.
- June 2, 2011. Landowners notified Mike Gottlieb that they would be moving dirt around B089 2<sup>nd</sup> to ~8<sup>th</sup> June 2011.
- July 15, 2011 – VSAT was powered down when Wade arrived on site. AC power supply had failed, replaced with new DC power supply. VSAT is now on battery backup and on timer.
- April 2, 2012 – Possible lightning strike on 3/27/12. Ch3 was just producing noise. Rebooted RT3 and logger board and CH3 resumed producing data.
- June 21, 2012 – The VSAT dish had been moved by horses and needed to be repointed. There is now a fence to keep them out. There was also a large tree branch blocking the satellite view, which was removed. The dish was repointed, and Mike eventually got 88 signal strength and 66 crosspole. Communications are back up, although very slow. This is likely due to data downloads catching up.
- February 6, 2013 – The logger board had failed and was replaced, but the replacement was also bad.
- March 2, 2013 – A trillium T120PH was installed at a depth of 5.72 m.
- March 5, 2013 – The logger board was replaced.
- April 17, 2013 – Secured electronics with velcro, zip ties, and double sided tape. Batteries have not been secured yet.
- March 20, 2014 – Logger was set for event mode internal. Changed it to be



disabled/external, to match the rest of the network.

- April 2, 2014 – Power cycled and replaced RT board. CH0 was still stuck at gain 1.
- October 16, 2014 – Landowners will be moving dirt 600ft from the Strainmeter for the next few weeks.
- January 6, 2015 – Station had lost GPS time. The GPS\_coldstart command was used to restore GPS time.
- January 21, 2015 – Ch0 was in G0. Reset channel, still was in G0. Could not adjust quadrature on this channel. Wade had already replaced the RT board. Could try an oscillator board next time. Checked other quads, they were all good.
- December 27, 2016 – Confirm RT firmware was 1.20. Adjusted quadrature and chop delays. Could not change CH0. Turned on event mode, set trigger/aftershock to 300/60. Confirmed all other strain-logger.conf settings were correct for this powerbox. Looked at data quality issues on CH0 and low tap step on CH1.

Known issues:

CH0 - tap step = 0, offsets during calibration, stuck in G0, no usable data

CH1 - tap step is low (263 mV instead of ~400), otherwise data seem ok. pumping nearby affects all channels

CH0 analysis:

Instrument settled at G0, RT at 50000 +0058.4. Checked average input: 0058.4 mV, very steady. Variance is 0000. Observed change on signal at Amp I/P with 1st decade of RT. Only saw 100 mV of signal change for each 1st decade change (should be 3V). Attempted to force a manual balance to G3 by adjusting gain up, balancing (minimizing signal) with manual RT changes, and repeating. Minimum signal is 800 mV at G1, no combination of transformer tap settings would reduce it past there. Mike believes that means the 800 mV is likely quadrature. There was no response to adjusting quadrature, the Amp O/P waveform did not change at all. Shorting input did change the signal from 58 mV to 0 mV. Did not have dummy load on site, this would be the next test to confirm issues are down hole. Clearly the low response to RT changes and the quadrature are significant problems that may or may not be fixable.

CH1 analysis:

The tap step for this channel is unusually low, ~263 mV. The tap step should be about 400 mV. It is above the cutoff (~80 mV) where real problems start. Amp I/P response to 1st decade RT changes is also slightly low, 2.5V instead of 3V. This is 83% of normal. Average input: variance of 0198 (which is high). This also shows up as a noisy thick waveform on the scope meter. Need to check and if dummy load changes this. The site appears to be dealing with the reduced DH signal appropriately (by calibrating so that RT changes represent a smaller voltage), so this low tap step reading seems ok.

- July 26, 2018 – Mike investigated coms outage. Appeared to be related to fire. Station was not connecting to AT&T Cell tower. Should come back when tower issue is resolved. Anza coop power was down. Mike discovered this only after tripping GFI, which he was unable to reset without live power coming in. He had to replace the GFI with a regular outlet.

- February 4, 2020 – Attempted to set cpu clock from 100 to 400. Could not connect via serial port on logger. Attempted several times via kermi in terminal as well as hyper terminal in a windows vm. No response from serial port, so unable to change cpu clock at this time.
- April 4, 2020 – No logging data. Reformatted compact flash card, still won't mount. Logger board will need to be replaced.