

Remote Monitoring

August 8, 2011

1. Remote Monitoring Checklist for Radial Sites.

Daily/Weekly/Monthly checklist and troubleshooting.

We suggest that some basic daily and weekly checks of diagnostics and data quality will help in network maintenance and remote troubleshooting and early detection of any problems creeping up resulting in less downtime and overall time and cost savings.

Use DiagDisplay application for plotting the diagnostic files.

(If required, watch the training video on how to use DiagDisplay for troubleshooting at our support website. [Click here](#) for the video.)

Daily checks:

- Check if the CSS and radials are up-to date in the source folder and Archives folders.
- Transmitter/Receiver Temperature diagnostic plots: Any unusual constant increase in temperature?
Typical Values:

Receiver chassis temperature not to exceed: 40°C

Receiver AWG temperature not to exceed: 45°C

Transmit Amplifier and Transmit Chassis temperatures not to exceed: 50°C

- FW/Ref power diagnostic plots: Any unusual decrease in FW power or increase in Ref. power?

- Receiver and Computer runtime: Any frequent restarts or communication loss events?

Notes: _____

Note: Computer restarts every day at mid-night, unless disabled in Sentinel settings.
The plots may also show some receiver loss events during midnight restart.

- Check computer hard-disk free space. At-least 15% space remaining?

- Check external drive free space. At-least 5% space remaining?

Using SeaSonde Controller, check:

- Forward Power: ____ Reflected Power: ____ VSWR: ____ (Typically, < 3.0)

- TX and RX voltages:

- TX 28V amplifier supply: _____ Typical: 28 +/- 1 V
- TX +5V supply: _____ Typical: 5V +/- 0.5V
- RX +5V supply: _____ Typical: 5V +/- 0.5V
- RX -5V supply: _____ Typical: -5V +/- 0.5V
- RX +12V supply: _____ Typical: 12V +/- .5V

- GPS satellite status. No. of satellites locked: ____ (Minimum 3 required)

- PLL locked? Yes ____ No ____

- PPS valid? Yes ____ No ____

- Always store a snapshot of the SeaSonde Controller Advanced window settings on the desktop of the computer.

- SeaSonde Controller(AWG) settings are same as before? Any settings changed?
Compare against the default snapshot mentioned above.
- Are the transmit drive-trip settings enabled?(Press Command + d in SeaSonde Controller).

2. Weekly Checks:(Suggested at-least 2 times in a week. For example: Monday and Friday)

Plot at-least last 7 days of data for weekly checks and when troubleshooting any anomalies, plot at-least 1 month or more data as necessary.

Radial Data:

Note: Read the “Troubleshooting” section when any anomalies detected.

- S/N ratio diagnostic plots for the 2 loops and the monopole. Any significant variation?
Average S/N1: _____ S/N2:_____ S/N3_____

Typical desired S/N ratio: 20dB.

- NoiseFloor : Any significant variation? Average NF1: _____ NF2:_____ NF3_____

Note: For the Long-Range sites,typical Noise Floor: -150dB with diurnal fluctuations expected between day and night values. Night time noise floor is typically higher than day time.

- Radial Range and Radial Vector counts diagnostic plots: Any significant reduction?

Also, using RadialDisplay/SeaDisplay:

- Create a radial density distribution covering last 7 days and compare against the previous radial distribution.
Look for any major or unusual changes, like gaps appearing in radial coverage, changes in the radial density in a particular region of the expected coverage area.
- Save the distribution as an image file on a local hard-disk for future comparison.
- Create a movie of radials covering last 7 days. Do a quick can through the movie and look for any unusual changes or anomalies in the radials.
- Scan through the CSS files covering the period from last weekly check till now.
 - Plot at-least 2 CSS files per day about 12 hours apart. (middle of night and middle of day)
 - Examine the CSS files for any external interference, ionospheric interference, high noise due to any other nearby equipment operation or power lines.
 - Are bragg peaks present?
 - How many range bins do the bragg peaks extend to?
- Examine the first order lines.

- Is all the required data being captured? Is any required data being not captured? Is any non-required data being captured?
- Does this correlate with the radial data and also range observed in the diagnostic plots?
- Amplitude diagnostic plots for the two loops: Any anomalies? A1:___ A2:___
- Phases diagnostic plots for the two loops: Any anomalies? P1:___ P2:___
(Read Don Barrick's article titled "Mystery of Phases", to get a better understanding on how to interpret different types of phase fluctuations.)

Monthly Checks:

- Using Disk Utility, verify the computer internal and any external disk permissions and repair if necessary.
 - Also verify the internal and external disks and repair if necessary.
 - Using Apple's Software update, check for any software updates and install any OS, Firmware, security updates. Good internet connection will be required. (You can log out of the site while installing the updates).
- For all the daily, weekly and monthly checks, note down any unusual observations/readings in the desktop logs.**

3. Elementary Radial Data-quality checks and Troubleshooting:

For troubleshooting, plot diagnostics covering a large period like 1 to 2 months and check the history of the parameter(s) and zoom in and out in the time scale for further evaluation.

- If S/N ratio on any channel(especially Monopole) is consistently less than 20dB:
 - Check the noise floor values and also check CSS files for the received signal strength of the bragg peaks.
 - Check for any external interference in the CSS files. Check the resultant radial data.
 - Examine the first order lines as mentioned in the above section.
- Similarly, often a quantum amplitude jump of 3-4dB is accompanied by phase jumps.
 - Correlation between the amplitude and phase jumps indicate a change in one of the RX antennas or cables or the RF amplifiers or Receiver filters.
 - In such cases, correlate with other hardware parameters like forward/reflected power and radial parameters like S/N ratios and Noise Floors to evaluate any anomalies. Also check the effect on radials.
- Examples of Radial Data quality deterioration:
 - Out-of-bound large vectors at unexpected bearings and range bins.
 - No radials at expected bearings and range bins.
 - Weak radial vectors at bearings/range bins which usually have strong vectors.
 - Vectors pointing in opposite direction in the same bearing between adjacent range bins.
 - Radial range/Radial vector counts reduced than usual.

As explained earlier, you can plot radial distribution and make movies to spot any such changes.

If any of the above anomalies appear, plot diagnostics covering large periods of time and correlate the anomalies with the S/N ratio, Noise floor, power plots and other hardware plots.

Examine the CSS files as explained in the weekly checks section for any external interference, ionospheric interference, high noise due to any other nearby equipment operation or power lines.

Examine the first order lines as explained in the weekly checks section.

Note down any unusual observations/readings in the desktop logs.

4. Combine Site Checklist:

Daily Checks:

- Check if the radials and totals are up-to date in the source folders and Archives folders.
- Current Analysis script running normally and not running in a loop.

Weekly Checks: (Suggested at-least 1 day per week)

- Using RadialDisplay/SeaDisplay:
 - Create and save a movie of totals covering last 7 days. Do a quick scan through the movie and look for any unusual changes or anomalies in the totals.
 - Look for any major or unusual changes, like gaps appearing in total coverage, changes in the total vector density in a particular region of the expected coverage area.
 - Compare this week's movie against last week's movie and look for any unusual changes.

Monthly Checks:

- Using Disk Utility, verify the computer internal and any external disk permissions and repair if necessary.
- Also verify the internal and external disks and repair if necessary.
- Using Apple's Software update, check for any software updates and install any OS, Firmware, security updates. Good internet connection will be required. (You can log out of the site while installing the updates).
- For all daily, weekly and monthly checks, note down any unusual observations/readings in the desktop logs.**

5. Elementary Totals Data-quality checks and Troubleshooting:

- If totals are not up-to date in source or archives folders:
 - Check if analyze current script is running normally and creating totals or if running in a loop. Observe the messages in the terminal window.
 - Are the corresponding radials present in the Radial Sites folders? Yes No.
 - If Yes,
 - Check Archivalist settings: If it is archiving totals faster than the corresponding source radials resulting in looping of totals creation and causing confusion in spotting the latest radials, since the old radials may be at the top of the list.
 - If No,
 - Check if the transfer script is transferring source radials from radials sites.
 - Check the transfer logs for any error/warning messages.
 - Is connection available to the radial site? Yes No.

Is the radial site operating and generating radials normally. Yes No.

Is Archivalist archiving(deleting) radials before the transfer scripts transfer to the combine site? Yes No.

Data Quality Checks/Troubleshooting

• Examples of Total Data quality deterioration:

- Out-of-bound large vectors at unexpected bearings and grid points.
- No totals at expected bearings and grid points.
- Weak total vectors at bearings/grid points which usually have strong vectors.
- Current flow in wrong or reverse direction.
- Total vector counts reduced than usual.
- Incorrect current flow in the baseline region between the 2 sites.

For example: Strong current flow on either side of baseline region, but weak current flow in the baseline region.

If any of the above anomalies detected:

Examine the radials of the contributing sites for the same time period as totals.

- This may in turn require examining corresponding CSS files.
- When necessary, refer to the data quality checks and troubleshooting procedure described for the Radials sections above.