



## Radial Diagnostic File Format

121.00.1610.FF

Oct 27, 2016

### Radial Diagnostic File Format

Radial Suite Processing of CSS cross spectra produces radial diagnostic files that start with **STAT\_** and end with **.rdt** that helps to trouble shoot radial performance. The **.rdt** file is built upon the Columnar Table Format (CTF) which is covered in a separate document for which you should be familiar with before reading this document.

To plot these files, use the **DiagDisplay** application in the Viewers folder. DiagDisplay can display multiple STAT files simultaneously, select the STAT\_ files you want in the Finder (use shift and/or command key to select) and drag the multiple selection to DiagDisplay icon. Note, if you try to plot a year's worth or more, you will need a very fast machine or a lot of patience.

### File Naming

These files are put into /Codar/SeaSonde/Data/Diagnostics and have the file naming format of **STAT\_XXXX\_YYYY\_MM\_DD.rdt** where XXXX is the radial site code, yyyy is the year, mm is the month, and dd is the day. The processing tools are hard coded to create new STAT\_ files weekly on Sundays.

### Identification of the File

The first keyword of the file will typically be '%CTF: <version>' describing the version of the CTF file. Before version 1.00, the file will be missing this key; however, it is still readable with this standard.

Within the first ten lines of the file will must be a keyword of:

**%FileType: <type> <subtype> <name>**

The **<type>** must be **DIAG** to identify it as a diagnostic file.

The **<subtype>** must be **rads** to identify it as a radial diagnostic file.

## Table Data

The table data time starts from the files **%TimeStamp:** key.

The **%TableType: <type> <subtype>** must have a <type> of **rads** while the <subtype> **rad1** describes the current table column output and will change in the future as more columns are added or inserted. The best way to read this files is to use the **%TableColumnType:** key, which contain a list of four character codes describing each column. The **%TableColumnType:** key for the 'TableType: rads rad1' output is:

**%TableColumnTypes: TIME AMP1 AMP2 PH13 PH23 CPH1 CPH2 SNF1 SNF2 SNF3 SSN1 SSN2 SSN3 DGRC DOPV DDAP RADV RAPR RARC RADR RMCV RACV RABA RTYP STYP TYRS TMON TDAY THRS TMIN TSEC**

Each table row is the processing result of a single CSS into a short time radial or the merging of short-time radials into final output radial.

The column character codes can be decoded as:

<b>TIME</b>	Recorded time of the data row in seconds from the %TimeStamp:
<b>AMP1</b>	Calculated antenna amplitude correction for loop 1 to monopole.
<b>AMP2</b>	Calculated antenna amplitude correction for loop 2 to monopole.
<b>PH13</b>	Calculated antenna phase correction for loop 1 to monopole.
<b>PH23</b>	Calculated antenna phase correction for loop 2 to monopole.
<b>CPH1</b>	Used antenna phase correction for loop 1 to monopole.
<b>CPH2</b>	Used antenna phase correction for loop 2 to monopole.
<b>SNF1</b>	Cross spectra Noise floor of loop 1.
<b>SNF2</b>	Cross spectra Noise floor of loop 2.
<b>SNF3</b>	Cross spectra Noise floor of monopole.
<b>SSN1</b>	Cross spectra Signal to Noise of loop 1.
<b>SSN2</b>	Cross spectra Signal to Noise of loop 2.
<b>SSN3</b>	Cross spectra Signal to Noise of monopole.
<b>DGRC</b>	Cross spectra range cell which had the highest SSN3 for which the noise floor and signal to noise were recorded.
<b>DOPV</b>	The total number of doppler cells in the cross spectra which were acceptable to process into radials. (Within First Order, Noise criteria, ...)
<b>DDAP</b>	The percentage of doppler cells that had dual angle MUSIC solutions
<b>RADV</b>	The total number of radial vectors solutions found at different bearings and ranges.
<b>RAPR</b>	The average number of radial vectors per range cell.
<b>RARC</b>	The number of range cells processed.
<b>RADR</b>	The maximum radial range calculated by where the number of radial vectors drops to below 20% of the average vectors per range.

<b>RMCV</b>	The maximum current velocity found. (This may be a negative number.)
<b>RACV</b>	The averaged absolute velocity. (always positive)
<b>RABA</b>	The averaged bearing of all radial vectors.
<b>RTYP</b>	The type of radial being processed.
<b>STYP</b>	The type of cross spectra being processed.
<b>TYRS</b>	Year of measurement date.
<b>TMOS</b>	Month of measurement date.
<b>TDAY</b>	Day of measurement date.
<b>THRS</b>	Hour of measurement date.
<b>TMIN</b>	Minute of measurement date.
<b>TSEC</b>	Second of measurement date.

## Details of Each Measurement

**TIME** – Recorded time of the data row in seconds from the %TimeStamp:

**AMP1, AMP2** – Calculated antenna amplitude corrections for loop 1 & loop2 relative to the monopole. These values are calculated by the **SpectraToRadial** tool during radial processing. A big jump in the average state over time in one of these may indicate an antenna problem and should be investigated. **SpectraToRadial** uses an average of the previous week of these to apply corrections to ideal antenna patterns. If using measured patterns and there is a big jump in the average state of these values over time then your antenna pattern may need to be-measured and also it may indicate an antenna problem and should be investigated.

**PH13, PH23** – Calculated antenna phase corrections for loop 1 & loop 2 relative to the monopole. These values are calculated by the **SpectraToRadial** tool during radial processing. They should typically be close to the CPH1,CPH2 values being used but there are conditions where they may vary significantly. A big jump in the average state over time in one of these may indicate an antenna problem and should be investigated.

**CPH1, CPH2** – Antenna phase correction for loop 1, loop 2 used by the **SpectraToRadial** tool. These typically come from the Phases.txt file.

**SNF1, SNF2, SNF3** – Cross spectra Noise floor of loop 1, loop 2, and monopole. These are calculated by averaging the noise levels (lack of signal) in each range cell. The values recorded here are for the range cell with the maximum signal to noise (see DGRC). These values are calculated by the **SpectraToRadial** tool during radial processing.

**SSN1, SSN2, SSN3** – Cross spectra Signal to Noise of loop 1, loop 2, and monopole. These are calculated by finding a peak signal at a single range cell and doppler to noise on just the monopole and measuring taking the difference from the signal level to the noise floor for each antenna. These values are calculated by the **SpectraToRadial** tool during radial processing and will be the highest S/N found across the processed range cells.

**DGRC** – Cross spectra range cell which had the highest SSN3 for which the noise floor and signal to noise were recorded for all antennas. This value is calculated by the **SpectraToRadial** tool during radial processing.

**DOPV** – The total number of doppler cells in the cross spectra which were acceptable to process into radials. (Within First Order, Noise criteria, ...) This value is calculated by the **SpectraToRadial** tool during radial processing.

**DDAP** – The percentage of doppler cells that had dual angle MUSIC solutions. This value is calculated by the **SpectraToRadial** tool during radial processing.

**RADV** – The total number of radial vectors solutions found at different bearings and ranges. This value is calculated by the **SpectraToRadial** tool during radial processing.

**RAPR** – The average number of radial vectors per range cell. This value is calculated by the **RadialDiagnostics** tool during radial processing.

**RARC** – The number of range cells processed. The same value that comes from the number of range cells to process in the Header.txt file

**RADR** – The maximum radial range calculated by where the number of radial vectors drops to below 20% of the average vectors per range. This value is calculated by the **RadialDiagnostics** tool during radial processing.

**RMCV** – The maximum current velocity found. (This might be a negative number depending on the radial velocity direction) This value is calculated by the **RadialDiagnostics** tool during radial processing.

**RACV** – The averaged of the absolute current velocities for all radial vectors. (always positive) This value is calculated by the **RadialDiagnostics** tool during radial processing.

**RABA** – The averaged bearing of all radial vectors regardless of velocity. If the radial has 360 deg of coverage, this value is meaningless and will appear random. Typical sites on shore will have limited angular coverage and this value should typically split that coverage and be somewhat stable over time. A sharp change in this value may indicate an antenna problem and should be

investigated. This value is calculated by the **RadialDiagnostics** tool during radial processing.

**RTYP** – The type of radial being processed. The possible values are:

- 0 Unknown (Shouldn't happen.)
- 1 Ideal Pattern Radial from CSS.
- 2 Measured Pattern Radial from CSS.
- 5 Merged Radials from Ideal Pattern.
- 6 Merged Radials form Measured Pattern.

The Merged Radials are the final output radials. Since they do not have a single cross spectra associated with them, the values for spectra in this row come from the previous CSS and should be ignored (done automatically by **DiagDisplay**). Their time entry will also be the same as the last CSS processed not the radial time stamp.

**STYP** – The type of cross spectra being processed. This is just the ASCII code of the third character of the cross spectra file name. This will typically be either a 'S' 83 or possibly an 'A' 65

## **Revision History**

First Draft Oct 27, 2016

## **Copyright and Disclaimer**

This document is copyrighted(c) by CODAR Ocean Sensors, Ltd and cannot be copied or reproduced in all or partial without expressed written consent by CODAR Ocean Sensors, Ltd.