# VSDControl
# – VSD configuration for class A AIS units –

© Torkel M. Jodalen
*annoyingdesigns.com*

October 29, 2016

**Abstract**

This document describes the *VSDControl* utility, a *Win32* application which provides an easy means of configuring vessel static data (VSD) as supported by class A AIS[1] units.

The *VSDControl* utility requires a serial communication link to the AIS unit. It should be noted that *VSDControl* will not work with class B AIS units, as these units do not transmit the same amount of vessel-specific static data.

The *VSDControl* utility has been tested with various *Windows* versions (*Windows XP* and above) and a *Raymarine AIS950* unit.

[1] Automatic Identification System

# Disclaimer

The author assumes no responsibility for your use of information contained in this document or the *VSDControl* utility itself.

The author does not represent any manufacturer of software products or hardware units mentioned in this document. Likewise, the author does not have any commercial interests in any of the companies or products mentioned in this document.

All trademarks remain the property of their respective holders, and are used only to identify the products mentioned. Their use in no way indicates any affiliation between the author and the holders of the said trademarks.

# Donationware

Please note that the *VSDControl* utility is *not* free software.

If you find this utility useful, please respect the *donationware* concept by submitting a donation to the author. Details can be found in section 4.4.

# Contents

# 1 Introduction

## 1.1 Vessel static data

Vessel static data (VSD) information remains relatively static during a voyage. However, the information will frequently change from voyage to voyage.

While vessel static data can be edited using the AIS unit itself, the procedure normally involves a number of keypresses, turning knobs, etc. — a rather time-consuming process. The *VSDControl* utility allows the user to update vessel static data using a personal computer/keyboard, which is less error-prone and less time-consuming than working directly with the AIS unit.

Vessel static data includes the following information, which can be modified using the *VSDControl* utility:

- Type of ship and cargo category
- Maximum present static draught
- Number of persons on board
- Destination
- Estimated UTC of destination arrival
- Estimated day of destination arrival
- Estimated month of destination arrival
- Navigational status
- Regional application flags

The *VSDControl* utility provides basic error-checking and filtering of the entered data. It should be noted that the *destination* field which is limited to 20 characters accepts only those characters which can be encoded using 6-bit ASCII.

## 1.2 VSD sentence structure

According to available references including [1], the VSD sentence should adhere to the following structure:

```
$--VSD,x.x,x.x,x.x,c--c,hhmmss.ss,xx,xx,x.x,x.x*hh<CR><LF>
```

`$--VSD` VSD sentence identifier. Insert the *NMEA* talker ID where the `--` acts as a placeholder.

`x.x` Type of ship and cargo category. Values 0 to 255, refer to [6] for details. Also note the apparent defect in the *Raymarine AIS950* unit, detailed in section **??**.

`x.x` Maximum present static draught. Values 0 to 25.5 meters.

`x.x` Number of persons on board. Values 0 to 8191.

`c--c` Destination, 1-20 characters. @@@@@@@@@@@@@@@@@@@@ indicates destination unknown.

`hhmmss.ss` Estimated arrival time (UTC), only the `hhmmss` portion should be transferred to the AIS unit. The `ss` portion will always be 00.

`xx` Estimated day of arrival (UTC). NOTE: Leading zero. Values 00 to 31.

`xx` Estimated month of arrival (UTC). NOTE: Leading zero. Values 00 to 12.

`x.x` Navigational status, values 0 to 15.

`x.x` Regional application flags, values 0 to 15.

`*hh` Checksum.

`<CR><LF>` Carriage return and line-feed (ASCII values 13 and 10).

Please note that some AIS units, including the *Raymarine AIS950*, require a password before allowing changes to certain VSD parameters. Section 3.5 refers.

# 2 Interconnections

A serial line (RS-232) will normally be the preferred way to connect the AIS unit to a computer. The *Raymarine AIS950* unit [10] (actually a branded *SRT Marine* [11] product) provides a rear-panel serial port intended for connecting ECDIS[2] units, etc. Figure 1 refers. As most PCs no longer come equipped with on-board serial ports, a serial-to-USB converter is probably required. Figure 2 shows a typical converter.

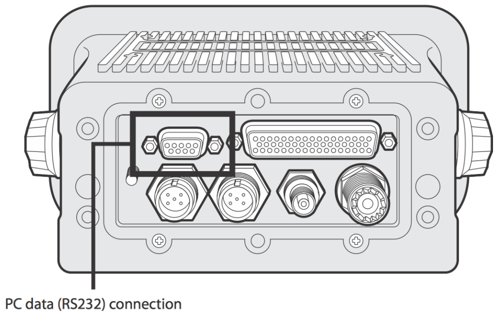


*Figure 1: The galvanically isolated RS-232 port of the Raymarine AIS950 unit — sporting a DE-9F connector. The pilot plug may also be used (a suitable connector is available from Farnell/Newark, part numbers 593059 and 1098399). The characteristics of the pilot plug is described in [7].*

.

*Figure 2: A typical "COM port via USB" cable. Dongle units are also common.*

NOTE: The *VSDControl* utility requires exclusive access to the COM port used to communicate with the AIS unit. The COM port cannot be used by any other application when *VSDControl* attempts to establish communication with the AIS unit.

[2] Electronic Chart Display and Information System

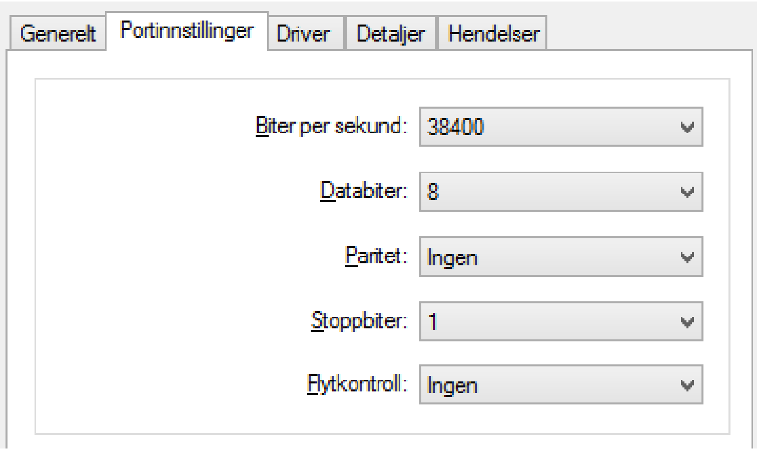
## 2.1 Serial port settings

Using the *Windows Device Manager*, the parameters for the COM port/serial line should be changed to match the communication parameters of the AIS unit. Typical values are shown below.

- Bits per second: *38,400*
- Data bits: *8*
- Parity: *None*
- Stop bits: *1*
- Flow control: *None*

To start the *Windows Device Manager* — proceed as follows: Click *Start*, click *Run*, then type `mmc devmgmt.msc` in the *Open* box, then press `[ENTER]`.

Navigate to *Ports (COM and LPT)*, then double-click on the COM port to be used for AIS communication and apply the correct settings.



Biter per sekund: 38400

Databiter: 8

Paritet: Ingen

Stoppbiter: 1

Flytkontroll: Ingen

*Figure 3: Typical COM port settings for AIS usage, as shown on a Norwegian-language Windows PC.*

## 2.2 The crazy mouse problem

The ”crazy mouse” problem remains a common nuisance when connecting a GPS or an AIS unit to a *Windows*-based PC. The problem is still present in *Windows* 8.1.

Unfortunately, the serial data returned by GPS and AIS units is formatted in a way which somewhat resembles the output from old-school serial mice. The result is that the mouse cursor will be jumping crazily all over the screen, performing left- and right-clicks all by itself.

The problem is dealt with in various articles and several remedies exist, including the *COMDisable* tool [4] and *Microsoft* knowledgebase article #283063 [5]. Unfortunately, the *COMDisable* tool does not seem to work with the *Windows 7* and *Windows 8* operating systems. Another software-based solution is offered by *Stentec* [13].

*Figure 4: The ever-present ”crazy mouse” problem, a common Windows nuisance.*

Using the *Registry Editor*, the problem can be eliminated without installing any additional software.

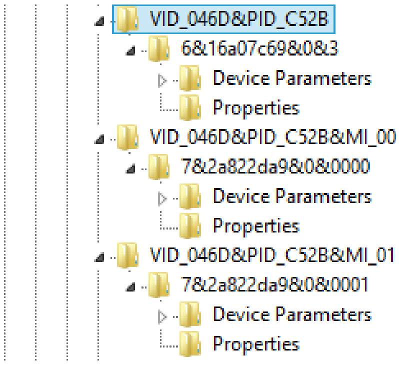
1. Start *Registry Editor* — `regedit.exe`. To do this, click *Start*, click *Run*, then type `regedit` in the *Open* box, then press `[ENTER]`.

2. Navigate to `LOCAL_MACHINE\System\CurrentControlSet\Enum\USB\DeviceID\InstanceID\Device Parameters`

   Replace `DeviceID` and `InstanceID` with relevant values (these values will change from system to system). As an example, these values could be `VID_046D` and `PID_C52B`. NOTE: This change may have to be applied to more than one `InstanceID`.

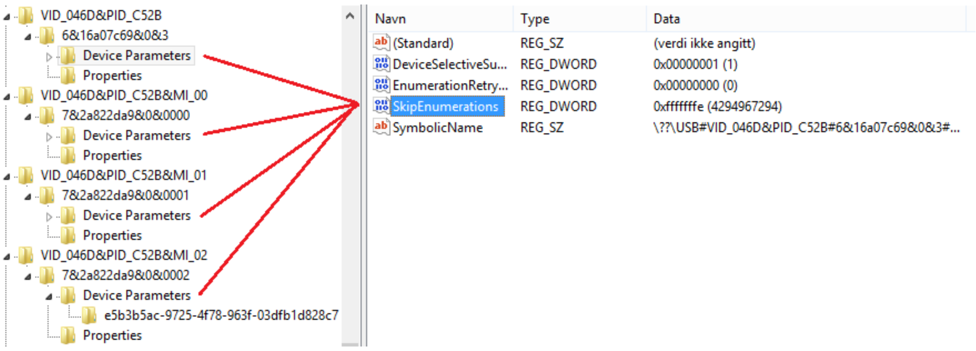
3. On the *Edit* menu, click *Add Value*, and then add the following registry entry:

   Value Name: `SkipEnumerations`
   Data Type: `REG_DWORD`
   Radix: `Hexadecimal`
   Value: `FFFFFFFE`



```
VID_046D&PID_C52B
  6&16a07c69&0&3
    Device Parameters
    Properties
VID_046D&PID_C52B&MI_00
  7&2a822da9&0&0000
    Device Parameters
    Properties
VID_046D&PID_C52B&MI_01
  7&2a822da9&0&0001
    Device Parameters
    Properties
```

Figure 5: Using the Registry Editor, there are multiple InstanceIDs which should be updated.



```
VID_046D&PID_C52B
  6&16a07c69&0&3
    Device Parameters
    Properties
VID_046D&PID_C52B&MI_00
  7&2a822da9&0&0000
    Device Parameters
    Properties
VID_046D&PID_C52B&MI_01
  7&2a822da9&0&0001
    Device Parameters
    Properties
VID_046D&PID_C52B&MI_02
  7&2a822da9&0&0002
    Device Parameters
      e5b3b5ac-9725-4f78-963f-03dfb1d828c7
    Properties
```

| Navn | Type | Data |
|---|---|---|
| (Standard) | REG_SZ | (verdi ikke angitt) |
| DeviceSelectiveSu... | REG_DWORD | 0x00000001 (1) |
| EnumerationRetry... | REG_DWORD | 0x00000000 (0) |
| SkipEnumerations | REG_DWORD | 0xfffffffe (4294967294) |
| SymbolicName | REG_SZ | \??\USB#VID_046D&PID_C52B#6&16a07c69&0&3#... |

Figure 6: The SkipEnumerations key and the associated value of FFFFFFFE.

4. Quit the *Registry Editor*, reboot and wait for *Windows* to complete the startup sequence. Then reconnect the AIS unit. The problem should be gone.

5. Note that the ”crazy mouse” problem may occur again if a different USB device is connected to the same USB port.

NOTE: Using a serial-to-USB converter, it is generally recommended to connect the converter *before* switching on the AIS unit. *Windows* will then get a chance to load the relevant drivers and recognize the serial-to-USB converter before the flow of data starts. This approach seems to minimize the ”crazy mouse” problem.

A different procedure deals with the `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\SerMouse` registry entry, in which the value for the `Start` key should be changed from `3` to `4`.

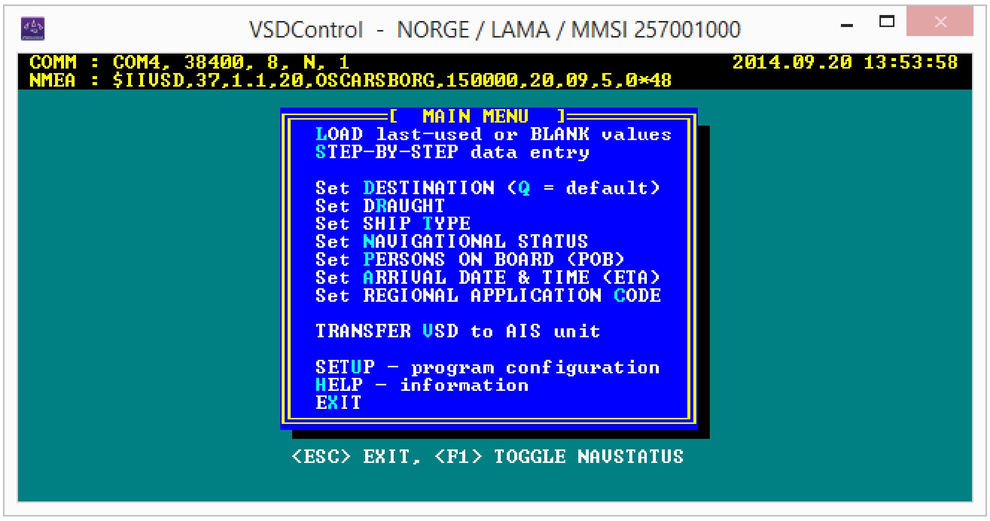
The *FixSerialBallpoint* utility [12] provides yet another solution to this problem.

# 3 *VSDControl* at a glance

## 3.1 The *VSDControl* main screen

The main screen of the *VSDControl* utility shows the present configuration, the local date/time and the assembled VSD sentence, which will be updated according to user input.

Menu selections are made by means of *hot keys* or mouse clicks.



```
VSDControl  -  NORGE / LAMA / MMSI 257001000
COMM : COM4, 38400, 8, N, 1                          2014.09.20 13:53:58
NMEA : $IIVSD,37,1.1,20,OSCARSBORG,150000,20,09,5,0*48

               ═════════[  MAIN MENU  ]═════════
                  LOAD last-used or BLANK values
                  STEP-BY-STEP data entry

                  Set DESTINATION (Q = default)
                  Set DRAUGHT
                  Set SHIP TYPE
                  Set NAVIGATIONAL STATUS
                  Set PERSONS ON BOARD (POB)
                  Set ARRIVAL DATE & TIME (ETA)
                  Set REGIONAL APPLICATION CODE

                  TRANSFER VSD to AIS unit

                  SETUP - program configuration
                  HELP - information
                  EXIT

               <ESC> EXIT, <F1> TOGGLE NAVSTATUS
```

*Figure 7: The VSDControl main menu.*

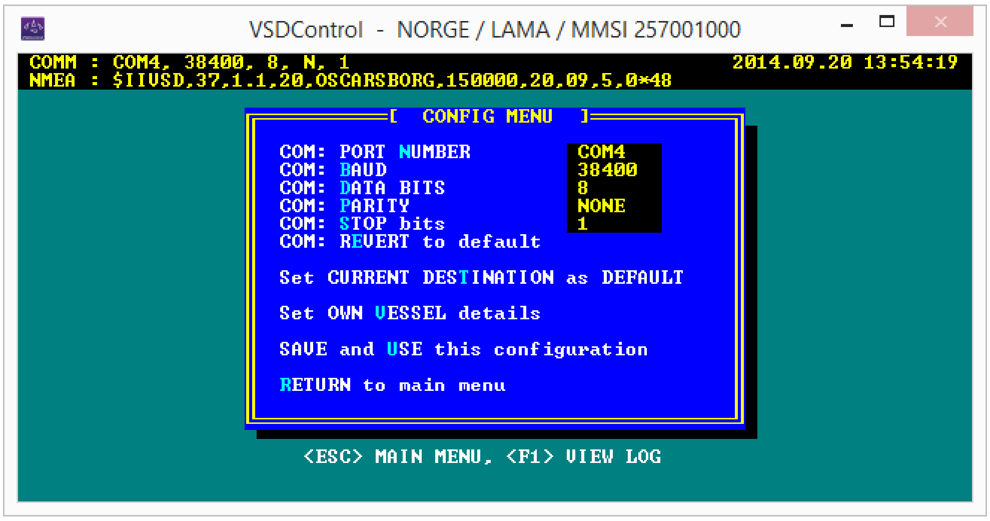
Navigational status can be set either via the appropriate menu item or by toggling between *under way using engine*, *under way sailing*, *at anchor* and *moored* by pressing the `[F1]` key.

## 3.2 The *VSDControl* setup screen

Changing configuration parameters, including own vessel data and viewing the program log can be achieved from the *setup* menu.

Menu selections are made by means of *hot keys* or mouse clicks. The program log file can be viewed by pressing function key `[F1]`. The log file can be cleared by pressing function key `[F5]`.

All settings are stored in the `VSDControl.INI` file. Section 3.5 details the contents of this file.



```
VSDControl  -  NORGE / LAMA / MMSI 257001000
COMM : COM4, 38400, 8, N, 1                              2014.09.20 13:54:19
NMEA : $IIVSD,37,1.1,20,OSCARSBORG,150000,20,09,5,0*48

            ═[  CONFIG MENU  ]═

  COM: PORT NUMBER              COM4
  COM: BAUD                     38400
  COM: DATA BITS                8
  COM: PARITY                   NONE
  COM: STOP bits                1
  COM: REVERT to default

  Set CURRENT DESTINATION as DEFAULT

  Set OWN VESSEL details

  SAVE and USE this configuration

  RETURN to main menu

        <ESC> MAIN MENU, <F1> VIEW LOG
```

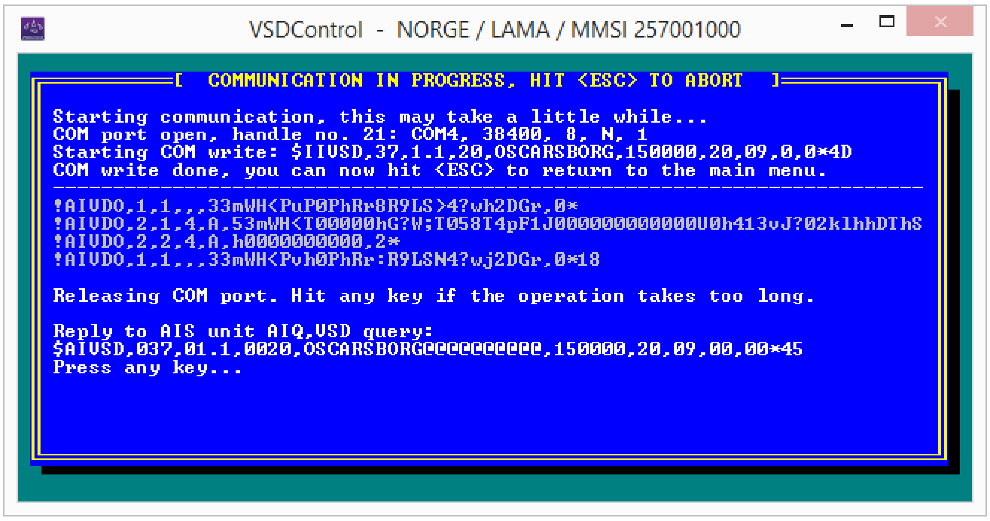
*Figure 8: The VSDControl setup menu. COM ports 1 thru 16 are supported.*

## 3.3 Transferring vessel static data to the AIS unit

Vessel static data will only be transferred to the AIS unit once the user selects the *TRANSFER VSD to AIS unit* menu item. The serial port will then be opened and the VSD sentence transferred to the AIS unit.

The *VSDControl* utility will then monitor the serial line for incoming data and display whatever is received. Received data will also be logged to the `VSDCapture.TXT` file.

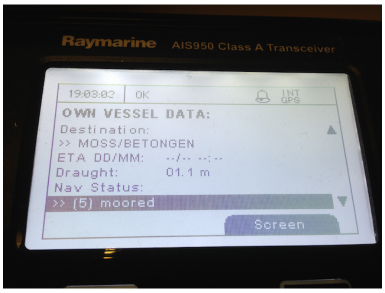
By default, an *AIQ,VSD* query will also be sent to the AIS unit. The response will be displayed and the user should verify that it matches the updated VSD sentence.



```
═══════[  COMMUNICATION IN PROGRESS, HIT <ESC> TO ABORT  ]═══════

Starting communication, this may take a little while...
COM port open, handle no. 21: COM4, 38400, 8, N, 1
Starting COM write: $IIVSD,37,1.1,20,OSCARSBORG,150000,20,09,0,0*4D
COM write done, you can now hit <ESC> to return to the main menu.
-------------------------------------------------------------------------
!AIVDO,1,1,,,33mWH<PuP0PhRr8R9LS>4?wh2DGr,0*
!AIVDO,2,1,4,A,53mWH<T00000hG?W;T058T4pF1J000000000000U0h413vJ?02klhhDThS
!AIVDO,2,2,4,A,h0000000000,2*
!AIVDO,1,1,,,33mWH<Pvh0PhRr:R9LSN4?wj2DGr,0*18

Releasing COM port. Hit any key if the operation takes too long.

Reply to AIS unit AIQ,VSD query:
$AIVSD,037,01.1,0020,OSCARSBORG@@@@@@@@@@,150000,20,09,00,00*45
Press any key...
```

*Figure 9: Transferring the VSD sentence to the AIS unit, followed by the response to the AIQ,VSD query.*

The VSD sentence sent to the AIS unit adheres to the specification described in section 1.2.



OWN VESSEL DATA:
Destination:
>> MOSS/BETONGEN
ETA DD/MM: --/-- --:--
Draught: 01.1 m
Nav Status:
>> (5) moored

*Figure 10: The Raymarine AIS950 display showing destination and nav status values entered into the unit by means of the VSDControl utility.*

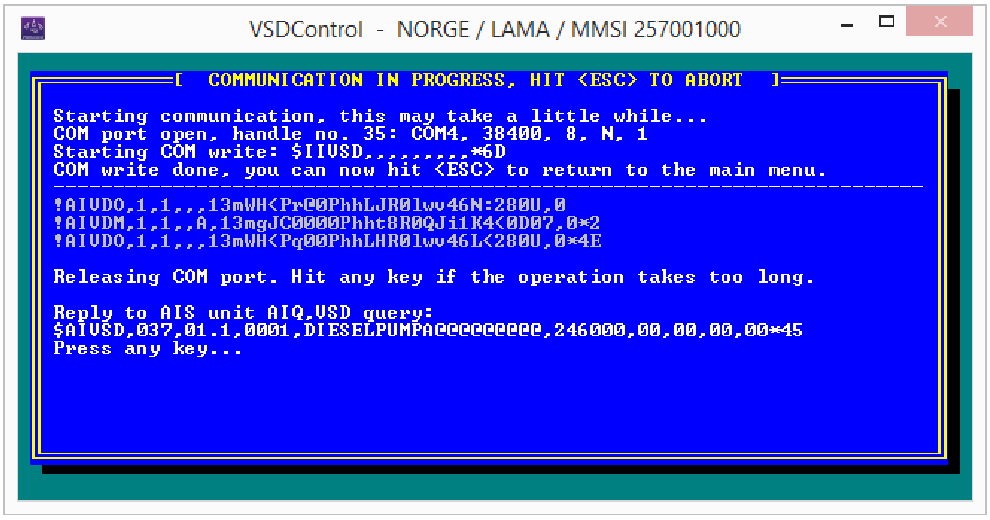
## 3.4 Monitoring AIS output/serial data

The *VSDControl* utility can also be used to monitor the serial data output from the AIS unit and query the unit for the present VSD values.

Simply leave the VSD sentence blank (or select the *LOAD last-used or BLANK values* menu item to reset the VSD sentence). The VSD sentence will then contain a sequence of nine commas (`,`) and no additional data — except the leading `$--VSD` and the trailing `*hh` structure (`--` refers to the *talker ID* and `*hh` indicates the calculated checksum). The "empty" VSD sentence indicates that no change should be made to any of the VSD parameters.

AIS output data will scroll over the screen. Pressing `<ESC>`, the *AIQ,VSD* query will be sent to the AIS unit and the response will be displayed.

Received serial data will always be logged to the `VSDCapture.TXT` file.



```
=========[  COMMUNICATION IN PROGRESS, HIT <ESC> TO ABORT  ]=========

 Starting communication, this may take a little while...
 COM port open, handle no. 35: COM4, 38400, 8, N, 1
 Starting COM write: $IIVSD,,,,,,,,,*6D
 COM write done, you can now hit <ESC> to return to the main menu.
 ------------------------------------------------------------------------
 !AIVDO,1,1,,,13mWH<Pr@0PhhLJR0lwv46N:280U,0
 !AIVDM,1,1,,A,13mgJC0000Phht8R0QJi1K4<0D07,0*2
 !AIVDO,1,1,,,13mWH<Pq00PhhLHR0lwv46L<280U,0*4E

 Releasing COM port. Hit any key if the operation takes too long.

 Reply to AIS unit AIQ,VSD query:
 $AIVSD,037,01.1,0001,DIESELPUMPA@@@@@@@@@,246000,00,00,00,00*45
 Press any key...
```

*Figure 11: No changes to any VSD parameters, only performing the AIQ,VSD query.*

## 3.5 The *VSDControl.INI* file

The `VSDControl.INI` files stores configuration settings, last-used values, etc. The contents of the file is described below.

```
[OWNSHIP]
NAME=NORGE
CALLSIGN=LAMA
MMSI=257001000

[NMEA]
TalkerID=II
PREAMBLE=SPW,E,1,00000000,,,0

[RS232]
COMPORT=COM4
BAUD=38400
DATABITS=8
PARITY=0
STOPBITS=0

[LASTVALUES]
TIMESTAMP=2014.09.20 09:08:07
SHIPTYPE=37
DRAUGHT=1.1
POB=20
DESTINATION=OSCARSBORG
ARRIVALUTC=150000
ARRIVALDAY=20
ARRIVALMONTH=09
NAVSTATUS=5
REGIONALAPPLICATION=0
SENTENCE=$IIVSD,37,1.1,20,OSCARSBORG,150000,20,09,5,0*48

[MISC]
AIQ=1
ASKSHIPTYPE=0
ASKRAC=0
VALIDCHARS=ABCDEFGHIJKLMNOPQRSTUVWXYZ@?>=<
;:0123456789/.-+*)('&%$#"! _^]\[

[DESTINATIONS]
DEFAULTDESTINATION=MOSS
```

**TalkerID** Is the *NMEA* talker ID used by *VSDControl*. Default value: *II*. For a list of generally recognized talker IDs, refer to [14].

**RS232 settings** The *parity* and *stopbits* settings reflect the *PowerBASIC* values used, not the clear-text representation of the actual values. Any COM port will be accepted, although *VSDControl* itself will only allow selection of COM ports 1 thru 16. If a higher port number is desired, simply modify the INI file as required.

**AIQ** Set to 1, *VSDControl* will send the *AIQ,VSD* query to the AIS unit after sending the VSD sentence. The result of the query will be displayed on the screen. If the AIS unit does not support the *AIQ,VSD* query, simply set the `AIQ` value to `0`.

**ASKSHIPTYPE** Set to 1, *VSDControl* will include the *ship type* prompt in the *STEP-BY-STEP data entry* process. As the ship type will normally remain unchanged from voyage to voyage, this prompt can be excluded from the data entry process by setting the `ASKSHIPTYPE` value to 0.

**ASKRAC** Set to 1, *VSDControl* will include the *regional application code* prompt in the *STEP-BY-STEP data entry* process. As this field is rarely used, it is can be excluded from the data entry process by setting the `ASKRAC` value to 0.

**PREAMBLE** A *preamble* containing a password may be required by some AIS units to allow updates to certain VSD parameters. Refer to [3] and [2] for details. Please note that *VSDControl* will not check for a negative acknowledge sentence indicating that a wrong password was supplied.

A non-empty string will send the specified *preamble* text to the AIS unit before the VSD sentence is sent. The specified *preamble* will be prefixed with the `$` sign and the specified *TalkerID*. The *NMEA 0183* checksum will be added after the *preamble*. In the above example, `$IISPW,E,1,00000000,,,0*10` will be sent immediately before the VSD sentence, supplying `00000000` as the password.

**VALIDCHARS** Lists the characters which will be accepted by the AIS unit for the *destination* field. The line break is inserted for clarity only and should *not* be included in the INI file. Only those characters which can be encoded using 6-bit ASCII should be included.

### 3.6 *VSDControl* files

The following files are included in the *VSDControl* distribution or created during program execution. Access requirement(s) are also listed (read/write):

| File | R/W | File contents |
|---|---|---|
| `VSDControl.EXE` | R | Executable file — main program. |
| `VSDControl.INI` | RW | INI file to store configuration settings. |
| `VSDLog.TXT` | RW | Log file of program events. |
| `VSDCapture.TXT` | W | Capture file — data from serial communication session. |
| `Version.TXT` | - | Revision history. |
| `CT_PRO.DLL` | R | *Console Tools* support library. |
| `Main.SCR` | R | Screen layout file. |
| `Setup.SCR` | R | Screen layout file. |
| `ShipType.INI` | R | Ship type codes/definitions. |
| `Status.INI` | R | Navigational status codes/definitions. |
| `VSDControl.PDF` | R | This PDF file — documentation. |
| `uninst.exe` | R | Uninstall utility. |

# 4 Et cetera

## 4.1 How and why *VSDControl* came into being

The *VSDControl* utility saw daylight once the author became sufficiently tired of updating the VSD parameters from the front panel of the *Raymarine AIS950* unit. The Norwegian summer season is simply too short to be spent playing with the knobs of the AIS front panel.

*VSDControl* is made in *PowerBASIC* [9], using the *Console Tools* [8] add-on. Most of the program was written as a time-passing exercise during a late-summer sailing trip totalling some 1,100 nautical miles — in August/September of 2014.

The documentation was written at a later stage, using *Emacs* and LaTeX.

## 4.2 Questions and answers

### Will there ever be a *SSDControl* utility?

Probably not, but features to update station static data (SSD) may be included in a future release of the *VSDControl* utility.

### Why won´t the *VSDControl* utility work with class B AIS transponders?

Actually, it does. But class B units do not support or transmit the full VSD payload.

### Is *VSDControl* a DOS[3] program? It sure looks like one!

No. *VSDControl* is a proper and respectable *Win32* application. It requires *Windows XP* or a newer *Windows* version to run. It does, however, operate in character mode, as a *console application*.

### Written in ... *PowerBASIC*, you say?

Indeed. Using the *PowerBASIC Console Compiler*, which allows developers to write fast, compact executables.

For *VSDControl* I opted for an old-school ”DOS-lookalike” user interface as I really had no motivation to draw a *Windows* GUI[4] (GUI layout in rough seas isn‘t for me).

Adding to that, *VSDControl* does what it does, regardless of a character-based UI or a GUI. Thanks to the *Console Tools* add-on, adding standard *Windows* elements such as message boxes, input boxes, etc. was just a few lines of code away.

[3] Referring to the *Microsoft Disk Operating System* (MS-DOS) — from the pre-*Windows* era

[4] Graphical User Interface

## 4.3 Known issues

### Some *Windows* dialogs won‘t respond to mouse events

Probably a shortcoming of the *Console Tools* add-on, which only affects select *Windows* versions. Use the keyboard instead (arrow keys, `[TAB]`, `[ESC]` and `[ENTER]` keys).

### Ship type is not updated in the AIS unit

The AIS unit may require a password before it accepts updates to the ship type paremeter. Please refer to [2], [3] and section 3.5 for details.

### *Windows UAC* problems

The *VSDControl* utility requires read and write access to several of the files residing in the *VSDControl* program folder. The *Windows UAC*[5] mechanism introduced in *Windows VISTA* and also found in later *Windows* versions may or may not interfere if *VSDControl* is installed to the `Program files` or `Program files (x86)` folder.

It is therefore recommended to install the *VSDControl* utility to the `VSDControl` folder or another folder *outside* the `Program files` folder.

## 4.4 Contact information

Contact information, web address, Google Groups discussion forum, et cetera:

Torkel M. Jodalen
Glassv. 71
NO-1515 Moss
Norway

Email → `tmj@bitwrap.no` (no support or technical questions, please). This email address is also the *PayPal* ID which can be used for donations if you find the *VSDControl* utility useful.

Web → `http://www.annoyingdesigns.com/vsd`

Google Groups → `https://groups.google.com/group/vsdcontrol`
(feel free to post your technical questions here).

Remember → Always have the appropriate amount of fun.

[5] User Account Control

# References

[1] SAAB TransponderTech AB. R5 SOLID AIS System. http://www.saabgroup.com/Global/Documents%20and%20Images/Civil%20Security/Maritime%20Transportation%20and%20Port%20Security/R5%20SOLID/Manuals/7000%20118-200,A4,R5%20Solid%20AIS%20Transponder%20System.pdf, 2012. Accessed: 2014-09-12.

[2] National Marine Electronics Association. Technical Bulletin. Amendment to NMEA0183 version 4.10 (AT 0183 20131216). http://www.nmea.org/Assets/20131216%200183%20amendment%20epv_spw_trl%20%20ver3.pdf, 2013. Accessed: 2014-10-02.

[3] Raymarine Technical Support Community. AIS 950 VSD sentence. http://raymarine.ning.com/forum/topics/ais950-vsd-sentence, 2014. Accessed: 2014-10-03.

[4] Microsoft Corporation. Overview of the COMDisable Tool. http://support.microsoft.com/kb/819036, 2007. Accessed: 2014-09-12.

[5] Microsoft Corporation. Serial device may be detected as a serial mouse in Windows 2000 (KB article 283063). http://support.microsoft.com/kb/283063, 2007. Accessed: 2014-09-15.

[6] United States Coast Guard. Automatic Identification System Encoding Guide. http://www.uscg.mil/hq/cg5/TVNCOE/Documents/links/AIS.EncodingGuide.pdf, 2012. Accessed: 2014-09-21.

[7] International Maritime Organization (IMO). Guidelines for the installation of a shipborne automatic identification system (AIS). http://www.imo.org/OurWork/Safety/navigation/documents/227.pdf, 2003. Accessed: 2014-10-09.

[8] PerfectSync Inc. Console Tools. http://www.perfectsync.com/pp/DevTools/ConsoleTools/ConTools.php, 2013. Accessed: 2014-09-12.

[9] PowerBASIC Inc. PowerBASIC. http://www.powerbasic.com, 2014. Accessed: 2014-09-12.

[10] Raymarine UK Ltd. AIS950 installation and operating instructions (document no. 87149-1). http://www.raymarine.eu/WorkArea/DownloadAsset.aspx?id=3296, 2011. Accessed: 2014-09-15.

[11] SRT Marine Technology Ltd. Advanced AIS Technology. http://www.srt-marine.com, 2013. Accessed: 2014-09-12.

[12] Steve Matt. The FixSerialBallpoint utility. http://www.stevematt.f9.co.uk/FixSerial/fixserial.htm. Accessed: 2015-03-08.

[13] Stentec Navigation. COM Port P&P blocker for stable GPS-connection. http://www.stentec.com/en/news/new-com-port-pap-blocker-for-stable-gps-connection, 2013. Accessed: 2014-10-06.

[14] Eric S. Raymond. NMEA Revealed. http://www.catb.org/gpsd/NMEA.html#_talker_ids, 2014. Accessed: 2014-09-22.

## Revision history

A working implementation of the *VSDControl* utility was first released in September, 2014. The `Version.TXT` file included in the *VSDControl* setup package details updates to the software itself.

The revision history of this document is recorded below.

| Date | Change(s) applied |
|---|---|
| 2016.08.08 | Minor editorial changes. |
| 2015.11.12 | Minor editorial changes. |
| 2015.03.08 | Added reference to the *FixSerialBallpoint* utility [12]. |
| 2014.10.29 | Minor editorial changes. |
| 2014.10.07 | Renumbered some paragraphs. |
| 2014.10.06 | Updated section 2.2. |
| 2014.10.03 | Updated section 3.5. |
| 2014.09.26 | Added information to section 4.3. |
| 2014.09.24 | Renumbered some paragraphs. |
| 2014.09.22 | Initial public release. |