

US Arrival Heights Noise Survey

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Abstract

The purpose of this document is organize and display VLF and ELF spectrograms around several key noise survey events. Spectrograms for VLF come first followed by ELF as noted in the individual figure labeling. Times for all events are in UT and take place during the year 2011 and have the following format: Day - HH:MM:SS. In general most of the times are approximate within a few seconds to a few minutes.

Almost all of the data plots correspond directly to their associated event time stamps except for a few cases where the system was stopped. In these cases the stop time would be a few minutes before the actual end of generated data but there was a desire to explicitly show the end of data acquisition. It is also important to note that generally the data one minute before was favored instead of on minute after. For example, if an event takes places at 00:30:30 the figures displayed would be for 00:29:00-00:30:00 and 00:30:00-00:31:00. If the event took place closer to 59 seconds then the current and next minute figures were used; an event at 00:30:50 would have figures displaying 00:30:00-00:31:00 and 00:31:00-00:32:00.

While there is a considerable amount of data and events in this document there are times when there isn't data or the exact time is unknown; In either case an X is used. When the X precedes an event it indicates that there is no data for this even and when the X fills a slot in the time format, such as 00:03:XX, it indicates the exact time is unknown. When the exact time is unknown and there is data available the best guess for figure timing is made given the average time between events for a given test.

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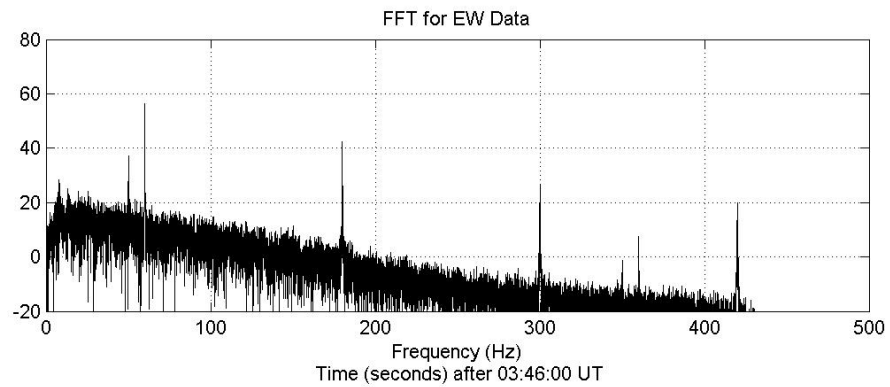
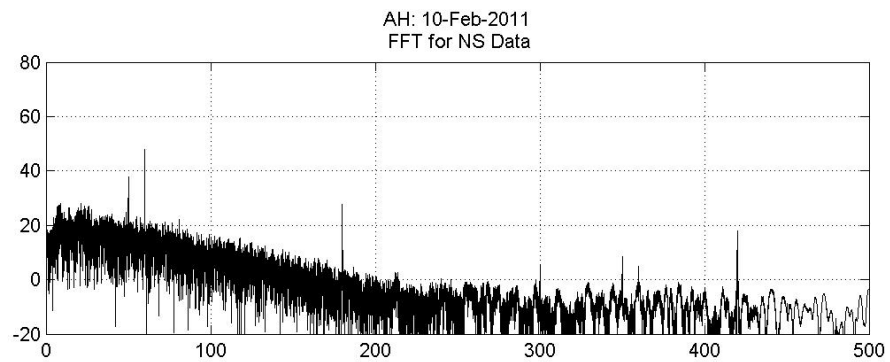
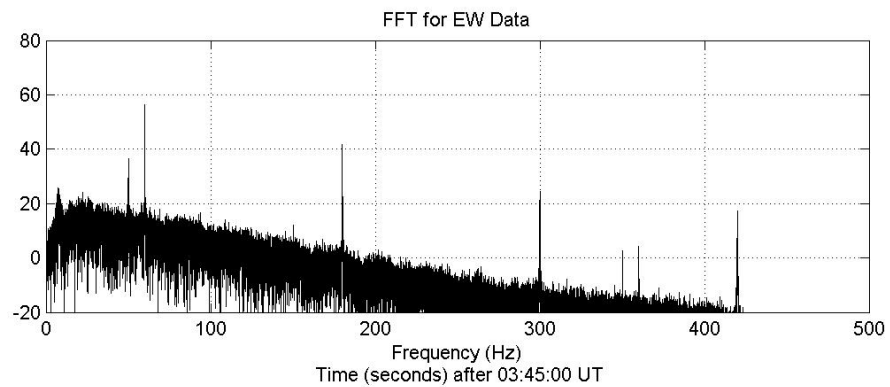
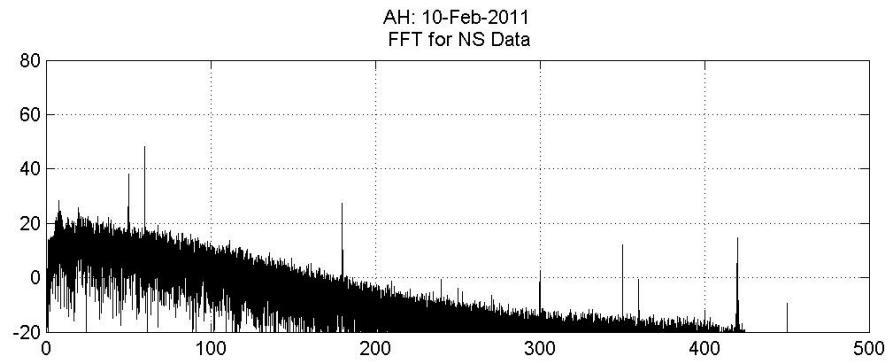
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0.1 Day 41 - Kludge Box Replacement

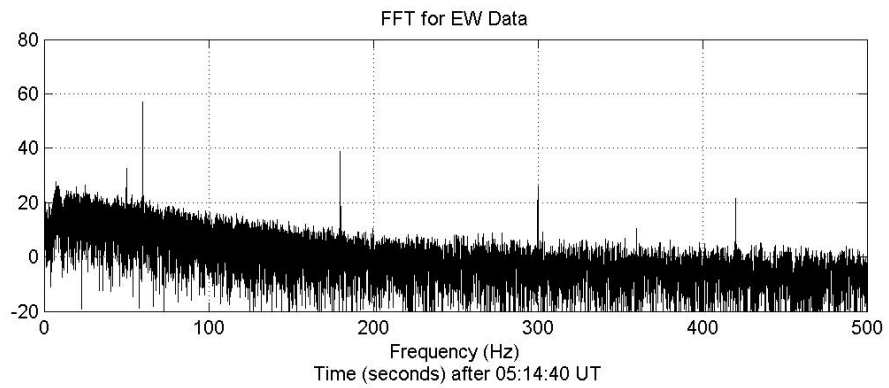
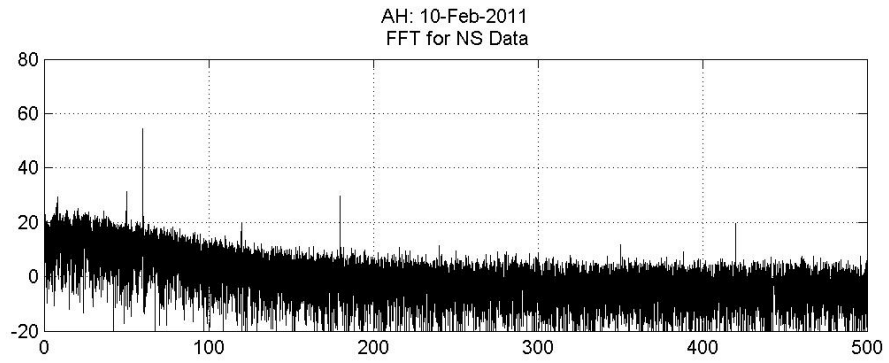
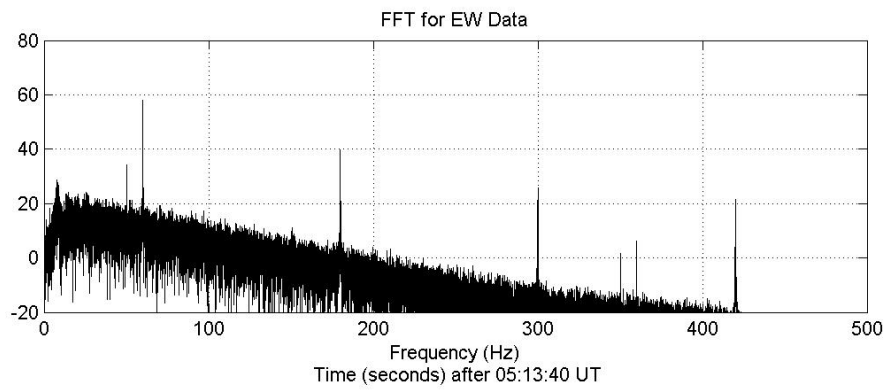
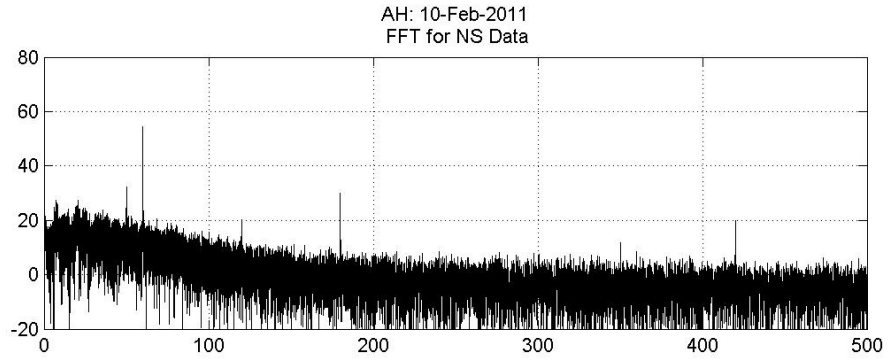
41 - 03:44:50 - DAQ software stopped, begin kludge box replacement

41 - 05:13:40 - Kludge box changed, ADC Channels changed; acquiring data

0.1.1 41 - 03:44:50 - DAQ software stopped, begin kludge box replacement



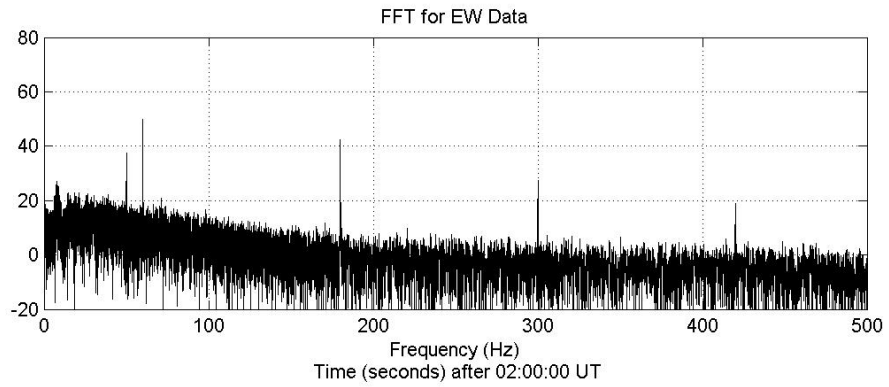
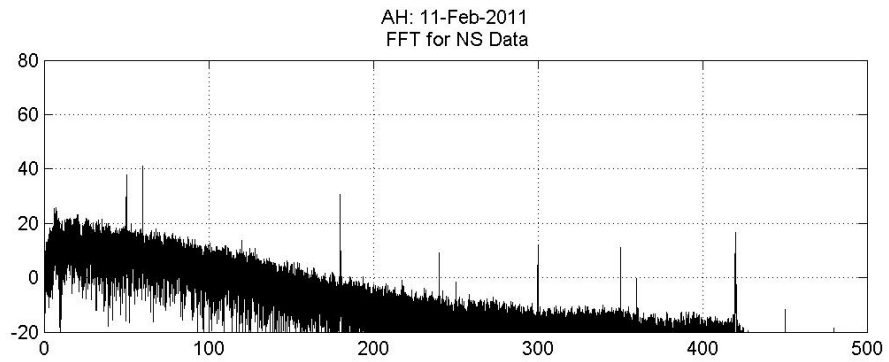
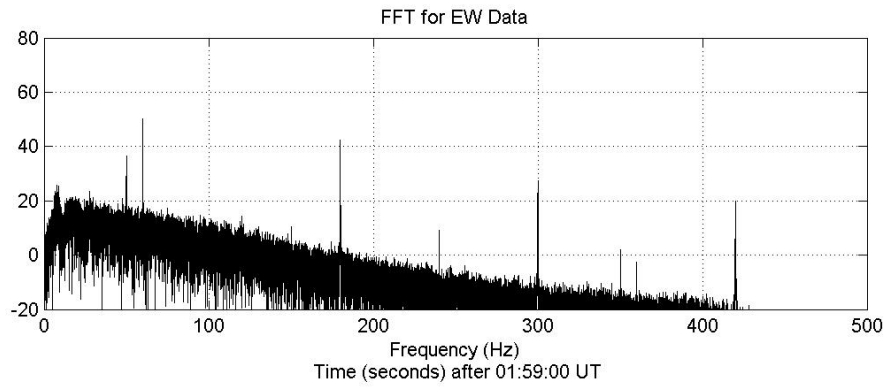
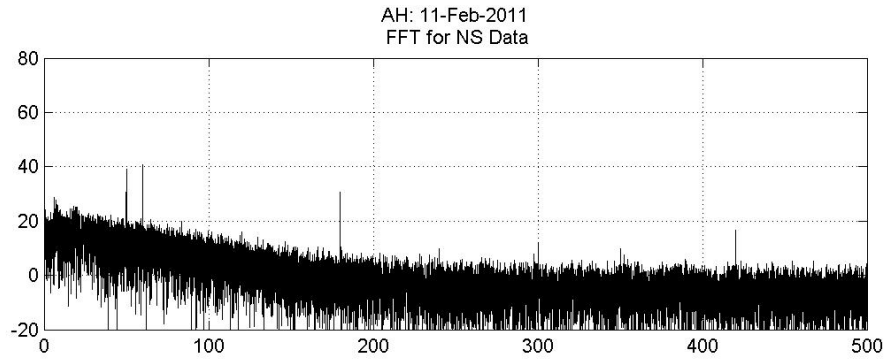
0.1.2 41 - 05:13:40 - Kludge box changed, ADC Channels changed; acquiring data



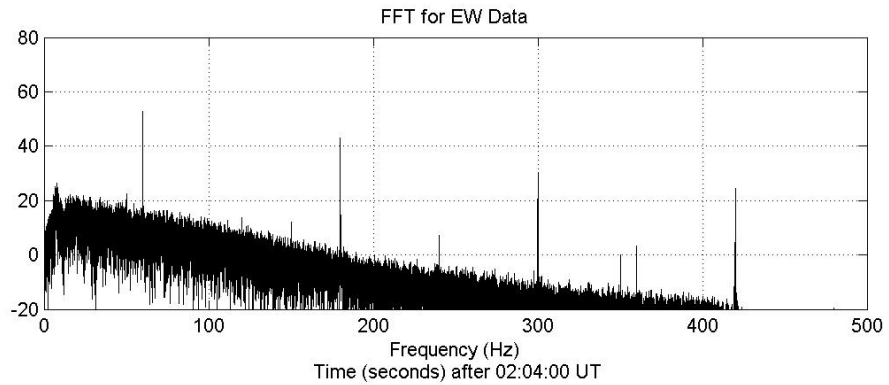
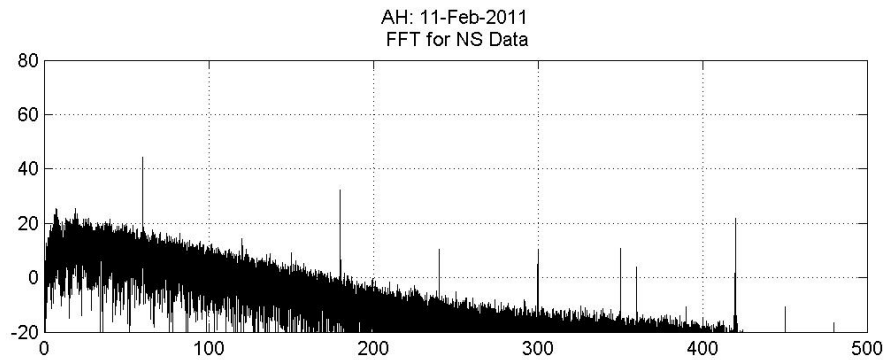
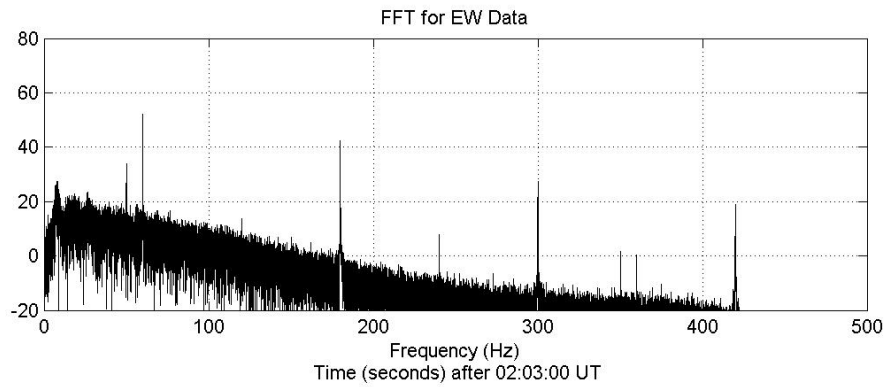
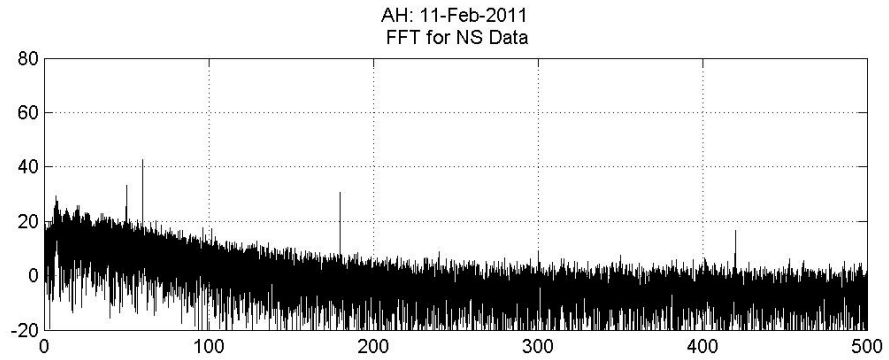
0.2 Day 42 - Transformer Installation

42 - 02:00:00 - Interferometer darkroom shutdown
42 - 02:03:45 - Wall power off, all systems switched to battery backups
42 - 02:26:45 - Full Power Returned
42 - 02:28+/-1 - Power lost temporarily
42 - 02:34:58 - Full power returned
42 - 02:37:30 - ELF/VLF Receiver on battery backup
42 - 02:40:10 - ELF/VLF Receiver back on wall power

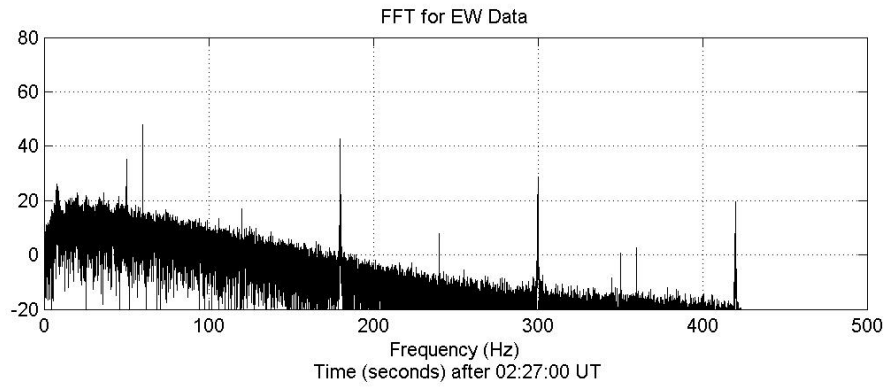
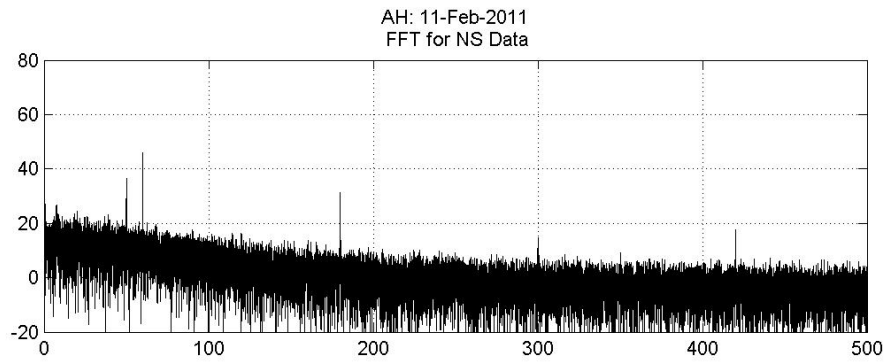
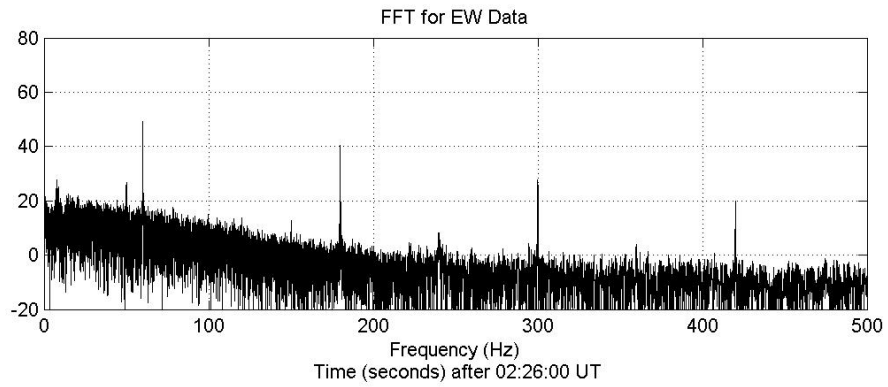
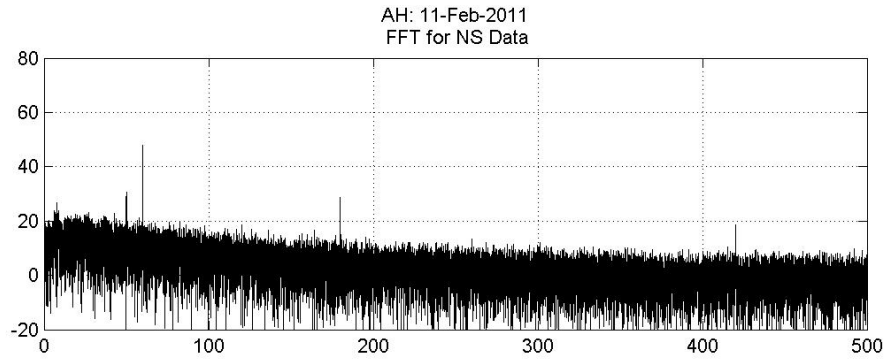
0.2.1 42 - 02:00:00 - Interferometer darkroom shutdown



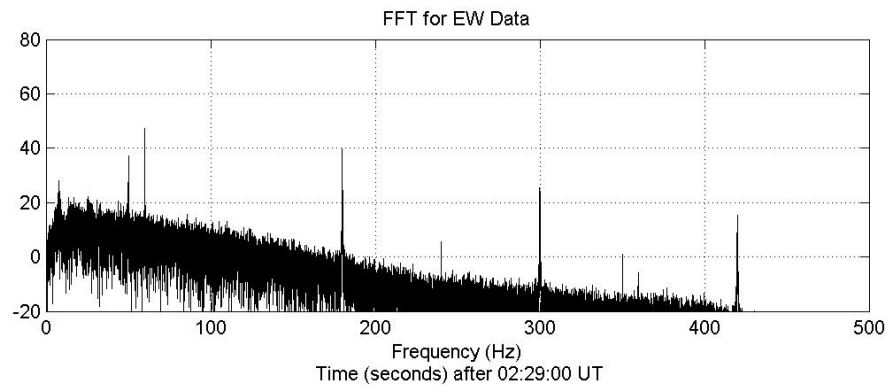
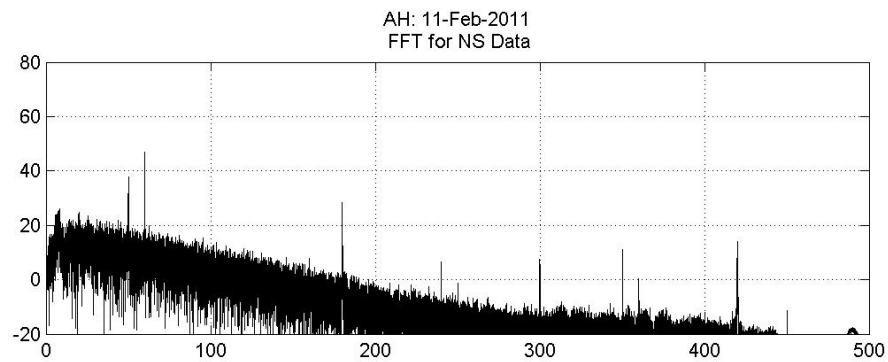
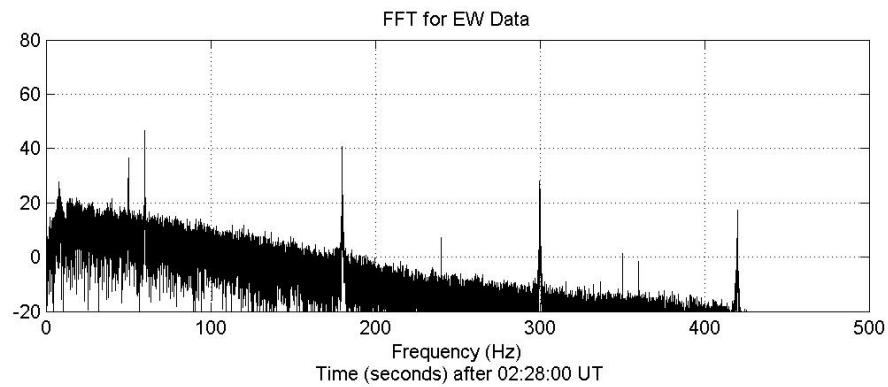
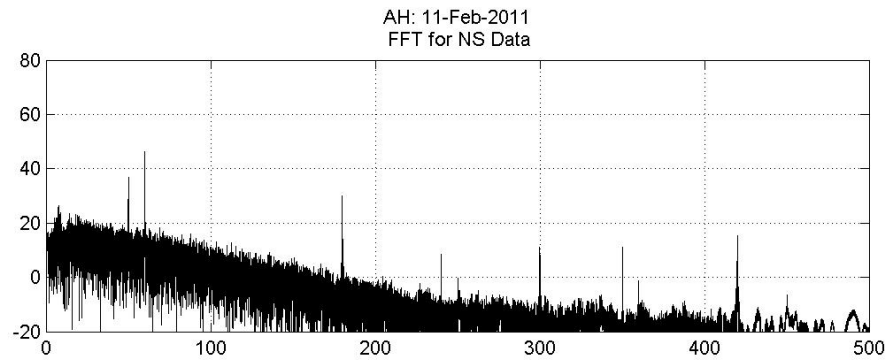
0.2.2 42 - 02:03:45 - Wall power off, all systems switched to battery backups



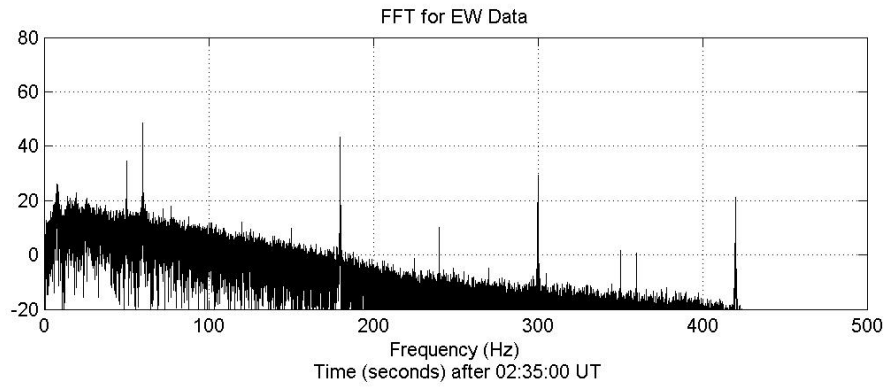
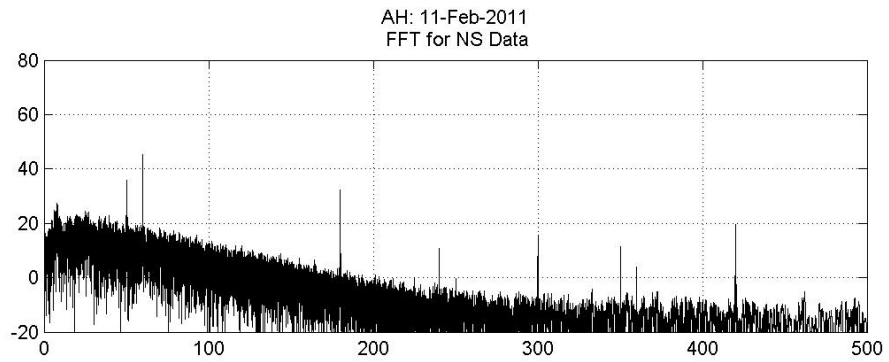
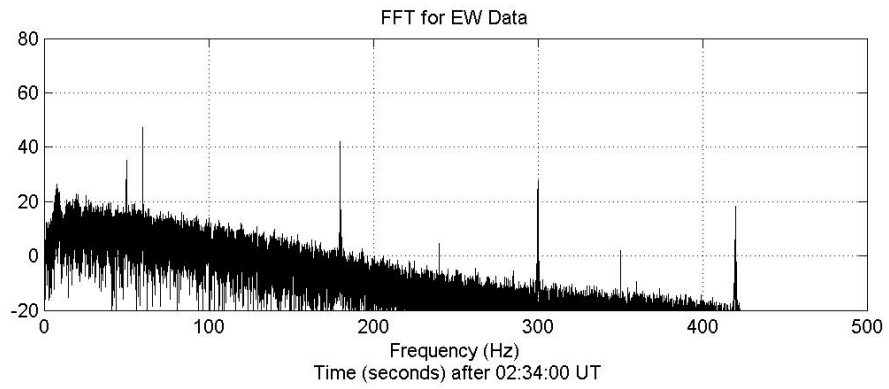
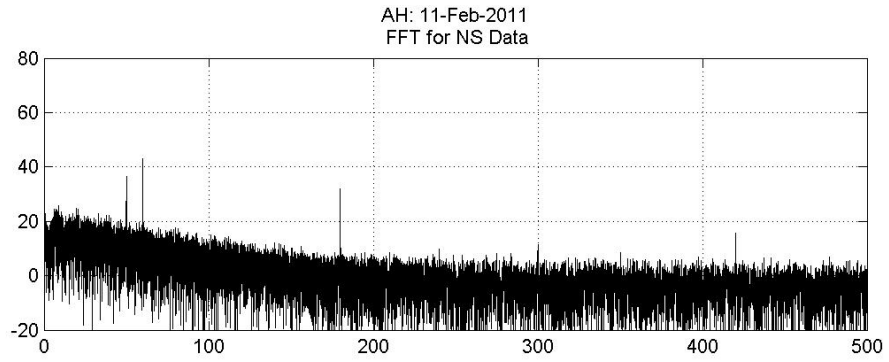
0.2.3 42 - 02:26:45 - Full Power Returned



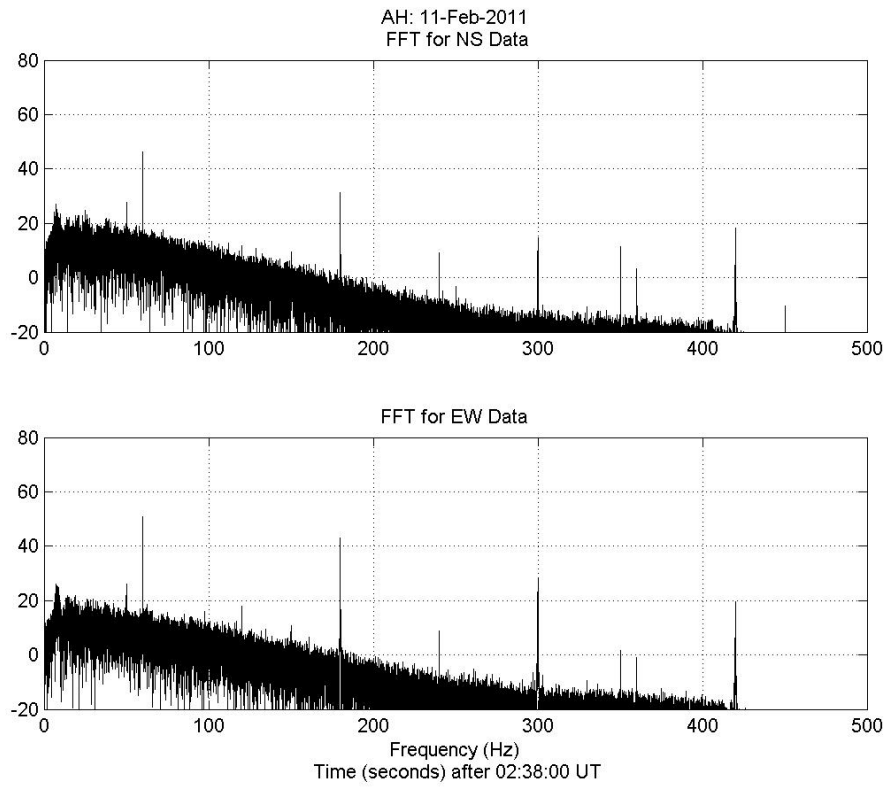
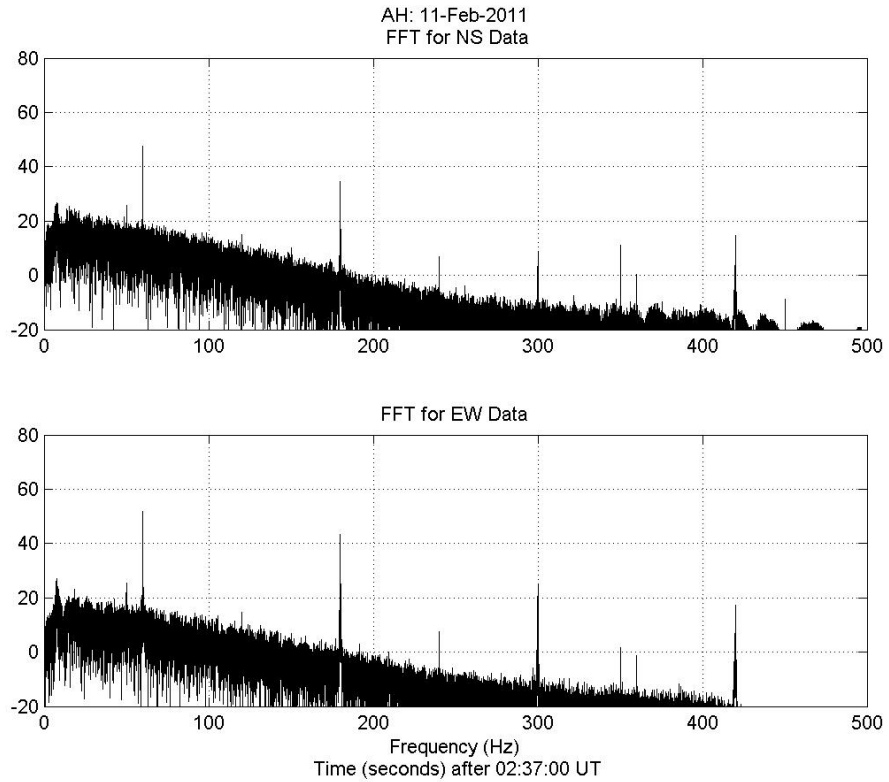
0.2.4 42 - 02:28+/-1 - Power lost temporarily



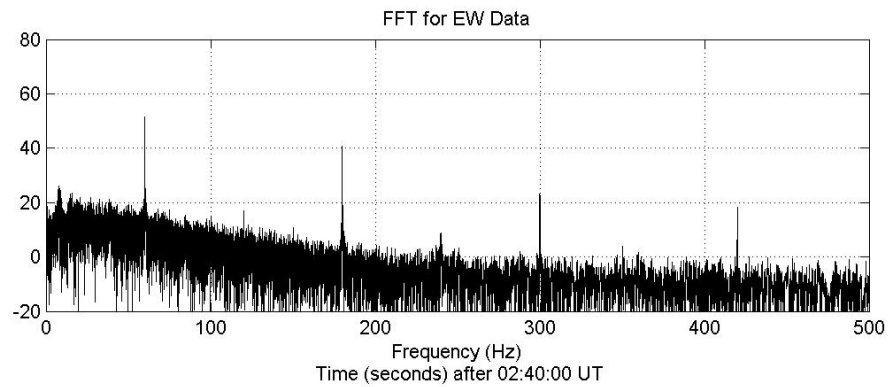
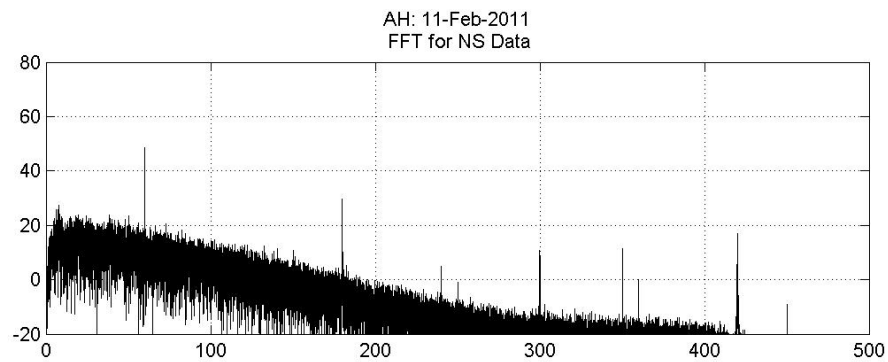
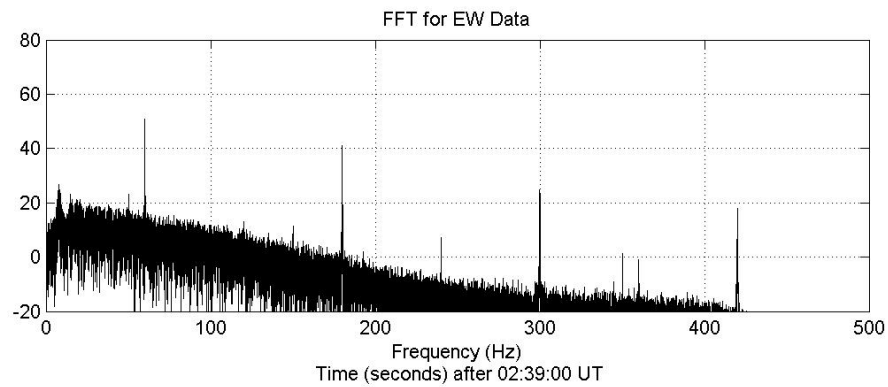
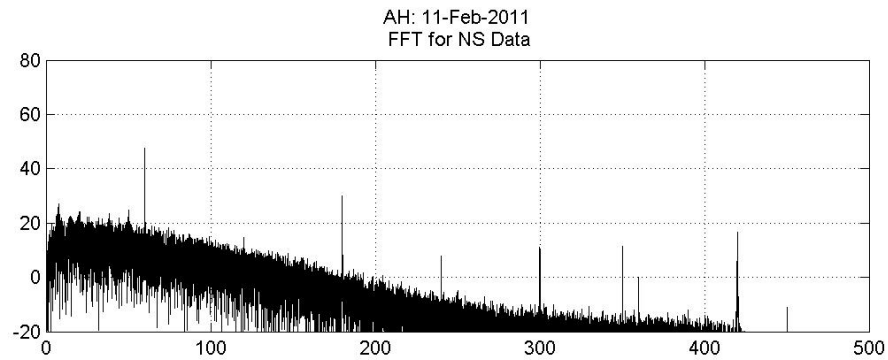
0.2.5 42 - 02:34:58 - Full power returned



0.2.6 42 - 02:37:30 - ELF/VLF Receiver on battery backup



0.2.7 42 - 02:40:10 - ELF/VLF Receiver back on wall power

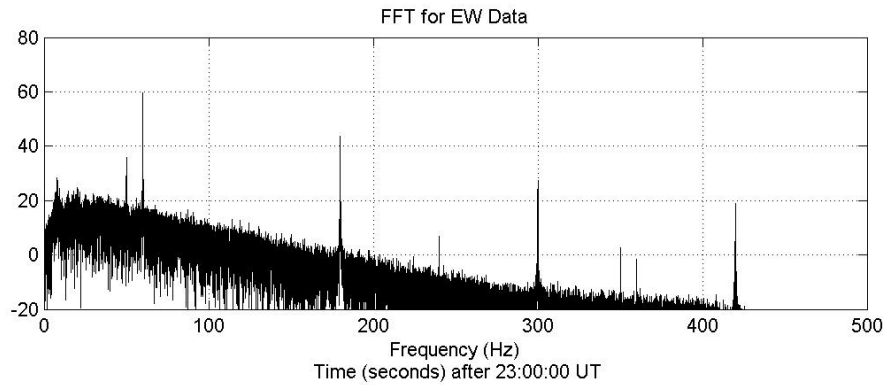
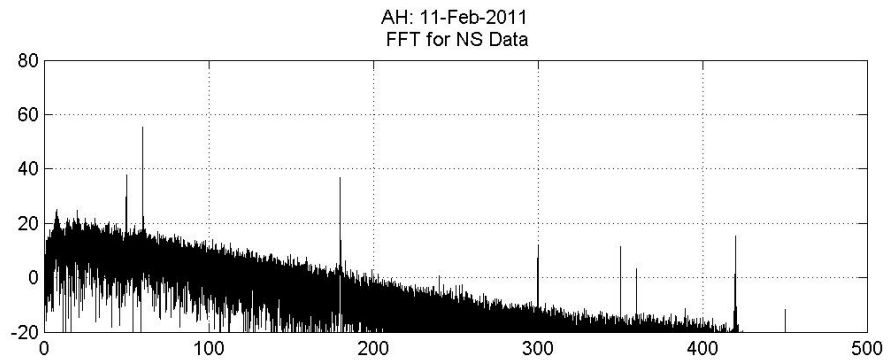
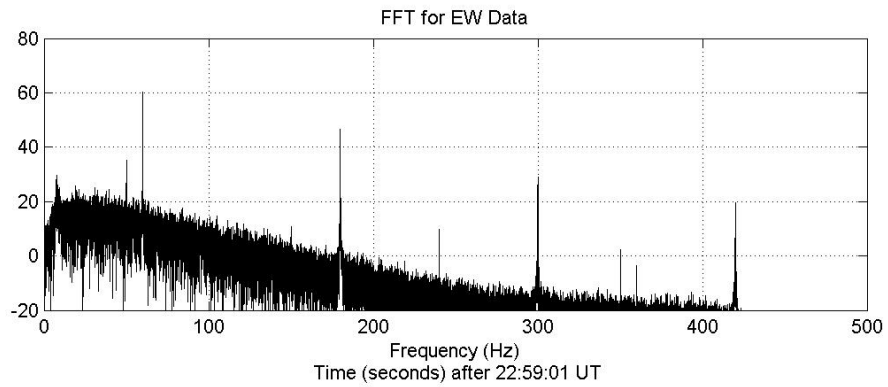
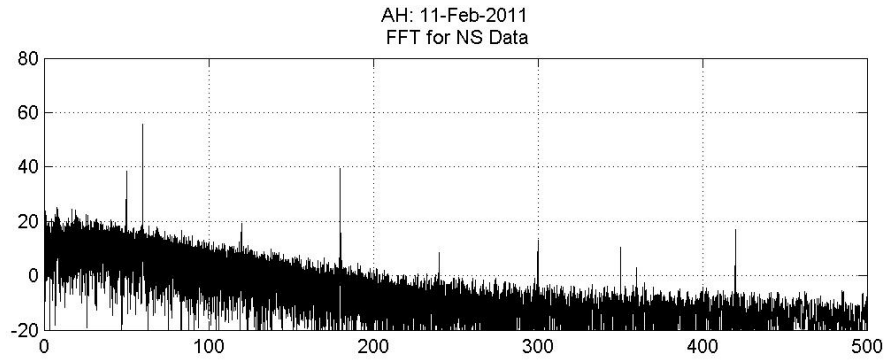


0.3 Day 42 - LIDAR Operation

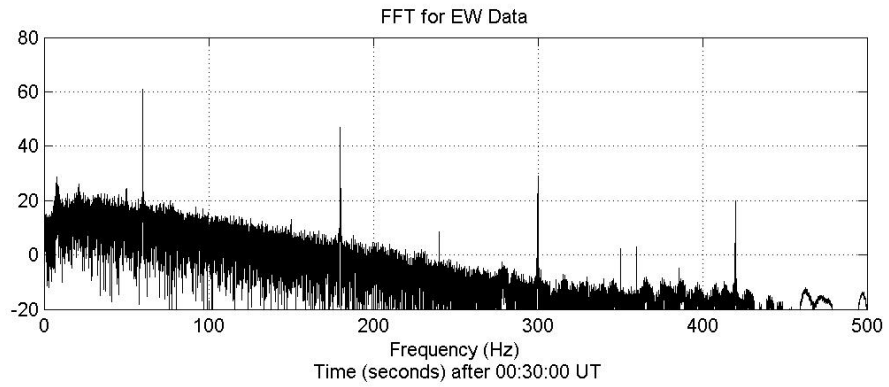
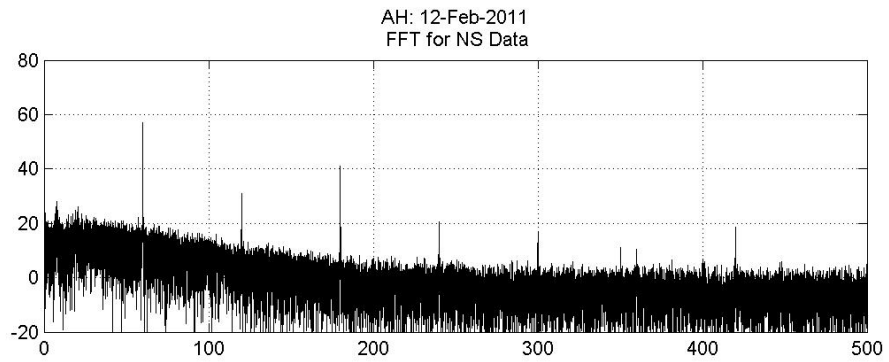
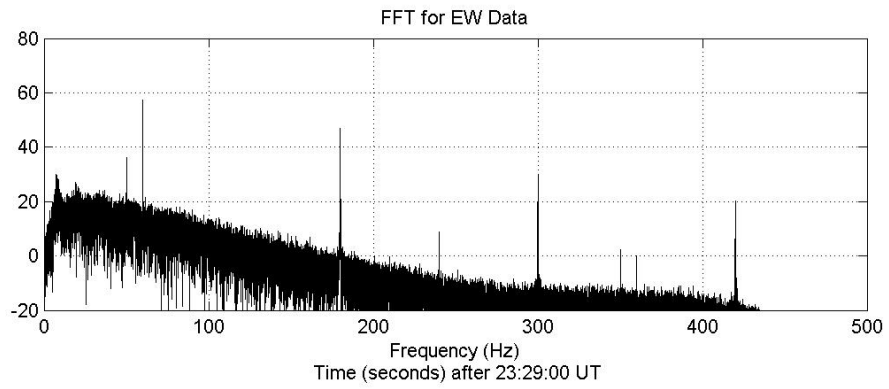
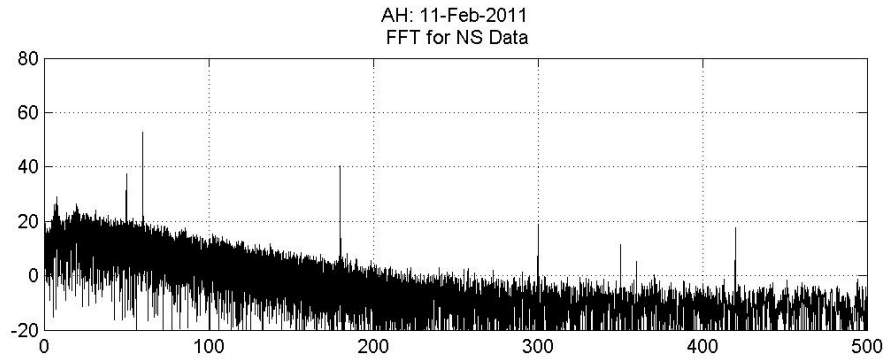
42 - 23:00:00 - LIDAR starts acquiring data

42 - 23:59:00 - LIDAR stops acquiring data

0.3.1 42 - 23:00:00 - LIDAR starts acquiring data



0.3.2 42 - 23:59:00 - LIDAR stops acquiring data

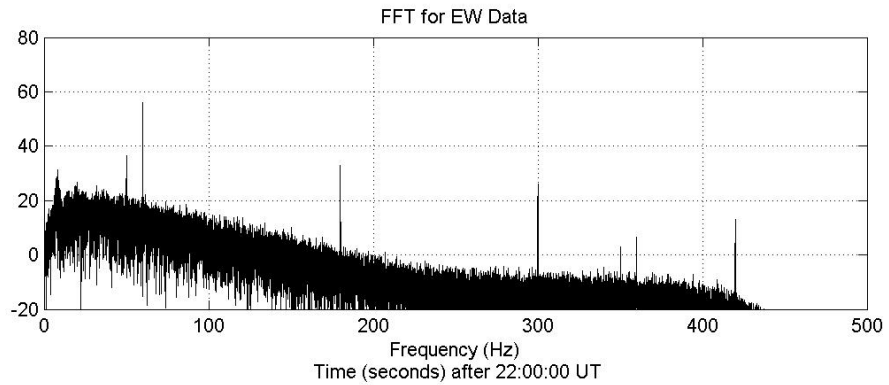
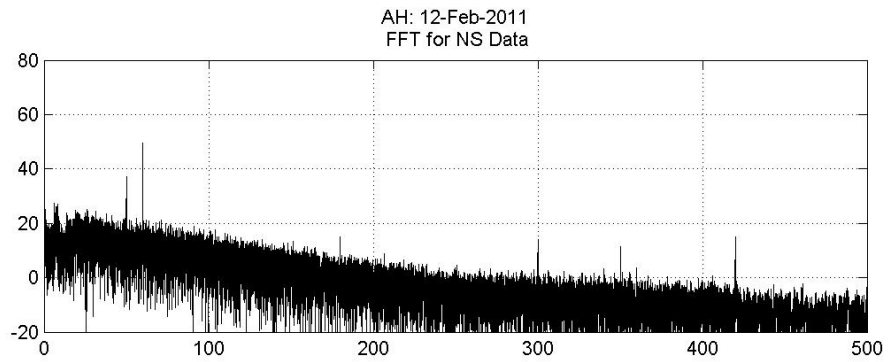
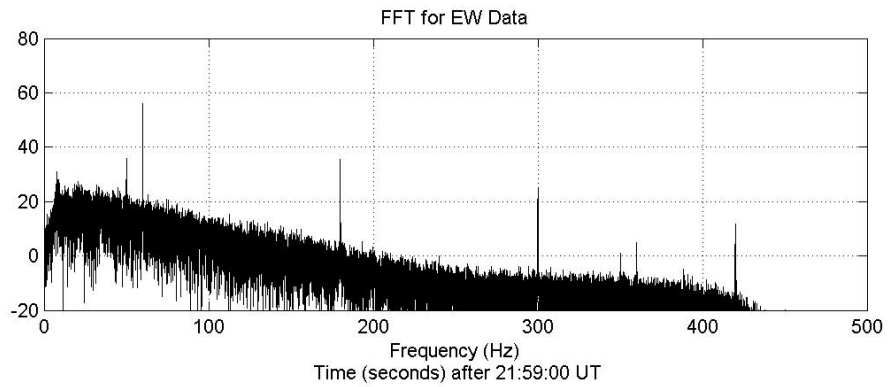
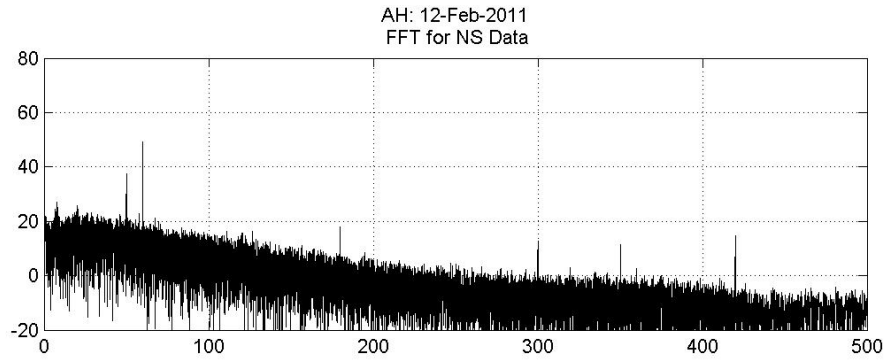


0.4 Day 43 to 44 - LIDAR Shutdown

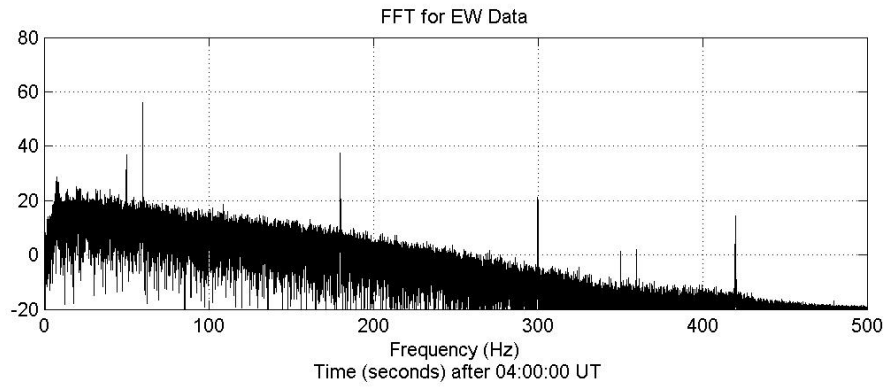
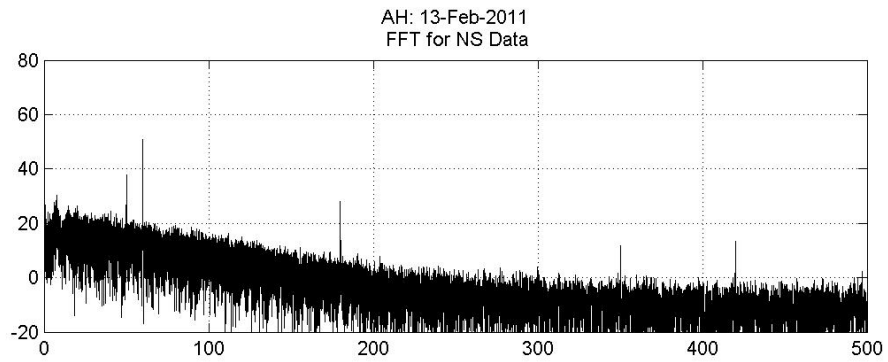
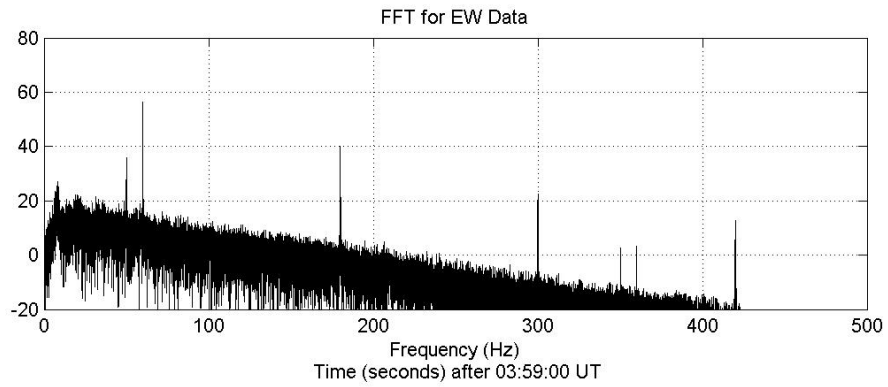
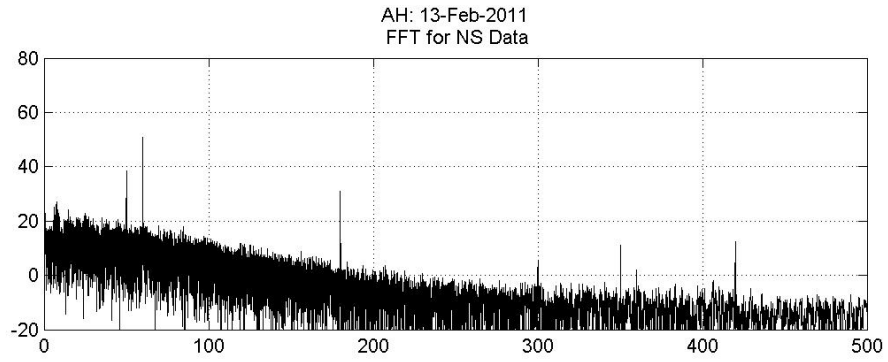
43 - 22:00:00 - Begin LIDAR shutdown

44 - 04:00:00 - End LIDAR shutdown

0.4.1 43 - 22:00:00 - Begin LIDAR shutdown



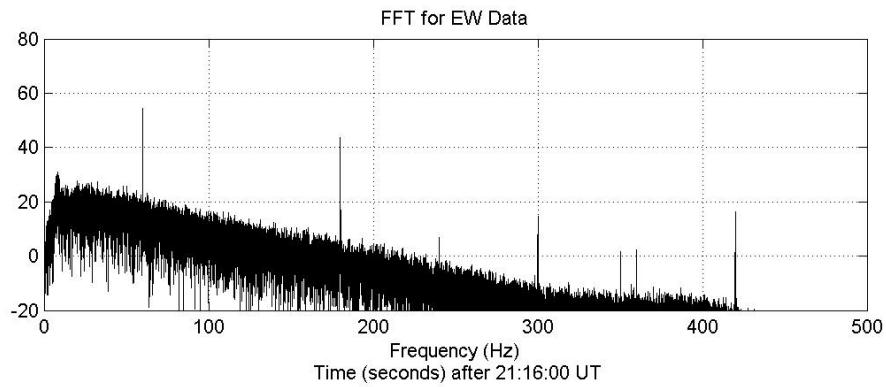
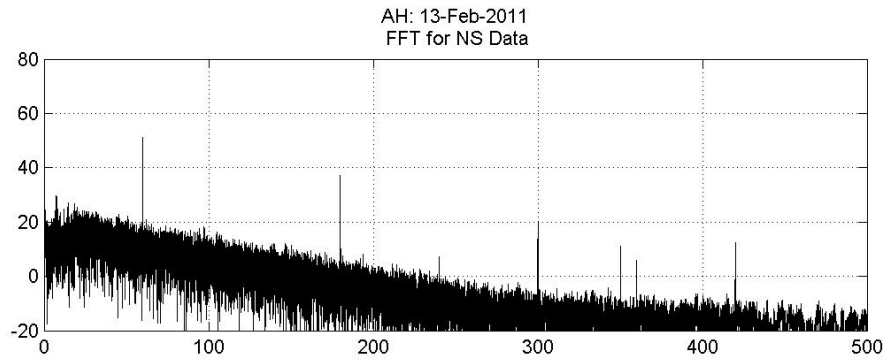
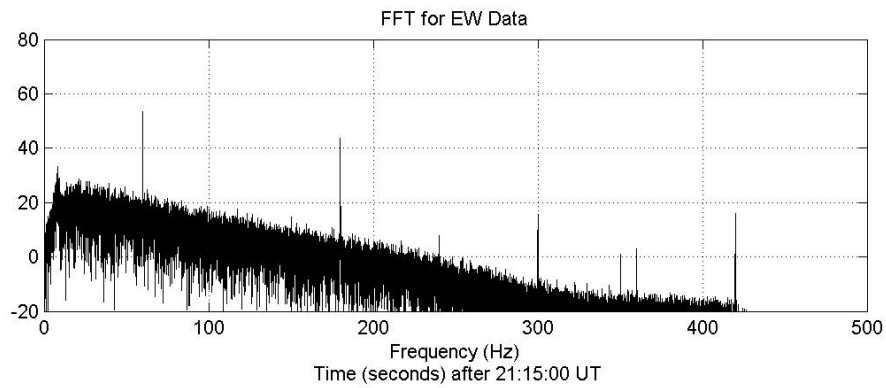
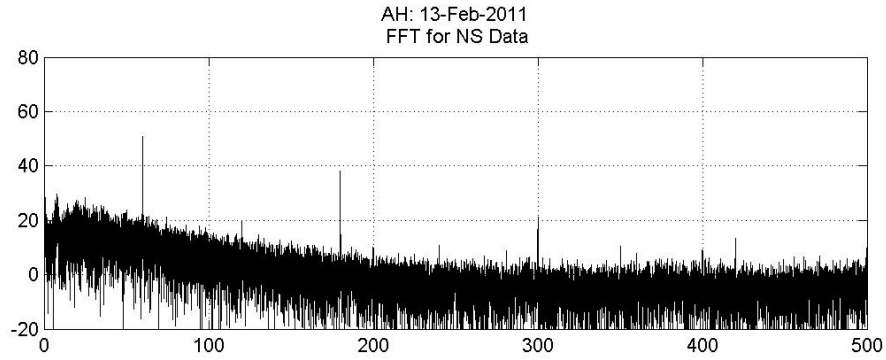
0.4.2 44 - 04:00:00 - End LIDAR shutdown



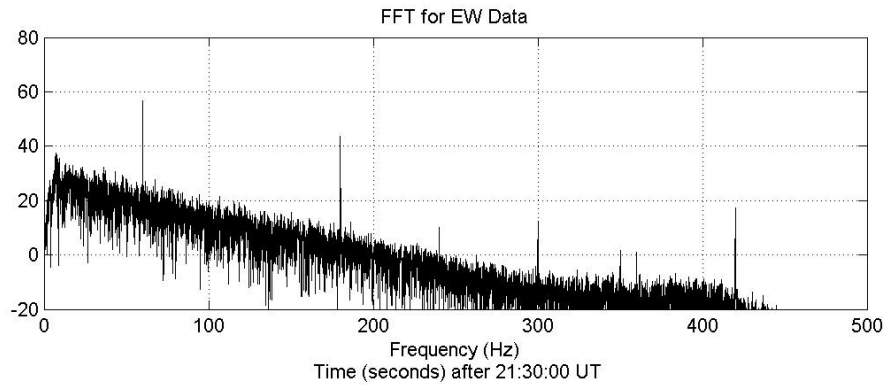
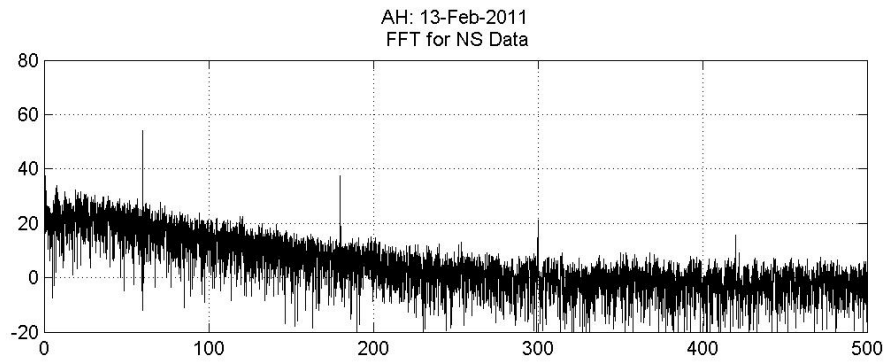
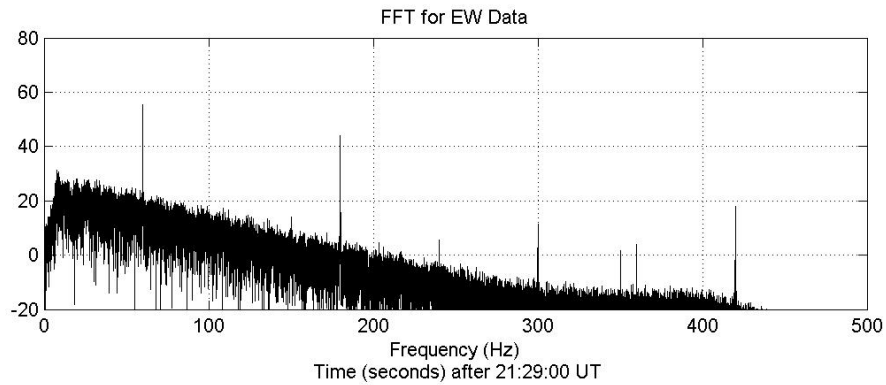
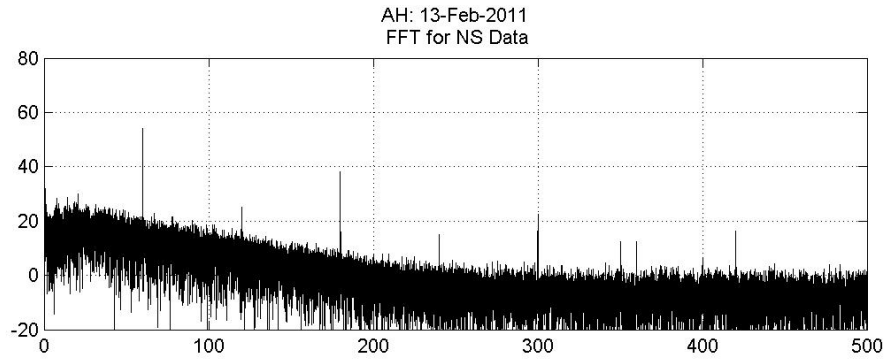
0.5 Day 44 to 45 - Full Site System Shutdown

- 44 - 21:16:30 - Kiwi Arrival Heights disconnected from power but still connected to grid; LIDAR still powered
- 44 - 21:30:00 - Shutdown of VLF/ELF system, begin switch to generator
- 44 - 21:31:00 - Gonzalos darkroom switch to generator started
- X - 44 - 21:32:10 - Darkroom switched to generator; full system runs on 1.2 kW
- X - 44 - 21:37:30 - VLF/ELF connected to generator, system restarted
- X - 44 - 21:41:00 - GPS locked, system restarted
- 44 - 21:44:00 - DAQ started acquiring data again
 - Other systems taken down:
 - Gonzalos Darkroom
 - Gonzalos UPS
 - A-111
 - UV Monitor
 - Communications and Weather
- 44 - 21:53:30 - Internet restored
- X - 44 - 22:06:15 - Panel B shutdown
- X - 44 - 22:07:15 - Panel C shutdown
- X - 44 - 22:09:05 - Heaters
- X - 44 - 22:10:30 - Head and smoke detectors, fire panel
- X - 44 - 22:15:15 - All other breakers
- X - 44 - 22:25:00 - Power failure to VLF/ELF System
- X - 44 - 22:30:00 - Switched VLF/ELF to wall power
- X - 44 - 22:33:XX - Disconnected from wall power to single generator
- X - 44 - 22:37:XX - Generator fails to start, switched back to wall power
- X - 44 - 22:43:15 - VLF/ELF GPS lock, restarting
- 44 - 22:49:30 - Generator determined to be putting out 52 V
- 44 - 22:51:00 - Generator turned off
- 44 - 22:53:45 - Gonzalos equipment starts being connected to wall power
- X - 44 - 22:XX:XX - Gonzalos equipment full connected to wall power
- 44 - 23:08:00 - Continued problems with system; two restarts, one forced
 - Full spectrogram created, not FTPing
- 44 - 23:26:00 - Two restarts still not FTPing
- 45 - 00:40:00 - Shutdown for outlet phase testing
- 45 - 01:47:29 - Wind turbines off; VLF/ELF and internet running on UPS batteries
- 45 - 01:58:00 - PC tower UPS connected to wall power
- 45 - 02:01:30 - UPS disconnected
- 45 - 02:02:42 - Electronics UPS connected to wall power
- 45 - 02:04:15 - Both UPSes connected to wall power
- 45 - 02:14:43 - System connected to wall power through isolation strips
 - Internet UPS connected to wall power
- 45 - 02:36:00 - Plugged in UPS, not connected to anything
- 45 - 02:XX:XX - Plugged in 2nd UPS, both are charging
- 45 - 02:44:35 - Unplugged UPS use by PC; PC still connected to wall power
- 45 - 02:47:10 - Connected charging UPS to same outlet as power strips
- 45 - 03:23:00 - Noted that wind turbines are spinning
- 45 - 03:31:30 - UPSes turned off
- 45 - 03:36:45 - UPS on for a few minutes, now off

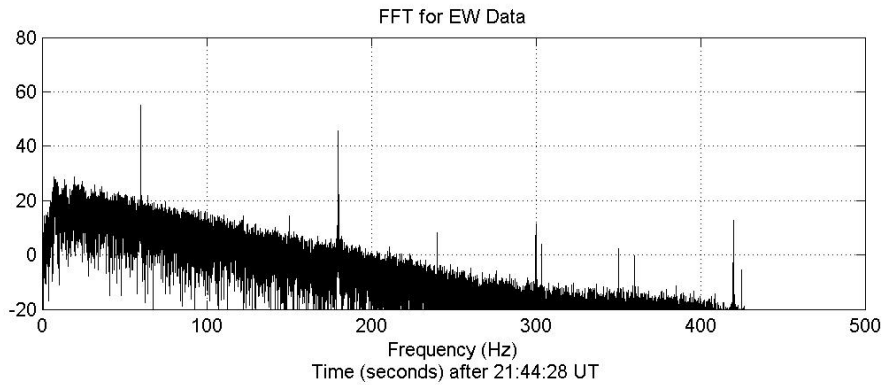
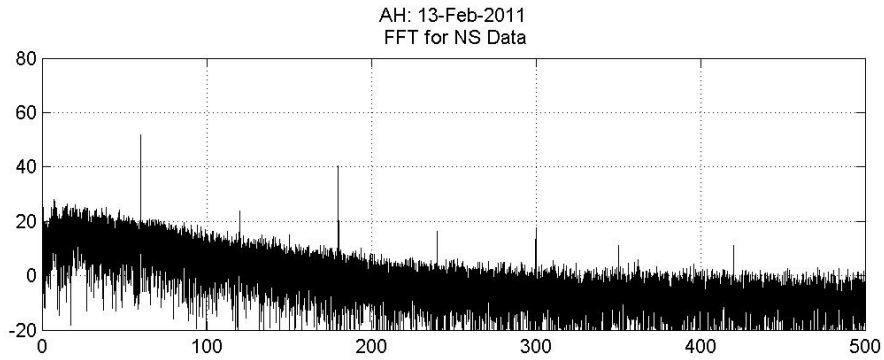
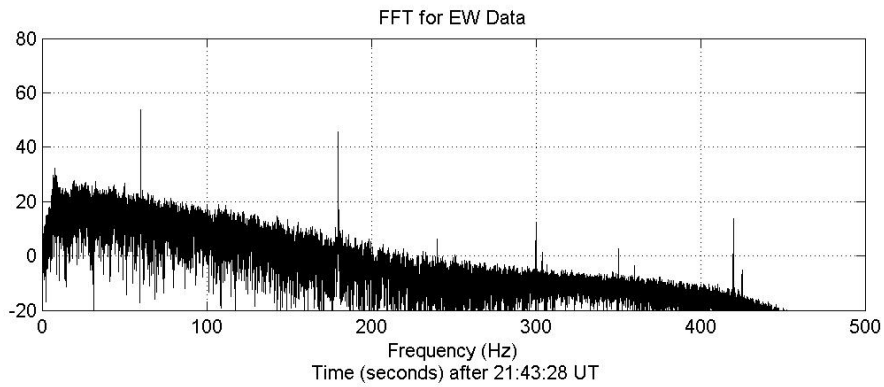
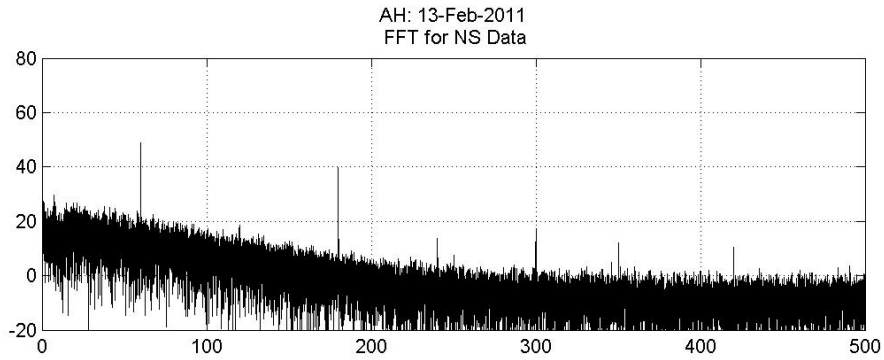
0.5.1 44 - 21:16:30 - Kiwi Arrival Heights disconnected from power but still connected to grid; LIDAR still powered



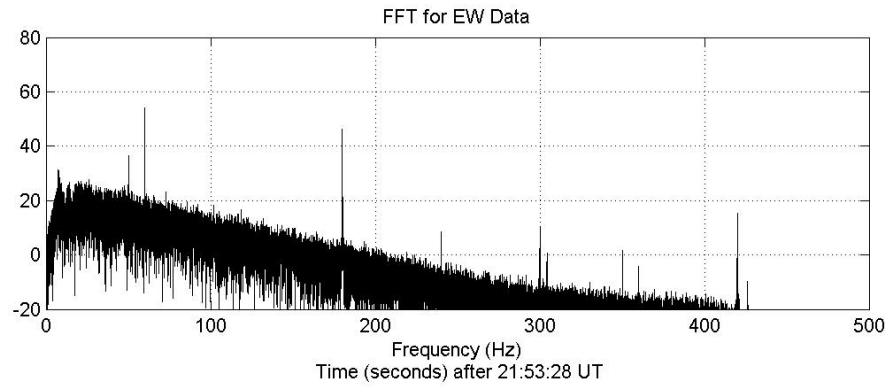
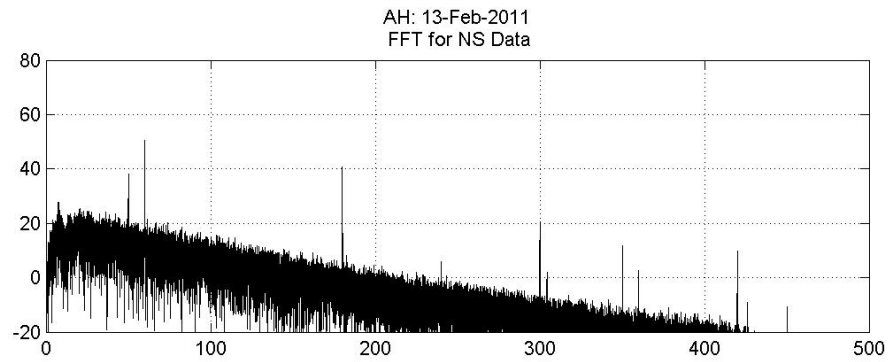
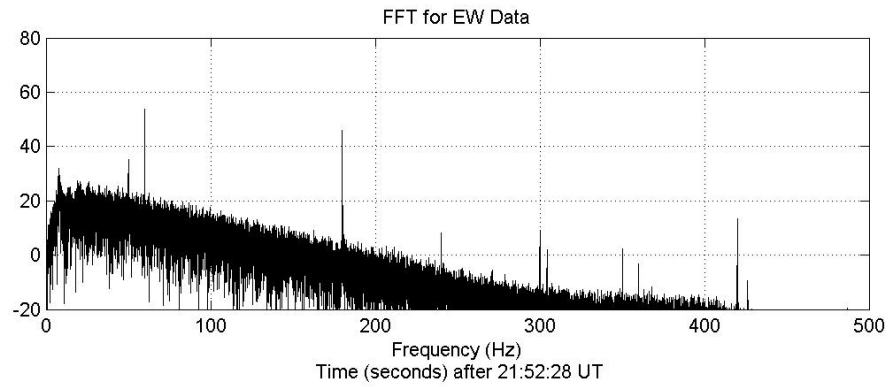
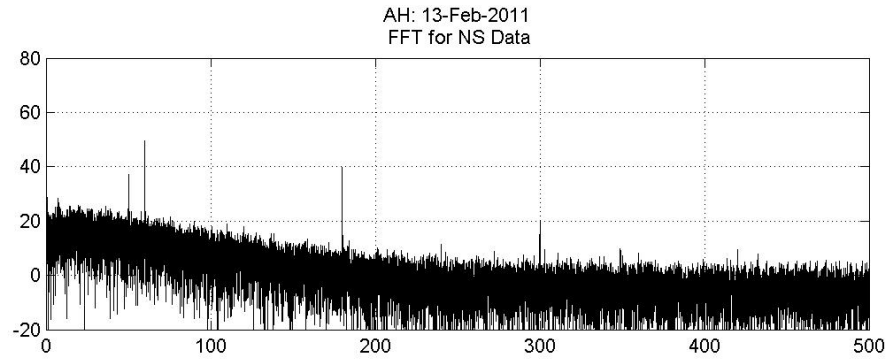
0.5.2 44 - 21:30:00 - Shutdown of VLF/ELF system, begin switch to generator



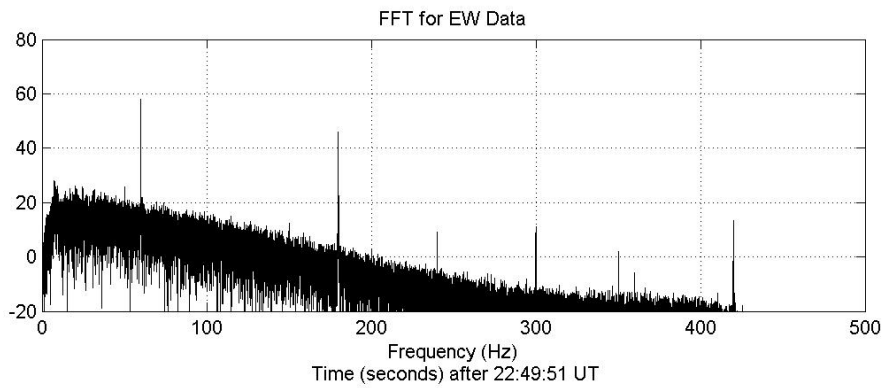
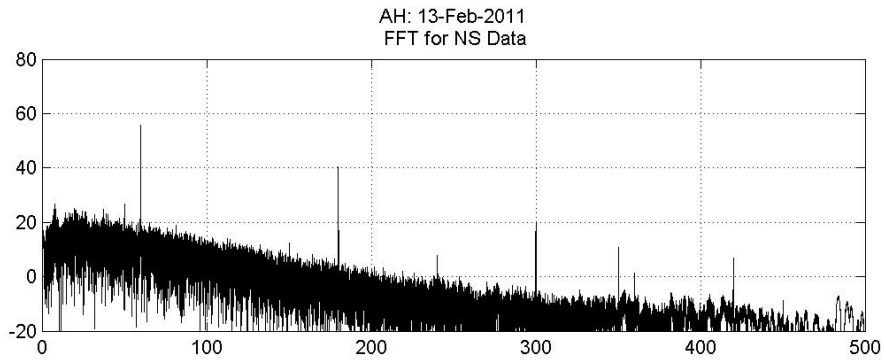
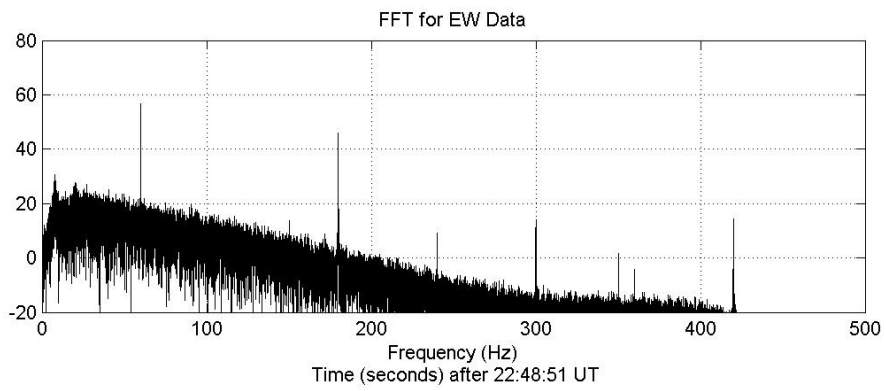
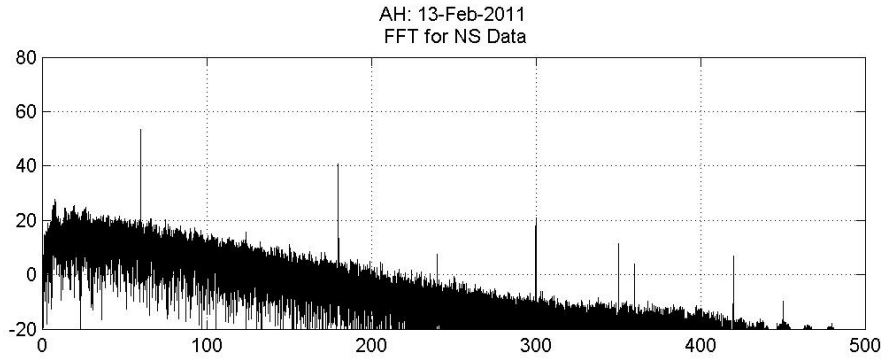
0.5.3 44 - 21:44:00 - DAQ started acquiring data again



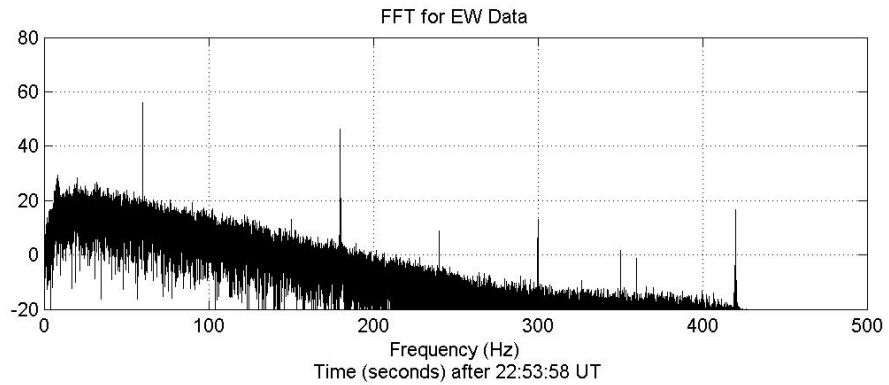
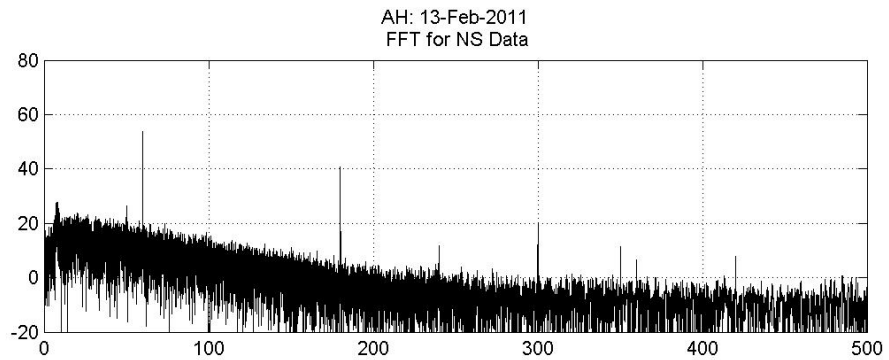
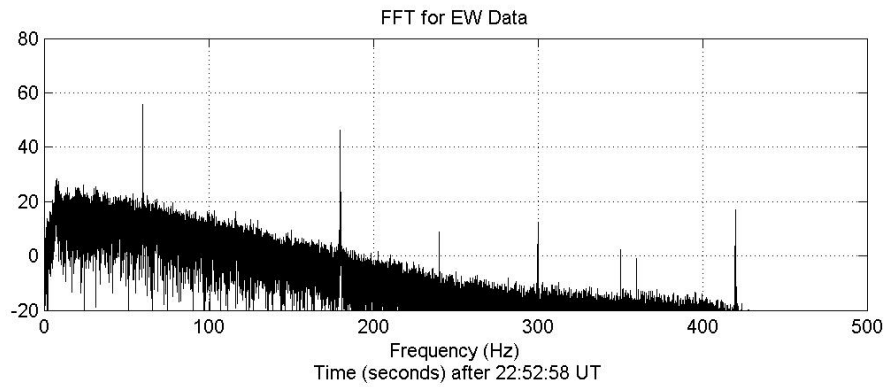
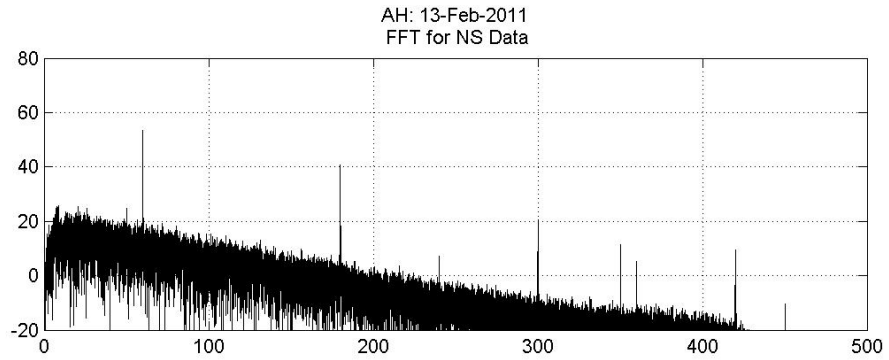
0.5.4 44 - 21:53:30 - Internet restored



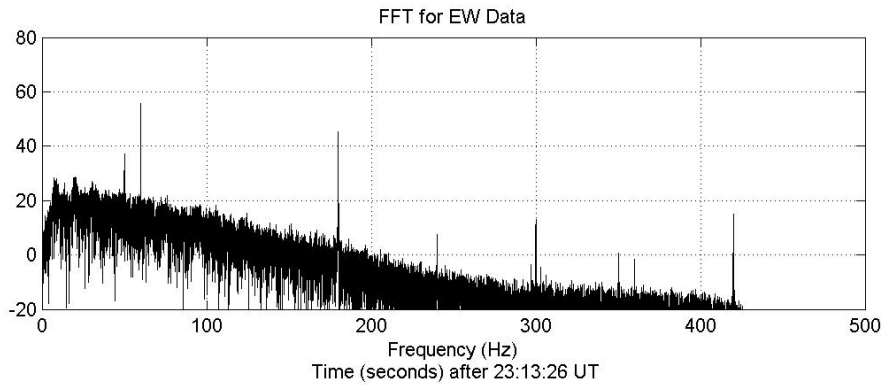
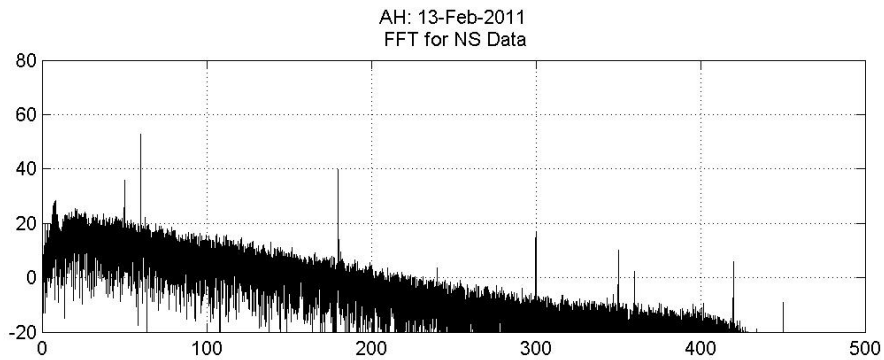
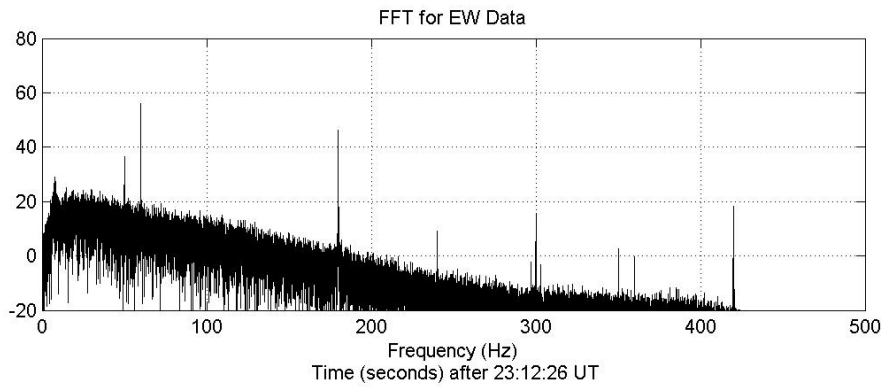
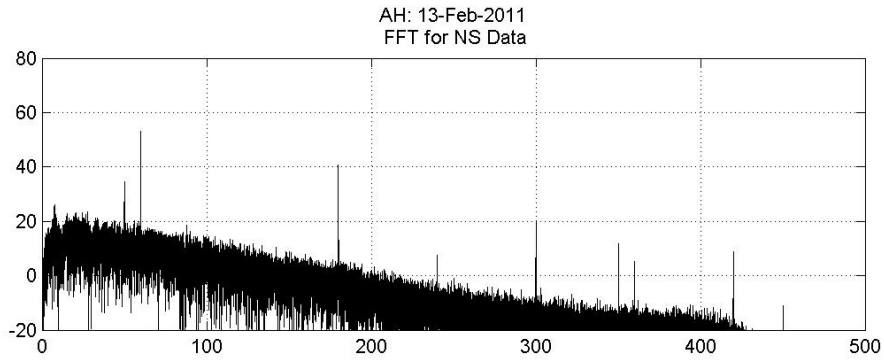
0.5.5 44 - 22:49:30 - Generator determined to be putting out 52 V
44 - 22:51:00 - Generator turned off



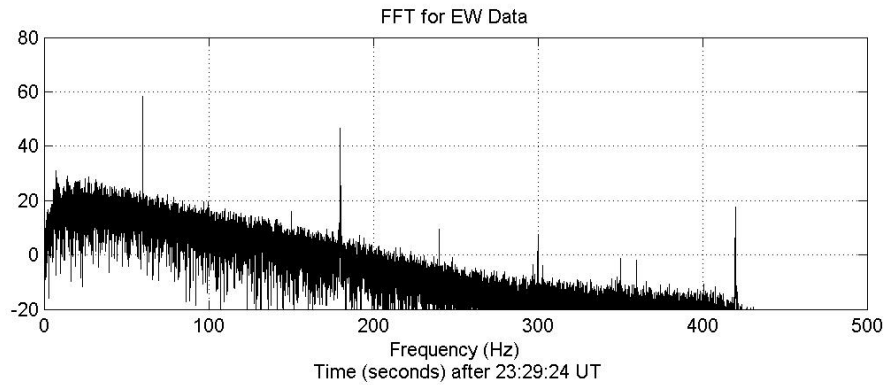
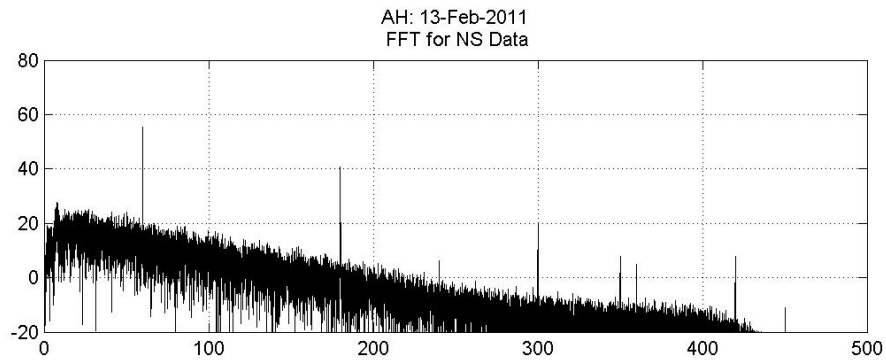
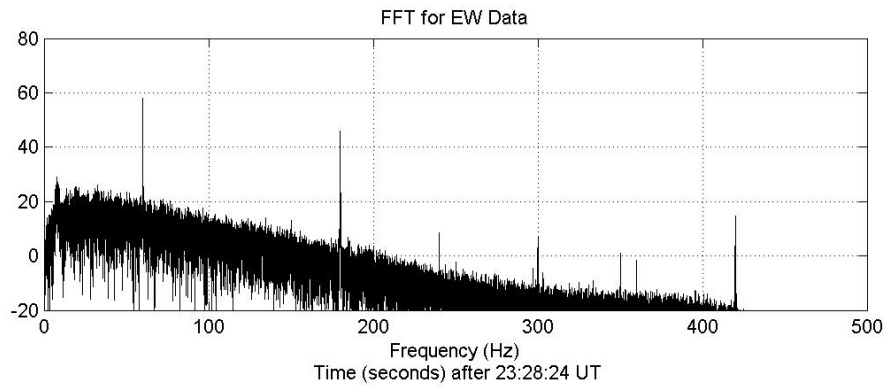
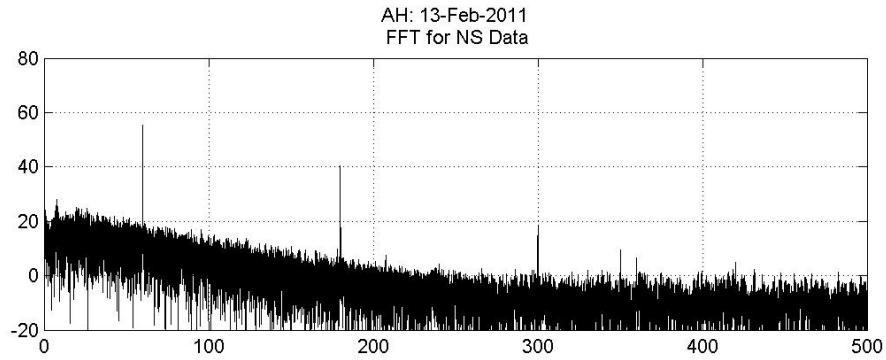
0.5.6 44 - 22:53:45 - Gonzalos equipment starts being connected to wall power



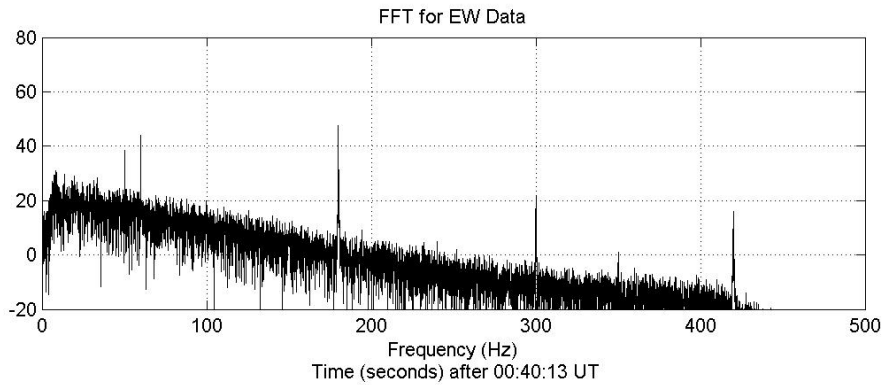
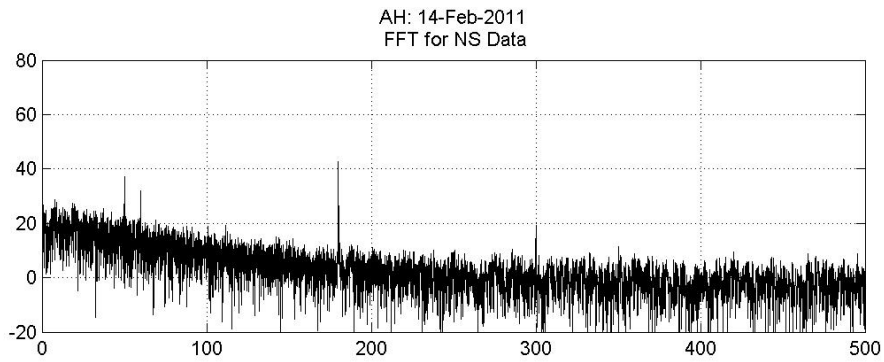
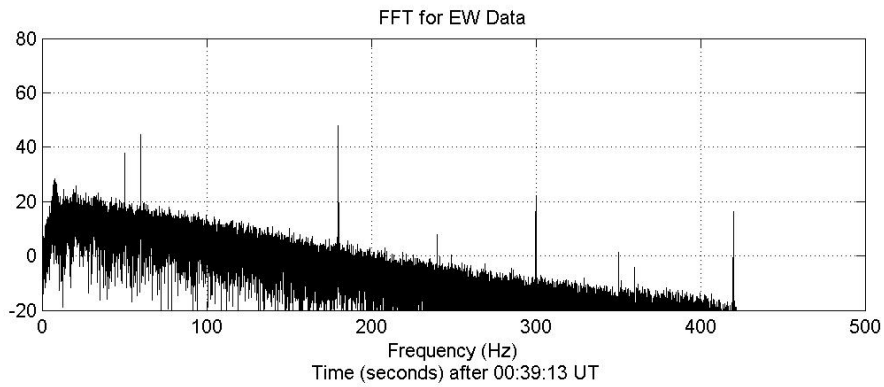
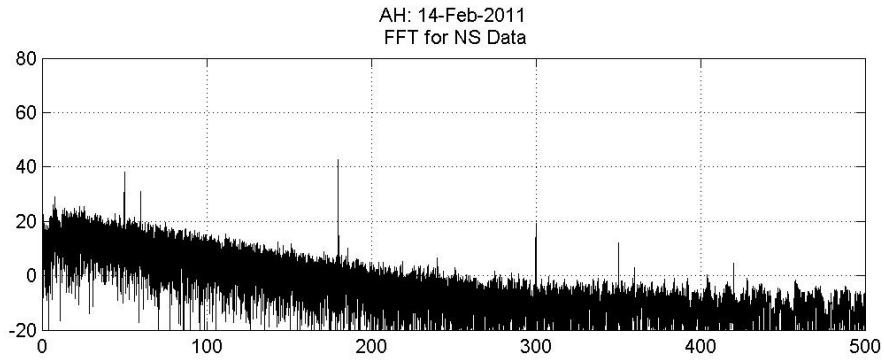
0.5.7 44 - 23:08:00 - Continued problems with system; two restarts, one forced



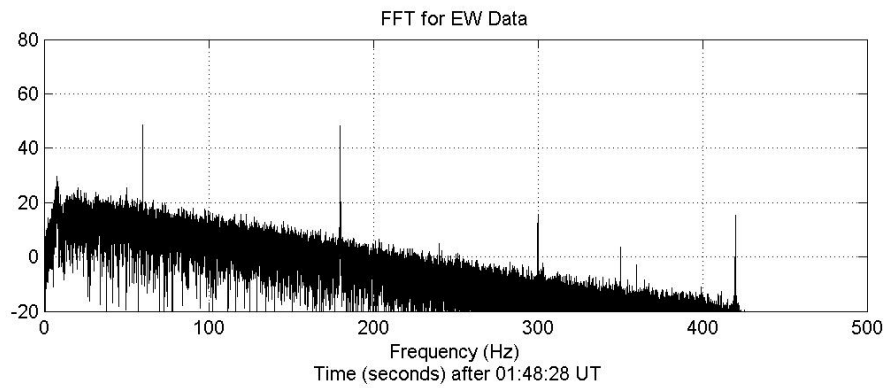
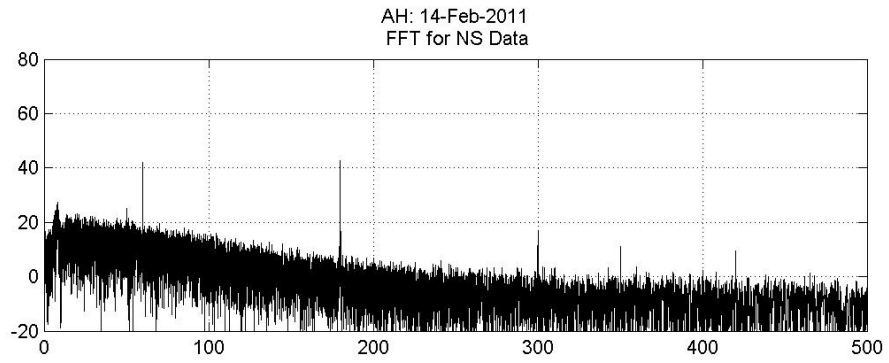
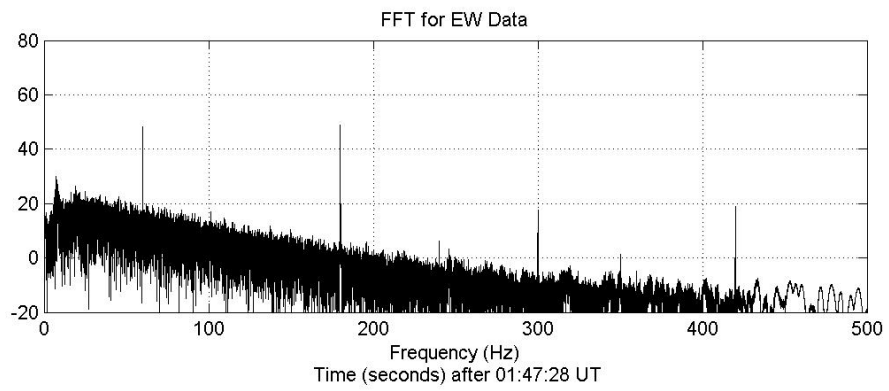
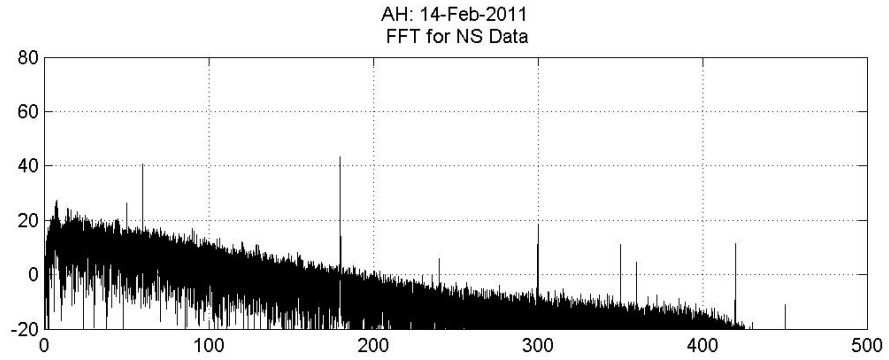
0.5.8 44 - 23:26:00 - Two restarts still not FTPing



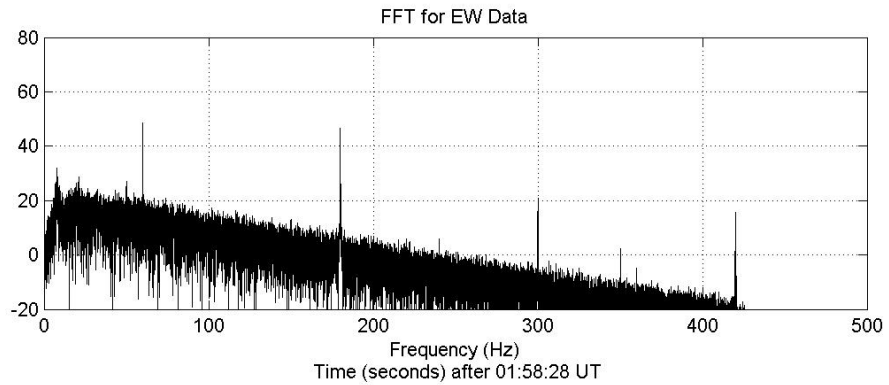
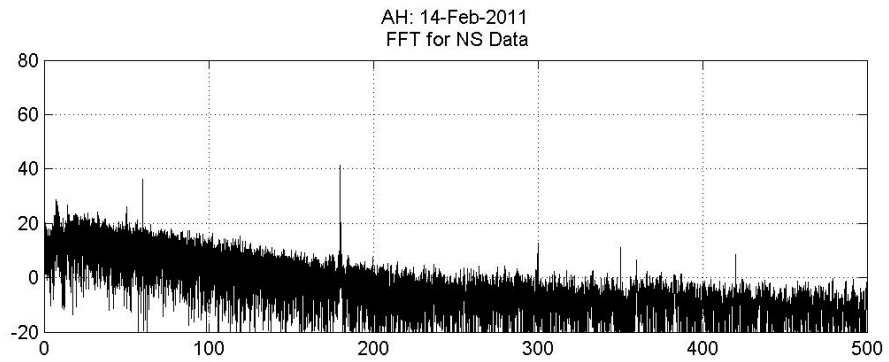
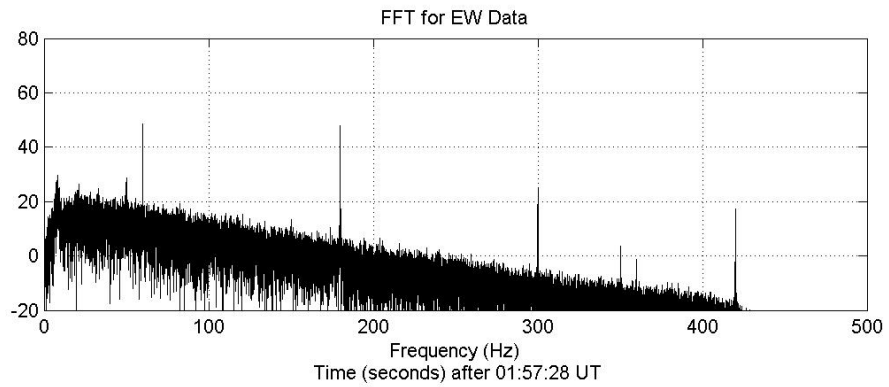
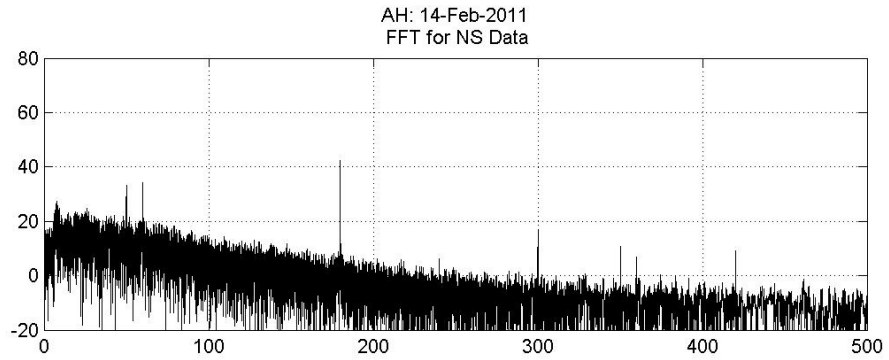
0.5.9 45 - 00:40:00 - Shutdown for outlet phase testing



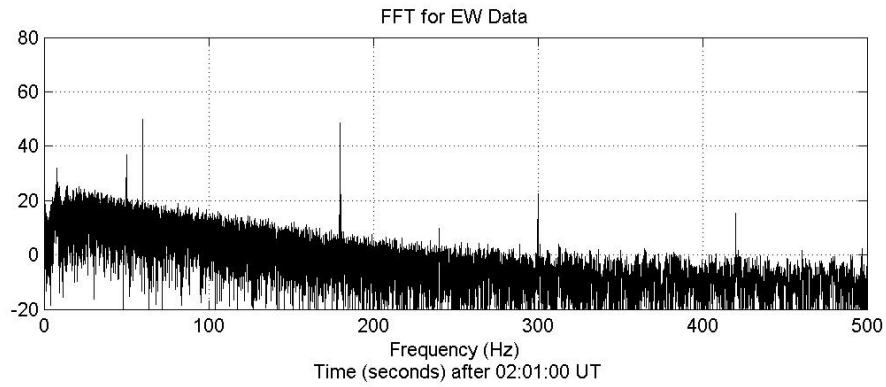
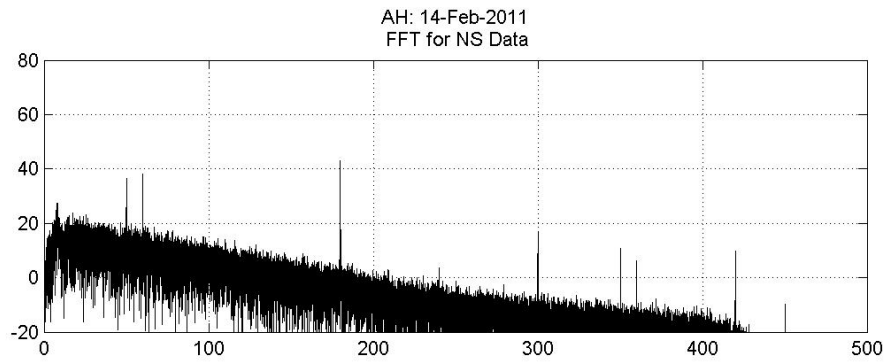
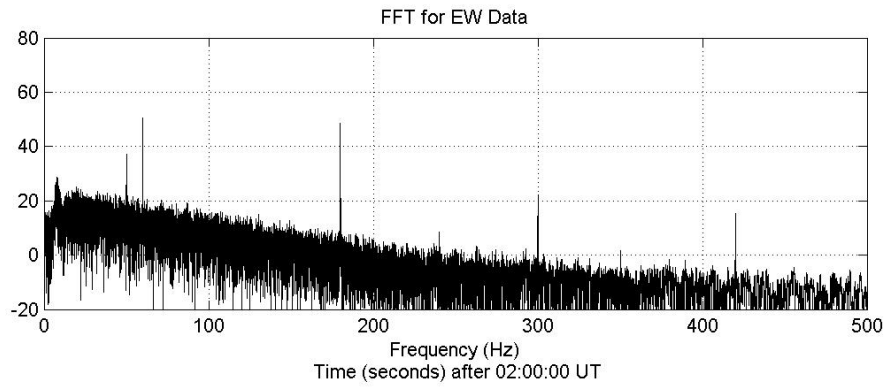
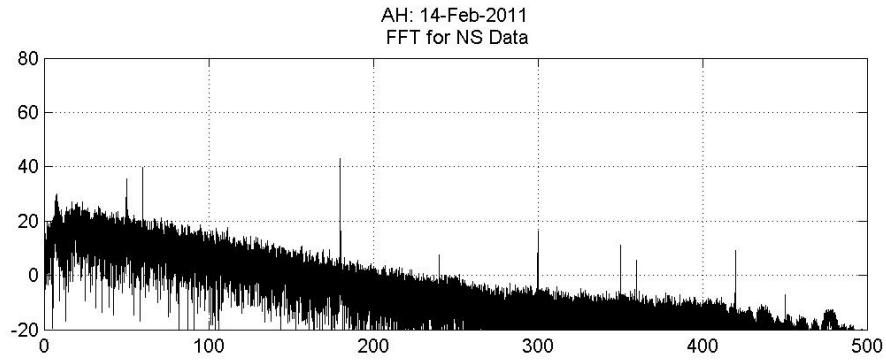
0.5.10 45 - 01:47:29 - Wind turbines off; VLF/ELF and internet running on UPS batteries



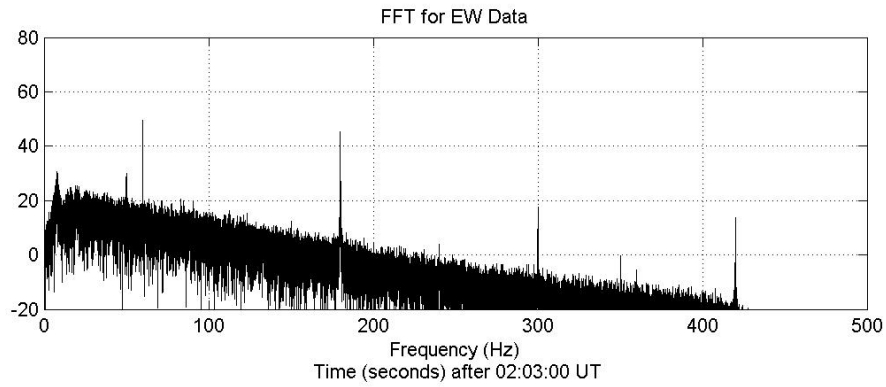
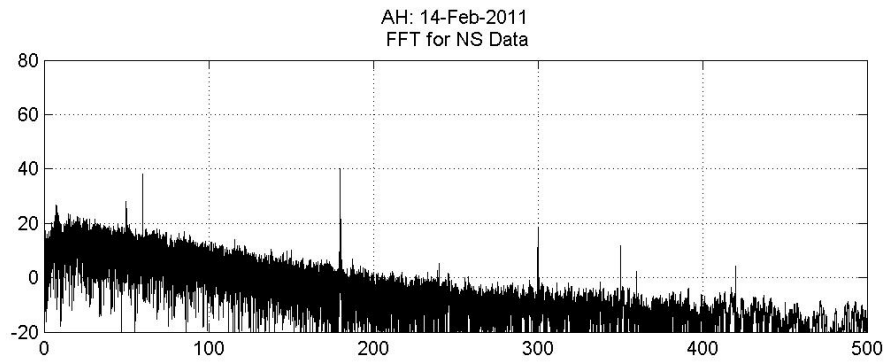
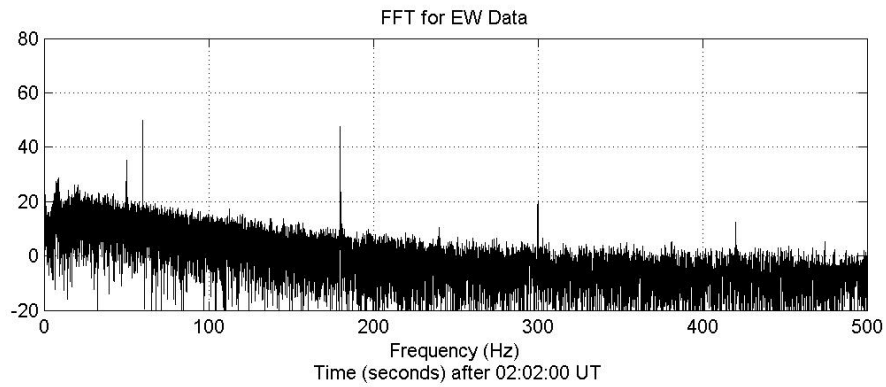
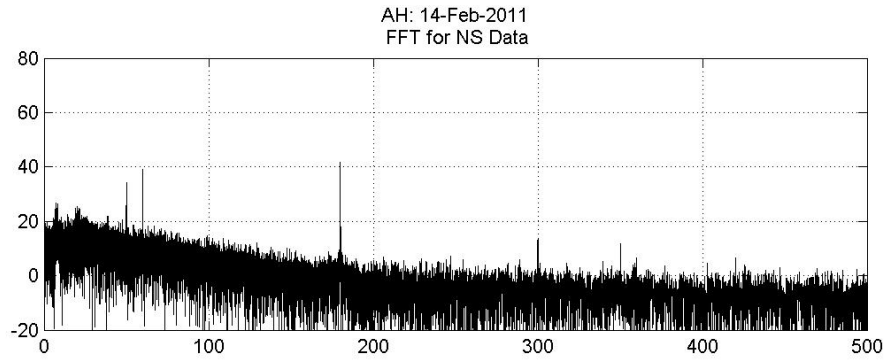
0.5.11 45 - 01:58:00 - PC tower UPS connected to wall power



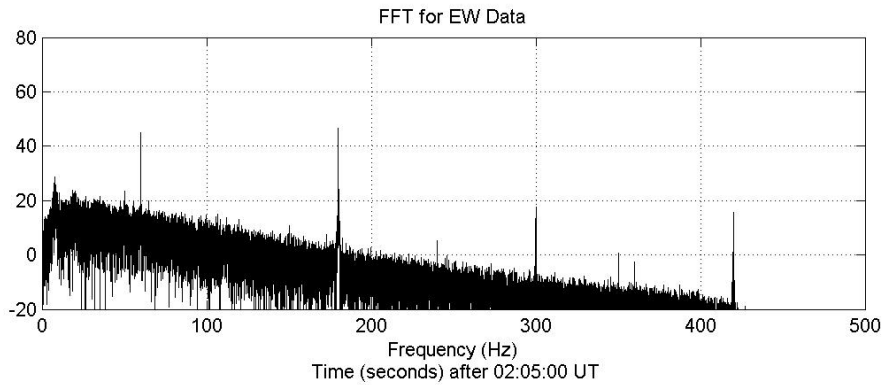
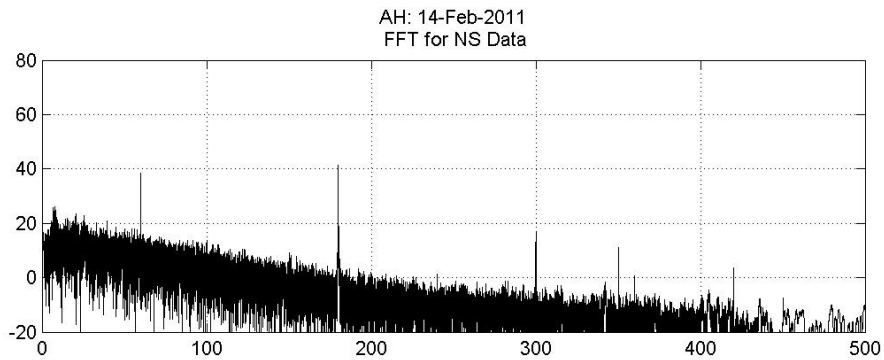
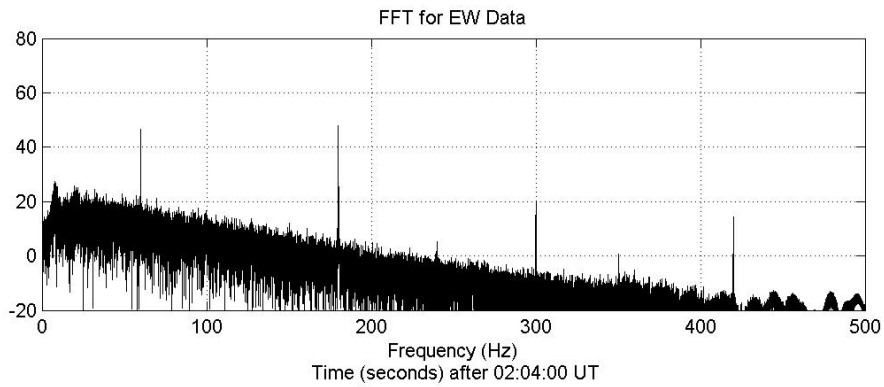
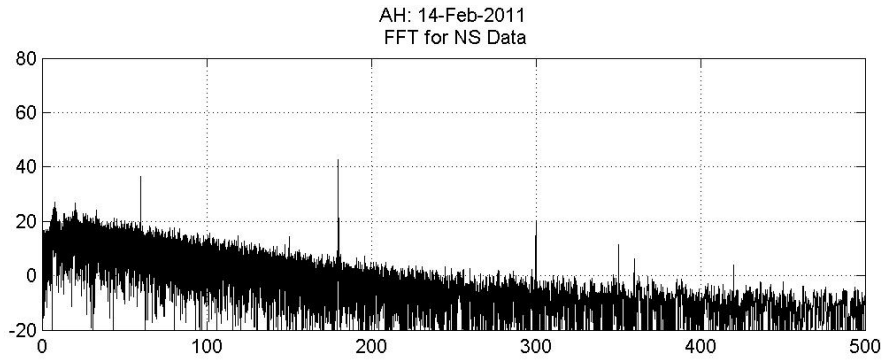
0.5.12 45 - 02:01:30 - UPS disconnected



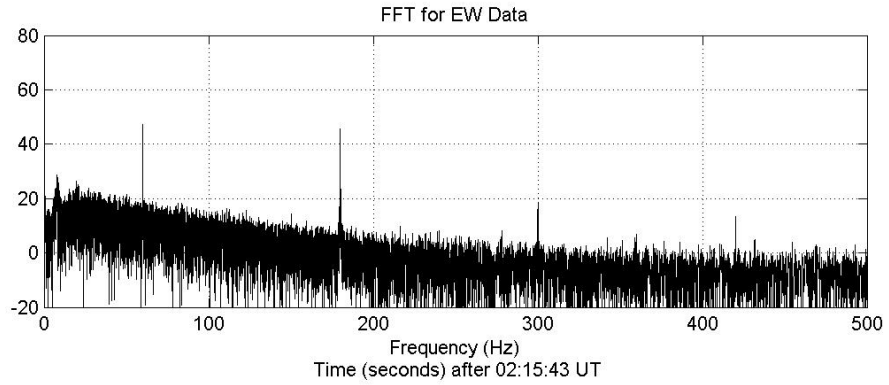
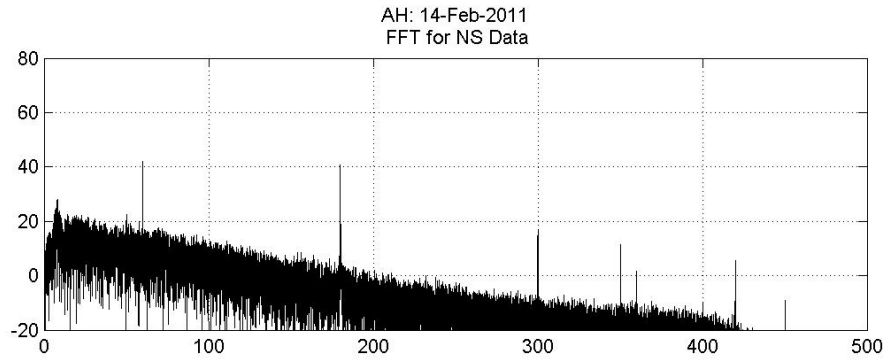
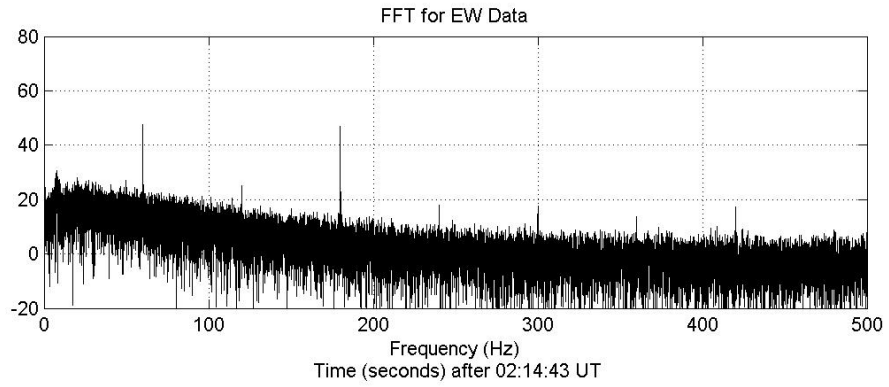
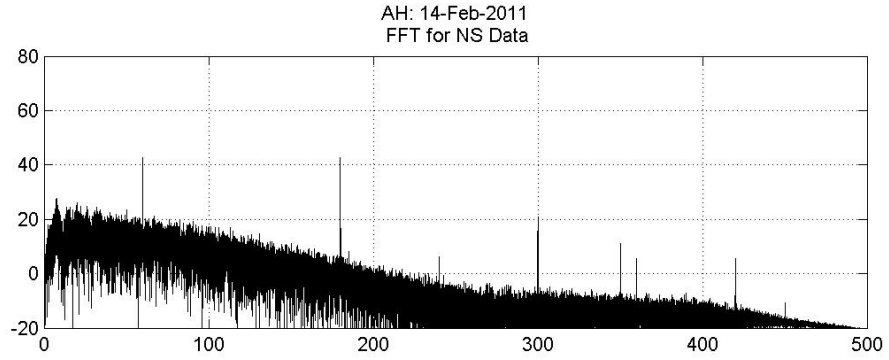
0.5.13 45 - 02:02:42 - Electronics UPS connected to wall power



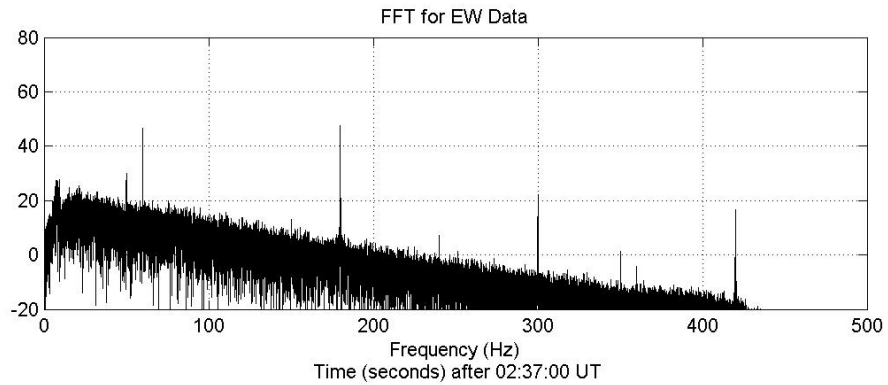
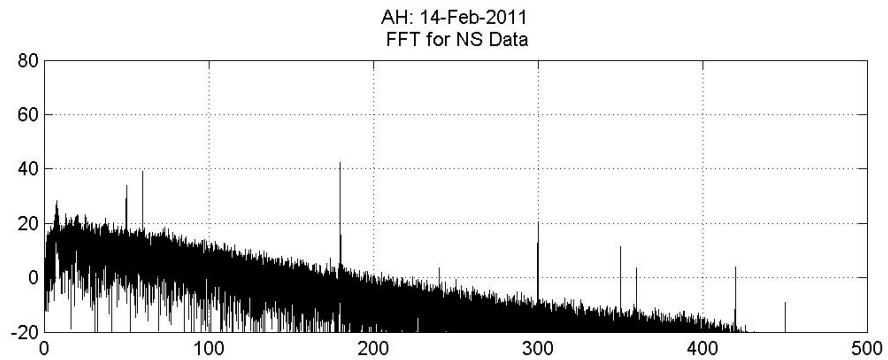
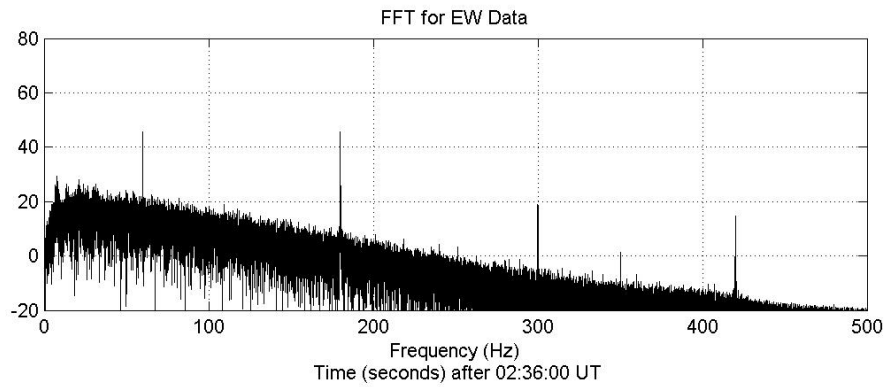
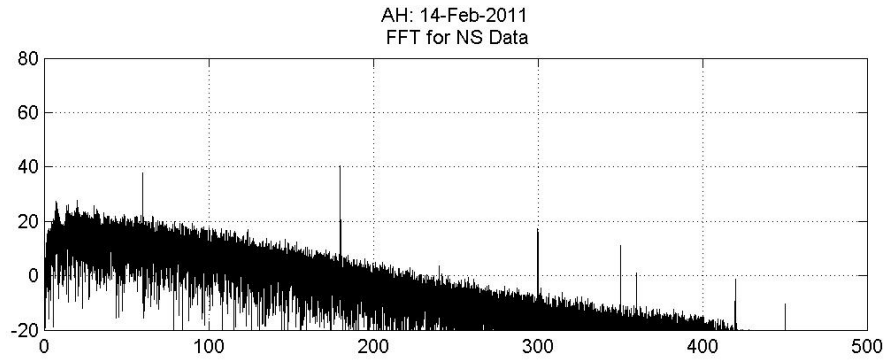
0.5.14 45 - 02:04:15 - Both UPSes connected to wall power



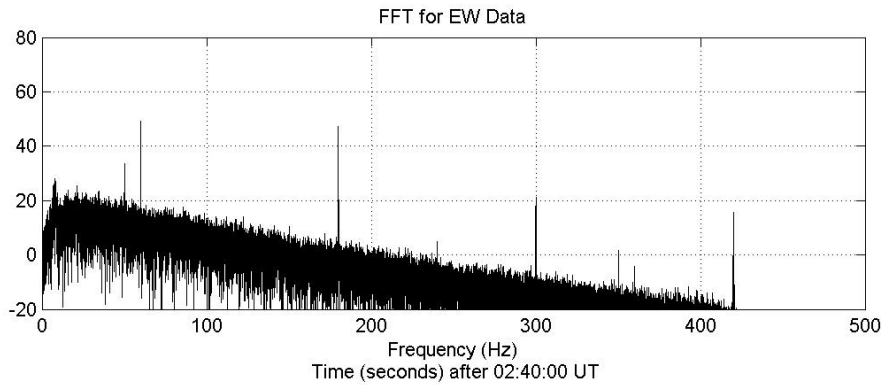
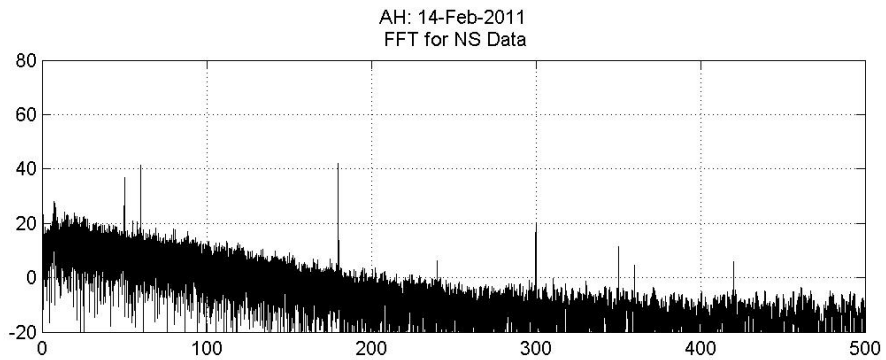
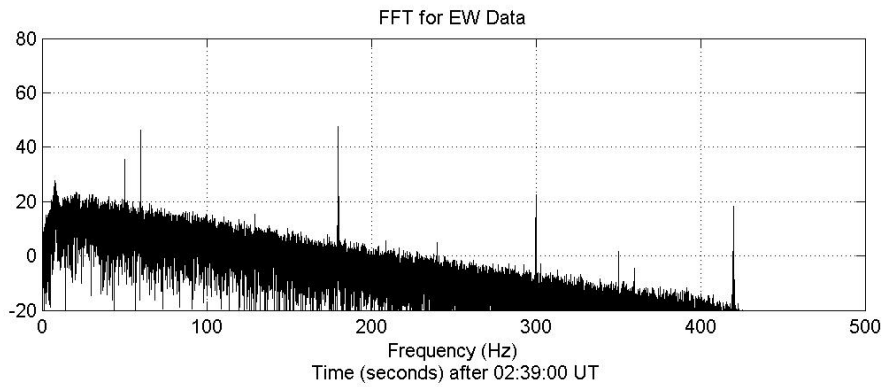
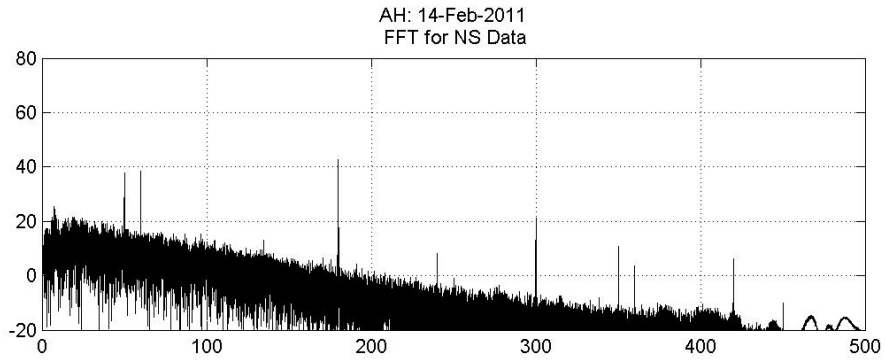
0.5.15 45 - 02:14:43 - System connected to wall power through isolation strips



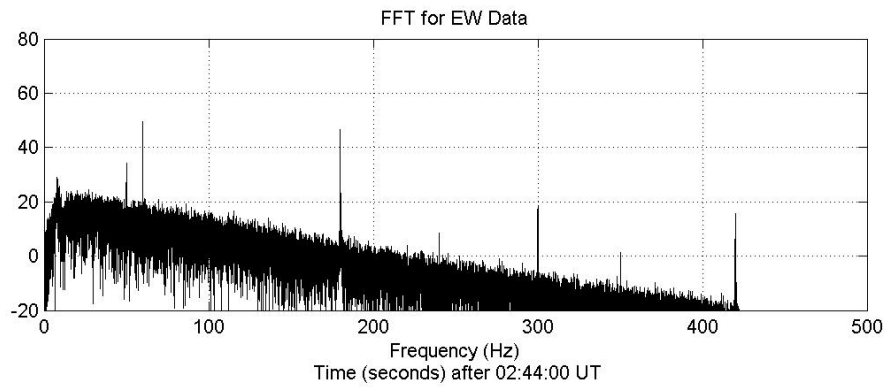
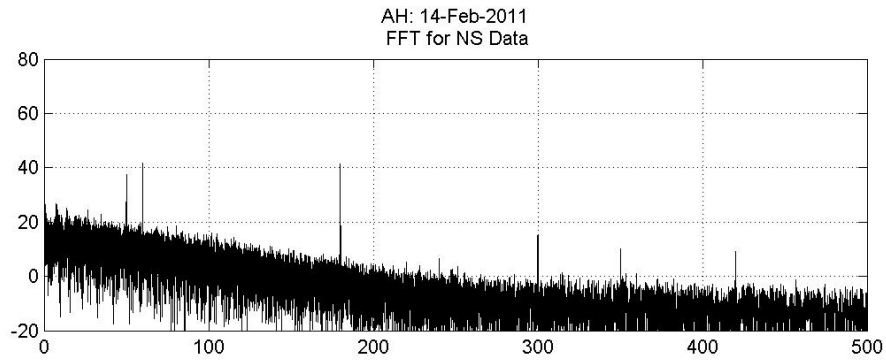
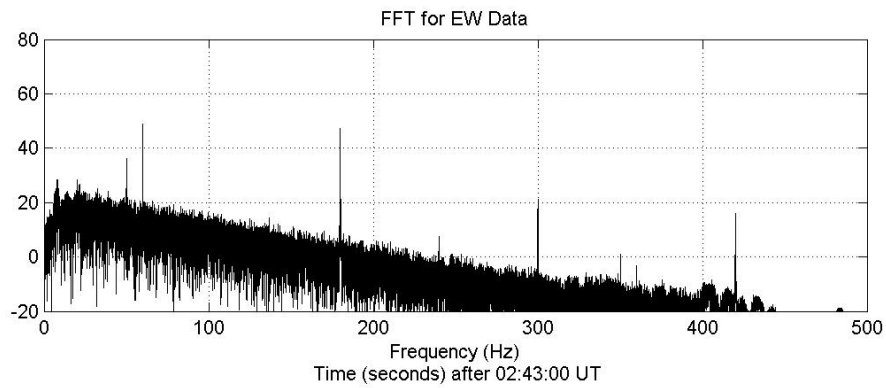
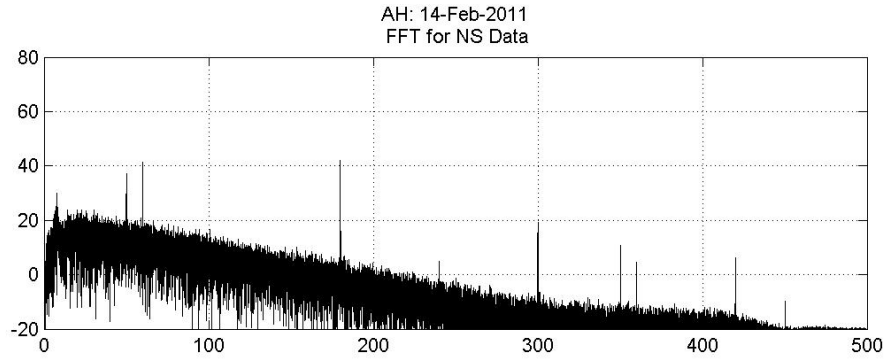
0.5.16 45 - 02:36:00 - Plugged in UPS, not connected to anything



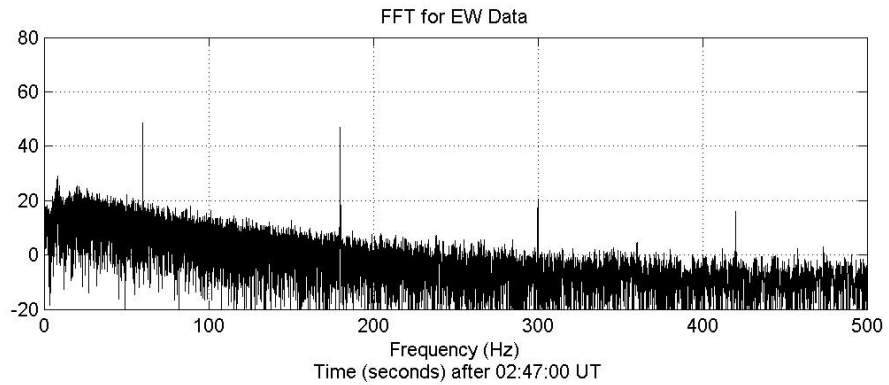
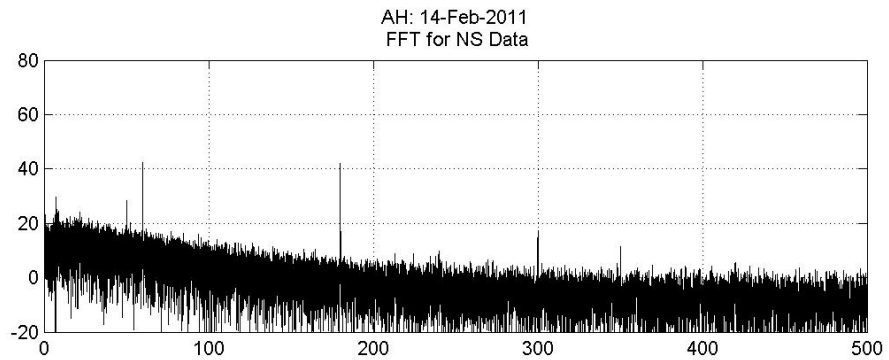
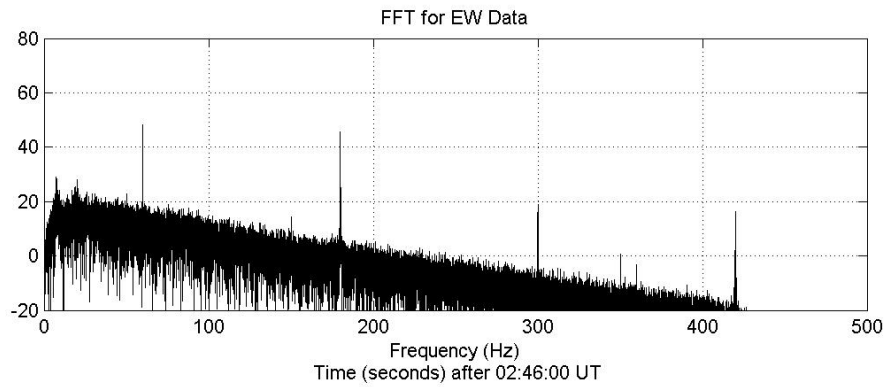
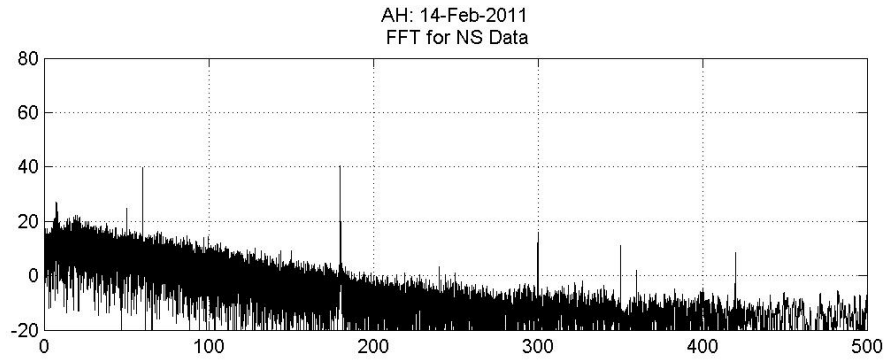
0.5.17 45 - 02:XX:XX - Plugged in 2nd UPS, both are charging



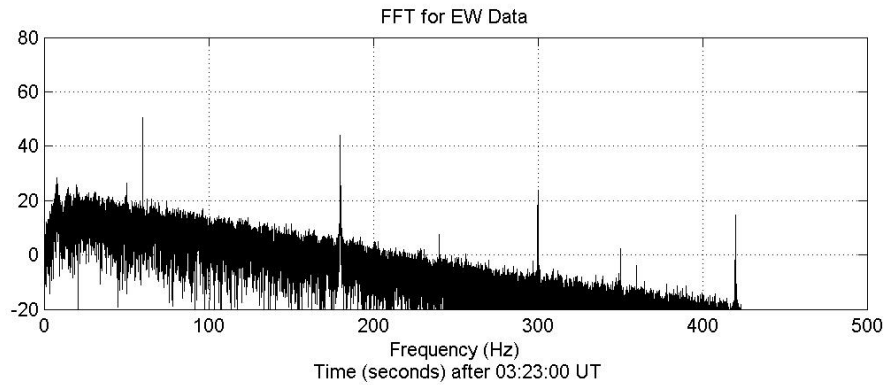
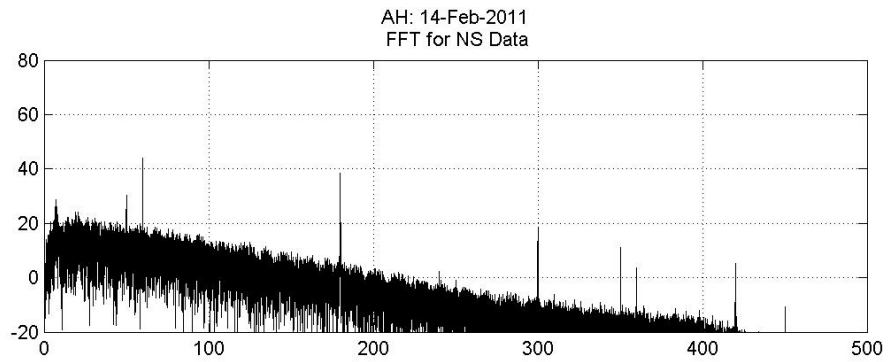
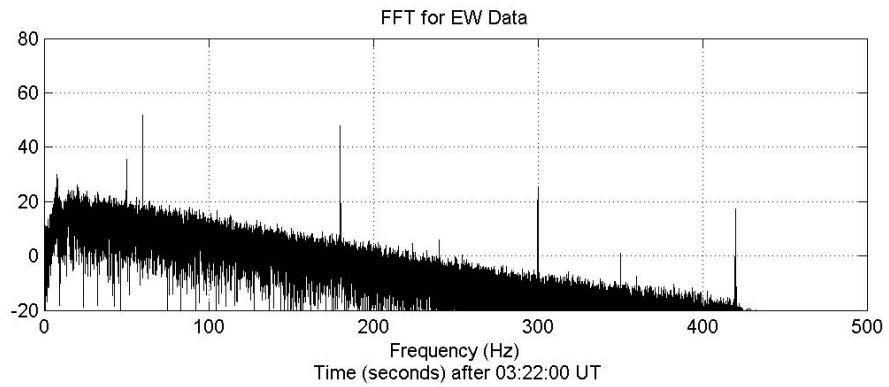
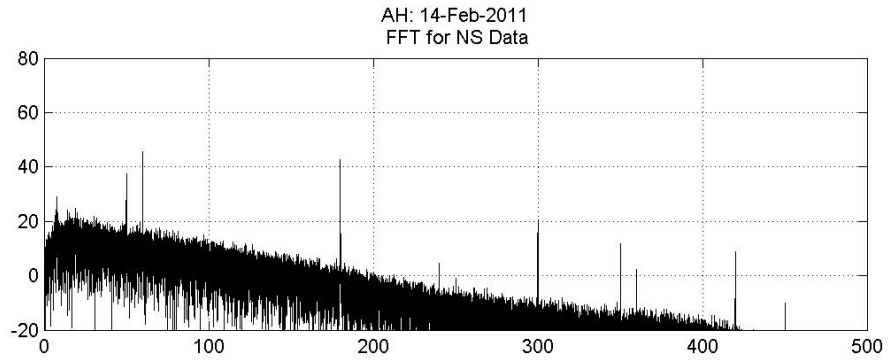
0.5.18 45 - 02:44:35 - Unplugged UPS use by PC; PC still connected to wall power



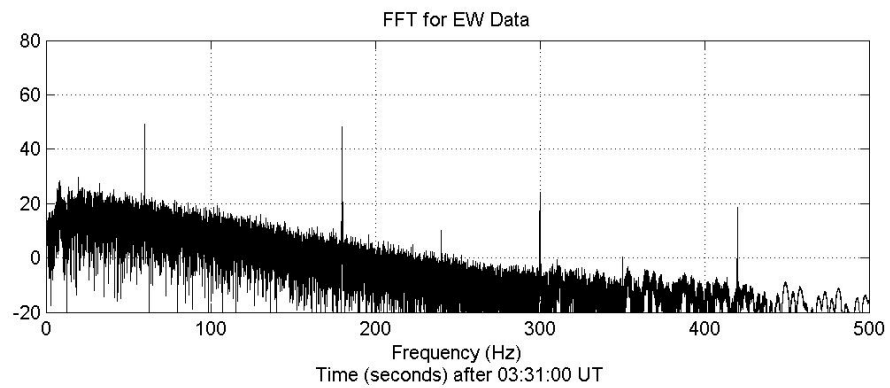
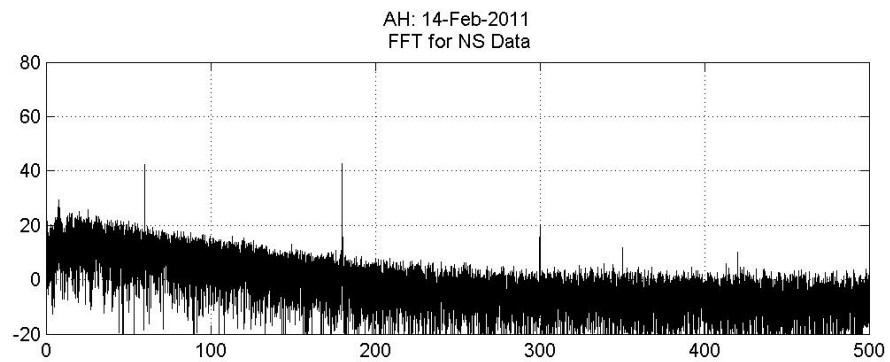
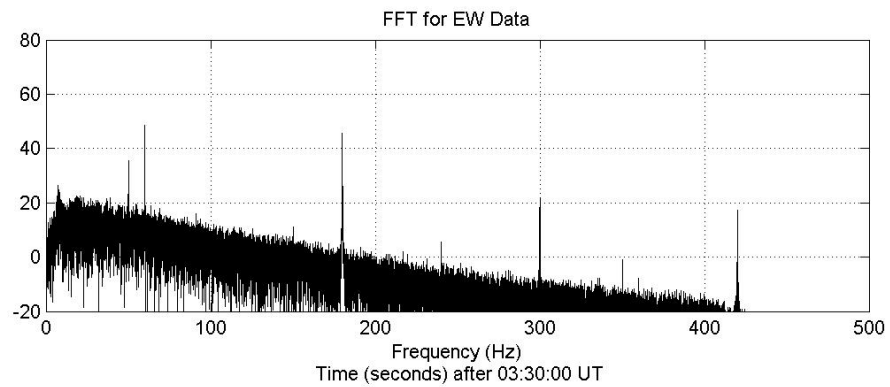
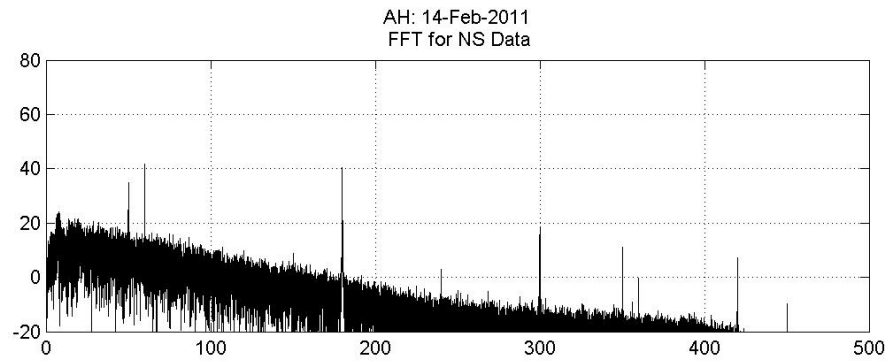
0.5.19 45 - 02:47:10 - Connected charging UPS to same outlet as power strips



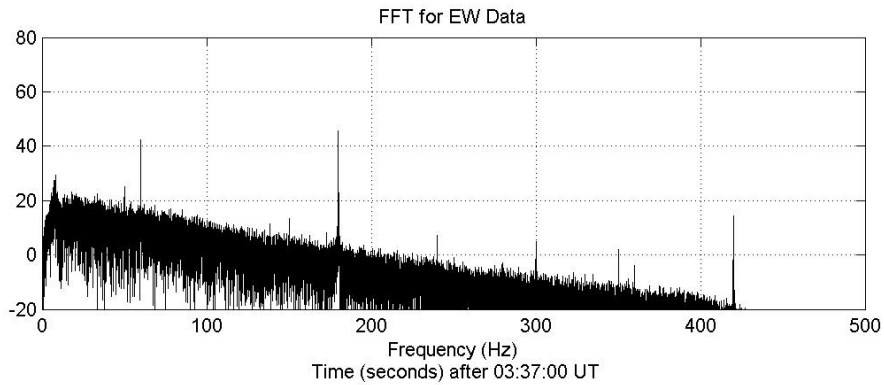
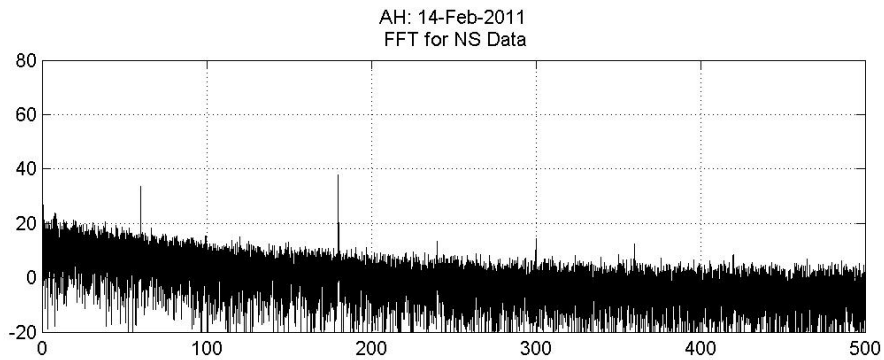
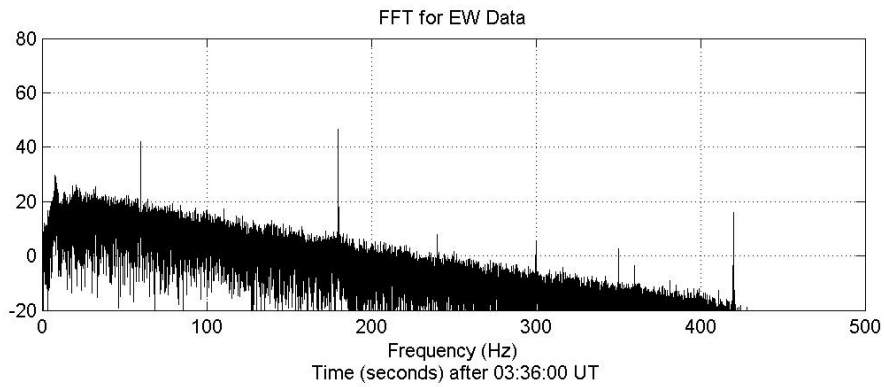
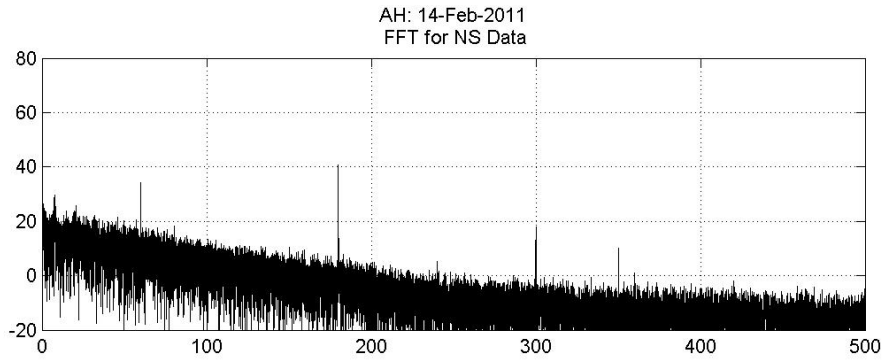
0.5.20 45 - 03:23:00 - Noted that wind turbines are spinning



0.5.21 45 - 03:31:30 - UPSes turned off



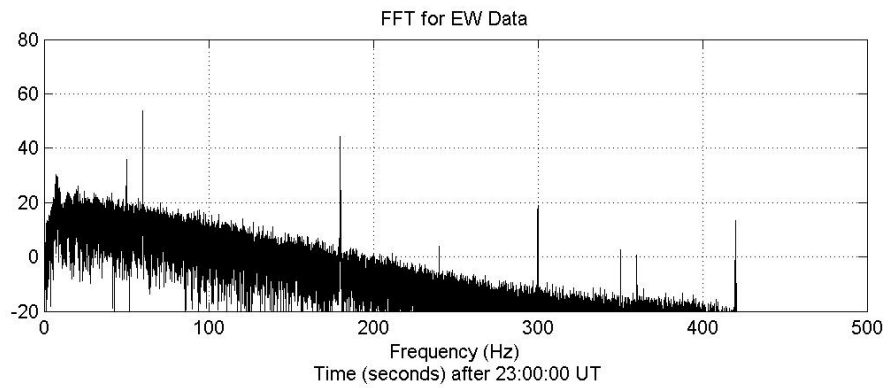
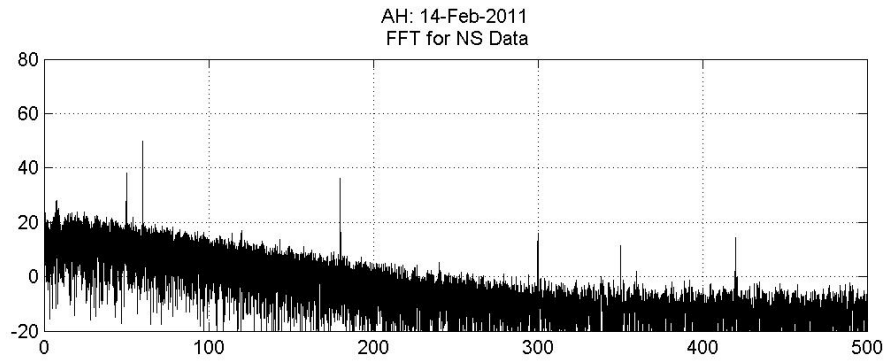
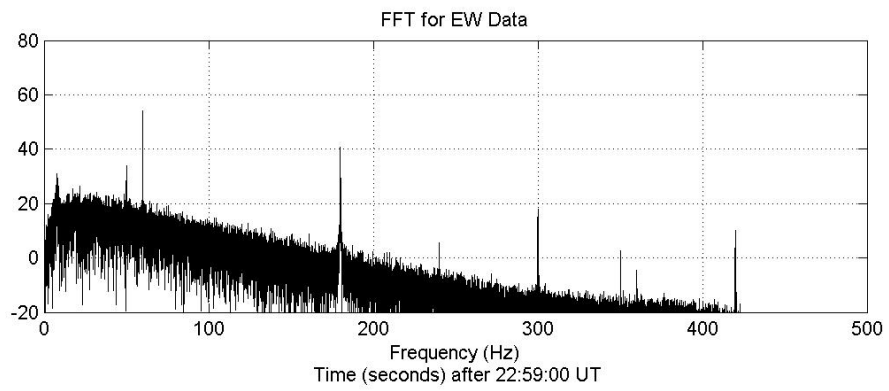
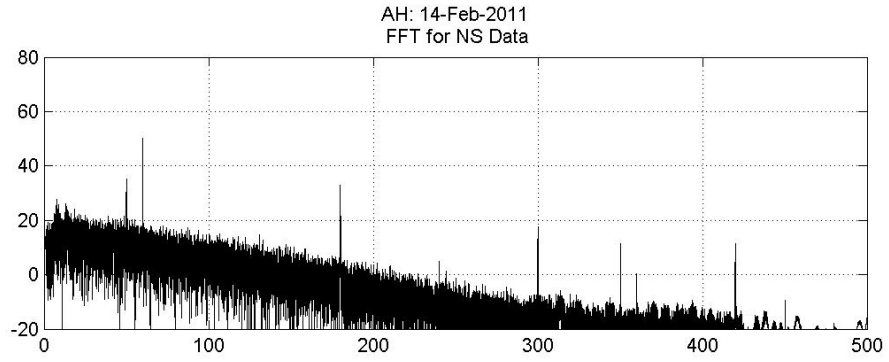
0.5.22 45 - 03:36:45 - UPS on for a few minutes, now off



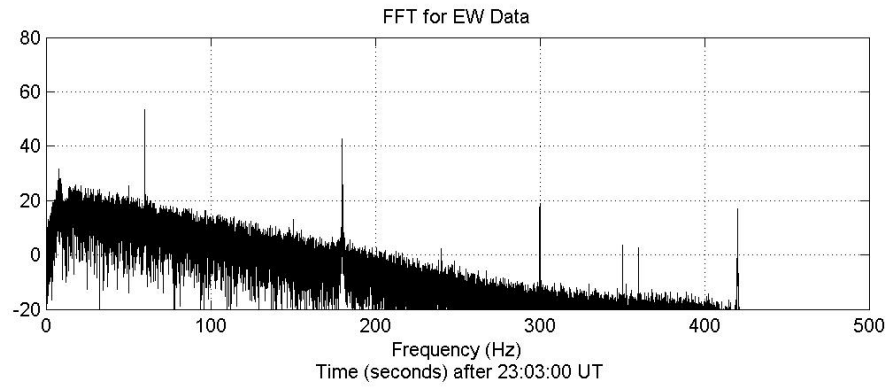
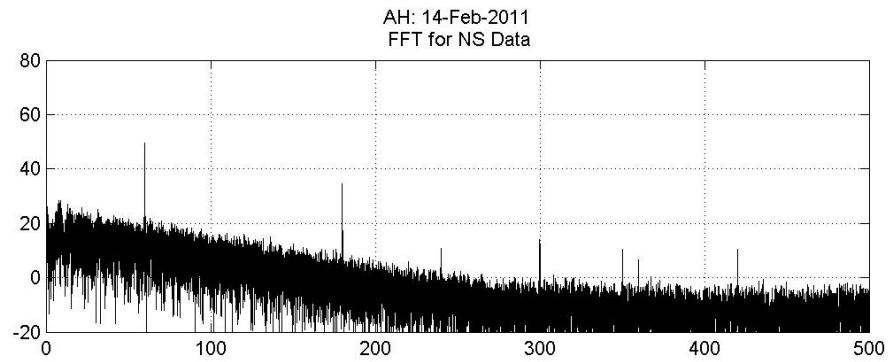
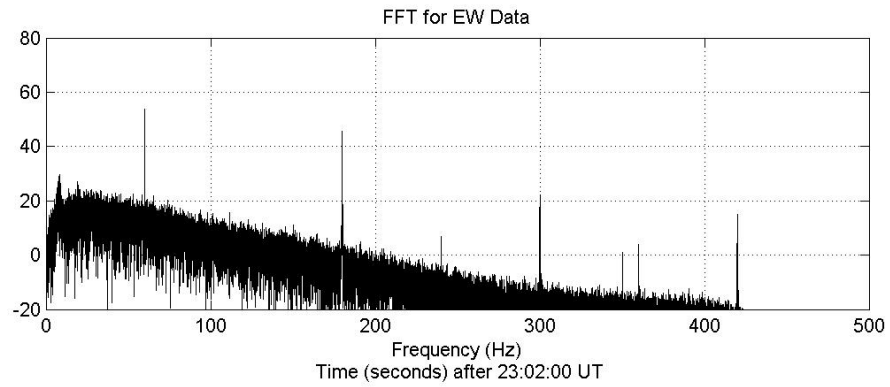
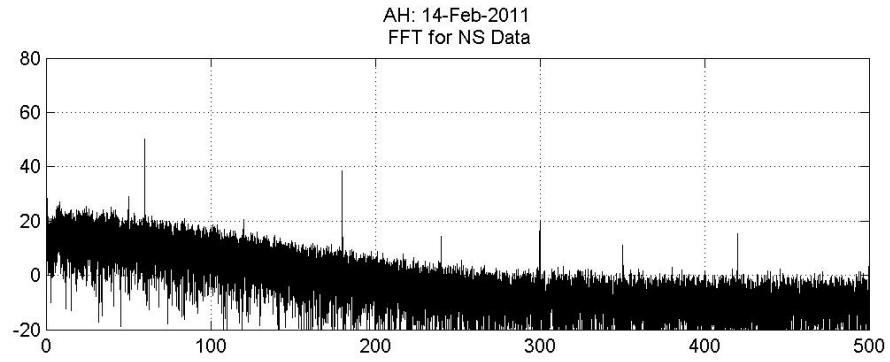
0.6 Day 45 - Disconnecting UPSes

45 - 23:00:00 - Unplugged UPS connecting Radiometer, Line receivers, and Mixer
45 - 23:03:00 - Both UPSes disconnected
45 - 23:04:40 - Radiometer, Line receivers, and Mixer UPS connected to power
45 - 23:09:00 - Reconnected 2nd UPS

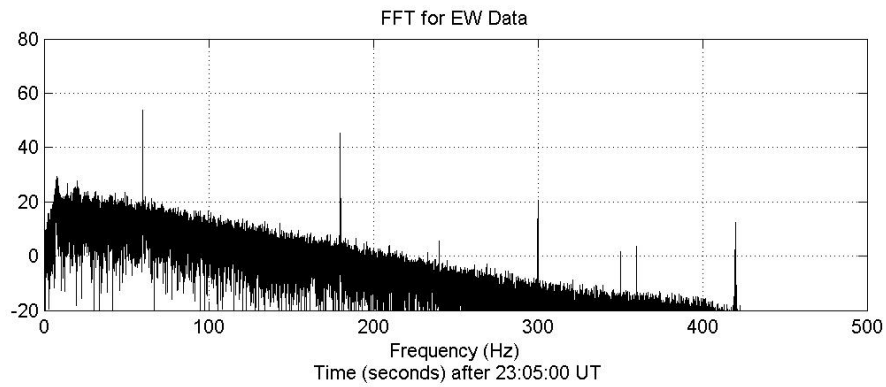
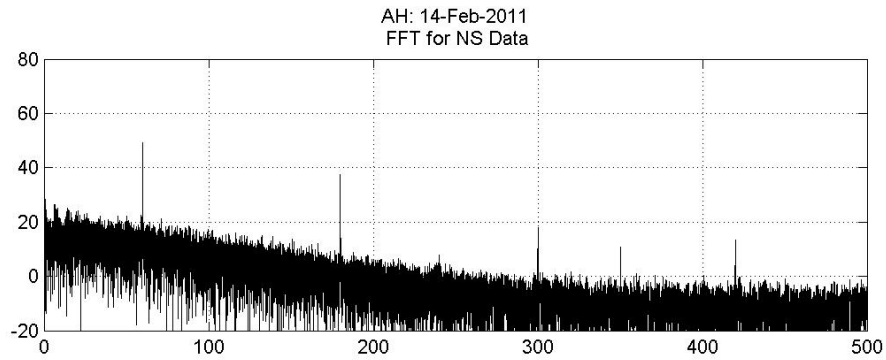
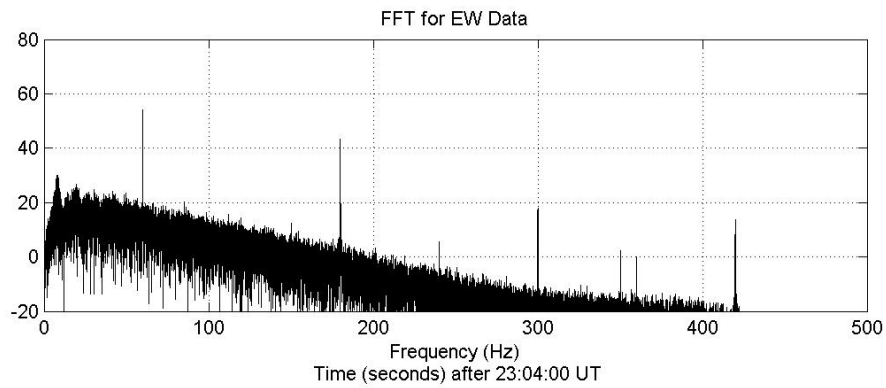
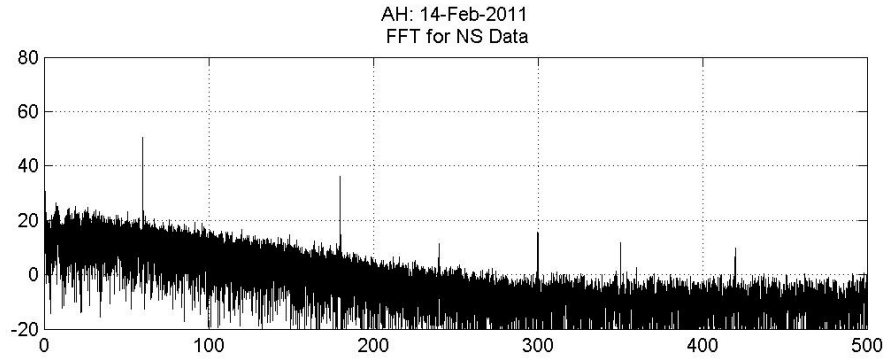
0.6.1 45 - 23:00:00 - Unplugged UPS connecting Radiometer, Line receivers, and Mixer



0.6.2 45 - 23:03:00 - Both UPSes disconnected

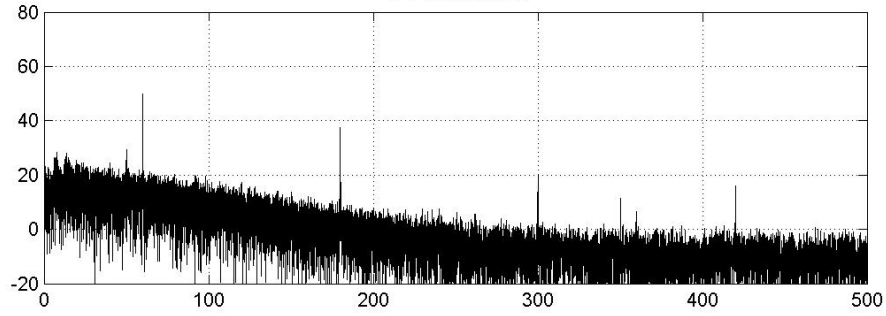


0.6.3 45 - 23:04:40 - Radiometer, Line receivers, and Mixer UPS connected to power

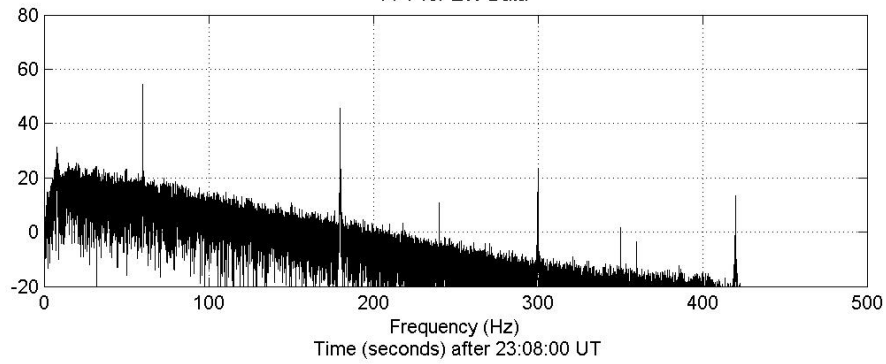


0.6.4 45 - 23:09:00 - Reconnected 2nd UPS

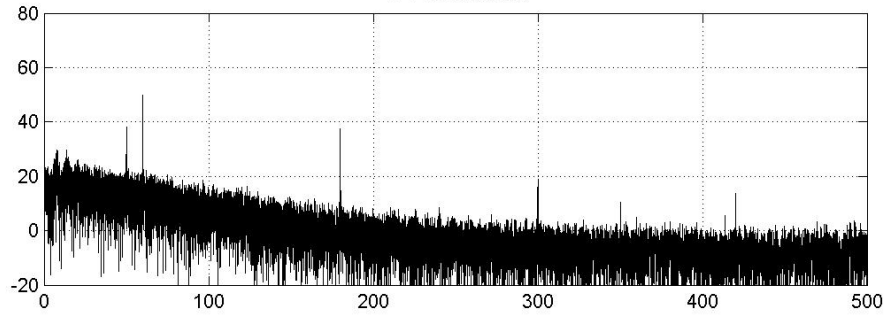
AH: 14-Feb-2011
FFT for NS Data



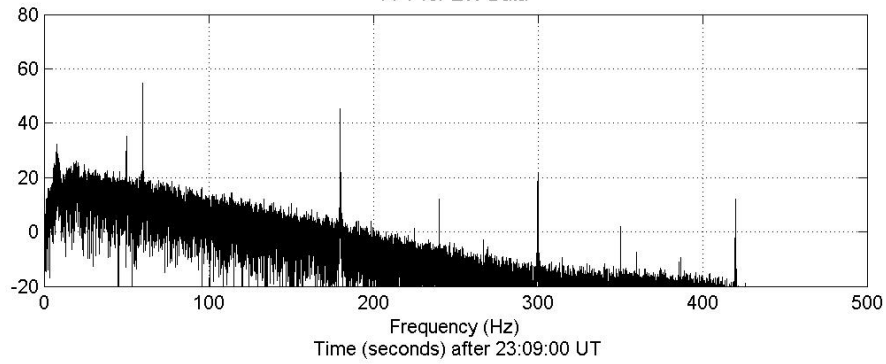
FFT for EW Data



AH: 14-Feb-2011
FFT for NS Data



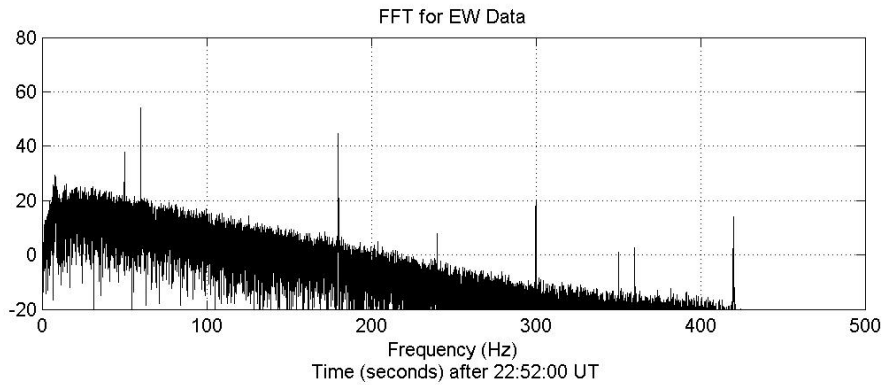
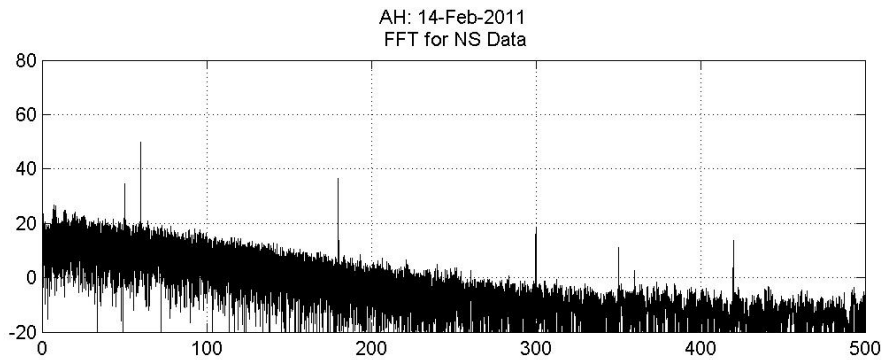
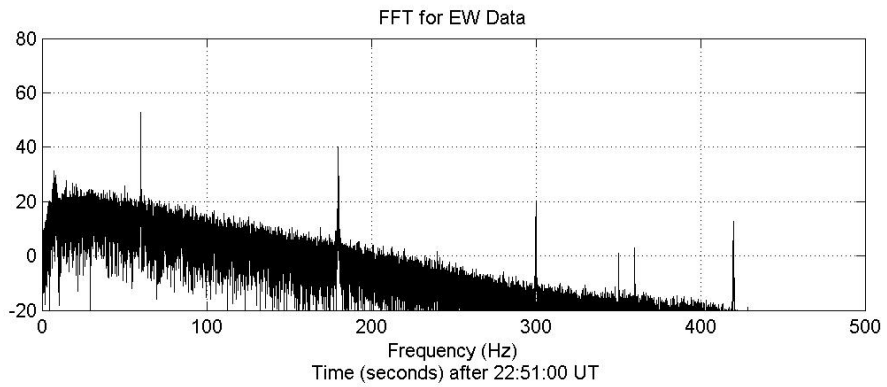
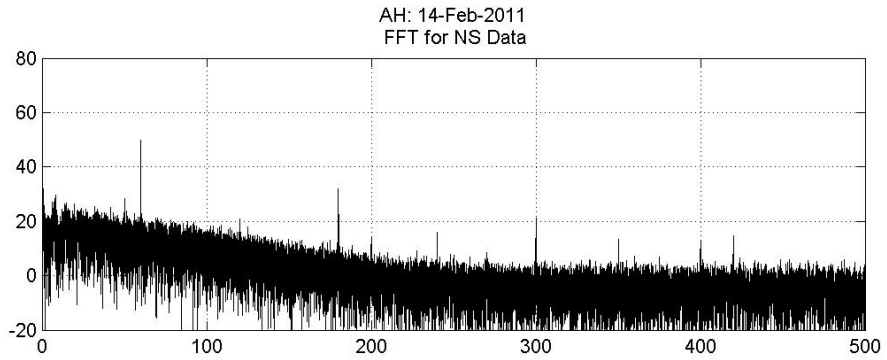
FFT for EW Data



0.7 Day 45 - LIDAR Operation

45 - 22:52:00 - LIDAR starts acquiring data

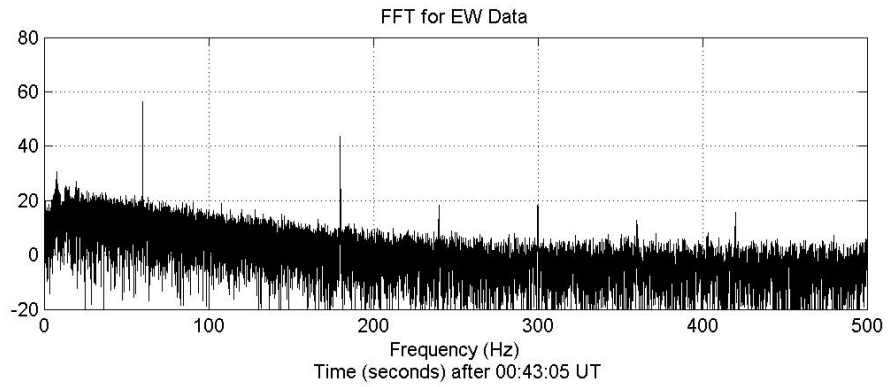
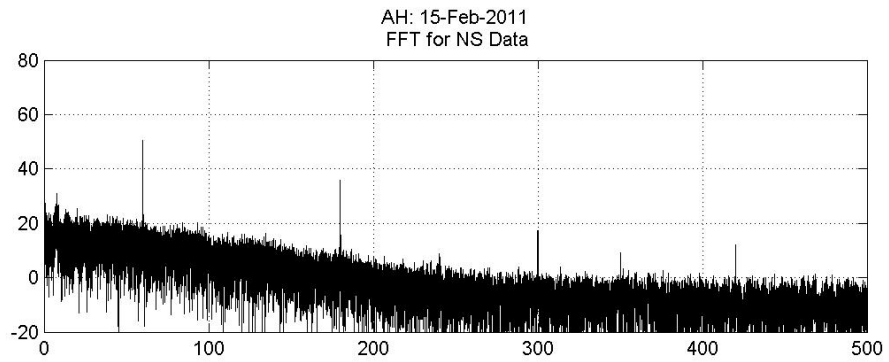
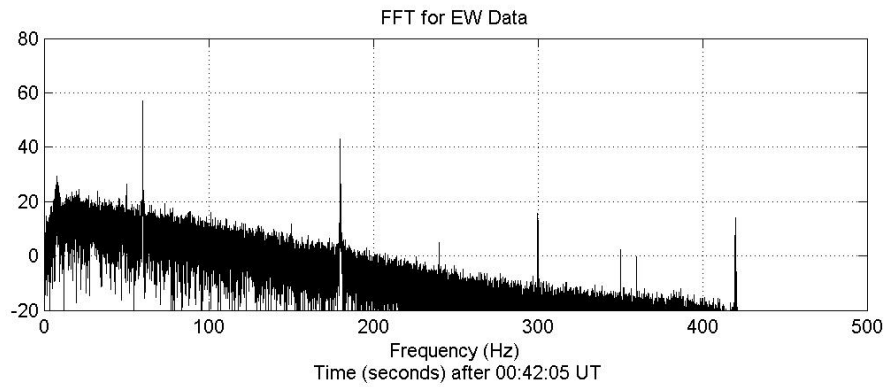
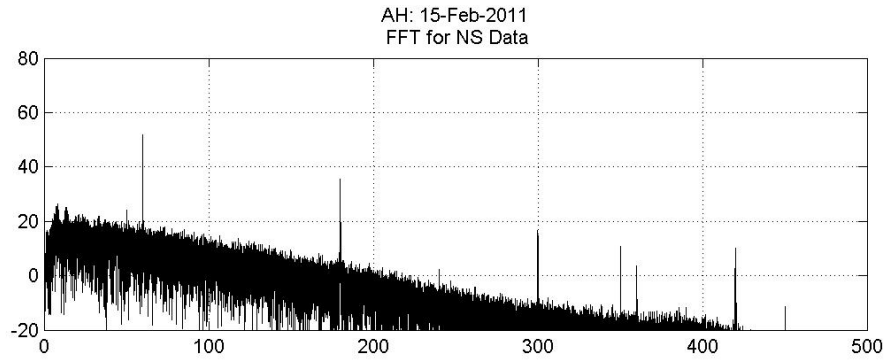
0.7.1 45 - 22:52:00 - LIDAR starts acquiring data



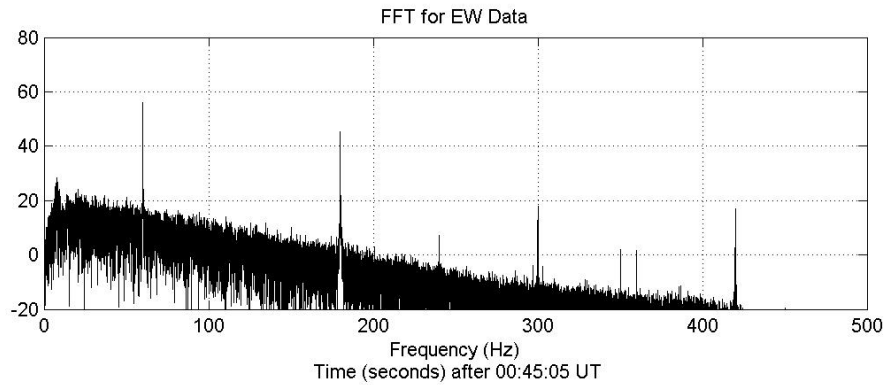
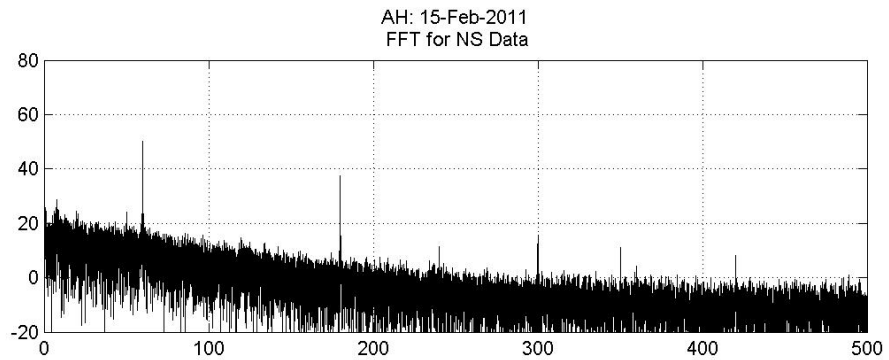
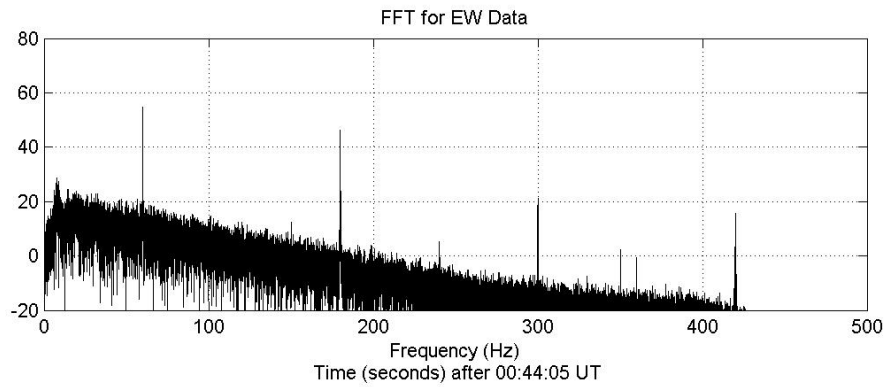
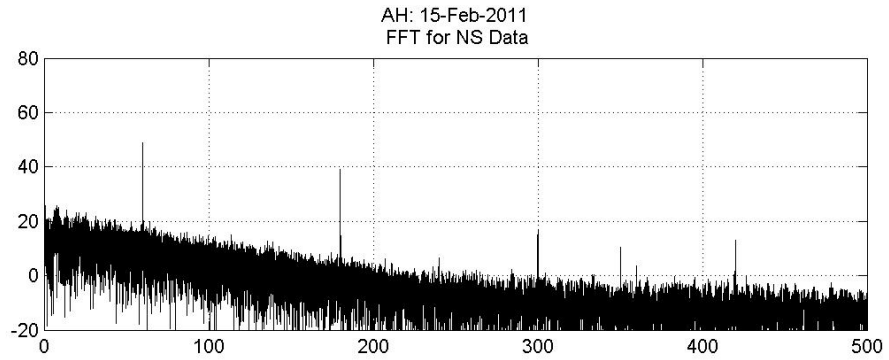
0.8 Day 46 - Disconnecting UPSes

X - 46 - 00:36:30 - Removed GPS from PC UPS and moved to signal electronics UPS
X - 46 - 00:38:30 - GPS locked, system restarted
46 - 00:43:05 - Disconnected signal electronics UPS from wall power
46 - 00:45:00 - Both UPSes unplugged was wall power
46 - 00:49:10 - Signal electronics UPS reconnected to wall power
46 - 00:5X:XX - Second UPS reconnected to wall power
X - 46 - 01:45:45 - Noted wind gusting at 30 knots at Arrival Heights
X - 46 - 03:XX:XX - Connected PC to signal UPS
46 - 03:16:25 - Disconnected signal UPS, running on battery power
46 - 03:20:00 - Second UPS disconnected
46 - 03:21:50 - Both UPSes connected to wall power

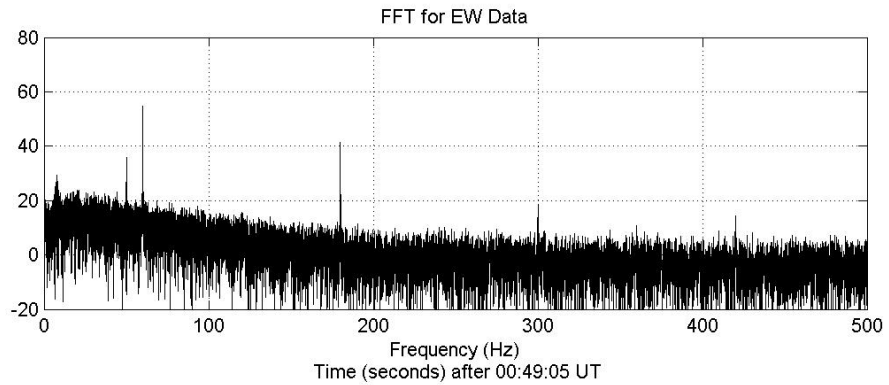
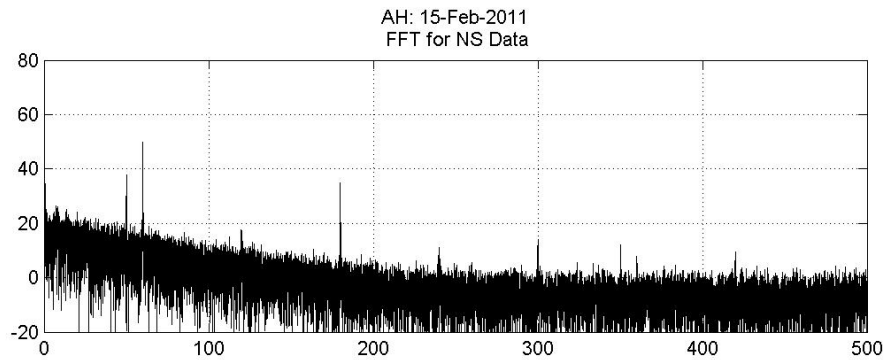
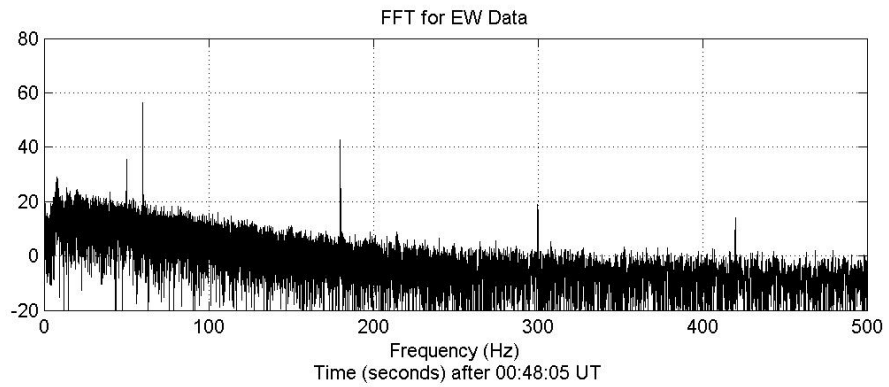
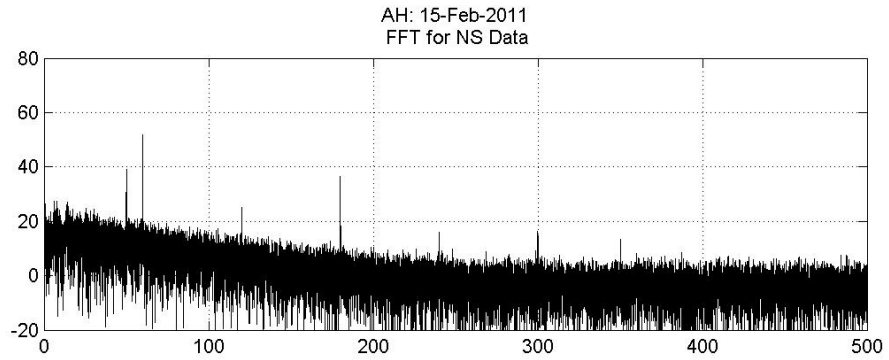
0.8.1 46 - 00:43:05 - Disconnected signal electronics UPS from wall power



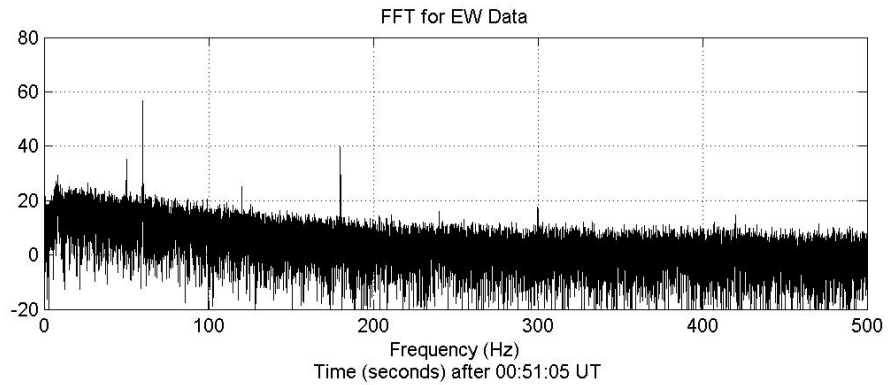
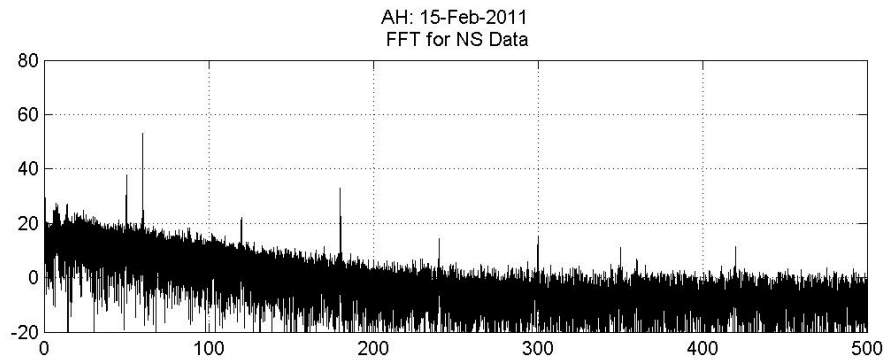
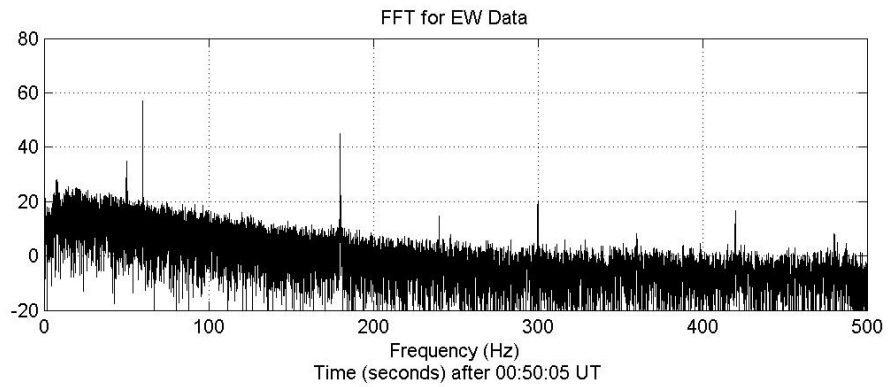
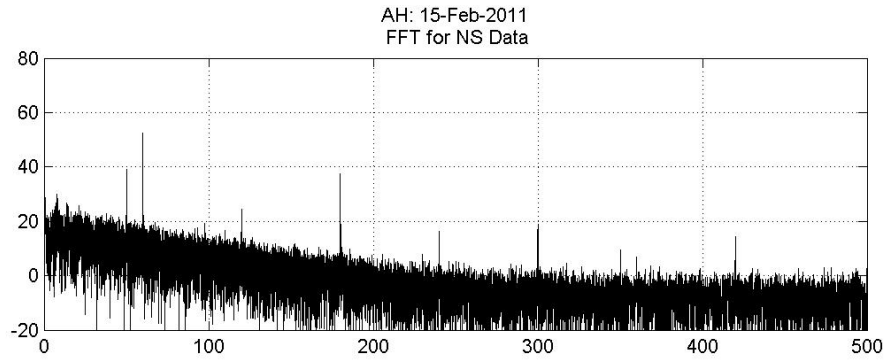
0.8.2 46 - 00:45:00 - Both UPSes unplugged was wall power



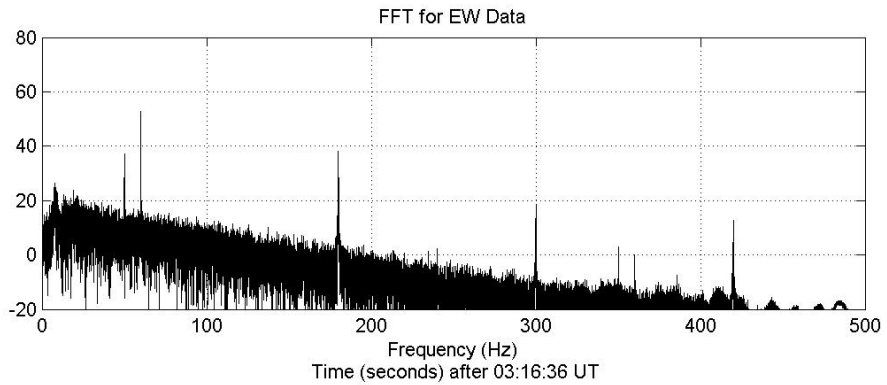
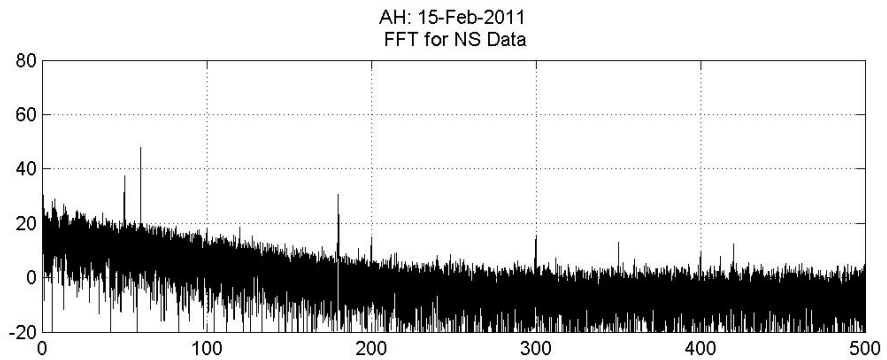
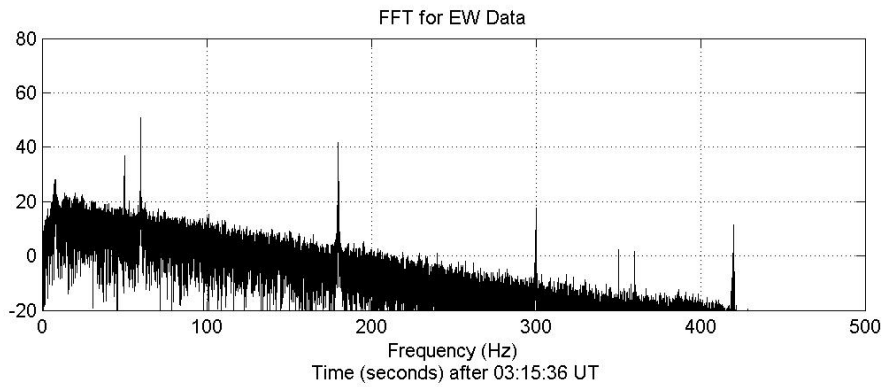
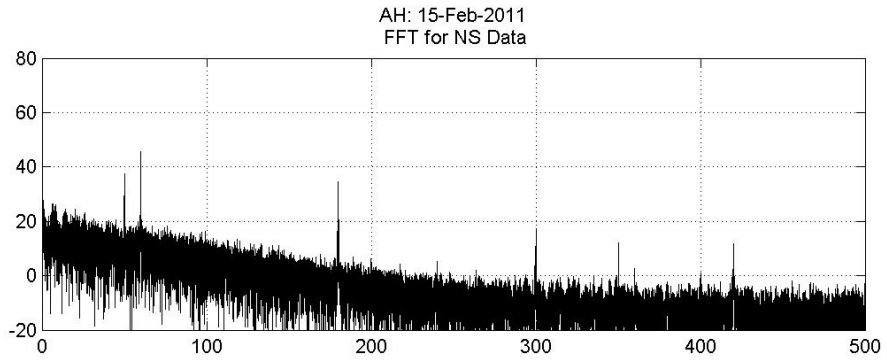
0.8.3 46 - 00:49:10 - Signal electronics UPS reconnected to wall power



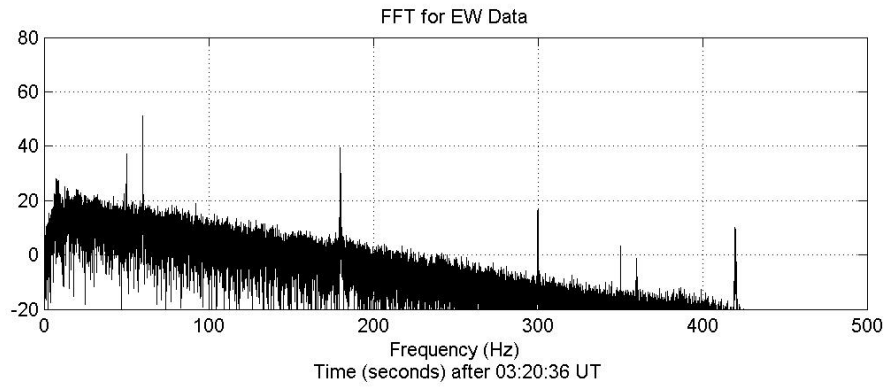
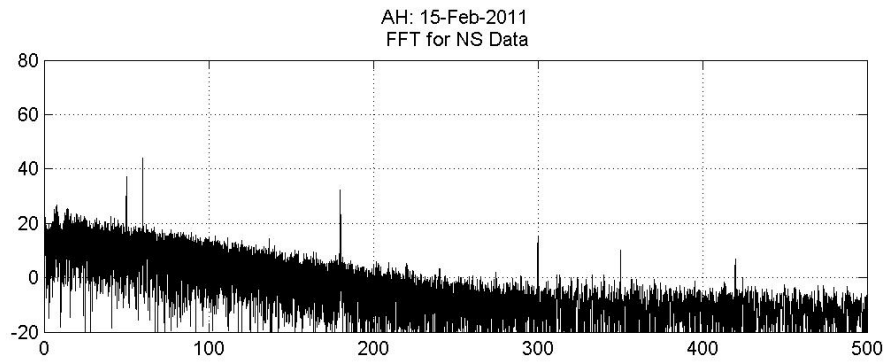
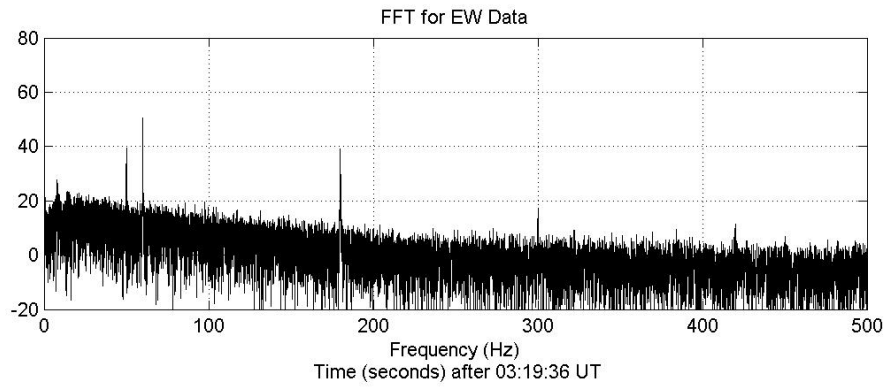
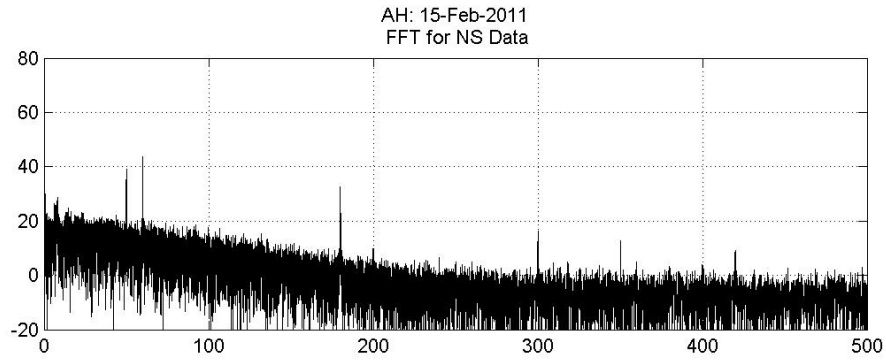
0.8.4 46 - 00:5X:XX - Second UPS reconnected to wall power



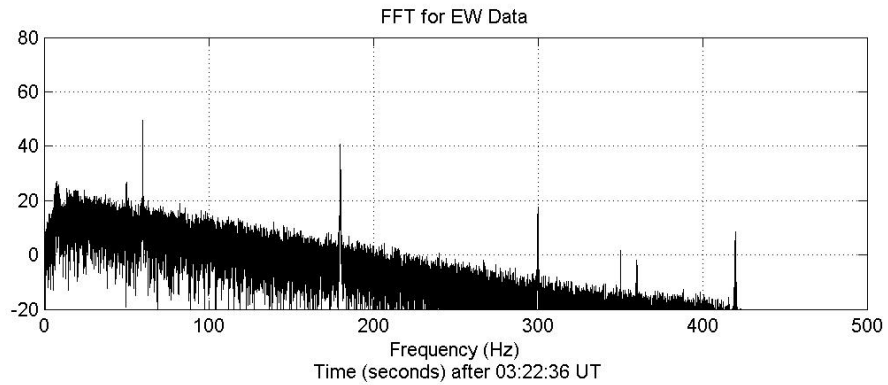
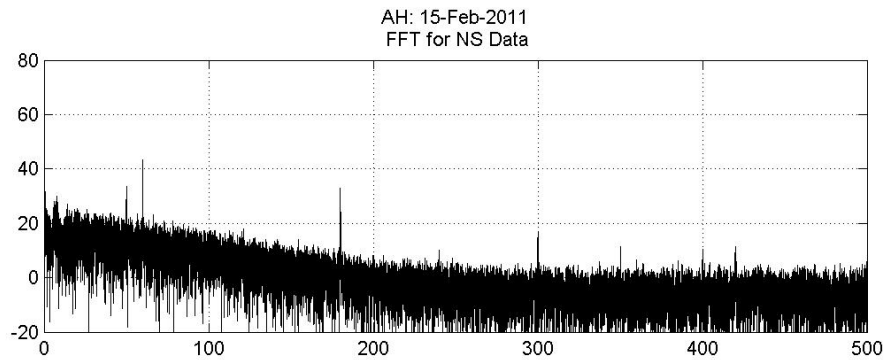
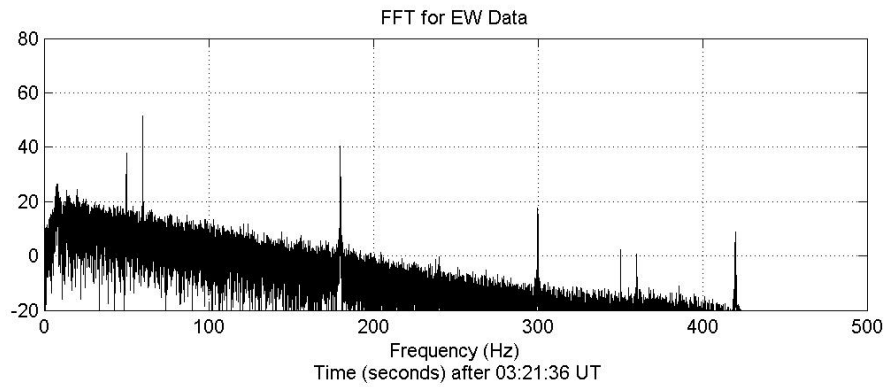
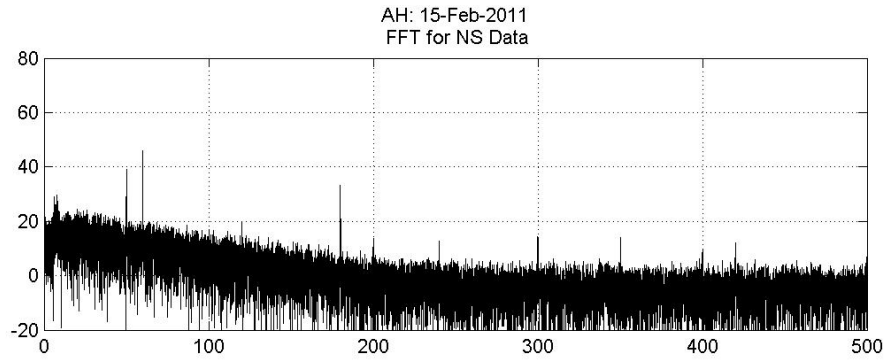
0.8.5 46 - 03:16:25 - Disconnected signal UPS, running on battery power



0.8.6 46 - 03:20:00 - Second UPS disconnected



0.8.7 46 - 03:21:50 - Both UPSes connected to wall power

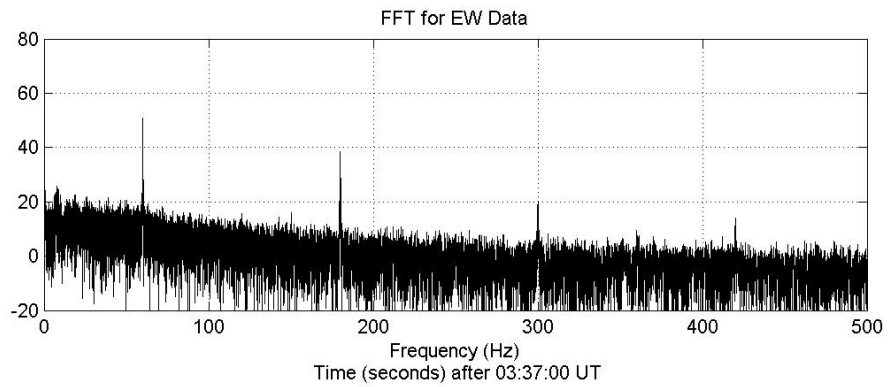
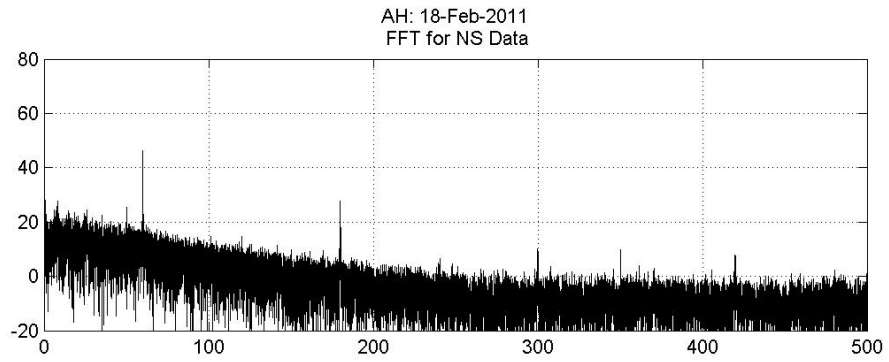
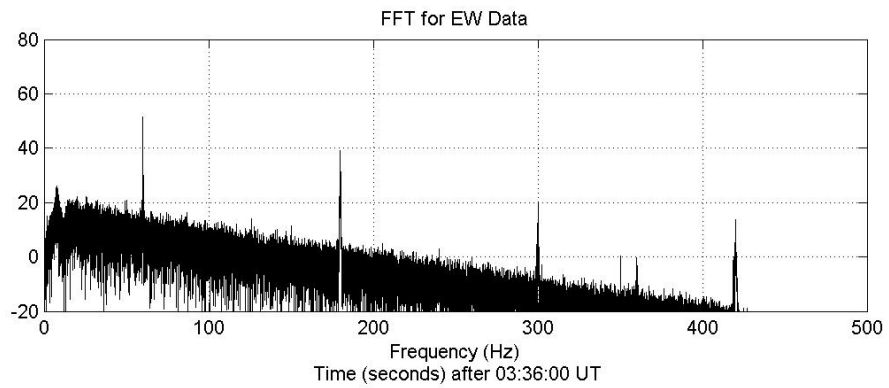
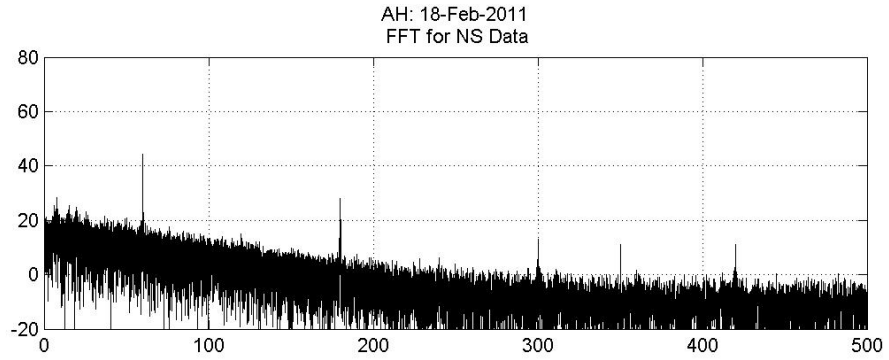


0.9 Day 49 - Single System EMI Test

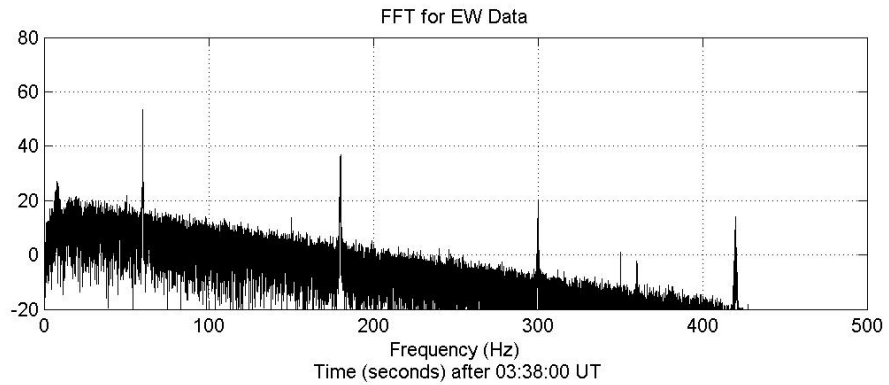
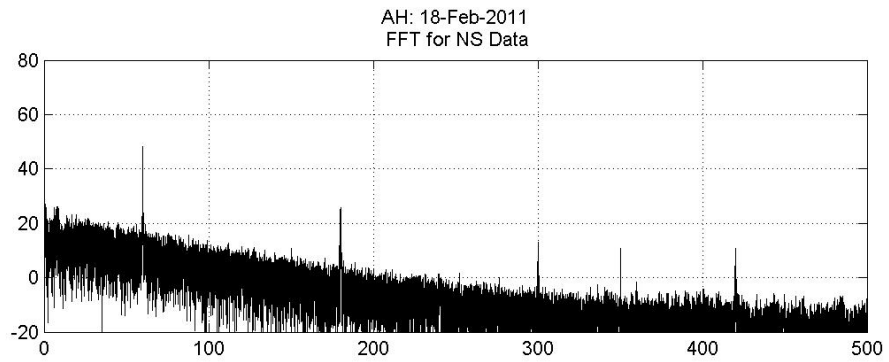
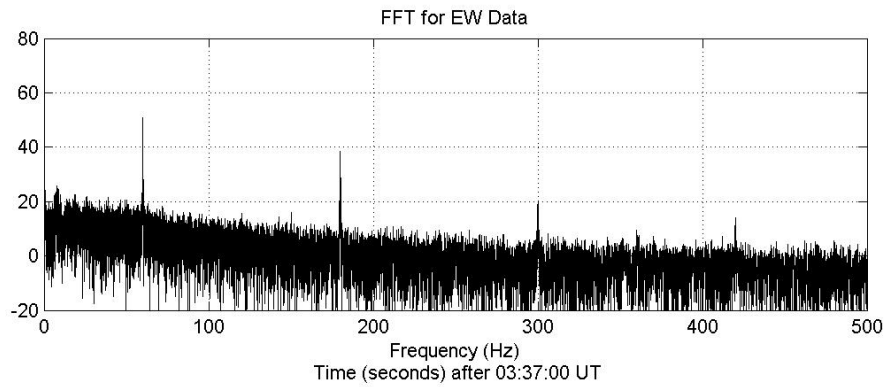
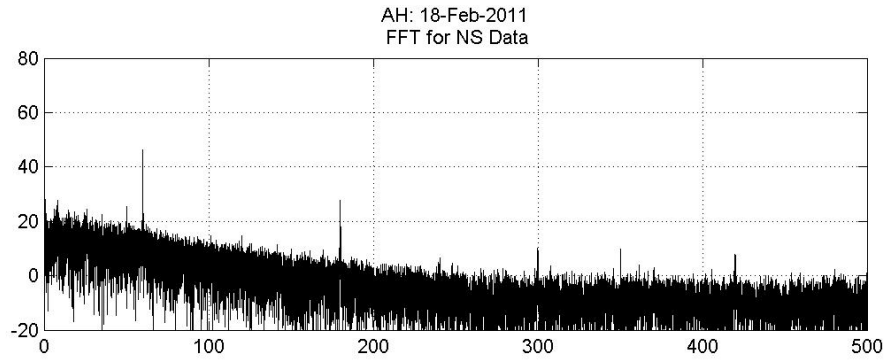
- 49 - 03:37:00 - Connected system to single circuit; UPSes disconnected temporarily
- 49 - 03:38:00 - System reconnected to wall power via UPS
- 49 - 03:40:20 - Disconnected and reconnected electronics power cables
- 49 - 03:44:30 - Switch to generator for Gonzalo's equipment started
- 49 - 03:45:50 - Most of the systems switched to generator
- 49 - 03:47:15 - Switching rest of Gonzalo's systems; UPS off
- 49 - 03:52:37 - Bringing all of photometer systems back online
- 49 - 03:56:00 - All systems of Gonzalo's are online
- 49 - 03:59:50 - A-111 system begins shutdown
- 49 - 04:01:10 - A-111 complete shutdown, communications and weather UPS is unplugged from wall power
- 49 - 04:06:10 - Begin power up A-111
 - Communications and weather UPS reconnected to power
- 49 - 04:09:54 - A-111 fully connected
- 49 - 04:13:XX - PC system UPS appears to be fully charged
- 49 - 04:14:50 - Begin UV monitor shutdown
- 49 - 04:16:15 - UV monitor completely off
- 49 - 04:21:45 - Begin UV monitor power up
- 49 - 04:27:00 - UV monitor at full power
- 49 - 04:40:30 - End of comparison data with Kiwi VLF receiver

Climate control system for Gonzalo's darkroom left on for the duration

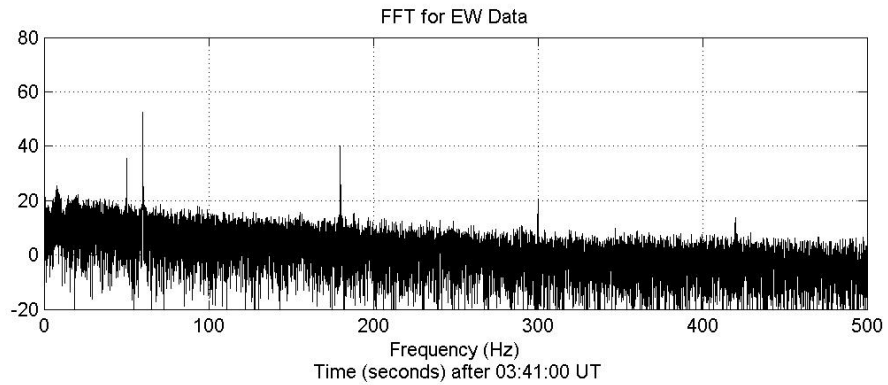
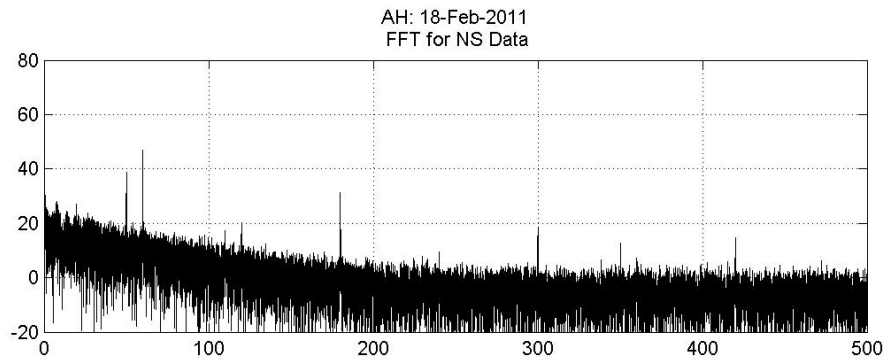
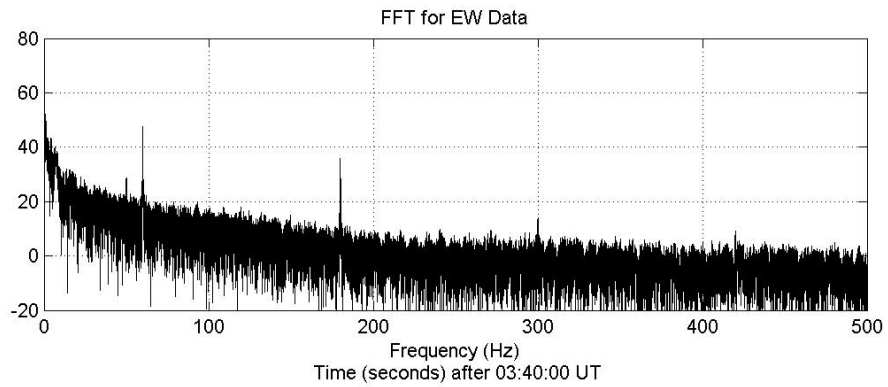
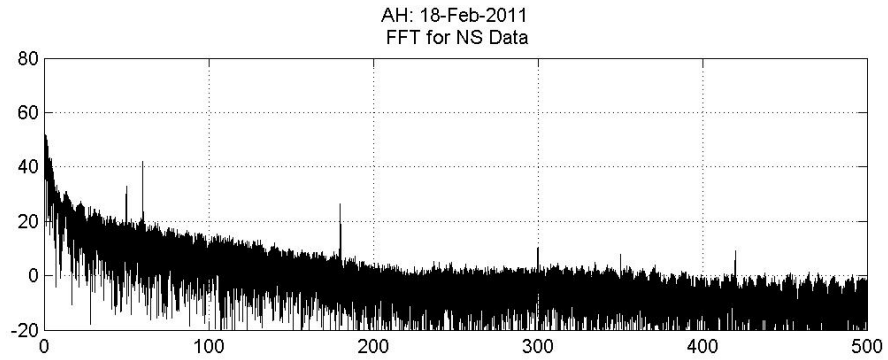
0.9.1 49 - 03:37:00 - Connected system to single circuit; UPSes disconnected temporarily



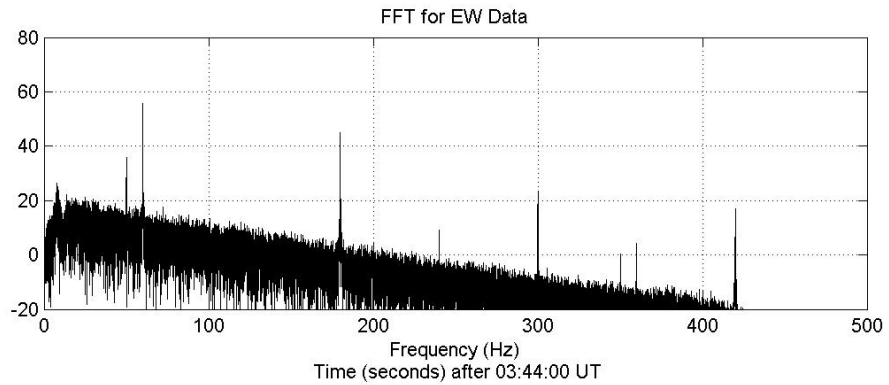
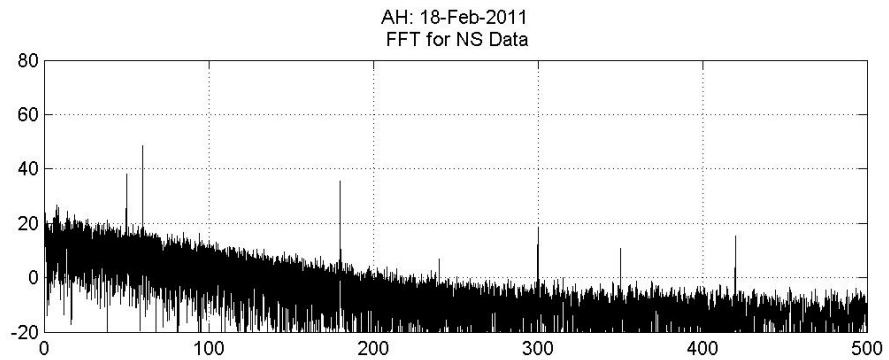
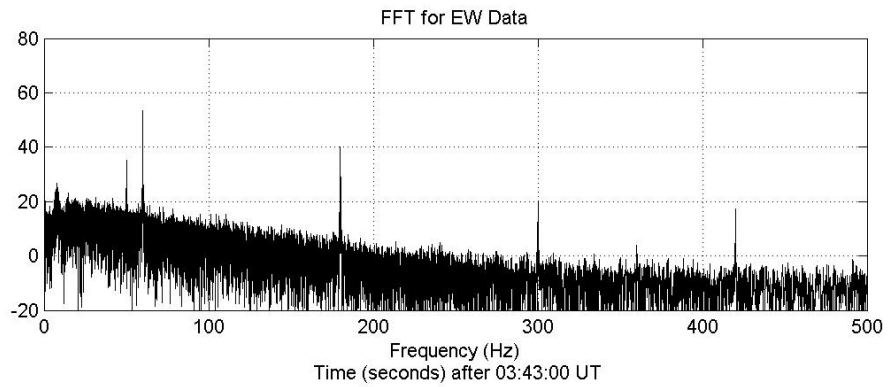
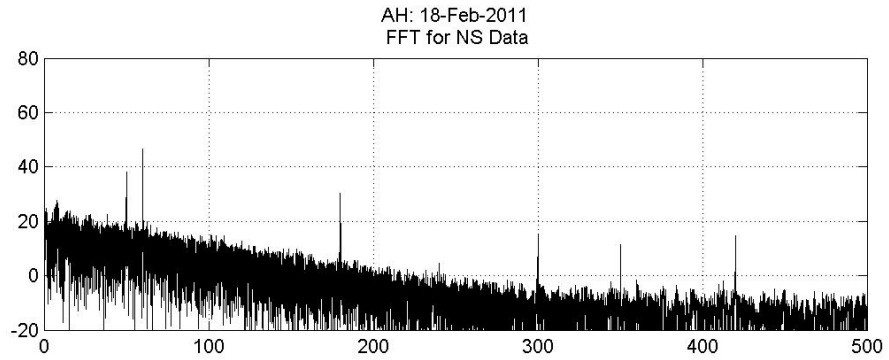
0.9.2 49 - 03:38:00 - System reconnected to wall power via UPS



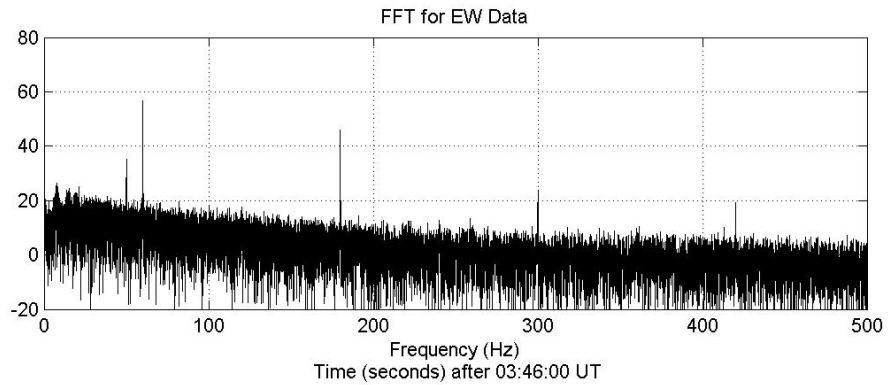
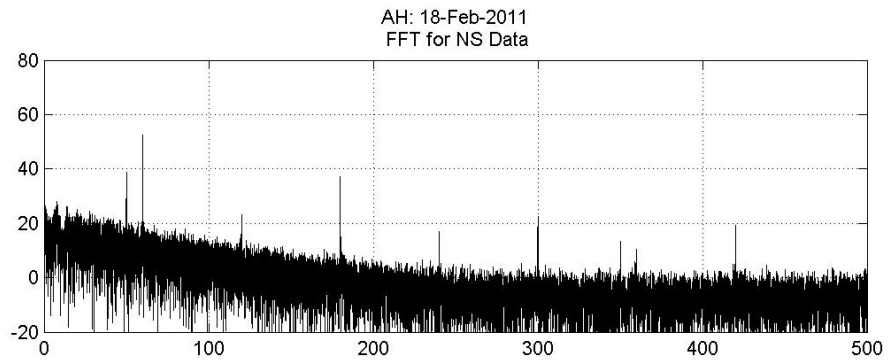
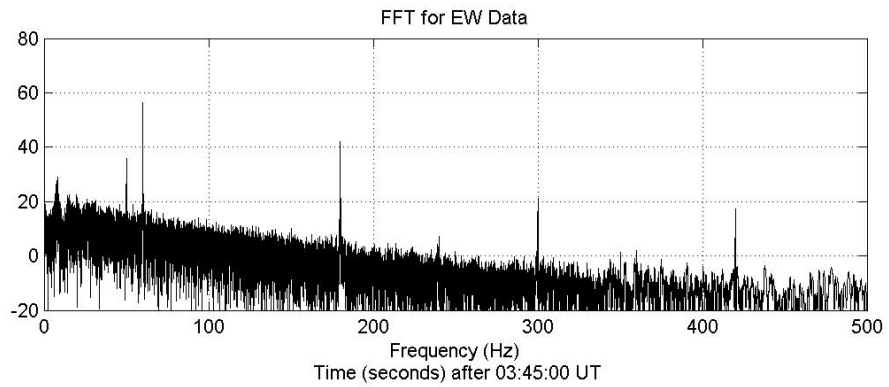
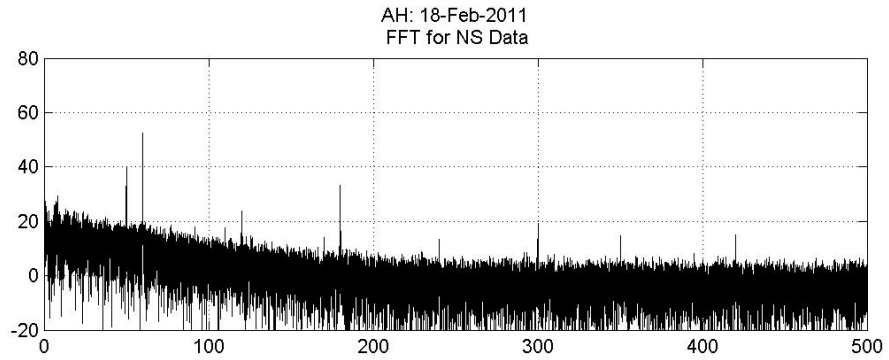
0.9.3 49 - 03:40:20 - Disconnected and reconnected electronics power cables



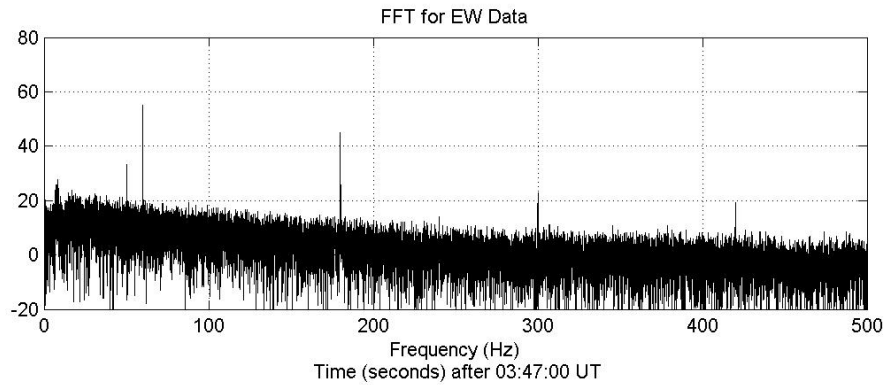
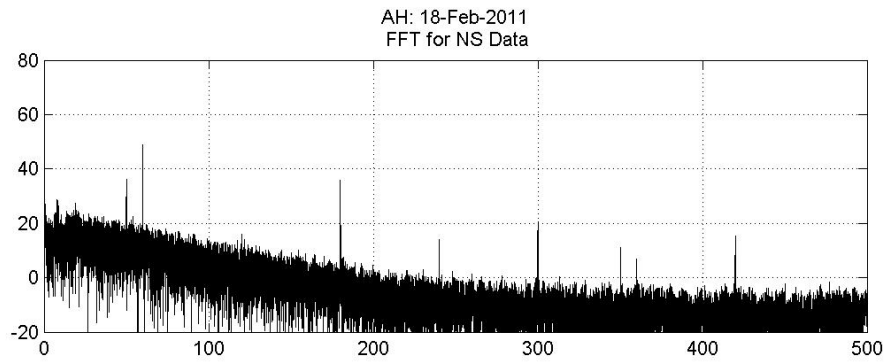
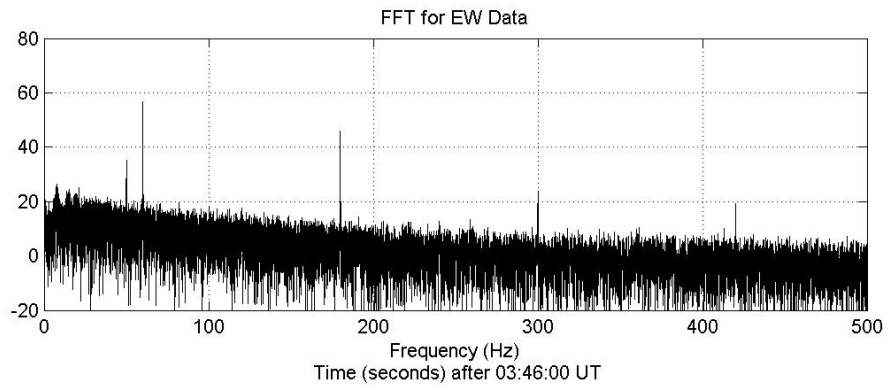
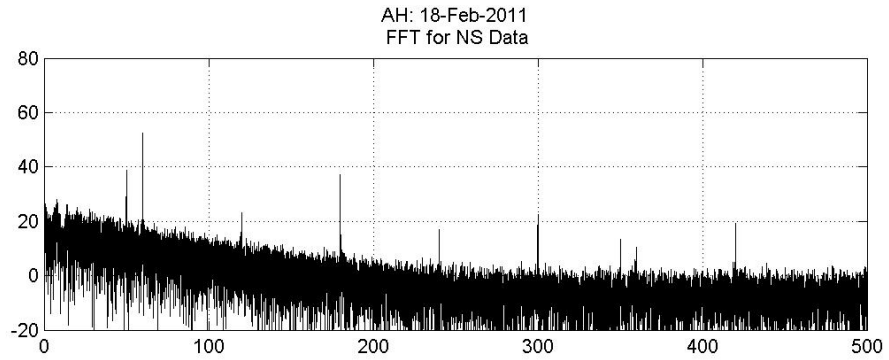
0.9.4 49 - 03:44:30 - Switch to generator for Gonzalo's equipment started



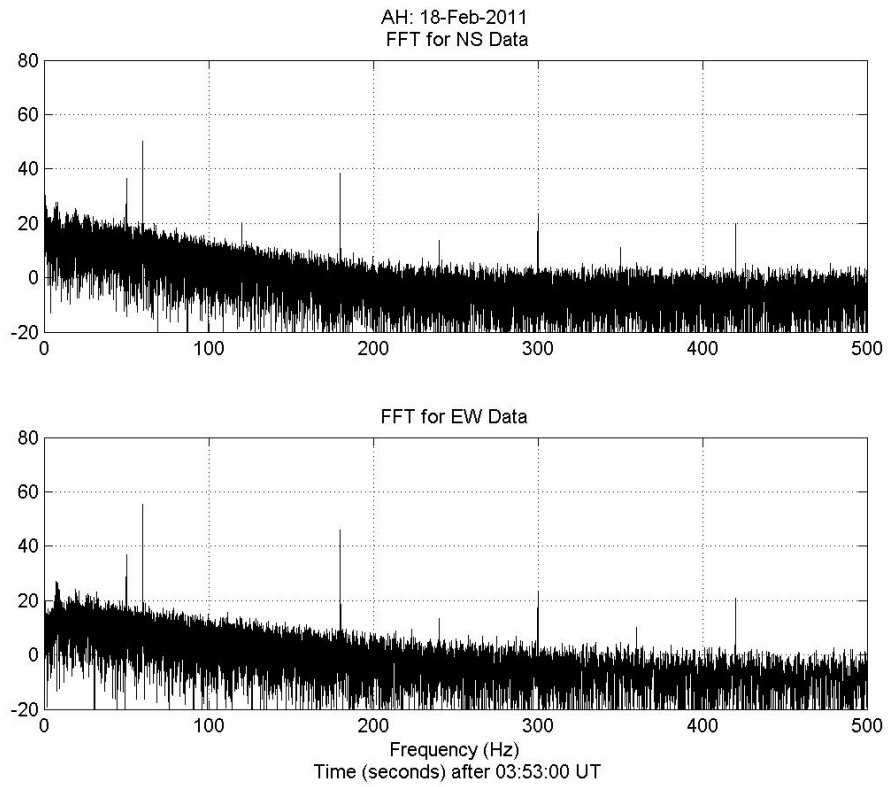
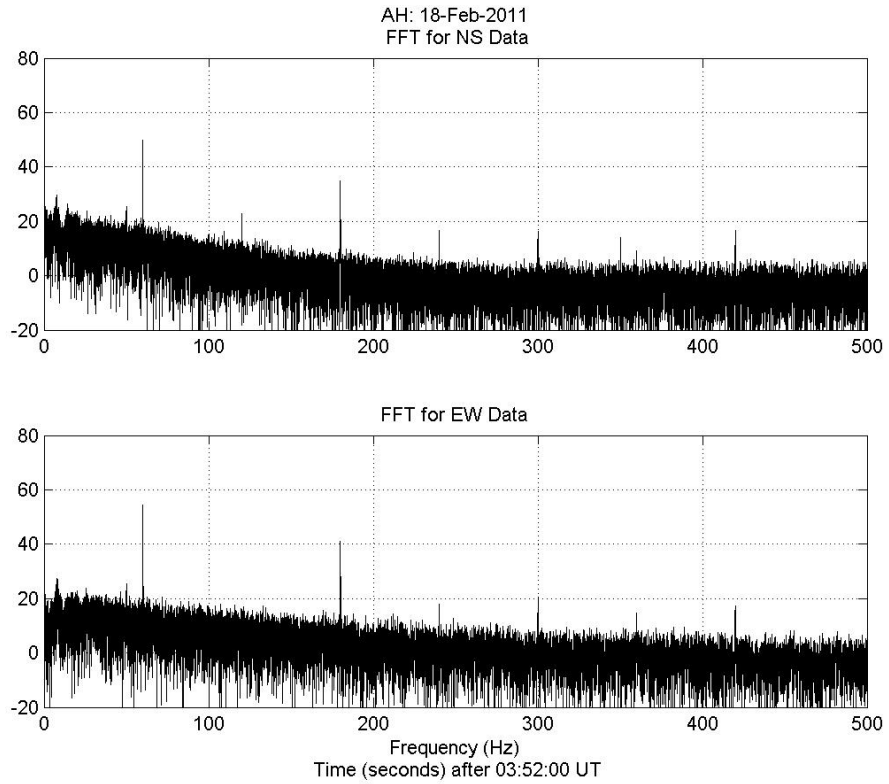
0.9.5 49 - 03:45:50 - Most of the systems switched to generator



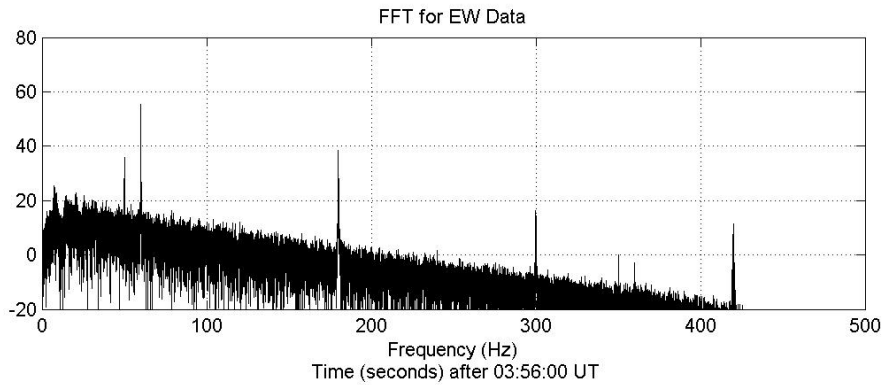
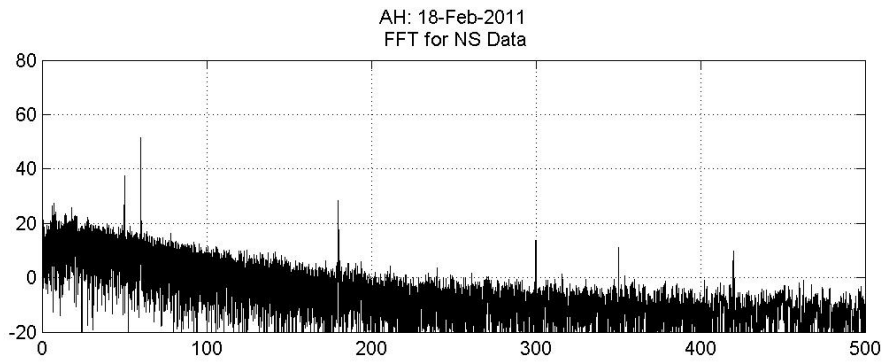
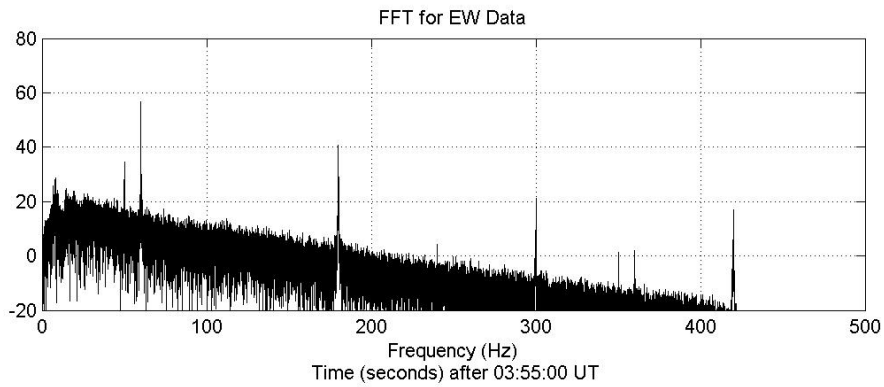
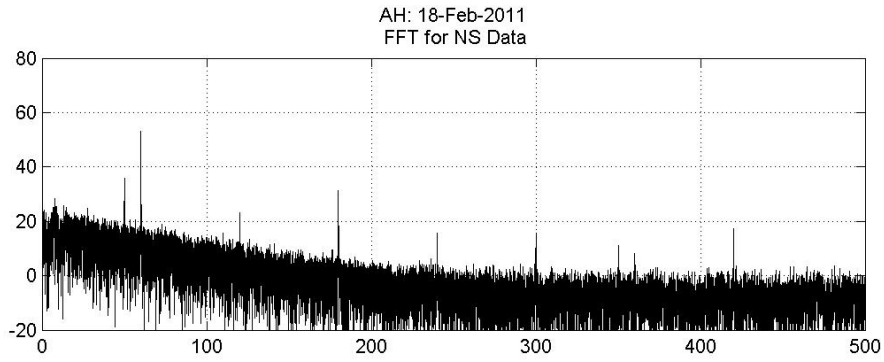
0.9.6 49 - 03:47:15 - Switching rest of Gonzalo's systems; UPS off



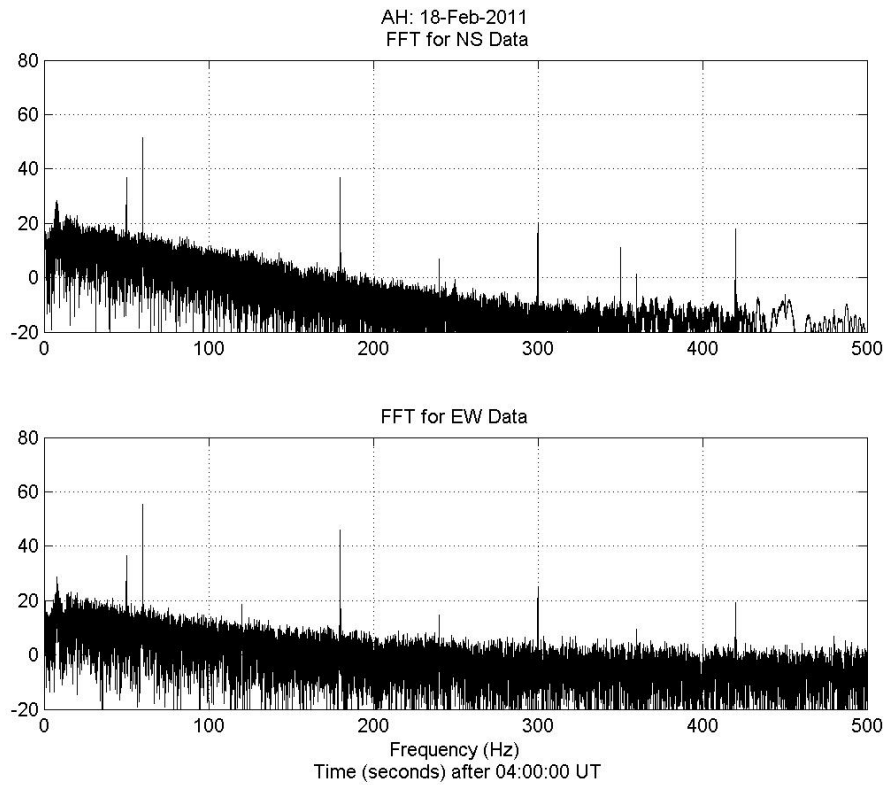
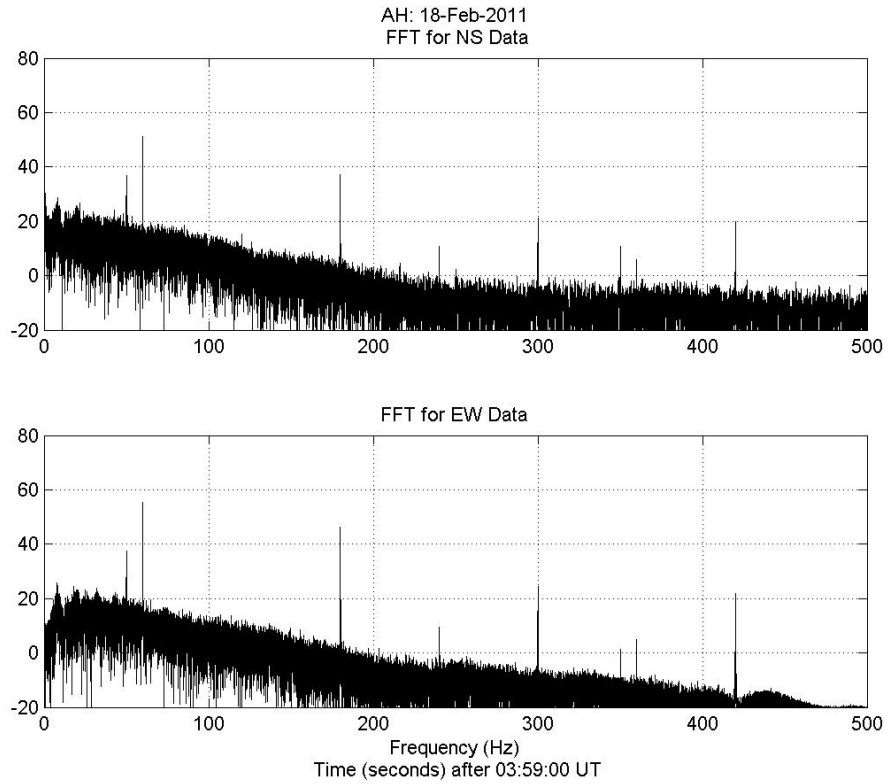
0.9.7 49 - 03:52:37 - Bringing all of photometer systems back online



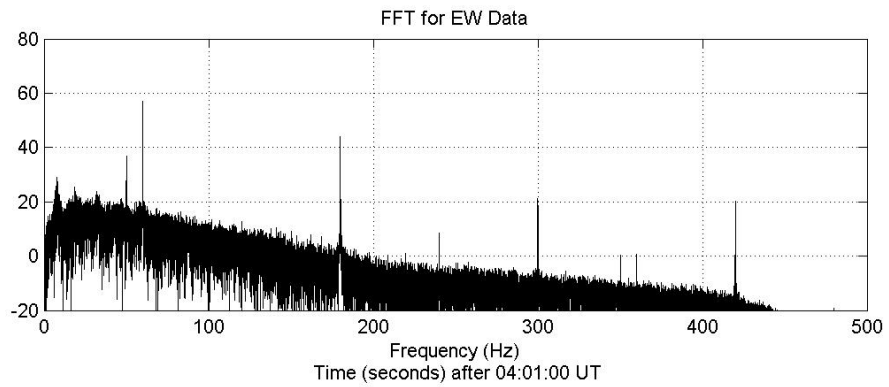
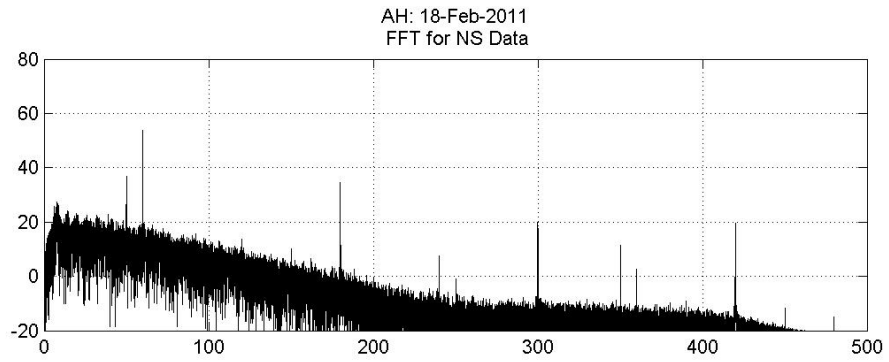
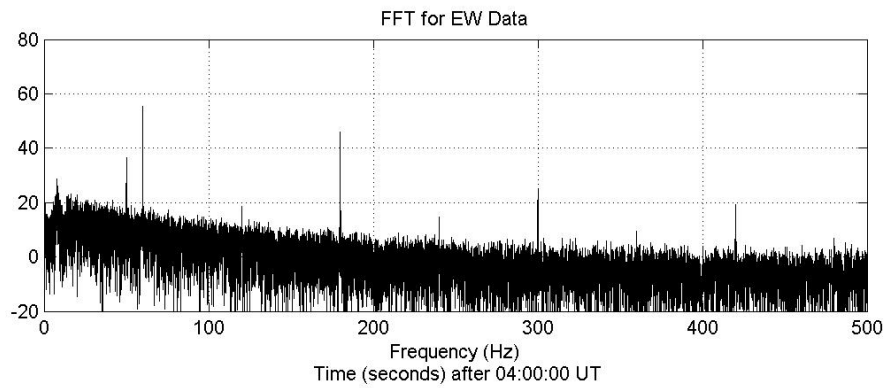
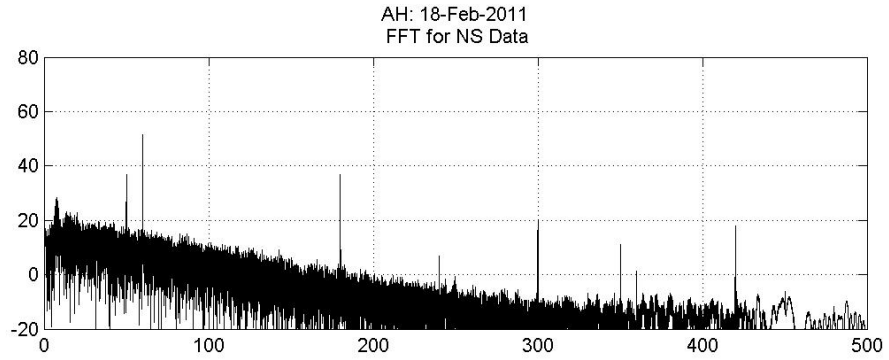
0.9.8 49 - 03:56:00 - All systems of Gonzalo's are online



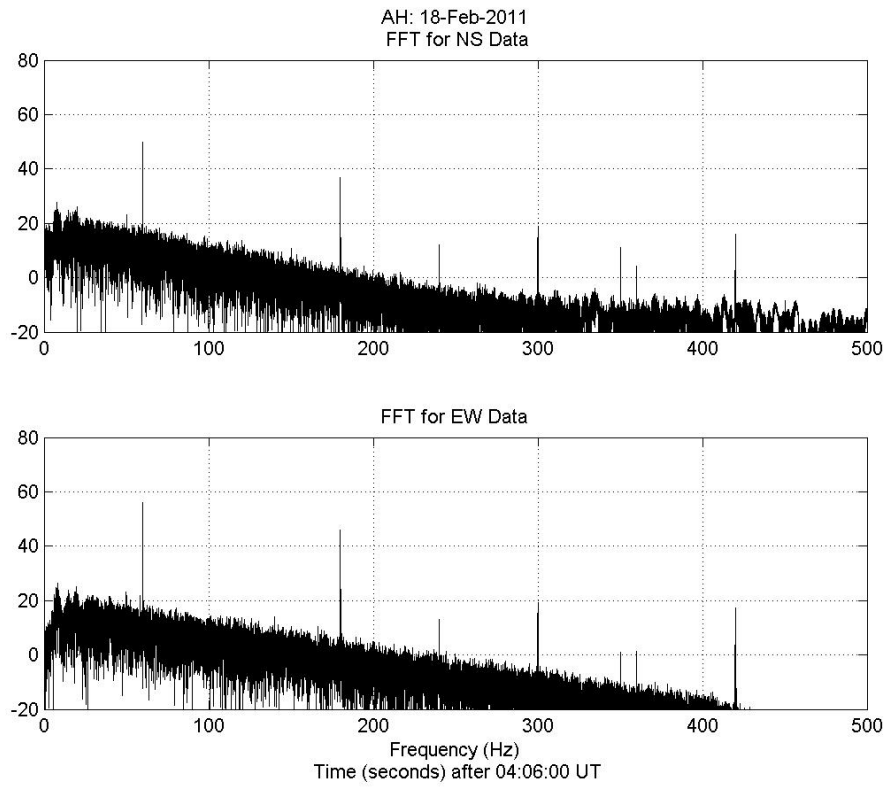
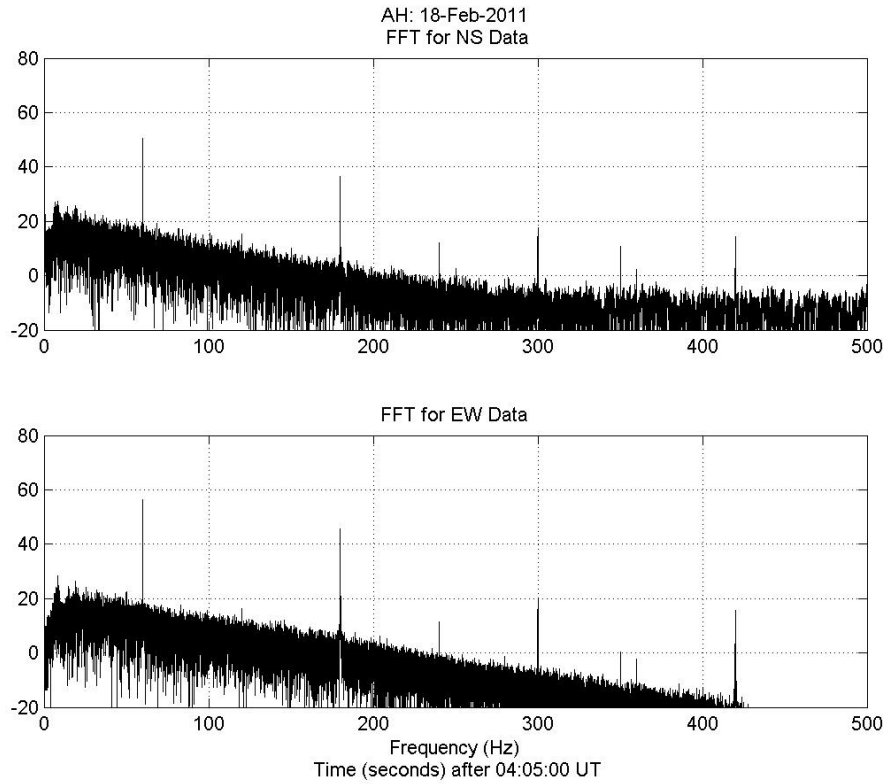
0.9.9 49 - 03:59:50 - A-111 system begins shutdown



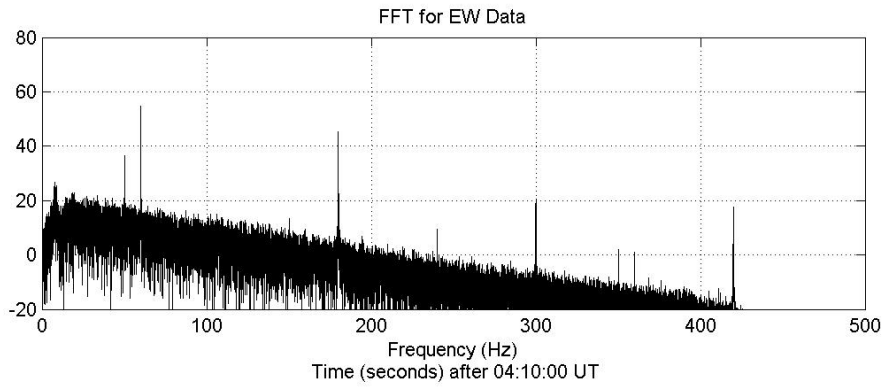
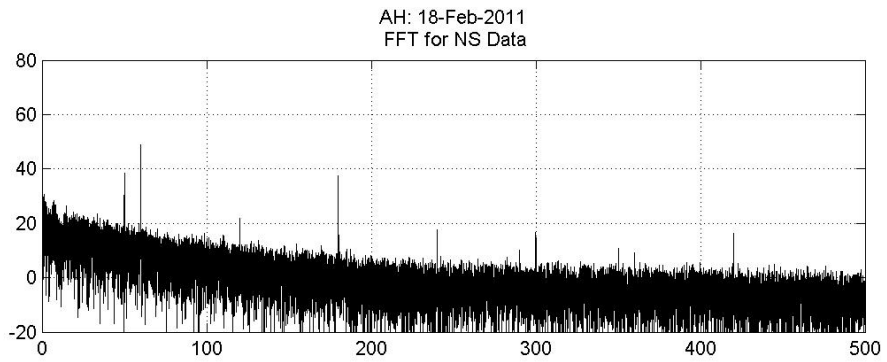
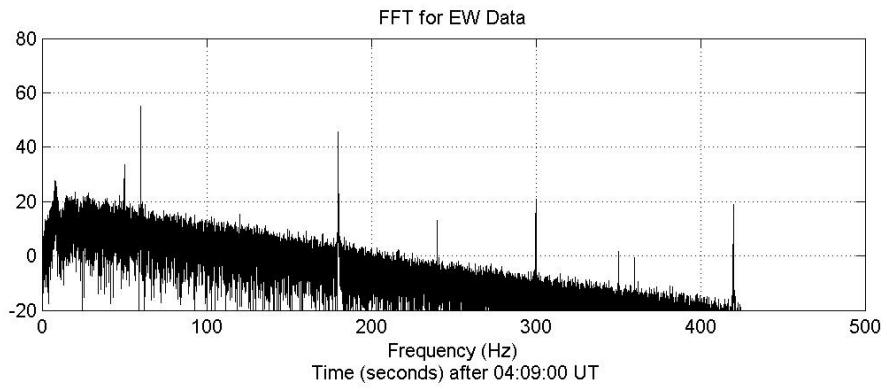
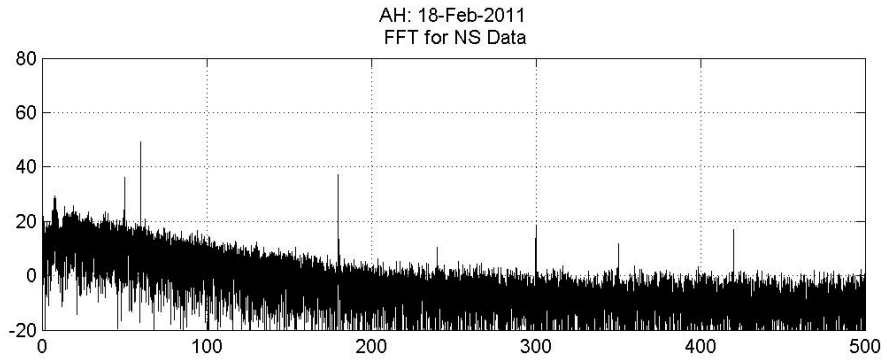
0.9.10 49 - 04:01:10 - A-111 complete shutdown, communications and weather UPS is unplugged from wall power



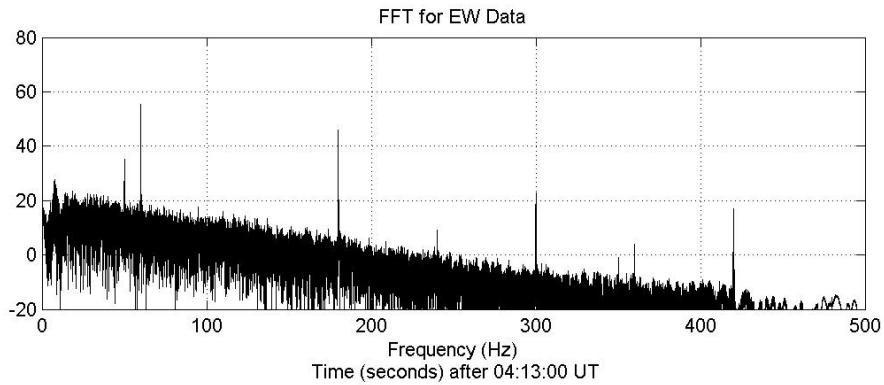
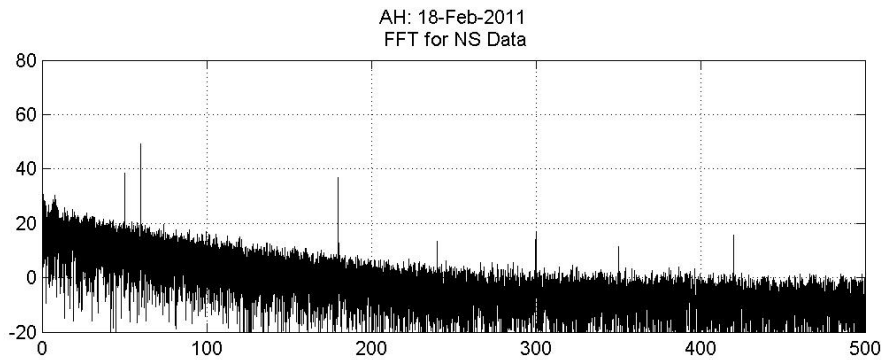
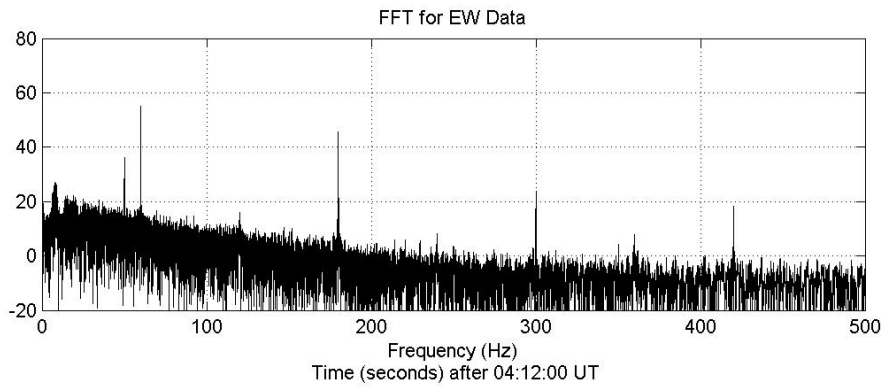
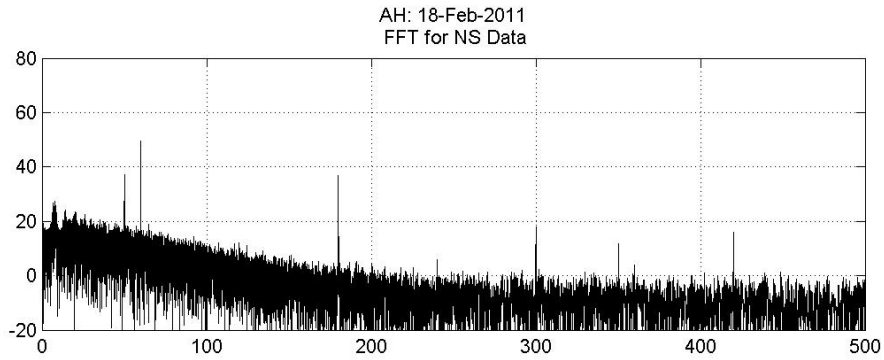
0.9.11 49 - 04:06:10 - Begin power up A-111



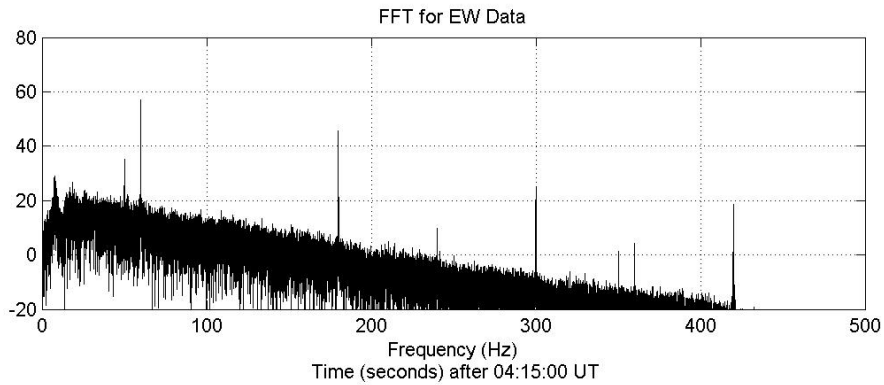
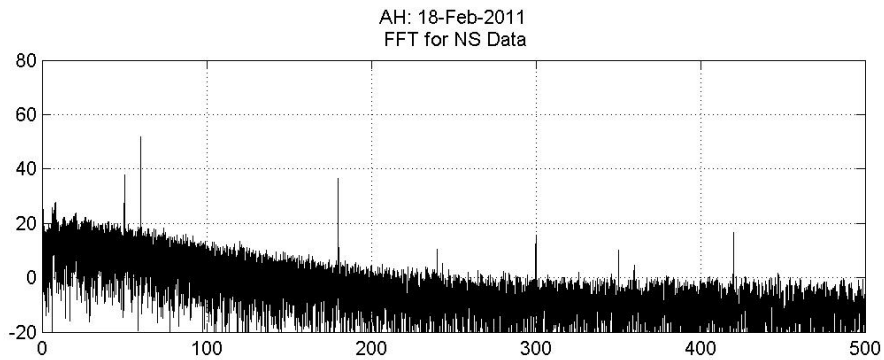
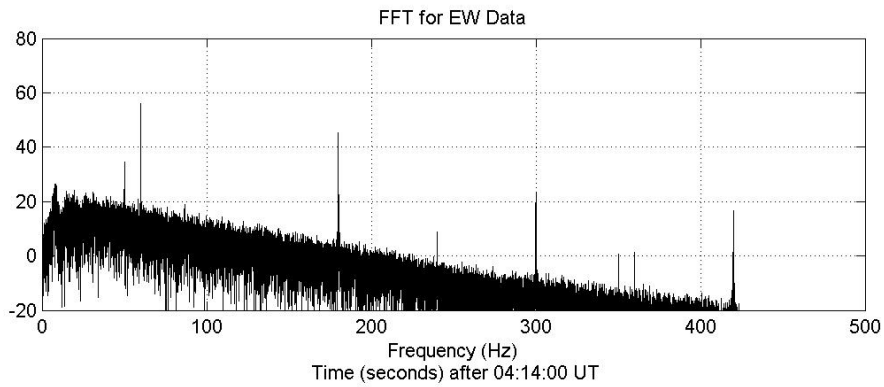
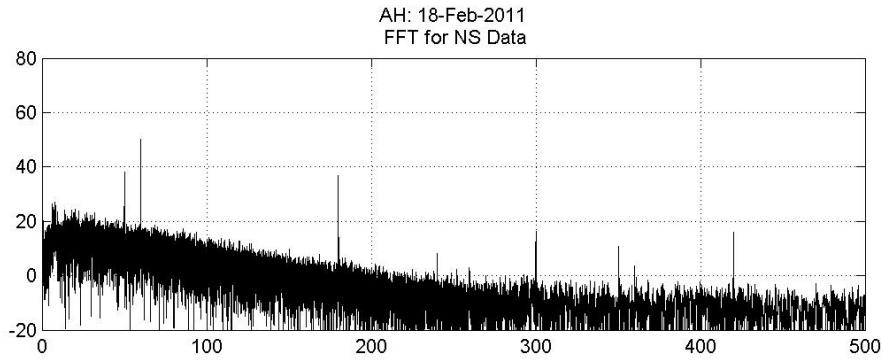
0.9.12 49 - 04:09:54 - A-111 fully connected



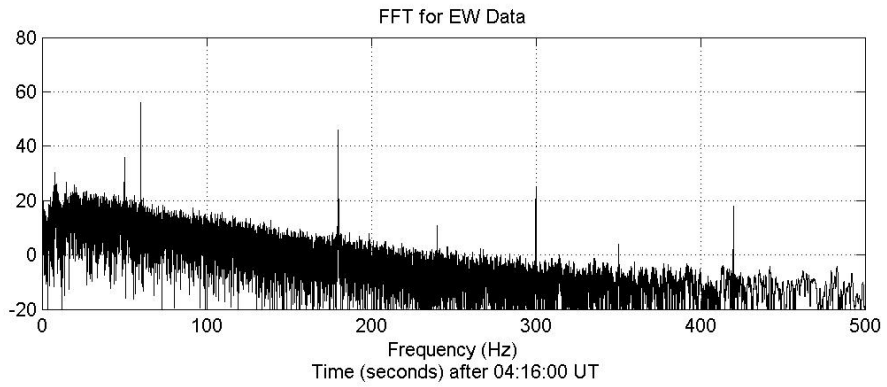
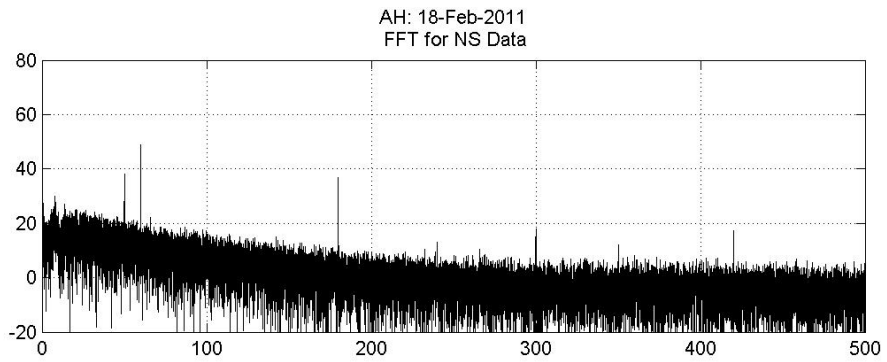
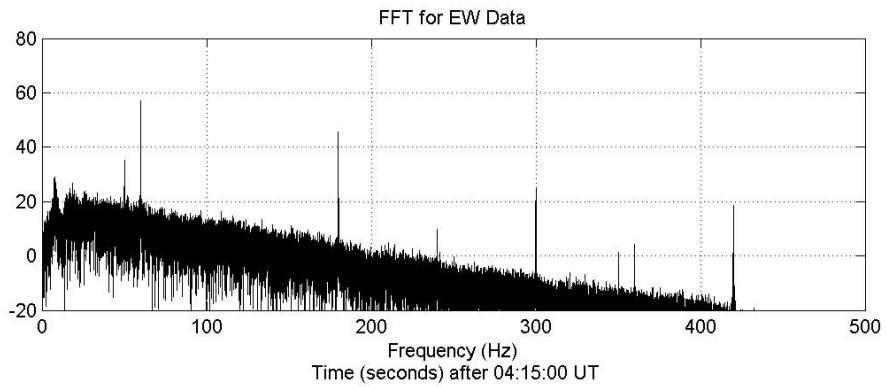
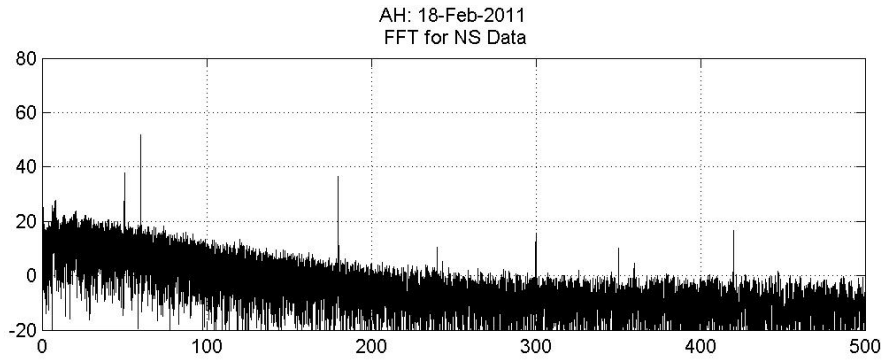
0.9.13 49 - 04:13:XX - PC system UPS appears to be fully charged



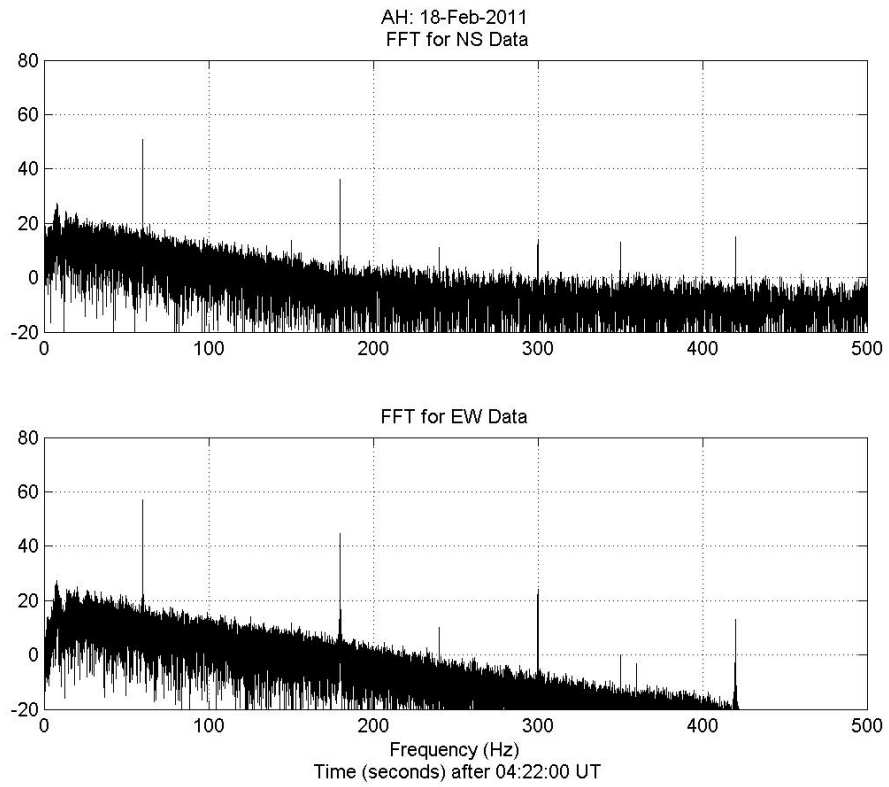
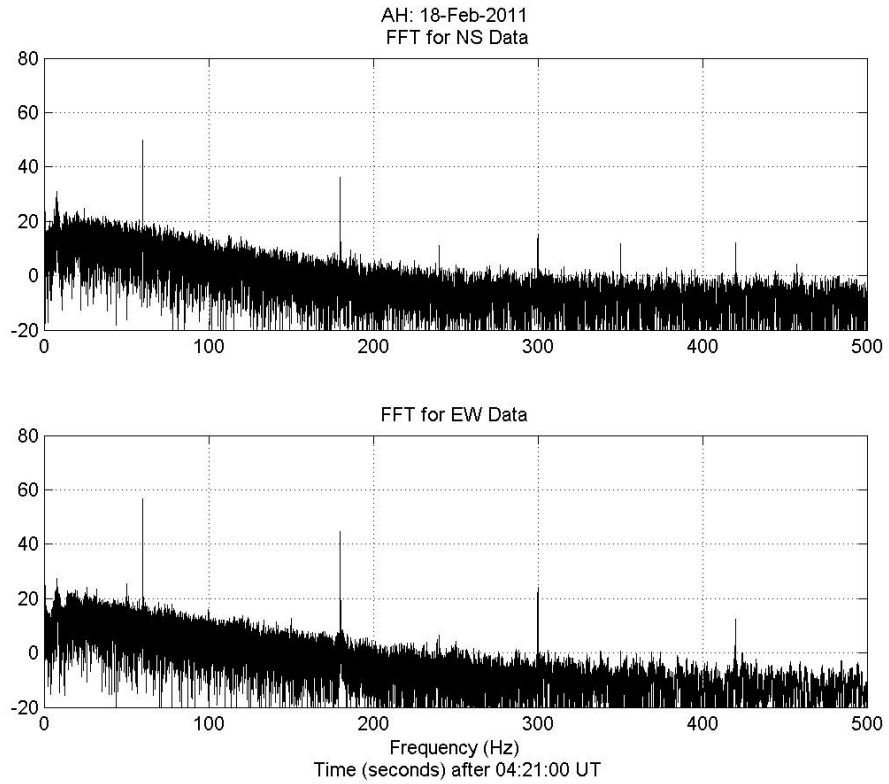
0.9.14 49 - 04:14:50 - Begin UV monitor shutdown



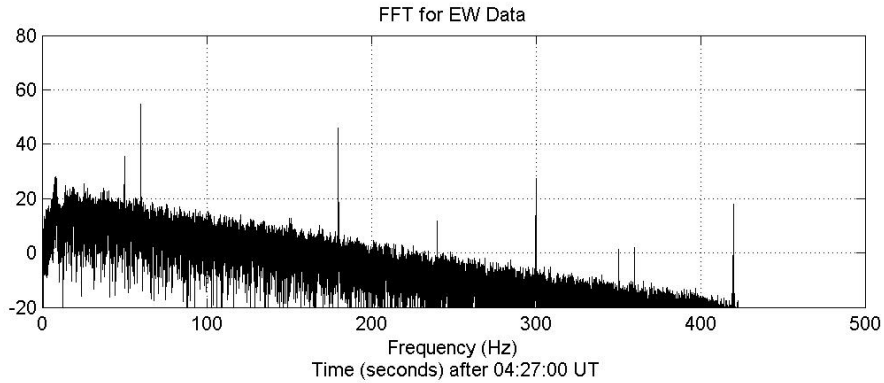
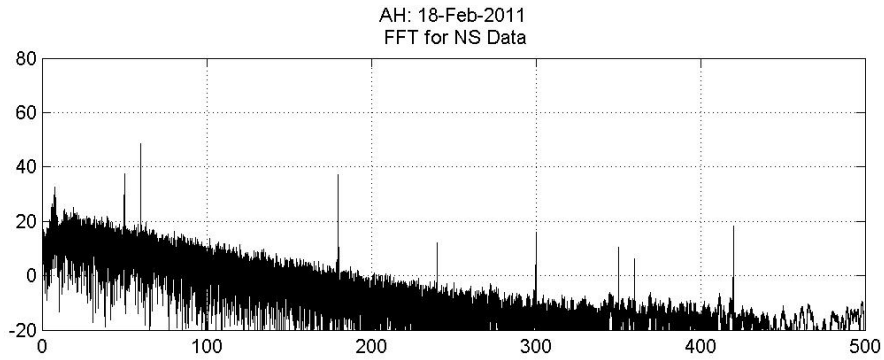
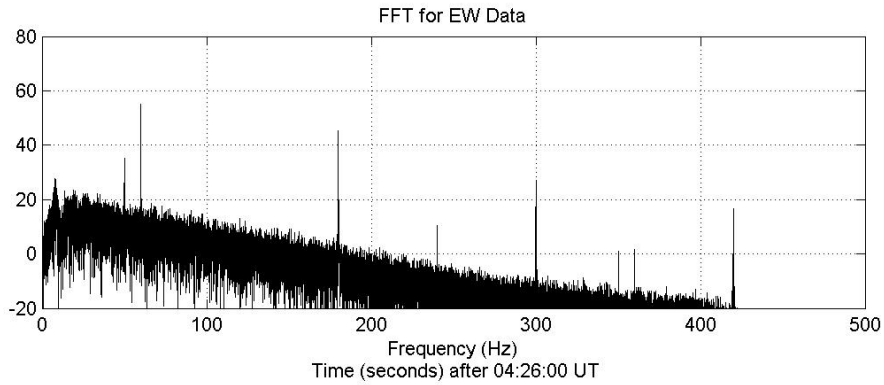
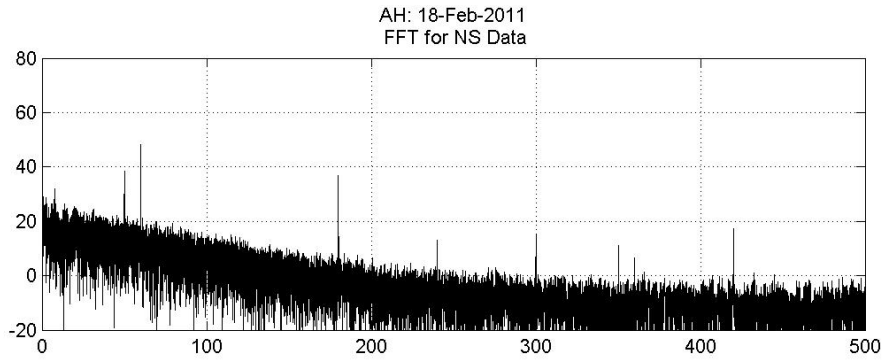
0.9.15 49 - 04:16:15 - UV monitor completely off



0.9.16 49 - 04:21:45 - Begin UV monitor power up



0.9.17 49 - 04:27:00 - UV monitor at full power



0.9.18 49 - 04:40:30 - End of comparison data with Kiwi VLF receiver

