# The ‘dah’ response

dah or dump average hex, aside from pressure reporting and spot sampling, is the primary way in which the 41N talks to the N1. The output takes the following form when presenting binned data of pressure, temperature and salinity:

S>dah
000000000000[[955]](http://svn.seabird.com/trac/Project/changeset/955)
4AA1FD098BD9
4E6FF6618C9C
4E7FF6458C9F
000000000000[[345]](http://svn.seabird.com/trac/Project/changeset/345)
upload complete

Not every bin has data and there could be a long span of these depending on the bin parameters and the physical deployment of the float. For example, if the top bin was set to 10 and the middle bin was set to 3000 and the float only profiled between 2000 and the surface there are 1000dBar of unused bins. These are “rolled up” in the notation above. In that example the float has 1303 bins of which the top 995 and bottom 345 do not have data. The number indicates “this line repeated this many times.” When ‘ds’ is run or the output of binaverage parsed these numbers should add: 955+3+345=1303 and equal the reported bins.

# Diagnostic Output

If the instrument supports autoresume and if it is enabled (v4.2.0 and later) the following line will appear as the last line of the high resolution output:

Resm 1, Rstr 0, Rbt 1

Where Resm refers to the number of times the 41N was auto-resumed, Rbt is the number of these events that were cold boots and Rstr the number of these events that were warm restarts.

# Original SBE 41CP UW flavor

The output is encoded into float and integer data depending on the expected value. This increases the overall efficiency of the iridium transmissions by not reserving space for values that will not be transmitted.

4D6BF8288C680A
ppppttttssssnn

## Pressure (pppp)

Accepts a 32b float and returns a unsigned 16b integer coded as a 16b float. This contains the numbers in a 32b IEEE 755 float inside that range of ±3276.7.

## Temperature (tttt)

Accepts a 32b float and returns a unsigned 16b integer coded as a 16b float. This contains the numbers in a 32b IEEE 755 float inside that range of -4.095 to +61.439.

## Salinity (ssss)

Accepts a 32b float and returns a unsigned 16b integer coded as a 16b float. This contains the numbers in a 32b IEEE 755 float inside that range of -4.095 to +61.439.

## Number of Samples in bin (nn)

Accepts a unsigned 32b integer and returns an unsigned 8b integer. Numbers greater than 255 are mapped to 255. This field is optionally included.

# New SBE 41N Serial Instruments

The new 41N appends binned serial data a string of hexadecimal numbers:

04D84C9F88D5172B28D41947050400029C00032700024E033D0A0026FE0302003901FF5902034401FEBD24091C
ppppttttssssnnwwwwwwvvvvvvmmyyyyyyxxxxxxzzzzzzqqrrrrttttttffjjjjjjbbbbbbaaaaaaccccccddeegg

In the long term these could be compacted similarly to the Dana encoded values. The string above includes the, optional, samples per pressure bin. This string changes based on the installed instruments. The first line of the ‘dah’ output indicates what instruments are enabled aside from PTS:

ser1: SBE 63, 1234 ser2: MCOMS, 3141 ser4: OCR-504, 1414

The format is “<chan>: type, serial number”. The instrument names should be standardized.

## Pressure, Temperature, Salinity, Num

Formatted as per a classic 41CP

## Optical Oxygen (wwwwwwvvvvvv)

Two encoded floating point numbers where ‘v’ represents temperature and ‘w’ represents phase.

### Decoding phase

Phase has a possible range of [-10.00000, +157.77215] and can be decoded as:

$$P=\frac{w}{1e5}-10$$

Numbers greater than 157.77215 are represented as 0xFFFFFF. Numbers less than -10.00000 as 0x000000.

### Decoding temperature

Temperature has a possible range of [-1.000000, +15.777215] and can be decoded as:

$$T=\frac{v}{1e6}-1$$

Numbers greater than 15.777215 are represented as 0xFFFFFF. Numbers less than -1.000000 as 0x000000.

## Optical Oxygen Samples in bin (mm)

An unsigned 8b integer with numbers greater than 255 mapped to 255. This field is optionally included.

## MCOMS (yyyyyyxxxxxxzzzzzz)

MCOMS data has a span of [-500 to +164000] and is represented by three encoded integers. These can be decoded as:

$$M=y-500$$

Values larger than 16779716 are encoded as 0xFFFFFF and smaller than -500 as 0x000000.

## MCOMS Samples in bin (qq)

An unsigned 8b integer with numbers greater than 255 mapped to 255. This field is optionally included.

## C-Rover Data (rrrrtttttt)

A fixed point number with span [-200,+16384] and a floating point number with a span of [-10.000, 150.000].

### Decoding corrected signal counts

Counts has an integer range of [-200,+16384] and can be decoded as:

$$C=r-200$$

Numbers greater than 16384 are represented as 0xFFFF. Numbers less than -200 as 0x000000.

### Decoding c-beam length

Temperature has a decimal range of [-10.000, 150.000] and can be decoded as:

$$Beam=\frac{t}{1000}-10$$

Numbers greater than 150.000 are represented as 0xFFFFFF. Numbers less than -10.000 as 0x000000.

## C-Rover Samples in bin (ff)

An unsigned 8b integer with numbers greater than 255 mapped to 255. This field is optionally included.

## OCR-504 Data (jjjjjjbbbbbbaaaaaacccccc)

All of the OCR-504 Data is unpacked with the same equation into a 32b unsigned integer.

$$Irradiance=\left(j∙1024\right)+ 2013265920$$

Raw numbers greater than 3355443196 are represented as 0x1FFFFFF and less than 2013265920 as 0x0

## OCR-504 Samples in bin (dd)

An unsigned 8b integer with numbers greater than 255 mapped to 255. This field is optionally included.

## Inclination and Azimuth (eegg)

Two encoded floating point numbers where ‘e’ represents the inclination of the float and ‘g’ represents the azimuth. There is no samples per bin field in any mode. The inclination is the maximum tilt in the bin and the azimuth at which that was taken.

### Decoding Inclination

Phase has a possible range of [0.0, +25.0] and can be decoded as:

$$I=\frac{e}{10}$$

Numbers greater than 25.0 are represented as 0xFF. Numbers less than -0.0 as 0x00.

### Decoding Azimuth

Temperature has a possible range of [0, 360] and can be decoded as:

$$A=g\*1.4$$

Numbers greater than 360 are represented as 0xFF. Numbers less than 0 as 0x00.