Sailbuoy datalogger User Manual

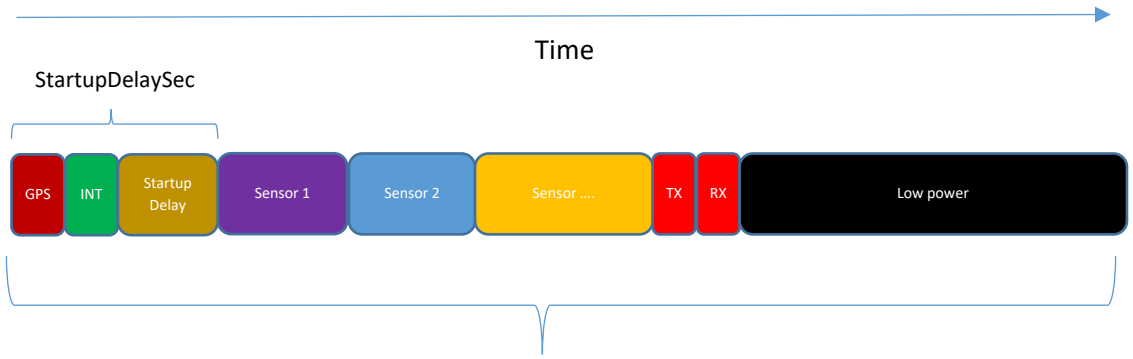
Applies to embedded software newer than: **1st March 2020**

Contents

Acquisition loop

In run mode the datalogger does the following things in sequence.

1. Get GPS fix (10-20 sec)
2. Get internal sensor values (1 sec)
3. Startup delay
4. Get sensor 1 data (time defined in the configuration)
5. Get sensor 2 data (time defined in the configuration)
6. Get sensor …..
7. Send data (30-120 sec) TX
8. Receive commands (10 sec) RX
9. Low power mode (rest of the log interval)



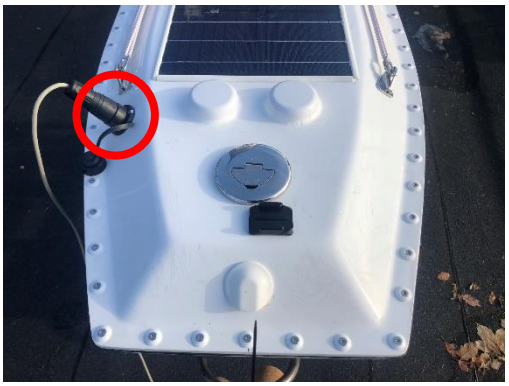
The datalogger has a watchdog timer that resets every 1.5 hours. If the log rate period is set to more than this or the software hangs for some reason the system is reset. After reset the datalogger restarts with the saved default configuration. The watchdog timer is turned off when downloading data, enabling the download to continue for several hours.

All sensors are disabled on power up and have to be actively enabled. This is to prevent sensors being switched on if a reboot occurs during a mission. A reboot can occur if a sensor malfunction causes the battery voltage to spike or the batteries are empty. When starting the datalogger all sensors are disabled by default and have to be actively switched on by sending the **$ENABLE** command. The sensors will automatically be deactivated when the voltage falls below a preset level (battery level is ~ 10%)

When the datalogger is powered off the configuration reverts back to the saved settings.
The datalogger has the ability to send small files. This is used by some sensors to send images or other kind of files.

Serial Port

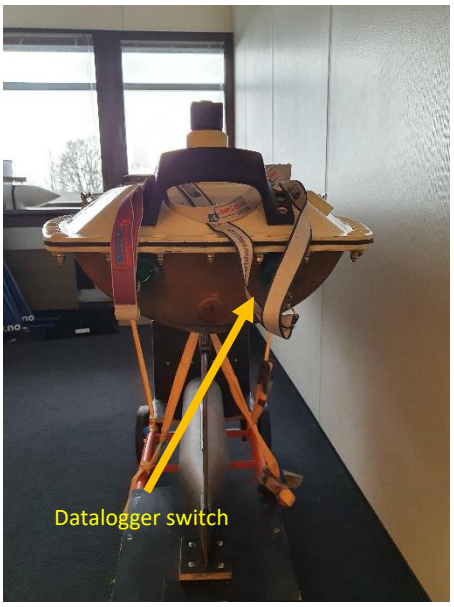
The serial port is used to communicate with the datalogger. It can be used to configure the datalogger and monitor the datalogger output when running.
The serial port will stop transmitting data after a while when the datalogger running.



How to switch the datalogger on/off

The datalogger is powered up by **removing** the magnetic switch. It is switched off by placing the magnetic switch on the Velcro pad.

Note: The solar panels will charge the batteries regardless if the datalogger is on or off.



Connecting to datalogger

Connect your PC with the datalogger using the supplied serial cable.
Start teratem and select the correct serial port at 9600 baud.
Power on the datalogger by removing the magnetic switch.
Some text will appear on the terminal.
Press ESC within 60 seconds to enter the menu system.

Datalogger menu

The menu system responds to the following keys.
RET (Enter) will display the menu again.
ESC will exit a submenu.

SPACE is to enter a note.

Main menu

In this menu the configuration of the datalogger can be changed. By selecting **'*':Run** the datalogger will enter run mode. Entering run mode via the menu system will enable all sensors by default. They are otherwise disabled and have to be enabled remotely.

```
MAIN MENU 01.01.2019 00:00:00

'0':Sensor menu
'1':File menu
'2':Direct Serial menu
'P':Print Configuration
'E':Edit Configuration
'S':Save Configuration
'T':Set Date Time
'*':Run
```

Sensor menu

This menu is used to run each individual sensor with the current configuration.
The content of this menu depends on which sensors are installed.
It is also possible to run the GPS, Iridium modem and check the battery voltage.

```
SENSOR MENU 01.01.2019 00:00:55

'5': Sensor 1
'B': Sensor 2
'G': GPS
'I': Iridium SBD
'V': Battery Voltage
```

File menu

This menu is used to download files and show the disk content. To ease all files use the command
`'7':Format drive`

```
FILE MENU MENU 01.01.2019 00:05:38

'3':Download files Ymodem
'4':Download one file Ymodem
'7':Format drive
```

```
'D':Display files
'P':Print file to screen
'B':Change baudrate
```

Direct serial

This menu is used to connect directly to each individual sensor. The sensor is switched on and the serial cable is connected directly to the sensors. This functionality can be used to connect the sensor to supplier software. Often used for sensor configuration.
When the sensor is selected the datalogger becomes transparent. To unlock the serial port, remember to close the terminal editor before opening any software configuration tool.

```
DIRECT SERIAL MENU 01.01.2019 00:01:30

'1': Sensor 1
'2': Sensor 2
```

** Depends on Sailbuoy sensor configuration*

Files

The datalogger has the ability to transmit files. This is used by some sensors for transmitting sensor data. Since Iridium is a low bandwidth connection only small files can be transmitted. The maximum transmitted data per acquisition period is normally limited to 5000 bytes.

Configuration

To change the configuration select `'E':Edit Configuration` in the main menu.
Enter new values or press return to keep the stored values.
Pressing save will keep the configuration after a power cycle.

Command	No Parameters	Description	Min	Max	Example
$LOGRT	1	Lograte in seconds	60	3600	$LOGRT 1800
$TXPER	1	Only transmit every N acquisitions	1	24	$TXPER 10
$STRDL	1	Sensor start up delay in seconds	0	1800	$STRDL 60
$ENABLE	0	Enable sensors			$ENABLE
$DISABLE	0	Disable sensors			$DISABLE
$IRIFS	1	Send byte limit	0		$IRIFS 5000
$SENDFILE	2	Send end part of file			$SENDFILE TMP.TXT 1000

$DIR	0	Send disk listing			$DIR
$SAVE	0	Save current configuration			$SAVE

$LOGRT - Lograte_sec

This configuration value decides the acquisition period. This value is the period in seconds.
"$LOGRT 1200" sets the acquisition period to 15 minutes.

$LRMIN Lograte_min

This is an alternate way to set the acquisition period. This value is the period in minutes.
"$LRMIN 15" sets the acquisition period to 15 minutes.

$TXPER - TXPeriod

This configuration value decides how often a message is transmitted. A value of 1 will tell the datalogger to transmit each time it has run the sensors.
Sending "$TXPER 10" the datalogger will transmit every 10th acquisition period.

$STRDL - StartupDelaySec

Sensor start up delay: A delay can be configured to start the sensor acquisition a set number of seconds after the datalogger starts a new acquisition period.
Sending "$STRDL 60" the sensor acquisition will start 60 seconds after power up.

$ENABLE

The datalogger always starts up with the sensors disabled. To enable the sensor acquisition, the command "$ENABLE" must be sent. The sensors will then run according to their configuration.

$DISABLE

This command disables the sensor acquisition.

$SENDFILE

This command will transmit parts of a file over iridium. It can be used to check the state of a sensor or download some data. The $SENDFILE command takes 2 parameters, where the fist parameter is the filename on the datalogger disk and the second parameter is the number of bytes to send.
If the file is bigger than the second parameter N, only the **last** N bytes of the file will be sent.
"$SENDFILE WBT.TXT 1000" tells the datalogger to send the last 1000 bytes of the WBT.TXT file. If the second parameter is bigger than the file size, the whole file will be sent.
Note that the TxByteLimit setting will limit the bytes sent.

$IRIFS

This command limits the maximum bytes send in one period. “$IRIFS 5000” limits the transmission of bytes to 5kB per period.

$DIR

This command will send a text file showing the files on the disk, Much like the DIR command in windows. This command has no parameters.
Sending “$DIR” will produce a file called DIR.TXT and below is an example of the contents of this file.

DIR.TXT

```
    Filename           Filesize[B]     Date        Time

  SERIAL.TXT                  860   24.10.2019 00:01:28
  AIRMAR.TXT                56024   24.10.2019 17:31:44
     DIR.TXT                    0   24.10.2019 17:31:44

              3 File(s)  56884 bytes
                        977 MB free
```

$SAVE

This command saves the current configuration as default.
Sending “$SAVE” will set the current configuration as default.

COMMON SENSOR PARAMETERS

Run Order

Each sensor has a RunOrder configuration value. This value decides in which order the sensors are run. The RunOrder value can be set to any number between 1 and 9.
Run Order: The order in which the sensors are run can be set in the configuration for each sensor.

The sensor with the lowest value will be run first.

Example 1:
Sensor1 RunOrder = 1
Sensor2 RunOrder = 2
Sensor3 RunOrder = 3

Sensor 1 will be run first, then sensor 2, then sensor 3.

Example 2:

Sensor1 RunOrder = 9
Sensor2 RunOrder = 1
Sensor3 RunOrder = 6

Sensor 2 will be run first, then sensor 3, then sensor 1.

RunCounter

Each sensor has a RunCounter configuration value. This value decides how often the sensor is run.
If RunCounter = 1 the sensor is run each acquisition period. If RunCounter = 2 the sensor is run every second period. If RunCounter = 3 the senor is run every third period and so on. The maximum value is 255.

If two or more sensors have the same RunCounter value, they will run in the same acquisition period.

Transmitted Data

Time	Time in UTC	[YYYY:MM:DD HH:MM:SS]
Lat	Latitude	[decimal degrees]
Long	Longitude [decimal degrees]	[decimal degrees]
TTFF	Time to first GPS fix	[seconds]
Count	Transmission counter	[Integer]
Commands	Received commands count	[Integer]
TxTries	Transmission attempts	[Integer]
ONT	On time (time in acquisition mode)	[seconds]
Disk Used	Space used on disk in %	[%]
Files	Number of transmitted files	[Integer]
I	Current consumption	[A]
V	Battery voltage	[V]
Temperature	Payload temperature	[deg C]

The transmitted data for the sensors is shown in the user manuals for each sensor. This depends on the configuration of the vehicle.
Each transmitted value has a limited range, i.e a maximum and minimum value. If the acquired value falls outside of these limits the transmitted value will be NULL. This is to save on transmission costs.

Battery Voltage and Solar Panels

The solar panels are connected to the batteries by a charging circuit. This circuit is always active regardless if the datalogger is switched on or off.
The battery voltage gives information about the charge of the battery. The battery is fully charged at 13.3V. Any voltage above this is due to the solar panels increasing the voltage.
At 13.0V the battery has around 50% charge left falling to about 15% at 12.7V. At this voltage the datalogger automatically turns the sensors off to preserve energy for the Iridium communication and GPS.

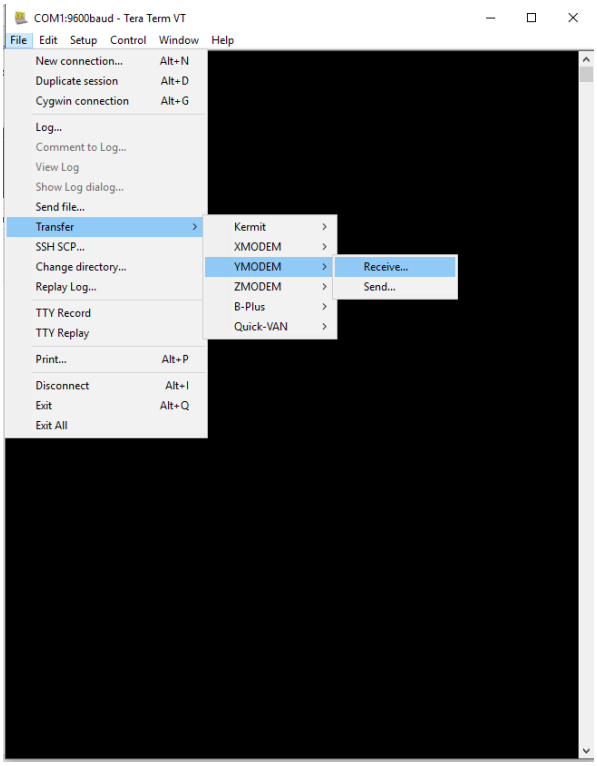
Running sensors

1. Select the sensor menu
2. Select the appropriate sensor

The datalogger will run the sensor according to the configuration parameters. This menu is normally used to check if sensors are working properly and have the correct setting.

Download files

1. Enter the file menu
2. Select `'B':Change baudrate` and enter a higher baudrate (i.e. 115200 baud)
3. Change the baudrate of the COM port to new baudrate in teraterm
4. Press return to display the menu
    5. Select `'3':Download files Ymodem (`The datalogger is now waiting for teraterm to initiate the download).
6. Initiate the download by selecting the teraterm menu item `File->Transfer->YMODEM->Receive..` (The download should begin immediately)



7. When the download is finished press return to display the datalogger menu.

During data download the watchdog timer is disabled.

Delete files

1. Enter the file menu
2. Select `'7':Format drive`
3. Select `'D':Display files to ensure the disk is empty`

Connect to sensor

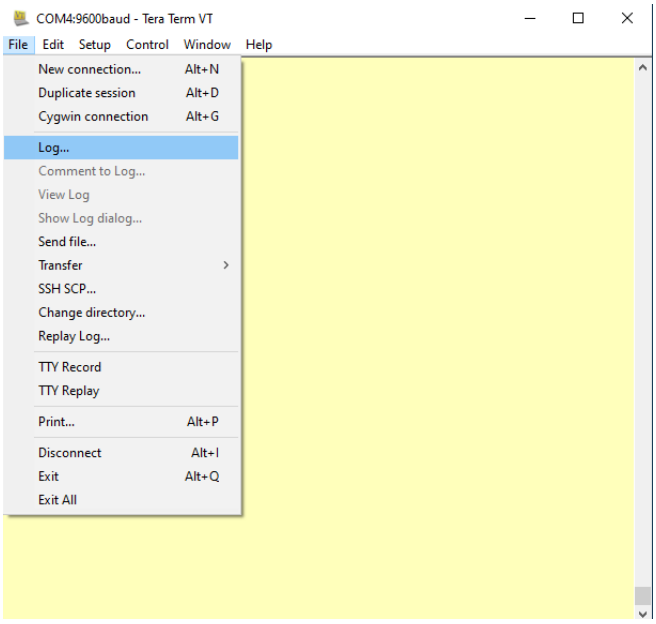
This mode is used when you need to connect directly to the sensor using proprietary software. Typically, some vendor provided program. This mode puts the datalogger in transparent serial mode so it acts like a direct serial connection from the PC to the sensor.

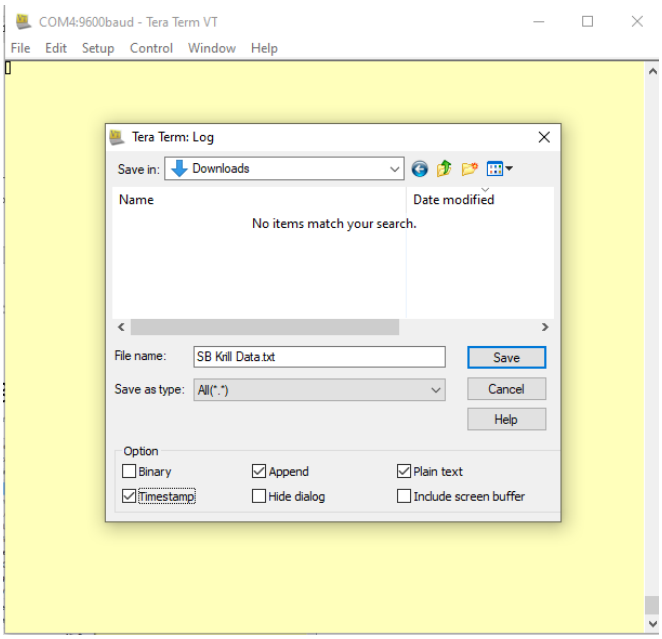
1. Enter the Direct serial menu
2. Select the appropriate sensor
3. Follow instructions on screen (Change Teraterm baudrate or close the terminal window and connect supplier software)

To stop direct serial connection cut power with the magnetic switch.

Log datalogger output

To keep track of changes made to the system it is good practice to log all the output form the datalogger to a file. See screenshots below.





Restarting

The datalogger can be restarted at any point in time without damaging the electronics. In some cases, a sensor does not like being switched off in the middle of an acquisition.
Upon restart the datalogger will start with the saved default configuration.

To restart the datalogger first switch it off with the magnetic switch, wait 60 seconds, then remove the magnetic switch to start again.
