

Datawell File Formats

Raw buoy messages

The complete stream of raw buoy messages is saved in files of hexadecimal format:

- Raw buoy messages (*.hvx | *.hva).

Post-processing: Wave data

The stream is post-processed into three types of wave data:

- raw buoy displacements (*.rw | *.raw),
- data from the upcross-wave analysis (*.wv | *.wvs), and
- spectral data (*.sp | *.spt).

The type of wave data is reflected by the file extension.

XML/wa:ft

There's a XML file format, called wa:ft (*.wft), that can be used for all types of wave data. This is described in a separate document.

File lengths

There are two file lengths:

- Files of 30 minutes of measurement data.
- Files of one month, containing the history of the main parameters (*.hiw | *.his).

The file kind is reflected by the file extension.

On-board data logger

The on-board data logger has two types of data files, both of binary format:

- Raw displacements (*.rdt), holding up to three days of data;
- Spectral data (*.sdt), one for each month (up to 1488 spectra).

File names

File names have three elements:

- the name of the measurement location,
- the date and time of the measurements, and
- the type of wave data that the file holds.

For example, in the file name "Noordwijk}2013-03-14T11h04.spt", "Noordwijk" is the measurement location, "2013-03-14T11h04" is the date and time (14 March, 2013, 11:04:00) according to ISO 8601 (except that the time separator : is replaced by h). Finally, the extension ".spt" indicates that the type of wave data is spectral data.

Another example: "Noordwijk}2013-03.his" is a monthly history file (*.his) of spectral parameters, containing data from March, 2013, measured off Noordwijk.

The general format is hence: `<location> } <dateTime> . <datatype>`

where `<dateTime> = <year> - <month> - <day> T <hour> h <minutes>`.

Overview

In the Table below, the file formats as output by Datawell buoys, loggers and software are listed. Most of these formats date back to the DOS days, and are not supported or read-only to the Windows software.

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File Extension (1,2)	Format (3)	Content	Size	Buoy	Instrument	Remarks
.1RW	Dec	Displacement Data	20 min	WR		
.1SP	Dec	Spectral Data	1 spectrum	WR		
.1WV	Dec	Wave Statistics	20 min	WR		
.BVA	Binary	Buoy messages	1 day	DWR4 /ACM	Data Logger	
.CMF	Dec	Displacement Data		DWR MkII	MkII Logger	
.CMP	Bin	Displacement Data		DWR MkII	MkII Logger	
.CPT	Dec	Spectral Data	1 spectrum	DWR MkII		Obsolete, alternative to *.spt
.DAF	Dec	Displacement Data		DWR MkII	MkII Logger	
.DAT (1)	Bin	Buoy messages		DWR MkII	MkII Logger	Ambiguous name
.DAT (2)	Text	Compressed Spectra		DWR MkII	Argos	Ambiguous name
.DWR	Dec	Compressed Spectrum	1 spectrum	DWR		Obsolete
.HIS	Dec	Spectral Data	1 month	DWR MkIII		Replaces the history.*
.HIW	Dec	Wave Statistics	1 month	DWR MkIII		Replaces the wavhist.*
.HXV	Hex	Buoy messages	30 minutes	All		
.HVA	Hex	Buoy messages	1 day	DWR4 /ACM		
.OM1	Bin	Orbcomm Message (Compressed spectrum)	1 spectrum	DWR	Orbcomm attachm.	
.OM2	Bin	Orbcomm Message (System File)	1 system file	DWR	Orbcomm attachm.	
.OM3	Bin	Orbcomm Message (Full Spectrum)	1 spectrum	DWR	Orbcomm attachm.	

.OM4	Bin	Orbcomm Message (System Status)		DWR	Orbcomm attachm.	OrbcommWaves software
.RAW	Dec	Displacement Data	30 minutes	DWR		
.RDT	Bin	Displacement Data		DWR MkIII, WR SG	MkIII Logger	
.SDT	Bin	Spectral Data		DWR MkIII, WR-SG	MkIII Logger	
.SPC	Bin	Spectral Data	48 spectra	DWR MkII	MkII Logger	60 bins only
.SPD	Hex	Spectral Data	1 spectrum	DWR MkII	MkII Logger	60 bins only
.SPF	Hex	Spectral Data	48 spectra	DWR MkII	MkII Logger	60 bins only
.SPT	Dec	Spectral Data	1 spectrum	DWR		
.WAV	Dec	Wave Statistics	30 min	DWR MkII		Obsolete, Replaced by *.wvs
.WFC	XML	GSM settings		DWR	GSM Modem	GSMBuoy software
.WFD	XML	Receiver settings		All	All hf receivers	rfBuoy software
.WFT	XML	All Data		All		
.WVS	Dec	Wave Statistics	30 min	DWR MkIII		Replaces the *.wav
GPS.TXT	Dec	GPS Positions	1 month	DWR MkIII, WR-SG		
HISTORY.	Dec	Spectral Data	(1 month)	DWR MkII		Obsolete, Replaced by *.his
MOM.	Dec	Spectral Data	(1 month)	WR /FI		Obsolete
PARAM.	Dec	Spectral Data	(1 month)	WR /FI		Obsolete
TEMP.	Dec	Sea Surface Temperature	(1 month)	WR /FI		Obsolete
WAVHIST.	Dec	Wave Statistics	(1 month)	DWR MkII		Obsolete, Replaced by *.hiw

- (1) Common File Formats in bold.
- (2) For File names: see next section.
- (3) Formats: Bin = Binary, Hex = Hexadecimal, Dec = Decimal.

File formats in detail

*.HXV

Meaning: HeXadecimal Vectors

Description: Stream of raw buoy messages

Buoys: DWR MkI, MkII, MkIII

From: HF receiver

Format: Ascii/Text, hexadecimal

Example

```
00A4,8B53,80C0,0501,92B7
00A5,A1AB,8040,0101,A978
00A6,C3D7,00D0,0502,5EDF
00A7,65C6,0160,1C01,8E58
00A8,9B59,0180,1A01,430E
00A9,E2AC,0330,0E00,E182
00AA,3412,0200,1680,9216
00AB,5AD3,0020,1880,E2D6
00AC,9869,80E0,0180,789A
00AD,A3AC,0028,1380,06B0
00AE,B3D4,8088,1600,1D19
00AF,61C9,8018,1D00,2A82
00B0,8F5D,8178,1F80,F734
00B1,7FFF,8388,1B00,0D07
00B2,9835,8358,1E02,8056
00B3,E4AD,8128,2203,FF5D
00B4,13FF,0068,1502,1737
...
```

Format

SSNN,YYYY,HHHN,NNWW,WPPP

SS: status

- 00: correct
- 01: transmission error, repaired
- 02: transmission error, not repaired
- 03: all-0 or all-1 vector
- 04: synchronizing
- 05: = 04 + 01
- 06: = 04 + 02
- 07: = 04 + 03

NN: index, 0-255, modulo 256

YYYY: spectral/system word

HHH: heave (vertical displacement), 12 bit, sign-magnitude

NNN: north displacement, 12 bit, sign-magnitude

WWW: west displacement, 12 bit, sign-magnitude

PPP: Parity, BCH(63,51)-code

*.RAW

Meaning: RAW displacements

Description: the heave, north, west displacements @ 1.28 Hz

Buoys: DWR MkI, MkII, MkIII

From: post-processing

Format: Ascii/Text, decimal

Example

```
0, 13, 3, -13
0, 3, 13, -13
0, 15, 17, -11
0, -10, 2, -1
0, 7, 4, 2
0, 10, 25, 18
0, -26, 27, 10
0, -13, 20, -23
0, 24, 22, -13
0, 14, 16, 21
0, -6, 10, 13
0, -6, 14, -6
0, -11, -1, -8
0, 8, -3, -2
0, 8, 11, 14
0, -15, -2, 9
0, 2, -15, 4
0, 3, -6, 19
0, 6, 0, 24
0, -5, -25, 14
0, 0, -16, -8
0, 7, -8, 0
0, 4, -15, 24
...
```

Format

sta, hv, no, we

sta: status

0 to 7: see *.HXV

16: one of the three displacements outside +/- 4σ .

32: two of the three displacements outside +/- 4σ .

48: all three displacements outside +/- 4σ .

64: dummy vector to replace unreceived vector

128: gap in GPS link (DWR-G buoys only)

hv: heave [cm]

no: north displacement [cm]

we: west displacement [cm]

*.SPT

Meaning: SPecTral data

Description: the heave and directional spectrum

Buoys: DWR MkI, MkII, MkIII

From: post-processing

Format: Ascii/Text, decimal

Example

```
1
71.000
2.857
2.1271E-1
24.95
2.95
1
0.63000
0.68500
-0.55375
37.969°
73.037°
0.0250, 1.4088E-3, 96, 80, 0.35, 1.42
0.0300, 3.5707E-3, 35, 62, -1.21, 1.75
0.0350, 3.0733E-3, 65, 68, 0.03, 2.14
...
0.0850, 1.9695E-3, 98, 51, -2.73, 3.40
0.0900, 2.9234E-3, 104, 44, 0.70, 6.06
0.0950, 1.8090E-3, 115, 53, -1.73, 4.03
0.1000, 2.4664E-3, 117, 44, 0.27, 5.46
0.1100, 1.6951E-3, 114, 63, -3.81, 2.87
0.1200, 6.4093E-3, 145, 64, 3.37, 2.47
0.1300, 3.9360E-2, 198, 58, 0.33, 1.55
0.1400, 1.1648E-1, 291, 34, -3.77, 9.22
...
0.5400, 1.0753E-1, 122, 47, -0.40, 1.71
0.5500, 1.8177E-1, 122, 38, 0.03, 2.71
0.5600, 2.1225E-1, 131, 38, -0.90, 3.36
0.5700, 1.5961E-1, 121, 43, -0.20, 2.50
0.5800, 1.4661E-1, 114, 45, 0.34, 2.34
```

Format

System file (12 parameters)

tn: transmission index (1 to 8)

Hs: significant wave height [cm]

Tz: zero-upcross period [s]

Smax: maximum of the psd $S(f)$ [m^2/Hz]

Tref: reference temperature [$^{\circ}C$, centigrade]

Tsea: Sea surface temperature [$^{\circ}C$, centigrade]

Bat: Battery status (0 = empty to 7 = full)

Av: offset of the vertical accelerometer

Ax: offset of the x-accelerometer

Ay: offset of the y-accelerometer

Ori: buoy orientation [$^{\circ}$]

Incli: magnetic inclination [$^{\circ}$]

Spectrum file (64 x 6 array)

f, S(f) / Smax, Dir(f), Spr(f), Skew(f), Kurt(f)

f: wave frequency [Hz]

S(f) / Smax: relative psd (power spectral density) [-]

Dir(f): wave direction [$^{\circ}$]

Spr(f): directional spread [$^{\circ}$]

Skew(f): skewness of the directional distribution [-]

Kurt(f): kurtosis of the directional distribution [-]

*.WVS

Meaning: upcross WaVeS data

Description: the chronological list of upcross waves

Buoys: DWR MkI, MkII, MkIII

From: post-processing

Format: Ascii/Text, decimal

Example

```
2012-01-25T05:00:00.000,100, 116, 4.1, 78, 4.0, 62, 3.9, 40, 3.2, 0.534,553
171, 28, -21, 4.071
451, 14, -7, 2.835
385, 8, -20, 2.637
 15, 32, -49, 3.230
140, 28, -24, 3.671
510,  3, -11, 1.983
134, 36, -18, 4.921
463, 11, -9, 1.342
187, 34, -14, 2.747
501,  4, -12, 2.086
327, 18, -16, 3.016
376, 12, -17, 2.327
346, 16, -16, 4.260
545,  3, -4, 1.327
115, 34, -22, 3.979
440, 15, -7, 4.675
282,  8, -30, 2.915
 86, 32, -27, 4.472
...
```

Format

Summary (12 parameters) .

Timestamp: date and time (ISO8601)

Coverage: percentage of raw data used in constructing the upcross waves [%]

Hmax: maximum wave height [cm]

T(Hmax): period of the highest wave [s]

H[1/10]: mean height of the highest 1/10 of the waves [cm]

T(H[1/10]): mean period of the highest 1/10 of the waves [s]

H[1/3]: mean height of the highest third of the waves [cm]

T(H[1/3]): mean period of the highest third of the waves [s]

Hav: mean height of all waves [cm]

Tav: mean period of all waves [s]

eps: bandwidth parameter [-]

NumWaves: number of upcross waves [-]

List of upcross waves (NumWaves x 4 matrix) .

rank, crest, trough, period

rank: index of wave when sorted ascendingly (1 = highest)

crest: maximum heave within present upcross wave

trough: minimum heave within present upcross wave

period: duration of present upcross wave

NB: the wave height of an upcross wave is the difference between crest and trough.

*.HIS

Meaning: HHistory of Spectral parameters

Description: the monthly timeseries of spectral parameters

Buoys: DWR MkI, MkII, MkIII

From: post-processing

Format: Ascii/Text, decimal

Example

```
2012-01-24T17:53:31.000, 4.35, 80.2, 26.1, 3.05, 85, 3.70, 3.19, 2.55, 3.34, 3.67, 4.29,
0.312, 0.547, 2.003, 0.059, 24.95, 2.80, 2
2012-01-24T18:23:31.000, 4.76, 66.1, 26.2, 3.12, 84, 3.90, 3.29, 2.56, 3.47, 4.01, 4.61,
0.336, 0.573, 2.066, 0.055, 24.95, 2.70, 1
2012-01-24T18:53:31.000, 4.55, 73.1, 27.1, 3.17, 86, 3.85, 3.33, 2.60, 3.49, 4.20, 4.45,
0.325, 0.571, 2.219, 0.055, 24.95, 2.80, 2
2012-01-24T19:23:31.000, 4.76, 74.5, 27.3, 3.13, 78, 3.91, 3.31, 2.52, 3.50, 4.27, 4.62,
0.348, 0.591, 2.179, 0.051, 24.95, 2.90, 1
2012-01-24T19:53:31.000, 4.55, 74.5, 20.9, 3.19, 77, 3.93, 3.37, 2.56, 3.55, 4.57, 4.58,
0.345, 0.595, 2.378, 0.049, 24.95, 3.10, 2
2012-01-24T20:23:31.000, 4.55, 71.7, 29.3, 3.06, 69, 3.78, 3.22, 2.51, 3.40, 3.91, 4.44,
0.337, 0.572, 1.998, 0.048, 24.95, 3.45, 2
2012-01-24T20:53:31.000, 4.55, 78.8, 24.8, 3.15, 72, 3.93, 3.34, 2.53, 3.52, 4.32, 4.61,
0.351, 0.596, 2.162, 0.047, 24.95, 3.35, 2
2012-01-24T21:23:31.000, 4.55, 78.8, 25.2, 3.11, 70, 3.89, 3.29, 2.51, 3.48, 4.32, 4.59,
0.350, 0.590, 2.231, 0.047, 24.95, 3.25, 2
2012-01-24T21:53:31.000, 4.76, 71.7, 29.7, 3.06, 69, 4.00, 3.27, 2.45, 3.49, 3.94, 4.90,
0.371, 0.599, 1.927, 0.047, 24.95, 3.30, 2
...
```

Format

Records of 19 spectral parameters.

Timestamp: date and time (ISO8601)

Tp: the peak period (the reciprocal of the peak frequency) [s]

Dirp: the wave direction at the peak frequency [°]

Sprp: the directional spread at the peak frequency [°]

Tz: the zero-upcross period [s]

Hs: the significant wave height [cm]

TI: the integral period, or $T_m(-2,0)$ [s]

T1: the mean period, or $T_m(0,1)$ [s]

Tc: the crest period, or $T_m(2,4)$ [s]

Tdw2: wave period $T_m(-1,1)$ [s]

Tdw1: peak period estimator [s]

Tpc: calculated peak period [s]

nu: Longuet-Higgins bandwidth parameter [-]

eps: bandwidth parameter [-]

QP: Goda's peakedness parameter [-]

Ss: significant steepness [-]

Tref: reference temperature [°]

Tsea: Sea surface temperature [°]

Bat: battery status (0 = empty to 7 = full)

*.HIW

Meaning: HHistory of upcross Waves parameters

Description: the monthly timeseries of upcross wave parameters

Buoys: DWR MkI, MkII, MkIII

From: post-processing

Format: Ascii/Text, decimal

Example

```
2012-01-25T07:30:00.000,100, 114, 3.6, 88, 3.7, 70, 3.7, 45, 3.2, 0.556,557
2012-01-02T09:21:00.000,100, 331, 5.1, 231, 10.4, 179, 7.0, 112, 5.0, 0.625,256
2012-01-05T06:30:00.000,100, 372, 7.3, 324, 7.4, 261, 7.6, 169, 5.9, 0.697,304
2012-01-05T07:00:00.000,100, 378, 7.4, 292, 7.7, 229, 7.0, 147, 5.4, 0.678,227
2012-01-09T07:07:00.000, 98, 318, 5.8, 225, 7.3, 133, 5.2, 69, 3.8, 0.562,541
2012-01-18T05:30:00.000,100, 66, 4.4, 51, 4.5, 42, 4.3, 27, 3.3, 0.612,542
2012-01-18T06:00:00.000,100, 63, 2.8, 50, 4.8, 40, 4.4, 25, 3.2, 0.621,341
2012-01-18T14:16:00.000,100, 67, 3.1, 49, 4.5, 40, 4.6, 26, 3.4, 0.601,485
2012-01-24T15:00:00.000,100, 116, 4.2, 81, 3.5, 64, 3.5, 42, 3.0, 0.497,592
2012-01-24T15:30:00.000, 99, 103, 3.4, 80, 3.5, 65, 3.5, 42, 3.0, 0.411,598
...
```

Format

Records of 12 upcross wave parameters.

Timestamp: date and time (ISO8601)

Coverage: percentage of raw data used in constructing the upcross waves [%]

Hmax: maximum wave height [cm]

T(Hmax): period of the highest wave [s]

H[1/10]: mean height of the highest 1/10 of the waves [cm]

T(H[1/10]): mean period of the highest 1/10 of the waves [s]

H[1/3]: mean height of the highest third of the waves [cm]

T(H[1/3]): mean period of the highest third of the waves [s]

Hav: mean height of all waves [cm]

Tav: mean period of all waves [s]

eps: bandwidth parameter [-]

NumWaves: number of upcross waves [-]

*GPS.TXT

Meaning: timeseries of GPS position

Description: the monthly timeseries of the GPS position

Buoys: DWR MkI, MkII, MkIII

From: post-processing

Format: Ascii/Text, decimal

Example

2012-01-25T07:23:32.000	5	59.96545	25.23298
2012-01-25T07:23:32.000	5	59.96545	25.23298
2012-01-02T09:05:55.000	3	59.96556	25.23641
2012-01-02T09:05:55.000	3	59.96556	25.23641
2012-01-05T06:23:03.000	3	59.96595	25.23523
2012-01-05T06:23:03.000	3	59.96595	25.23523
2012-01-05T06:53:03.000	7	59.96594	25.23521
2012-01-05T06:53:03.000	7	59.96594	25.23521

...

Format

Records of 4 parameters.

Timestamp: date and time (ISO8601)

Status: 3 = OK

Latitude: +/- = N/S, decimal degrees

Longitude: +/- = E/W, decimal degrees

*.WFT

Meaning: wa:ft file

Description: XML file in wa:ft format

Buoys: DWR MkI, MkII, MkIII

From: post-processing

Format: Ascii/Text, XML

Example

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<wa:ft xmlns:wa="http://www.datawell.nl/waft">
  <head>
    <site>wv3</site>
    <buoy>wv3</buoy>
    <rcvr>iBuoy</rcvr>
    <mach>217.172.91.238</mach>
    <phonenumber></phonenumber>
    <appl>iBuoy v1.0.15</appl>
  </head>
  <body RawData="">
    <sdat ready="2011-10-20T08:22Z" src="buoy" wnd="Taper" sgm="8" ovl="false">
      <bins>
        <bin f="0.025">
          <psd>2.92E-04</psd><dir>2.236E+2</dir><spr>1.342E+2</spr>
        </bin>
        <bin f="0.03">
          <psd>2.12E-03</psd><dir>1.547E+2</dir><spr>6.712E+1</spr>
        </bin>
        <bin f="0.035">
          <psd>2.93E-02</psd><dir>8.578E+1</dir><spr>6.712E+1</spr>
        </bin>
        ...
        <bin f="0.385">
          <psd>7.63E-04</psd><dir>2.004E+2</dir><spr>6.712E+1</spr>
        </bin>
        <bin f="0.465">
          <psd>2.92E-05</psd><dir>2.419E+2</dir><spr>1.834E+2</spr>
        </bin>
      </bins>
      <bsum>
        <prm name="Hm0" unit="m">0.873</prm>
        <prm name="Tz" unit="s">16.423</prm>
        <prm name="Smax" unit="m2/Hz">0.0000E+0</prm>
        <prm name="Tsea" unit="degC">3.85</prm>
        <prm name="BLE" unit="weeks">165</prm>
        <prm name="Av" unit="m/s2">0.250</prm>
        <prm name="Ax" unit="m/s2">0.125</prm>
        <prm name="Ay" unit="m/s2">0.375</prm>
        <prm name="Lat" unit="deg N">62.0150</prm>
        <prm name="Lon" unit="deg W">6.7930</prm>
      </bsum>
      <ssum>
        <prm name="Hm0" unit="m">0.000</prm>
      </ssum>
    </sdat>
  </body>
</wa:ft>
```

```

    <prm name="T1" unit="s">18.736</prm>
    <prm name="Tz" unit="s">16.423</prm>
    <prm name="T3" unit="s">11.457</prm>
    <prm name="Tc" unit="s">6.940</prm>
    <prm name="nu">0.549</prm>
    <prm name="eps">0.906</prm>
    <prm name="Qp">2.22</prm>
    <prm name="Dirp" unit="deg">37.97</prm>
    <prm name="Sprp" unit="deg">63.28</prm>
    <prm name="Ss">0.000</prm>
  </ssum>
</sdat>
</body>
</wa:ft>

```

Format

XML elements between tag pairs.

<head>...</head>: file header, containing information about the site, the receiver, the machine (PC) and the software application.

<body>...</body>: the wave data section.

<sdat>...</sdat>: spectral data.

<bins>...</bins>: the collection of spectral bins.

<bin f="f">...</bin>: a spectral bin at frequency *f*.

<psd>...</psd>: the power spectral density (psd) at frequency *f*.

<dir>...</dir>: the wave direction at frequency *f*.

<spr>...</spr>: the directional spread at frequency *f*.

<bsum>...</bsum>: the *buoy* information *summary*, the system file.

<ssum>...</ssum>: the spectral *summary*, the record for the *.his history file.

<prm name="name" unit="unit">value</prm>: a wave parameter named *name*, whose *value* has unit *unit*.

For the list of parameters, see the *.spt file format.

*.RDT

Meaning: Raw displacement DaTa

Description: the raw displacements, heave, north and west

Buoys: DWR MkIII

From: DWR MkIII data logger

Format: binary

Example

```
2a 30 36 0a 26|07 db 04 0d 00 11|3f a3 d7 0a|00
01 00 01 00 08|00 1a 00 0c 00 02|00 20 00 08 ff
f7|ff f2 ff fa ff ef|ff f6 ff eb ff fb|ff ff ff
f9 00 15|ff f5 00 05 00 10|ff fc 00 03 00 07|00
04 ff fe 00 04|00 00 00 06 ff fb|00 02 00 0d ff
f0|ff f9 00 01 ff f7|ff ff ff fb ff f7|00 17 00
0e ff f4|ff ff 00 0c ff fe|00 05 ff fb 00 07|00
0a ff f8 00 0a|ff fd ff fa ff fa|ff f3 ff fc ff
Ea|ff e5 ff f3 ff f4|ff fa ff f3 00 08|00 18 ff
fb 00 11|ff f7 ff f9 ff f7|ff ed ff e4 ff e3 00
14 ff e7 00 05|00 0a 00 02 00 16|ff ec 00 15 00
03|ff f8 00 08 ff f4|00 11 ff f1 00 05|00 28 ff
fa 00 12|00 13 00 0b 00 07|ff e2 00 0f 00 01|ff
e3 ff fa ff f7|ff ff ff ff ff f1|00 0d 00 19 ff
f0|ff f9 00 17 00 0e|ff e8 00 03 00 1d|00 01 ff
fd 00 05|00 21 00 0e ff f5 00 0a 00 12 00 00|ff
e7 00 04 00 19|ff f0 ff fd 00 1c|00 10 00 0b 00
...
06|ff e6 00 04 ff fa|ff e8 ff fc ff f8|ff f3 ff
fe ff fb|00 09 00 06 00 02|00 0d ff ff 00 06|a0
```

Format

2a 30 36 0a 26: header

2a: start of message

30: message id (here: rdt)

36: message length (msb)

0a: message length (lsb)

26: checksum

07 db 04 0d 00 11: timestamp (UTC)

07 db: year (here: 2011)

04: month (here: April)

0d: day (here 13, hence 13 April, 2011)

00: hour (here: 0)

11: minutes (here: 17, hence 00:17)

3f a3 d7 0a: sample rate

Always 1.28 Hz

00 01 00 01 00 08: heave (1 cm), north (1 cm), west (8 cm)

00 1a 00 0c 00 02: heave (26 cm), north (12 cm), west (2 cm)

00 20 00 08 ff f7: heave (32 cm), north (8 cm), west (-9 cm)

...

00 0d ff ff 00 06: heave (13 cm), north (-1 cm), west (6 cm)

a0: checksum

*.SDT

Meaning: Spectral DaTa

Description: the spectra of one month

Buoys: DWR MkIII

From: DWR MkIII data logger

Format: binary

Example

```
2a 10 02 26 1e|07 dc 0b 14 13 04|c0 10 55 a8 a0
b6 91 ff c1 a5 c4 8a a5 c7 50 ff c2 92 a2 eb 93
aa 93 ff 83 32 22 9c 93 72 8f ff 84 19 42 e9 9c
9e 44 ff 85 73 b2 8c ac 5d b1 ff 46 ad a3 9e a8
84 51 ff 47 8d 92 ee 8f bb 92 ff c8 a8 32 aa ac
c8 50 ff 89 0a 12 3d 9d c9 b2 ff 0a a9 b2 03 94
98 62 ff cb be 81 2b 93 a3 58 ff 8c af 91 b2 9f
92 48 ff cd ef 52 15 91 b6 90 ff 8e f9 32 6e a5
bc 60 ff 4f e9 32 08 8d a6 91 ff 10 dd 01 dd a1
95 b0 ff d1 c5 e1 82 96 60 9b ff 12 b9 f0 dd 83
60 7e ba d3 bf 20 ed 7c 83 a5 a1 94 d4 d0 a5 61
b5 92 92 15 d1 60 f4 6c a3 8f a1 96 c5 71 0d 6a
91 98 87 97 c0 71 52 79 65 96 94 d8 cf a0 e8 51
c2 a0 91 d9 ce e0 cd 48 c7 94 90 5a cf b0 98 41
...
b0|08 0d 10 25 20 a7 38 c5 42 58 50 f3 63 76 70
4d 80 3e 90 28 a4 c3 b2 93 c0 4b dc 93 e0 e7 f5
e1|0a
```

Format

2a 10 02 26 1e: header
2a: start of message
10: message id (here: sdt)
02: message length (msb)
26: message length (lsb)
1e: checksum
07 dc 0b 14 13 04: timestamp (UTC)
07 dc: year (here: 2012)
0b: month (here: November)
14: day (here 20, hence 20 November, 2012)
13: hour (here: 19)
04: minutes (here: 4, hence 19:04)
c0 10 55 a8 a0 b6 91 ff ... b0: spectrum file
08 0d 10 25 20 a7 38 ... f5 e1: system file
a0: checksum