



Operating Notes

SeaSaw Software
for
Datawell Waverider Buoys



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Contents

1 Introduction	4
1.1 Welcome	4
1.2 Hardware.....	4
2 Start SeaSaw21 via RfBuoy module	4
3 Data communication between RfBuoy and SeaSaw21	12
4 Changing Station Preference setting	15
5 Display description and controls.....	16
5.1 Numerical Panes	16
5.2 Resizing panes.....	16
5.3 Trends	16
5.4 Setting the Trend interval	16
5.5 Editing Graphs.....	16
5.6 GPS positions.....	16
6 Data Files	17
6.1 Nomenclature and Format.....	17
6.2 File logging cycles	17
6.3 Software spectral processing	18
6.4 Time stamps.....	18
7 Annexes	19
Annex A - Auto start procedure for RfBuoy module.....	19
Annex B - Overview of Datawell file formats.....	20

Document Change Summary

<u>Issue</u>	<u>Issue date</u>	<u>Reason for change</u>
Provisional	10/2004	Introduction
Version 1.1.0 (RfBuoy v12)	10/2005	Introduction of RfBuoy version 12
Annex B	02/2006	Introduction

1 Introduction

1.1 Welcome

The SeaSaw21 program comprises a main module called SeaSaw - for displaying wave data and GPS location – plus a data acquisition module, called RfBuoy. The latter can be launched from the former. Wave data output is derived from the receiver (or modem) by the RfBuoy.exe module, which processes and files the data. A link to the Waverider receiver is set up within that program. The two modules use a TCP protocol to communicate.

1.2 Hardware

For a Diwar - select 1200 baud and 2.56Hz through the jumpers at the rear of the receiver. Set the Receiving Channel to “1” or “R”. Use the RS232 connector labeled A.

For a Warec - remove all jumpers at the rear (2400 baud, hexadecimal format). Use the RS232 connector labeled A.

For an RX-C or D - no specific configuration is required.

2 Start SeaSaw21 via RfBuoy module

Having installed the software from a CD, the program will request a code key number to be inserted into the displayed window. This number consists of 4 groups of 4 letters or numbers and is found on the software CD cover. With the code key entered the software will be active. Select from the Windows taskbar: Start | Program Files | Datawell | SeaSaw21 | RfBuoy v2.1.12

On the displayed "Open" window, select a wfd file that has the required station set-up configuration or click the cancel button (Fig.1).

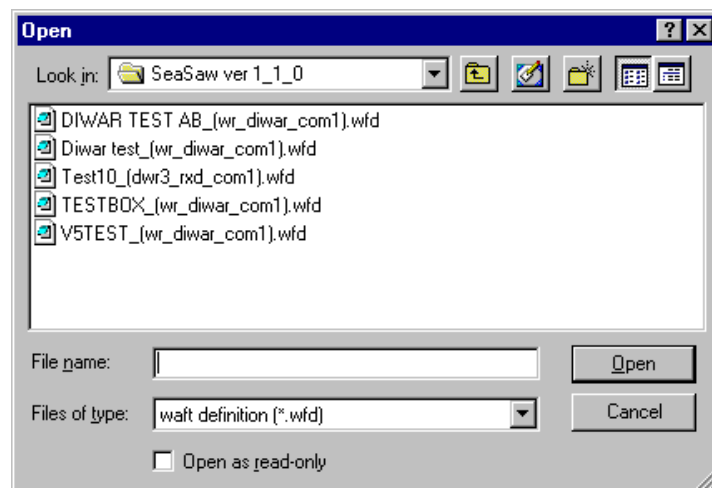


Figure 1.

The "Cancel" button opens a Properties window called **“Buoy Connection Wizard”** showing six tabs (Site, Receiver 1, Receiver 2, Redirect 1, Redirect 2, Saving).

On the **Site** tab, enter a name for the measuring site. The example uses “Noordwijk”, which is the Dutch coastal village where a Datawell test buoy is moored. This name will be used to identify all data. Select the Buoy and Receiver (Note: RXD = RXC). If the receiver is a Diwar, do not use the “Autodetect” buoy button but select “Waverider”. Select the time zone required.

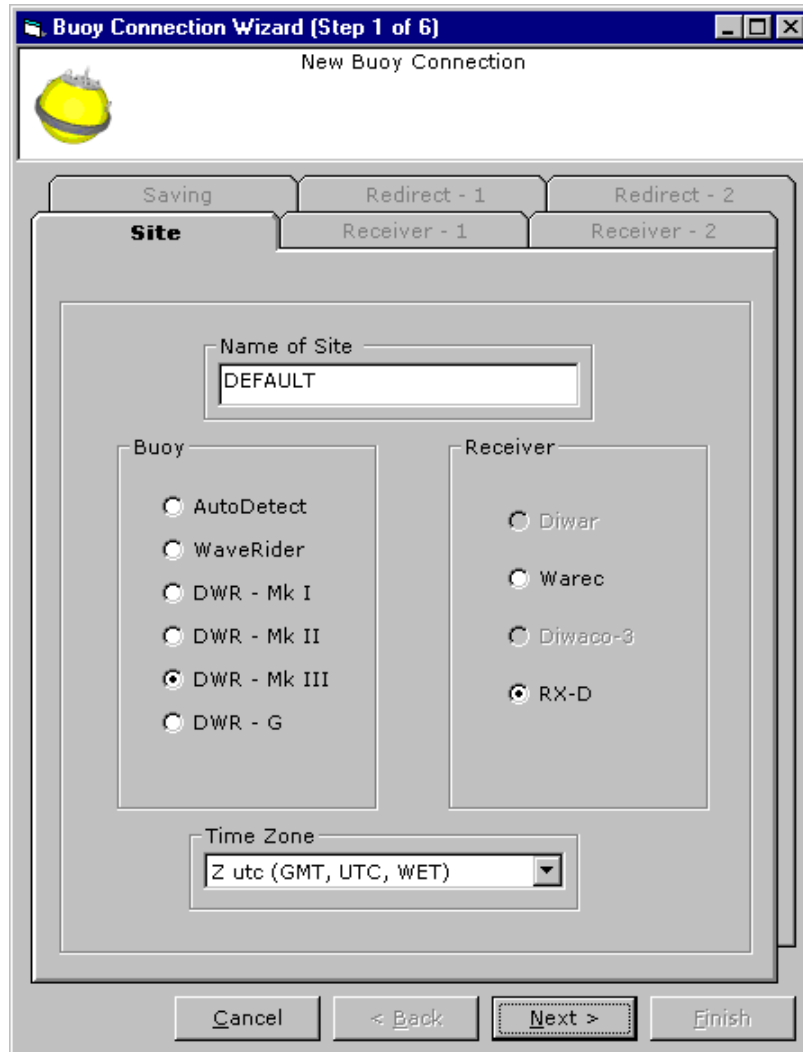


Figure 2.

Press the "Next" button.

On the **Receiver-1** tab, select the Comport. If the receiver has to be contacted over a telephone line (or a null modem cable), enter the appropriate details in the “*Modem Command*” space.

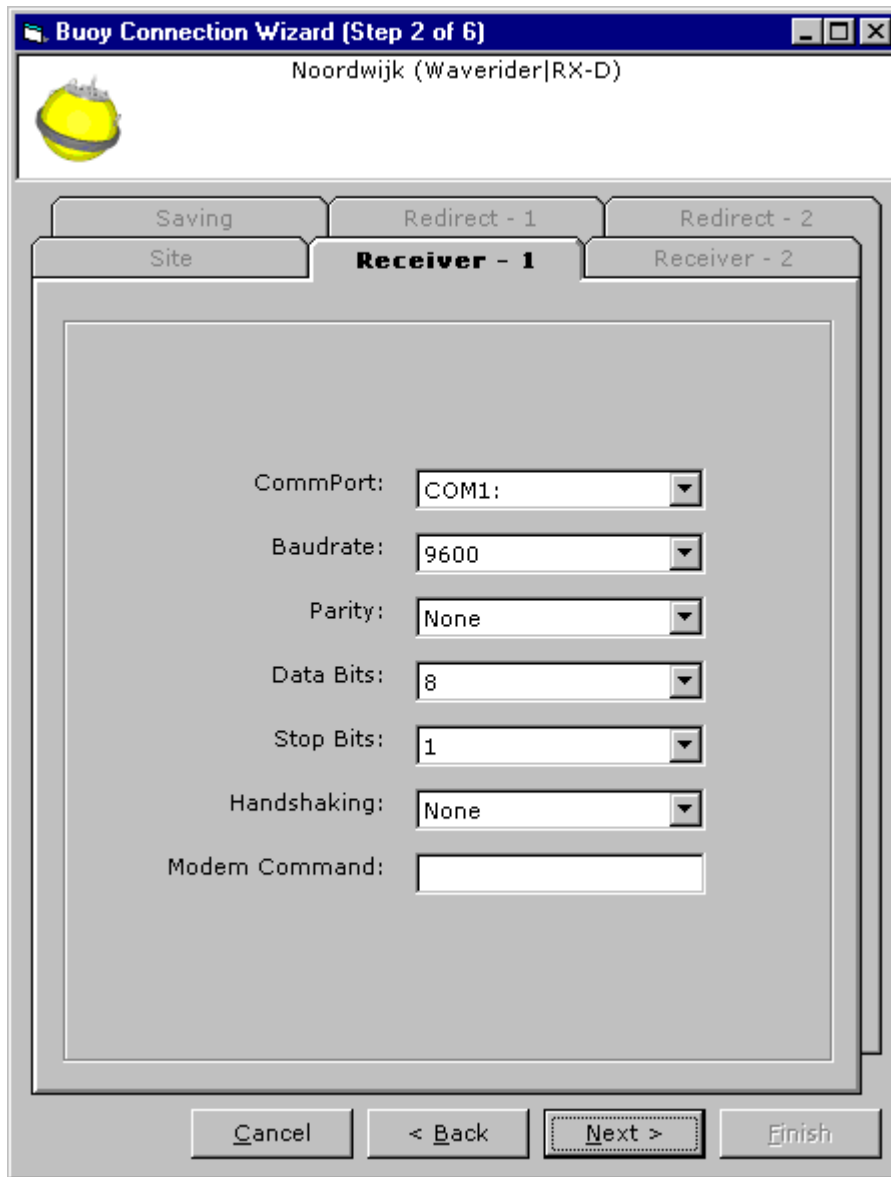


Figure 3.

Press the "Next" button.

On **Receiver-2** tab, set all the serial COM port settings. For a Diwar, set the DTREnable flag in the second form by checking the appropriate checkbox.

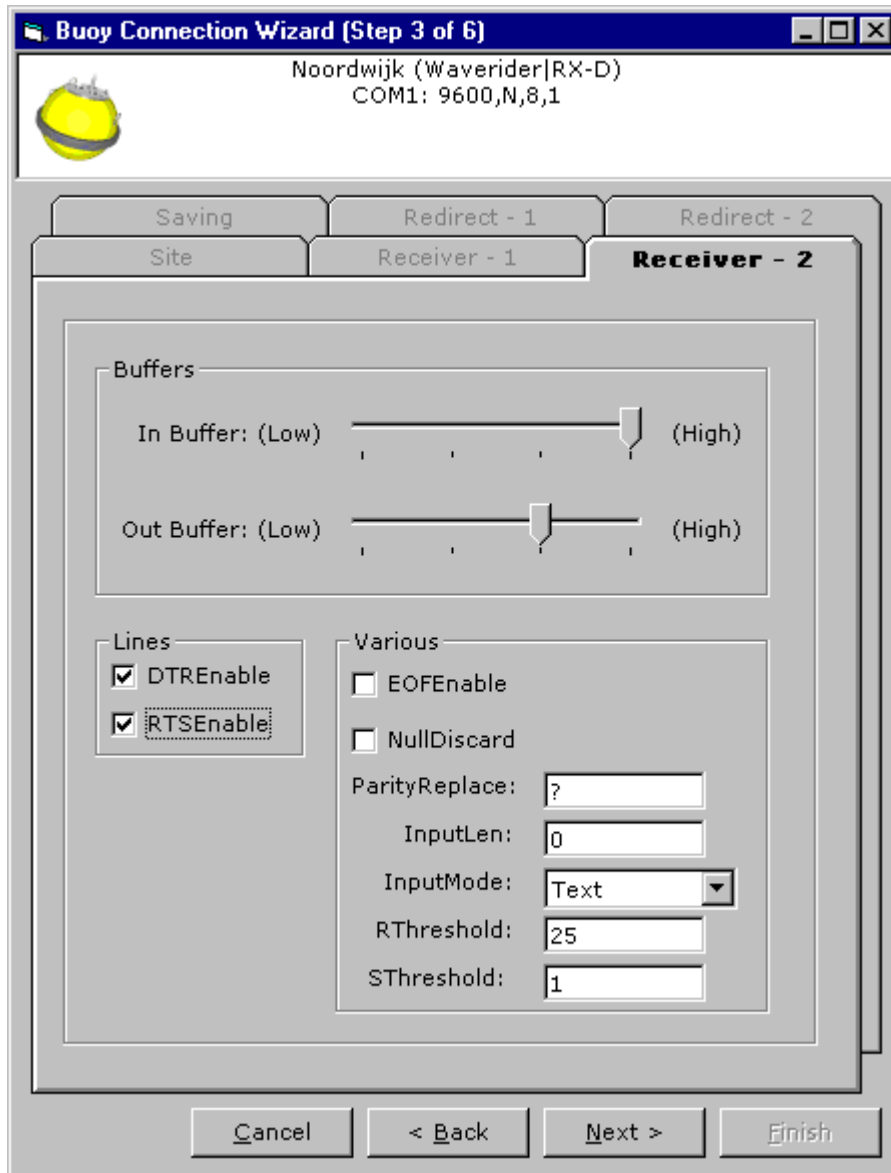


Figure 4.

Press the "Next" button.

The **Saving** tab enables the selection of what (which data in which file format), when (the times at which data are to be saved) and where (the path to the folder) data are to be saved.

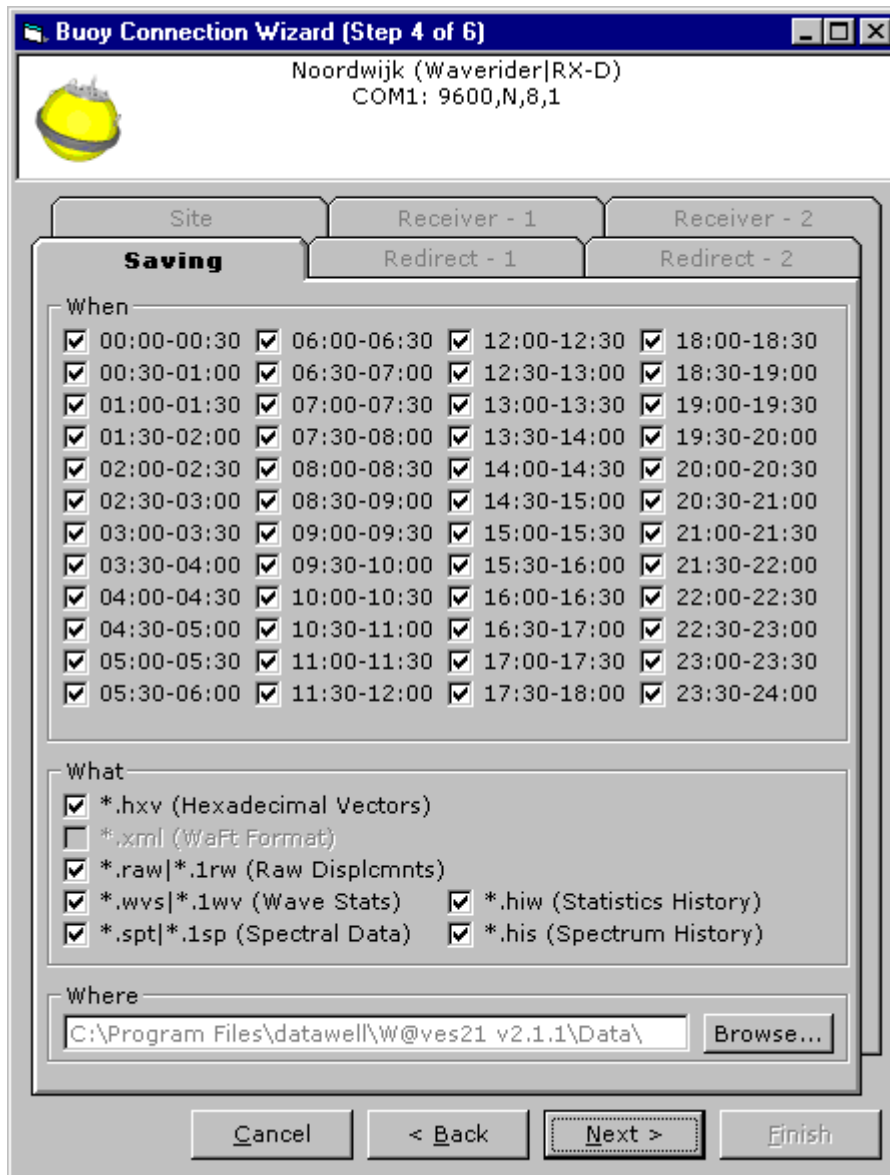


Figure 5.

Press the "Next" button.

The **Redirect-1** tab is for forwarding the received data to another COM port.

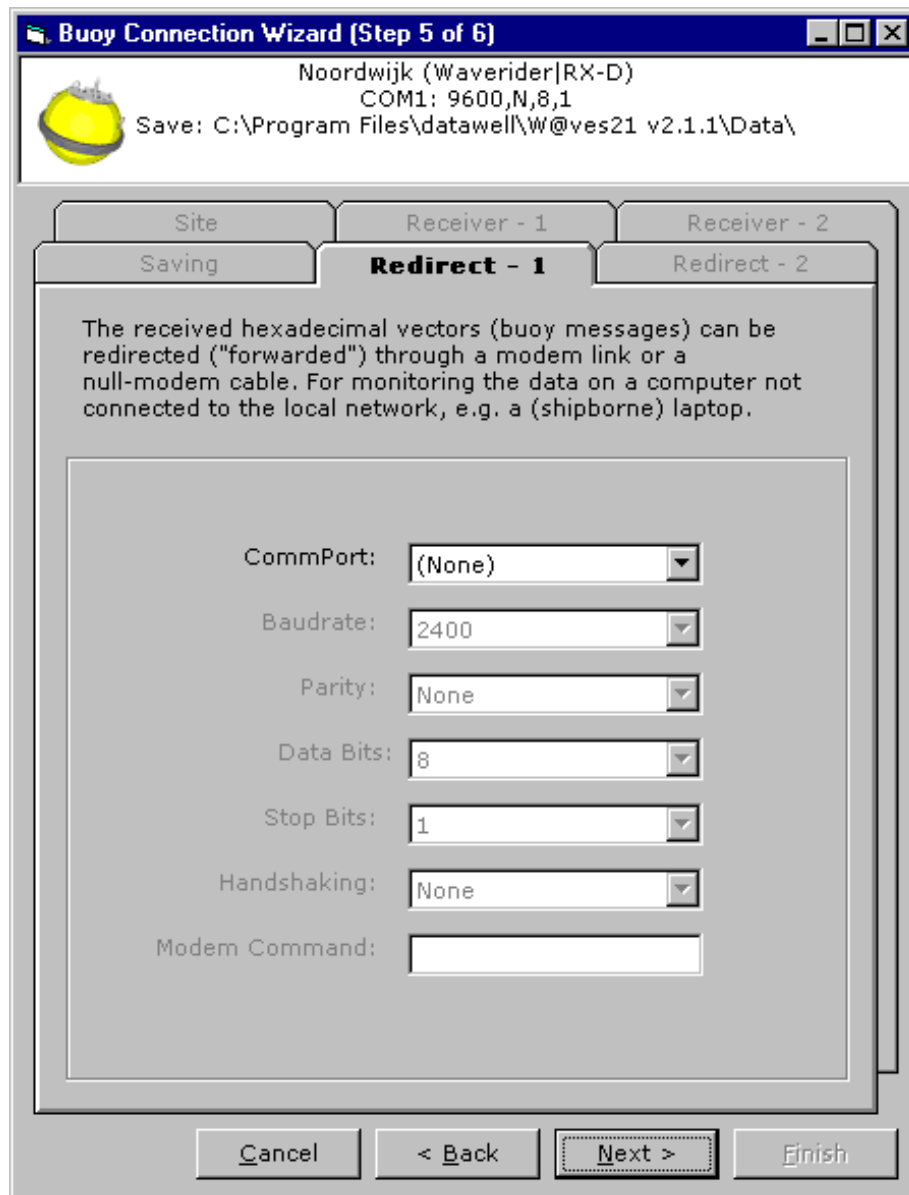


Figure 6.

Press the "Next" button.

The **Redirect-2** tab is de-activated if no selection is made on Redirect-1 tab.

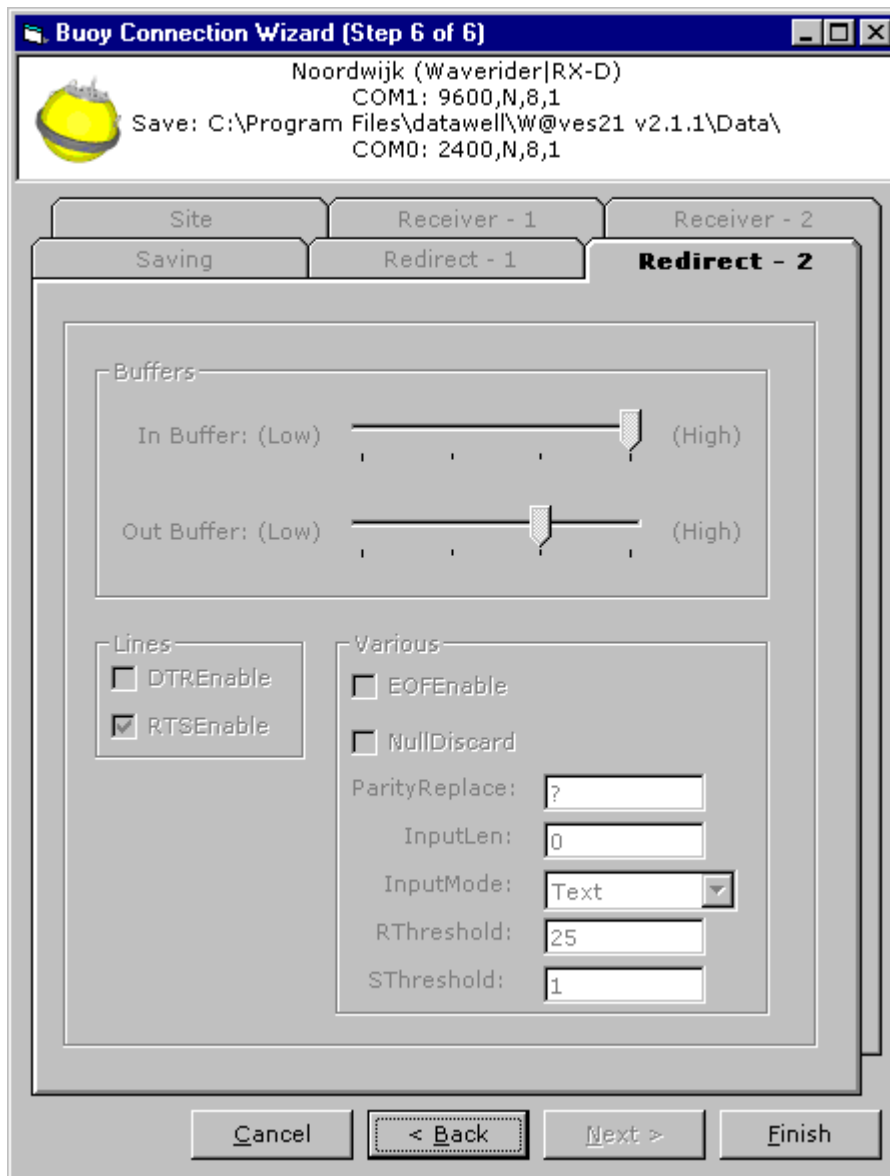


Figure 7.

If all settings are made click the “Finish” button.

A "Save As" window enables the station configuration to be saved as a wfd file.

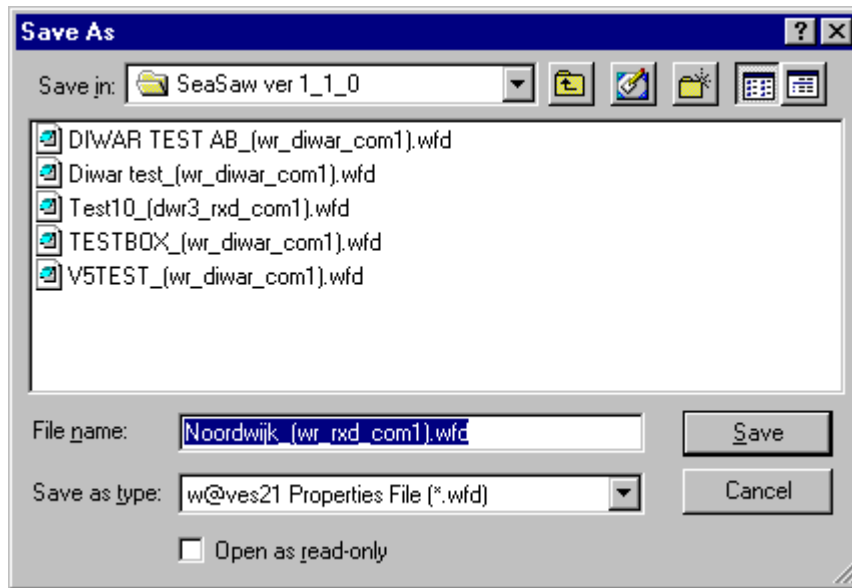


Figure 8.

Press the "Save" button.

This launches a RfBuoy window in the bottom-right corner of the screen.

In the small RfBuoy window, the data are now visible in the left text box. In the right text box, an estimate of the significant wave height H_s is given. In the status bar, three panels are visible: the first shows the serial COM connection, the second shows the sample frequency, and the third panel shows if the software is synchronized to the receiver output stream. This information displays the location (index) of a command word/message in the data stream from the buoy e.g. 3:15:17 (Transmission 3, block 15, vector 17).

The title or caption bar has a circular or rotating text that displays the TCP connection, RfBuoy module version, the configuration wfd file name and the buoy and receiver type e.g. DWR MkIII / RXD.

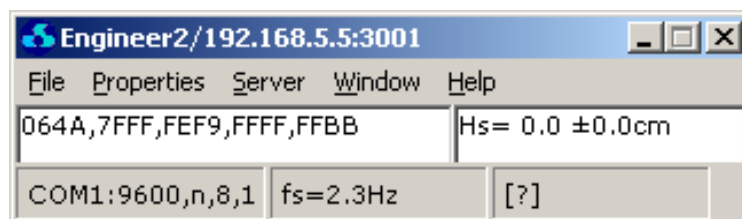


Figure 9.

Note

An alternative procedure for activating the RfBuoy module is established via the "Waverider / New" menu item link from SeaSaw21. Let the software scan the local network for RfBuoy modules, or connect directly when if the IP address and port number are known.

3 Data communication between RfBuoy and SeaSaw21

Select from the Windows taskbar: Start | Program Files | Datawell | SeaSaw21 V1.1.0. The program will open with the following window.

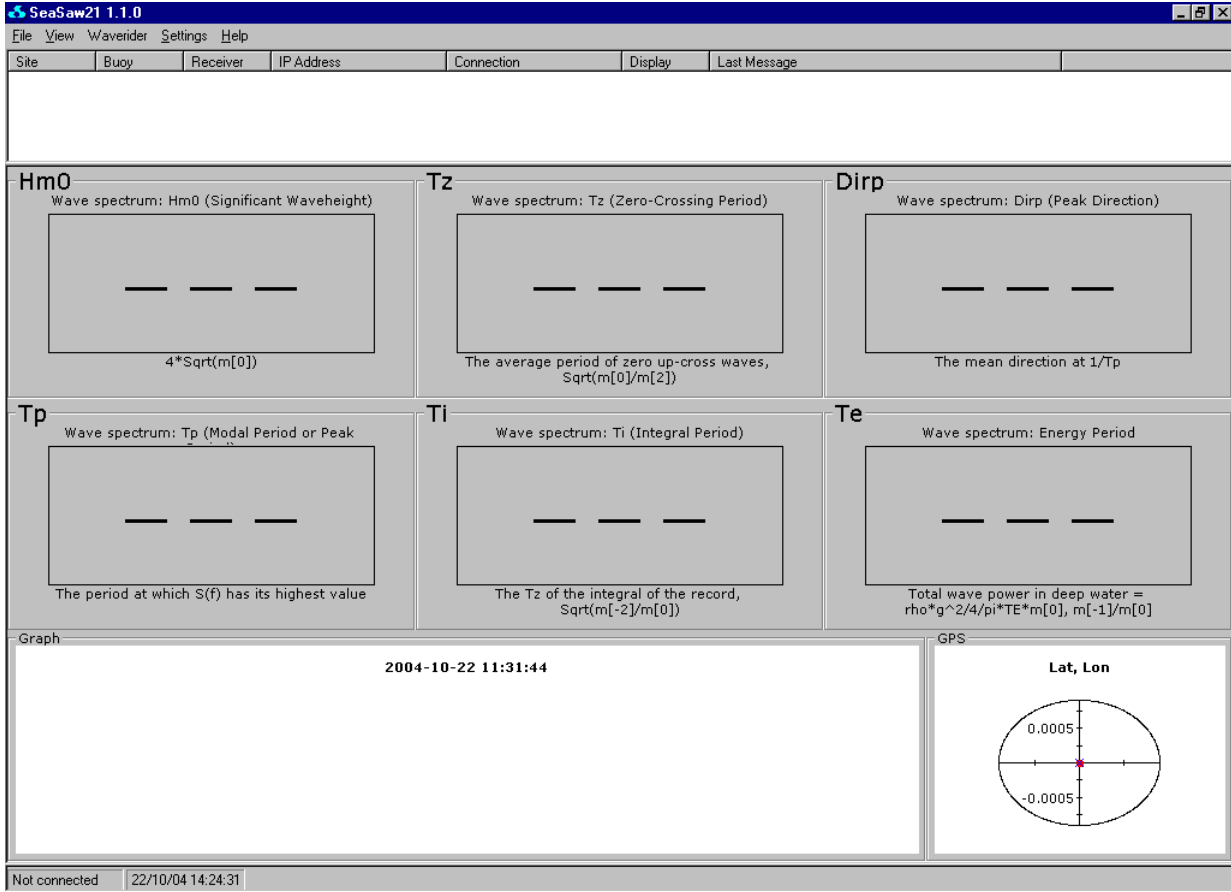


Figure 10.

Enable the TCP link in the RfBuoy program: choose menu item "Waverider | Scan the local network for Waveriders".

In the window press "OK".

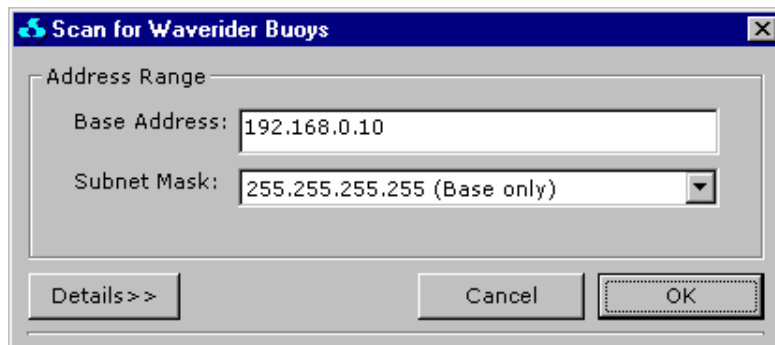


Figure 11.

After a few seconds, the buoy details are displayed in the Waverider information bar at the top of the window.

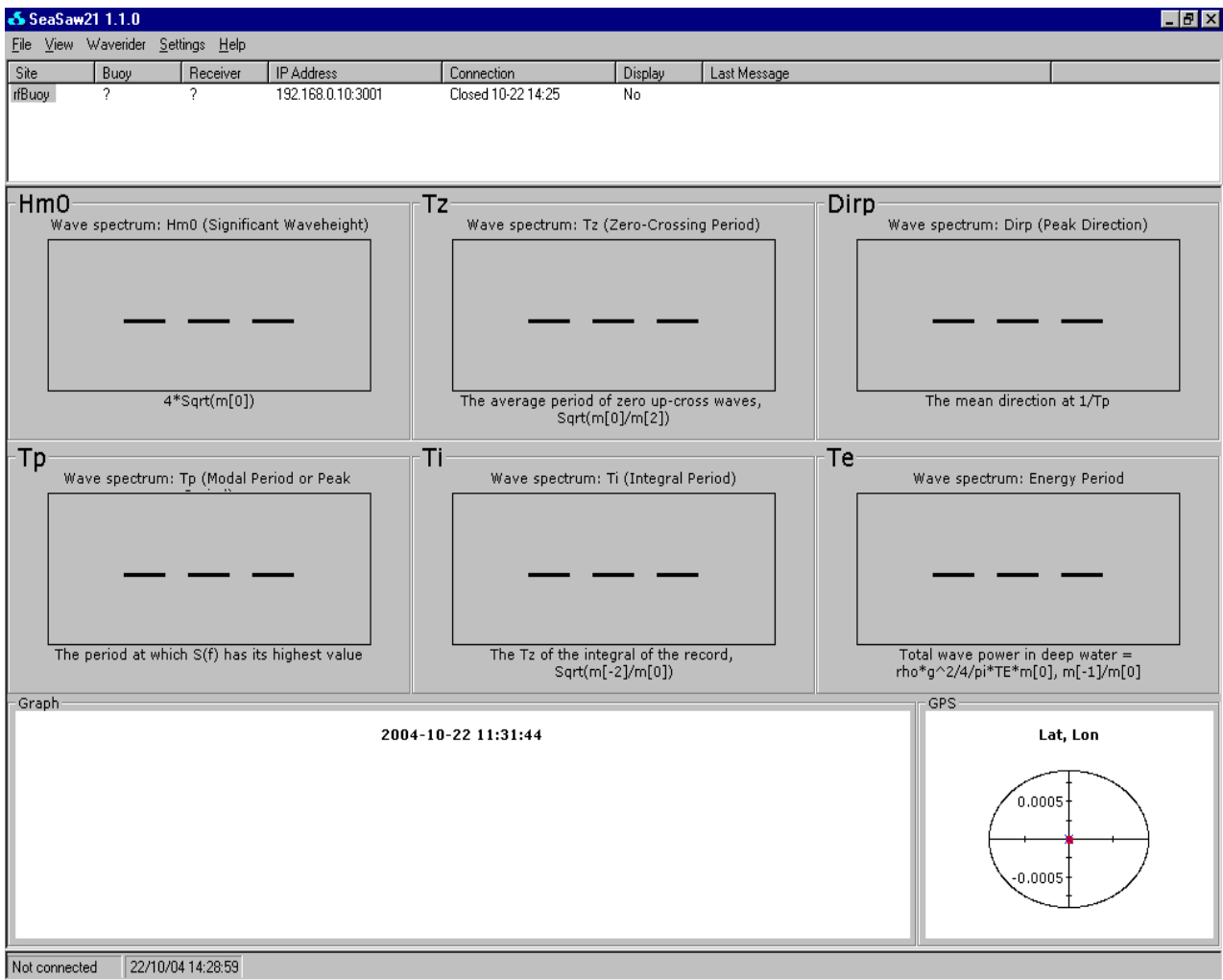


Figure 12.

With the mouse pointer highlight the buoy and right-click. Chose from the sub-menu "Make TCP Connection". After a few seconds the text will change to Connected and show the date and time connected.

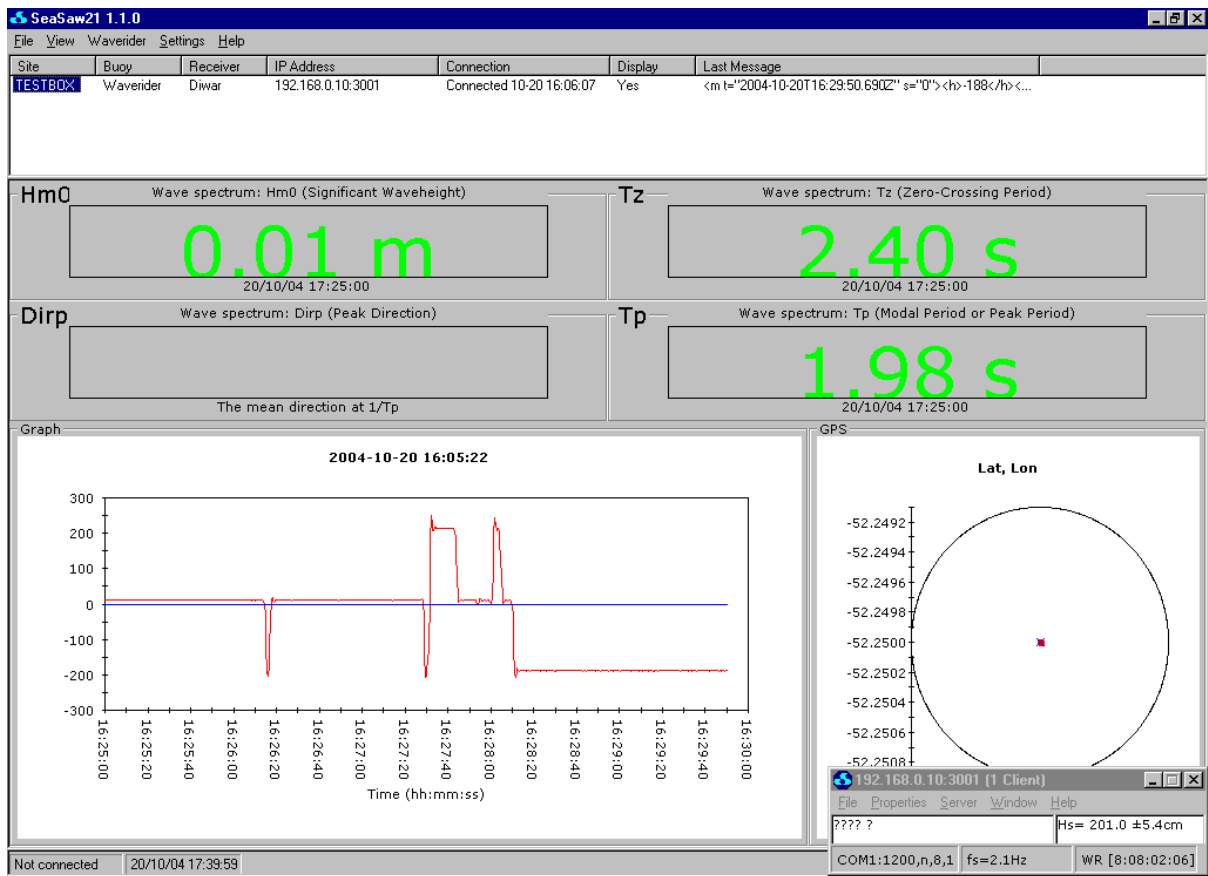


Figure 13.

If no data are displayed, with the mouse pointer, highlight the buoy and right-click. Choose from the sub-menu "Display wave data".

Wave height trace will be displayed in the Graph panel at the foot of the window after a few seconds.

Processed wave data will only be displayed after the RfBuoy module has collected sufficient samples - approximately 100 seconds.

4 Changing Station Preference setting

The wfd files (xml format files) store the station preference settings, to change these settings access to the wfd file is via the Properties menu of the RfBuoy module. This will open a window allowing selection of Notepad or WordPad as an editor.

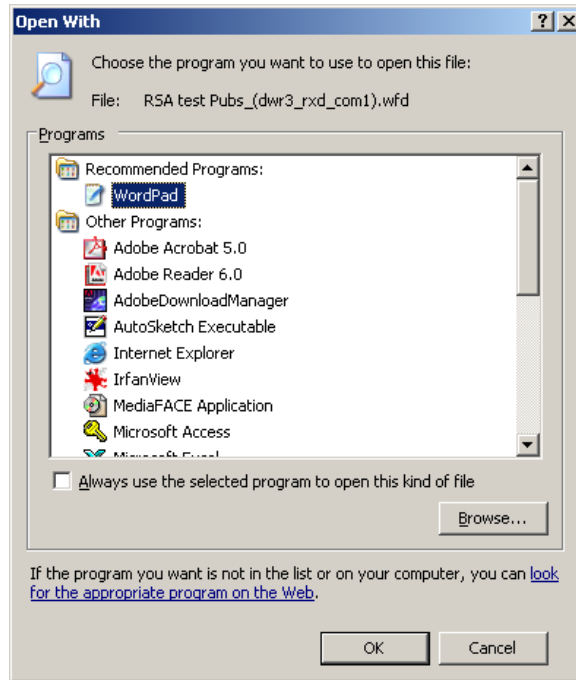


Figure 14.

Note that the changes made will only take effect after closing and restarting RfBuoy module.

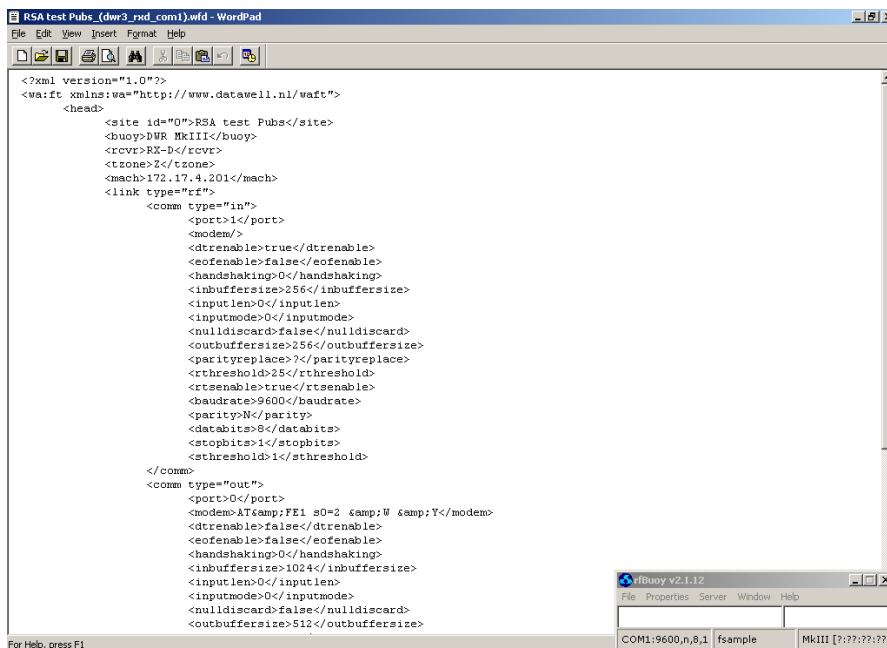


Figure 15.

5 Display description and controls

5.1 Numerical Panes

The numerical parameter panes display processed digital data values against a coloured background. Valid data are displayed as green digits against a grey background. Invalid, or time expired, values cause the digits to change colour to dark grey thereby effectively expunging the display. Values are updated approximately every 100 seconds. The time expiry default setting is 30 seconds. This can be changed by the user to a value greater than 30 seconds via the menu item "Settings | Other... | Values Expire After...".

Caution and *Warning* features in SeaSaw21 action a change in the pane background colour to amber (*Caution*) and red (*Warning*) when entered thresholds are exceeded. The default threshold settings can be changed by the user to meet individual requirements. Currently the Settings submenu Parameter is not active.

5.2 Resizing panes

The Graph pane can be resized. Near its border, the mouse pointer changes into a NS, WE, or NESW double arrow. Left-Click and drag. Where the button is released, the new border will be drawn. All other panes are resized accordingly.

5.3 Trends

The trend of the significant wave height Hm0 is shown in the Graph pane when the Hm0 numerical pane is clicked (left button). The same is true for other parameters. The actual wave height is displayed when right-clicking the Graph while holding the Alt-key. This combination (Alt + Right-Click) can be used to toggle between trends and actual wave height.

The recent history of a parameter pane is contained in a *.dat file, stored in the main directory, that corresponds to that parameter pane and are used for initialising the trend graph at a restart of the software.

5.4 Setting the Trend interval

Through the menu item "Settings | Other... | Range of Trend Graph", the interval of the trend graph can be set. Any integer value between 2 and 24 hours is possible.

5.5 Editing Graphs

Graphs can be edited by right clicking while holding the Ctrl-key. A Properties dialog is opened, where all properties of the graph can be set.

5.6 GPS positions

Through the menu items "Settings | GPS | Mooring Position..." and "Settings | GPS | Radius of Watch Circle...", an initial position and a watch circle about this position can be defined. If no mooring position is known, then the last position is used as the center of the watch circle. If no radius is specified, a radius of 100m is used. A new radius value is not displayed until a new position is received.

6 Data Files

6.1 Nomenclature and Format

Wave data come in three flavors: displacement, statistics and spectral data.

Data are stored in the file formats already known from the `W@ves21` software by the `RfBuoy` module of the software. The default data file storage wizard uses the environment variable "AppData" for the directory where to save the data. This probably won't work under Win9x (though the software shouldn't crash). However a different directory may be selected with data being stored in sub folders for year and month.

The files are named as: "sitename}YYYY-MM-DD T HHhNNA". E.g. "Noordwijk}2004-12-31T23h59A", for the example test buoy at Noordwijk. The last character A indicates the time difference (in hours) from UTC (GMT). See Time Stamps in Para 4.4.

For the Directional Waverider, the formats are *.raw, *.wvs, *.spd and *.spt.

For the non-directional (omni-directional) Waverider, they are *.1rw, *.1wv and *.1sp.

The monthly reports of spectral (*.his) and statistical (*.hiw) data are:

e.g. "sitename}YYYY-MM.his" and "site name}YYYY-MM.hiw".

The raw buoy messages (in hexadecimal format) with the extension hxv (Hexadecimal Vectors) are also stored. These files contain all information from the Waverider buoys, but are not easily readable unless using `W@ves21` software.

For Directional Waverider buoys spectral data, GPS position and other housekeeping information is also produced onboard the buoy. The data are encompassed as part of a "Command message" which is transmitted at the end of every half hour period and 8 times over the next 30 minute period. The `RfBuoy` module can identify the buoy produced spectral data and will store this data in a specifically identified file.

As there are two types of spectral data files (one computed from HXV data by the `RfBuoy` module software, the second computed and transmitted from the buoy), there will consequently be two types of spectral history file produced.

The former (PC spectra) are saved in a file named `Y7$}2004-12.his`, the latter in a file named `Y7}2004-12.his` (or in general `<sitename>}<year>-<month>.his` and `<sitename>$}<year>-<month>.his`).

For a non-directional Waverider, there will be only PC spectra history file as `Y7$}2004-12.his`.

In addition the `RfBuoy` module stores the received GPS position as a text file e.g. "Noordwijk}2004-10 GPS.txt".

6.2 File logging cycles

Files with the hxv extension are created every half hour.

Files with spectral data computed and transmitted by the buoy are stored every half hour.

Spectral files produced by the PC software (*.spt) are created every half hour.

Spectral files received from the buoy (*.spd) are stored when they arrive from the buoy.

History files are created for each calendar month.

The log (*.log) files that store all events and actions seen by the software and GPS location text file are created daily.

6.3 Software spectral processing

The RfBuoy module spectral processing routine is devised such that every 100 seconds a block of 256 data values are used to compute a spectrum with a resolution of 5 mHz up to 0.64 Hz. There are 17 blocks of RfBuoy computed spectra produced every 30 minutes and the resultant data are saved to *.spt and *.his files identified by the additional \$ character in the file name (GYM M1\$}2005-01.his). This ensures the display screen is up-dated at regular intervals with spectral data and results in the large amount of data in the PC created spectral files.

The buoy produced spectral data, transmitted from the buoy over the radio link in the Command Word (8 times over a 30 minute period), is stored as a *.spd file. These files are created roughly every 3.45 minutes.

As the RfBuoy module uses the PC real-time clock, spectra and other files produced have round time labels (hh.00 and hh.30), where as buoy spectra are labelled by time labels with a random number of minutes (hh.mm where mm is any number between 00 and 59) when data are received from the buoy.

The buoy history file (GYM M1}2005-01.his) is only written to once in a half hour period. This is usually after 2 or 3 command words have been received.

6.4 Time stamps

If timestamps end with a Z, they are in Greenwich Mean Time (GMT) or Coordinated Universal Time (UTC) or Z (Zulu) time. See <http://www.aros.net/~yogi/zulutime.htm>. Without Z, the timestamps are local times.

7 Annexes

Annex A - Auto start procedure for RfBuoy module

This section deals with the steps needed to configure a PC to auto (re)start the RfBuoy module on your computer.

Step 1 - install/configure RfBuoy

SeaSaw21 must be installed on the computer. To get the latest version visit <http://www.datawell.nl> (support → download). You must be logged in as administrator to install the product.

After installation start RfBuoy and create a configuration. Save this configuration and create a shortcut in Start → Programs → Startup (folder names can differ on local language). Test this shortcut.

Step 2 - Download TweakUI

This step is only necessary when the user needs to logon to this computer (with a password), if that's not the case then you can go to step 3.

To get a recent version of TweakUI visit <http://www.microsoft.com> and search for "TweakUI". This will bring a list with results and probably the first one will be a correct result ("PowerToys for Microsoft Windows XP"). On the right side select "TweakUI.exe", download and install this.

After installation go to Start → Programs → Powertoys for Windows XP → Tweak UI.

Expand the Logon tab and select "Autologon".

Enable "Log on automatically at system startup", provide username, domain and password.

Remember that you can bypass this auto-logon process by holding down the shift key while the system starts.

Be sure to test the automatic logon feature.

Step 3 - BIOS-settings

Alter your BIOS-settings so the computer automatically starts-up after AC-power loss. This setting has different names on different systems but you could look for something like "AC-Power recovery" or "Restore on AC/Power loss".

Be sure to test this feature by pulling the plug out of power socket while running (only when there is no hard drive activity).

Annex B - Overview of Datawell file formats

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.

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		
.CMF	Dec	Displacement Data		DWR MkII	MkII Data Logger	
.CMP	Bin	Displacement Data		DWR MkII	MkII Data Logger	
.CPT	Dec	Spectral Data	1 spectrum	DWR MkII		Obsolete, alternative to *.spt
.DAF	Dec	Displacement Data		DWR MkII	MkII Data Logger	
.DAT (1)	Bin	Buoy messages		DWR MkII	MkII Data 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		
.OM1	Bin	Orbcomm Message (Compressed spectrum)	1 spectrum	DWR	Orbcomm attachments	
.OM2	Bin	Orbcomm Message (System File)	1 system file	DWR	Orbcomm attachments	
.OM3	Bin	Orbcomm Message (Full Spectrum)	1 spectrum	DWR	Orbcomm attachments	
.OM4	Bin	Orbcomm Message (System Status)		DWR	Orbcomm attachments	Orbcomm Waves software

File Extension (1,2)	Format (3)	Content	Size	Buoy	Instrument	Remarks
.RAW	Dec	Displacement Data	30 minutes	DWR		
.RDT	Bin	Displacement Data		DWR MkIII, WR SG	MkIII Data Logger	
.SDT	Bin	Spectral Data		DWR MkIII, WR-SG	MkIII Data Logger	
.SPC	Bin	Spectral Data	48 spectra	DWR MkII	MkII Data Logger	60 bins only
.SPD	Hex	Spectral Data	1 spectrum	DWR MkII	MkII Data Logger	60 bins only
.SPF	Hex	Spectral Data	48 spectra	DWR MkII	MkII Data 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 names and date/time

File names of data files have the following format:

```
<filename> = [<site name>]<datetime>.<extension>  
<datetime> = <date>[T<time>[<timezone>]]  
<date> = <year>-<month>[-<day>]  
<time> = <hours>h<minutes>
```

where name fields are between < > brackets, and optional fields are between [] brackets. Valid <extension> values are listed in the Table above. A valid <timezone> is a character between A and Z (but not J). An example of correct file names is:

```
Noordwijk}2006-02-08T14h47A.spt
```

```
<extension> = spt  
<sitename>= Noordwijk  
<date> = 2006-02-08  
<time> = 14h47 = 14:47:00  
<timezone> = A = UTC+01:00
```

Other examples are:

```
Noordwijk}2006-02.his  
Noordwijk}2006-02-08T14h47A.wvs  
Noordwijk}2006-02-08T14h47.wvs  
2006-02-08T14h47A.wvs  
2006-02-08T14h47.wvs  
2006-02.hiw
```