DRIVERS AND INTERFACING MANUAL

QINSy Versions 7.x

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TRADEMARK ACKNOWLEDGEMENTS

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MANUAL OBJECTIVE

This manual is intended as a supplement to the QuickStart document, in order to describe special additions to the Acquisition Software. Thereafter, further details can be found in the Online Help that comprises module specific help along with relevant reference material.

1. INTERFACING

1.1 Introduction

The Acquisition Software is PC (personal computer) based, comprises a suite of programs built using the MS Visual C++ language, and runs under the Windows NT (WinNT®) 32 bit operating systems.
The Acquisition Software has a very solid base structure (*core elements*) upon which various modules can be built to provide the functionality (*client applications*) needed to perform any type of survey.

I/O drivers enable the Acquisition Software to communicate with input and output devices. Each *input driver* is a separate executable that deciphers the input data string, stripping out and distributing the various pieces of information to the individual Acquisition Software modules needing them. Each *output driver* is a separate executable that compiles the required output data into a predefined format which can be read and deciphered by an external device or software application.

Complete modularity of the Acquisition Software drivers means that additional device drivers can be added to your system without re-compilation of the entire software package. Moreover, drivers for new devices or new output requirements can be added without re-compilation.

1.2 General Interfacing Remarks

Any intelligent multi-channel communications card supported by the WinNT/95® operating systems will work with the Acquisition Software. This means you are not limited to communications boards preferred by us, as long as the manufacturer supplies the Windows® virtual interface drivers which map the interface ports as standard COM ports (RS-232). Multi-channel communications also includes PCMCIA cards which means the Acquisition Software will run on a notebook style computer. WinNT® will support the definition of up to 256 serial COM ports.

The cable wiring to a 9-pin COM port and a 25-pin COM port (RS-232) is as follows:

COM DB-9	
Pin	***Function***
2	RXD
3	TXD
5	SG

COM DB-25	
Pin	***Function***
2	TXD
3	RXD
7	SG

For some Acquisition Software drivers, it is important that the wiring is bi-directional. If a device needs handshaking, 9-pin cables can be configured for handshake by connecting 7 RTS and 8 CTS, and 25-pin cables by connecting 4 RTS and 5 CTS. See the driver descriptions.

The usual way to configure the Acquisition Software to use a specific I/O driver is to just add a system to the database. Start the Database Setup module and add the appropriate survey and object details. Thereafter, add a system for each measurement device or output string. Use a unique identification number for each system, complete its name and select the system type from the list. Select the Interfacing tab (select I/O Parameters if necessary) and enter the diver interface parameters. Complete the system configuration by connecting the appropriate observation(s) and node(s), and defining the system parameters.

It is important that the Date, Time and Time Zone of the PC are properly set, because some input drivers in the Acquisition Software use these settings to identify the proper date if only a time is decoded. For some measurement devices, in order to be able to use all different types of observations contained in one device output string, more than one system has to be added to the Acquisition Software database, using the same driver name and interface parameters for the different types of systems. Furthermore, some Acquisition Software drivers have a separate driver user interface. Refer to the individual driver descriptions and the release notes for more information.

If specific Acquisition Software interfacing remarks are suggested for clarification or completeness, then prescribed or recommended interface parameters, procedure for setting up the Acquisition Software database parameters, procedure for setting up sensor and parameters, cable wiring and connection notes, and/or interface testing notes are given in the individual driver descriptions.

1.3 Driver Input/Output Testing

Input/Output can be tested using the I/O Test utility, the HyperTerminal program under WinNT® (see Accessories group) or Procomm Plus under MS-DOS, which can also be used to change the settings on certain devices. Just start HyperTerminal, select a COM port and modify the port settings. If a connection is properly configured, data will be displayed. ASCII strings should be easily readable. Recording a sample of ASCII data can be done with all three programs, though recording a sample of binary data should only be done with either the I/O Test utility or Procomm Plus programs. The separate RTCM IO Tester utility can be used to display incoming RTCM-104 type 1/9 and 2 messages.

The Acquisition Software Survey (Online) program can also be used to test and verify driver input. The Observation Physics display shows raw data as decoded by the Acquisition Software input drivers, and can be opened without computations configured. When observations are displayed, it is not only an indication that the input string is decoded, but also that the data is distributed within the Acquisition Software.
The Positioning System display will show data that has been decoded from the output string of a positioning system. The EchoSounder / Raw Multibeam displays show raw depths from echosounder systems. Finally, the Timeplot display can also show raw observations.

Online, with the Controller and I/O modules started, if all I/O is properly configured (device connection, interface port selection and system configuration) the Controller should indicate, with the three status lights, that the three main processes of I/O, Computation and Deskewing are working. You can use the Computation Wizard to configure the computations.

2. INPUT/OUTPUT DEVICES

2.1 INTERFACE CARDS

2.1.1 GTEK PCSS-8IA

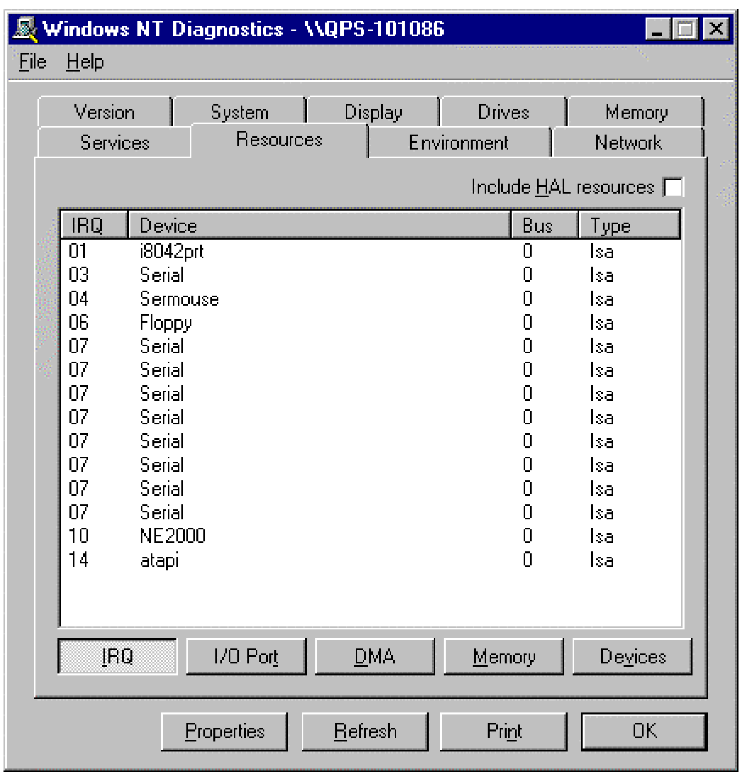
Last modified: 1997-Oct-10

General Description

GTEK PCSS-8IA Intelligent Super Serial Coprocessor Cards provide 8 independent RS-232 asynchronous serial communication channels per board. Both transmitted and received data is buffered on the board with no overhead on the host computer's processor. Each PCSS-8IA board occupies only 4 I/O addresses.

Installation Notes

Before installing the board in the PC, a unique I/O port and a memory base address used to map the memory, as well as a shared IRQ number, need to be determined. In order to check all the available options under Windows NT, choose "Programs" - "Administrative Tools" - "Windows NT Diagnostics" from the "Start" menu, and select the "Resources" tab to evaluate both the IRQ numbers and I/O Port addresses which are already used. The example below gives a list of IRQ numbers *after* the GTEK board has been installed.



Jumper Settings for I/O Port Addresses

Jumper block JB1 selects one of seven base addresses for the PCSS-8IA. In the following list, "ON" means jumper installed between the two pins (sequence 1-2-3). Notice that you need *no* jumper to use the default.

OFF-OFF-OFF for 2E0h; ON-OFF-OFF for 2E4h; OFF-ON-OFF for 210h; ON-ON-OFF for 214h; OFF-OFF-ON for 218h; ON-OFF-ON for 21Ch; OFF-ON-ON for 220h (ON-ON-ON is not allowed).

Jumper Settings for IRQ Selections

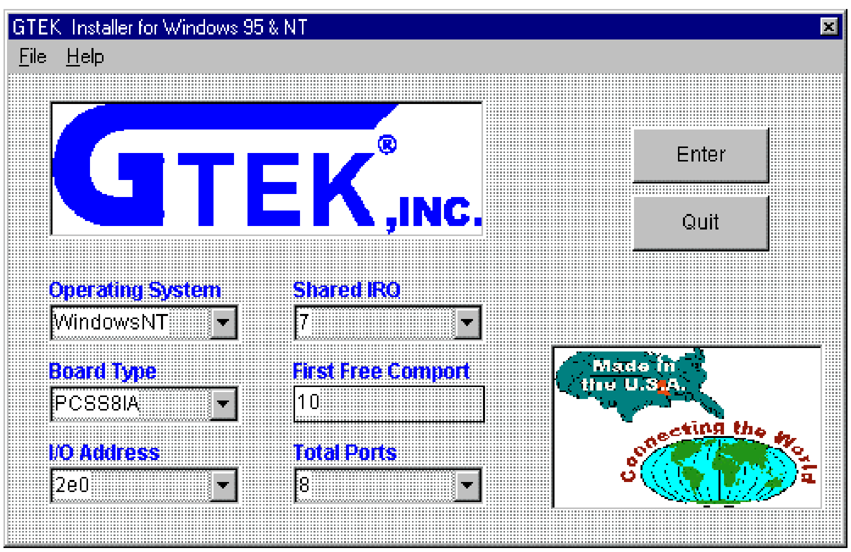
Jumper block JB3 selects the desired interrupting function with a *single* jumper on number 2, 3, 4, 5, or 7.

GTEK Setup and Installation

After the JB1 and JB3 jumpers have been set and the PCSS-8IA interface board has been installed in the PC, the GTEK files have to be installed. In most cases, these files are available on CD-ROM or floppy. If only a ZIP archive is available, e.g. 95NT(1).ZIP, extract all the files in the ZIP file to a temporary directory. Run SETUP.EXE and follow the instructions. After a successful setup, choose "Programs" - "GTEK" - "GTEK" from the "Start" menu and select the appropriate parameters. Press "Enter", shutdown and restart Windows. The result of the GTEK installation can best be tested by using the HyperTerminal (or GTERM) program.

GTEK Installation Example

An example of a typical GTEK installation is shown below. The I/O address is the default 2E0h using no shorting jumper. The first COM port 10 is chosen to correspond to port 0 on the GTEK expander box.



Note. *In case the GTEK installation has NOT been successful, its COM ports must be deleted using the "Settings" - "Control Panel" - "Ports" command from the Windows "Start" menu.*

2.1.2 DigiBoard PC/8e, AccelePort 8e

Last modified: 1997-May-01

General Description

The Digi PC/8e and AccelePort 8e boards, which are functionally identical, are multi-channel intelligent serial communication boards for computers equipped with at least one 16-bit ISA slot.
The CPU of the AccelePort 8e board is a 16-bit 80186 processor. The card is equipped with a 64 Kb of dual-ported high-speed RAM used for the program running on the card and for buffering of the data. It allows the board to support a throughput of 57600 bps for each of the 8 asynchronous ports.

The processor and the dual ported RAM relieve the computer of burden of managing the serial ports. The operating system can transport large blocks of data directly to the memory on the board, then move on to other tasks while the board sends out the data one character at a time. Similarly, the board receives incoming data and stores it in its memory so that the operating system only needs to read it periodically.

The dual ported RAM is mapped into a 64 or 8 Kb unused area in the computer's memory address space (typically somewhere between C0000h and EFFFFh - the area traditionally reserved for expansion board BIOS's and dual ported memory).

Installation Notes

Before installing the board in the PC a unique I/O port and a memory base address used to map the dual ported memory need to be determined. To help the user with this two utilities are provided with the board.

<u>DIGIMMAP.EXE</u>
This program helps a user to find a 64 or 8 Kb large memory region that can be used to map the dual ported memory. It is located in the \DIAGS directory of the floppy disk provided with the DigiBoard. QPS normally uses a 8 Kb memory region. For further information please run the program and follow the instructions.

<u>UD-CISC.EXE</u>
This program allows a user to verify that the board is functioning correctly. It is also located in the \DIAGS directory of the floppy disk provided with the board. Be sure to use correct settings such as board address, window size (8 Kb), memory address and IRQ setting (disabled). For further information please refer to the "User Diagnostics Manual" which is stored in the same directory on the floppy disk as USERCISC.TXT.

<u>IMPORTANT</u>: With some PC's it is necessary to specifically set the ISA MEM BLOCK BASE to the required address and windows size in the computer BIOS.

DIP Switch Settings for I/O Port Addresses

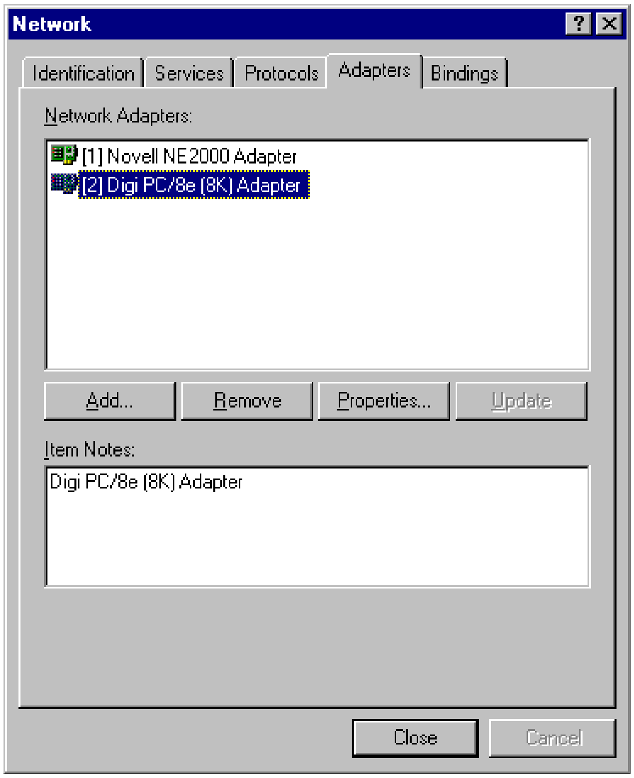
The first 8-bit I/O register, which the computer uses to configure the board, is defined by setting switches 1-3 on DIP switch DS1. The other three registers occupy consecutive addresses. If you are installing multiple 8e boards, each board must have its own I/O addresses. The switch settings for the different I/O ranges are as follows. The fourth switch should always be in the ON position (towards the circuit board). See manual.

OFF-OFF-ON for 100h-103h; OFF-ON-OFF for 110h-113h; OFF-ON-ON for 120h-123h; ON-OFF-OFF for 200h-203h; ON-OFF-ON for 220h-223h; ON-ON-OFF for 300h-303h; ON-ON-ON for 320h-323h.

Windows NT Adapter Drivers

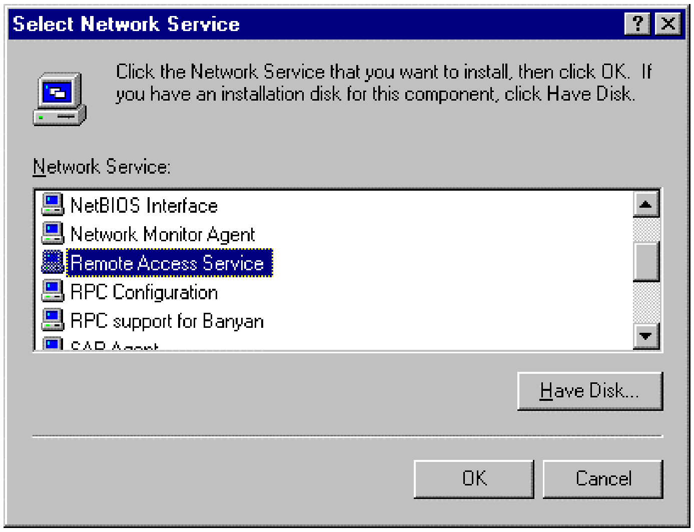
According to the manual supplied with the Digi 8e board, drivers included with the Windows NT operating system should be used. However, earlier versions of Windows NT did not contain Digi 8e drivers but later versions (3.51 and later) included all drivers. Below you will find an installation of a Digi 8e on a NT 4.00 system, but it is also valid for Windows NT 3.51, except that the user interface is different. The next figure shows the network adapters settings after adding the driver.

The Network settings icon is located on the computer's Control Panel. Select the Adapters tab and add the Digi PC/8e (8K) Adapter by selecting it in the Network Adapter Option List.



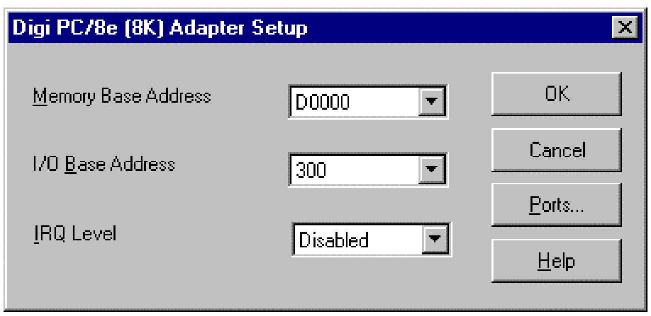
<u>Note</u>. *In case no network adapter is available, remove all items that are listed in the Network Services tab (Installed Network Software part for NT 3.51) of the Network dialog (figure above).*

<u>Note</u>. *Another way to get the DigiBoard operational when no networking is available, is to Add the Remote Access Service Software (next figure). The settings as displayed in the Installed Network Software can remain in place when this method is used.*



Windows NT Adapter Setup:

After adding the network adapter using the "Add..." button, the settings need to be configured using the "Properties..." or "Configure..." button. The next figure shows the settings as used in the QPS office.



Memory Base Address
The Memory Base Address field identifies the start of the adapter's dual ported memory, which is used for data transfer between the computer and the adapter board. The actual size of the dual ported memory is dependent upon the adapter type: The AccelePort 8e requires either 64 or 8 Kb bytes of memory. Use the DIGIMMAP utility to determine which base address choices are free. To set the memory base address, click on the Memory Base Address field, then click on the desired address. The setting used was D0000h.

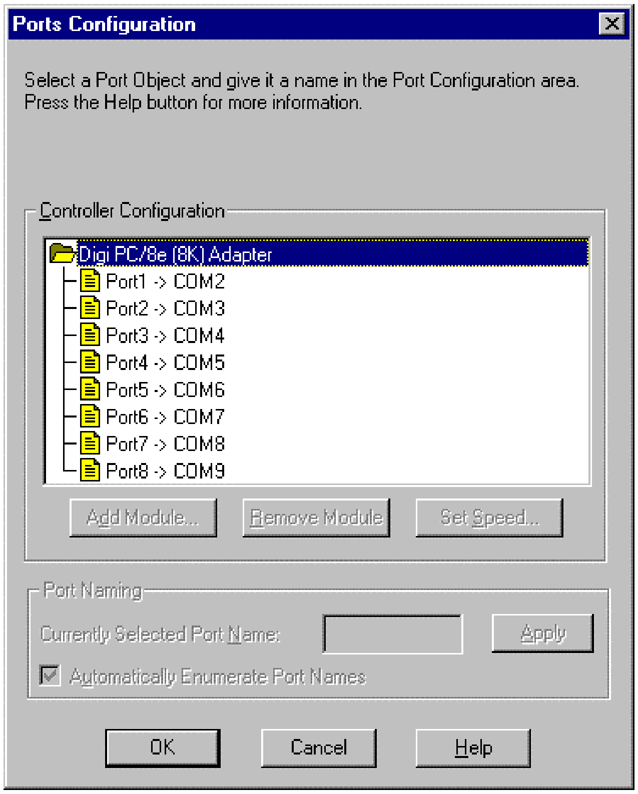
I/O Base Address
The I/O base address is the address of the first I/O port on the AccelePort adapter. The number of I/O ports used is 4 according to the documentation .The I/O ports are used for low-level control functions. The I/O Base Address field must match the setting of the switches on the back of the board, and must not conflict with any other devices in the system. To set the I/O base address, click on the I/O Base Address field, then click on the address that corresponds to the setting of your adapter. The setting used was 300h, which caused no conflicts with other devices. (Switches 1, 2 & 4 Down and 3 Up).

IRQ Level

The Digi driver for Windows NT does not use interrupts, and the IRQ Level field should be set to Disabled.

Windows NT Port Configuration

After the previous settings are entered, port assignments need to be checked. The figure gives an example.



After accepting all the necessary settings, the configuring of the adapter is now finished and after leaving the Network settings dialog the operating system should tell you that the PC needs to be rebooted.

After the PC has been rebooted the functionality of the input and output ports can easily be tested using the HyperTerminal program which is available in the Accessories program group.

2.1.3 DigiBoard PC/16e

Last modified: 1997-May-01

General Description

The Digi PC/16e board is a multi-channel intelligent serial communication board for computers equipped with at least one 16-bit ISA slot. The CPU of the DigiBoard is a 80C186 processor. The card is equipped with a 64 Kb of dual-ported high-speed RAM used for the program running on the card and for buffering of the data. It allows the board to support a throughput of 57600 bps for each of the 16 asynchronous ports.

The processor and the dual ported RAM relieve the computer of burden of managing the serial ports. The operating system can transport large blocks of data directly to the memory on the board, then move on to other tasks while the board sends out the data one character at a time. Similarly, the board receives incoming data and stores it in its memory so that the operating system only needs to read it periodically.

The dual ported RAM is mapped into a 64-KB unused area in the computer's memory address space (typically somewhere between C0000h and EFFFFh - the area traditionally reserved for expansion board BIOS's and dual ported memory).

Installation

Before installing the board in the PC a unique I/O port and a memory base address used to map the dual ported memory need to be determined. To help the user with this two utilities are provided with the board.

<u>DIGIMMAP.EXE</u>
This program helps a user to find a 64-KB large memory region that can be used to map the dual ported memory. It is located in the \DIAGS directory of the floppy disk provided with the DigiBoard. QPS normally uses a 64 Kb memory region. For further information please run the program and follow the instructions.

<u>UD-CISC.EXE</u>
This program allows a user to verify that the board is functioning correctly. It is also located in the \DIAGS directory of the floppy disk provided with the board. Be sure to use correct settings such as board address, window size (64-KB), memory address and IRQ setting. For further information please refer to the "User Diagnostics Manual" which is stored in the same directory on the floppy disk as USERCISC.TXT.

There are two banks of DIP switches and one jumper on the board which need to be set prior to installing the board into the computer. For 64-KB local RAM boards, the jumper shunt must be placed across pins 1 and 2, for 16 Kb local RAM across pins 2 and 3. DIP bank 1, switches 1-8 are used to set the board's memory start address, switches 9-11 determine the I/O port address. Refer to the manual for setting information. The DIP 2 switches are used to specify the IRQ line (the normal setting is IRQ disabled, all switches turned OFF).

<u>IMPORTANT</u>: With some PC's it is necessary to specifically set the ISA MEM BLOCK BASE to the required address and windows size in the computer BIOS.

Windows NT Adapter/Port Configuration

See DigiBoard PC/8e description for information. Be sure to select the appropriate Digi PC/16e Adapter

2.1.4 ADLink NuDaq PCI-7200 Digital I/O Card

Last modified: 2001-April-06

General Description

ThePCI-7200 is a PCI form factor high-speed digital I/O card, it consists of 32 digital input channels, and 32 digital output channels. High performance designs and the state-of-the-art technology make this card suitable for high-speed digital input and output applications. The PCI-7200 performs high-speed data transfers using bus-mastering DMA via 32-bit PCI bus architecture. The maximum data transfer rates can be up to 12MB per second. It is very suitable for interfacing high-speed peripherals and your computer system.

The PCI-7200 has the following specifications:

Digital I/O (DIO):	32 TTL compatible inputs and outputs
· *Input Voltage:*	
Low:	Min. 0V; Max. 0.8V
High:	Min. +2.0V
· *Input Load:*	
Low:	+0.5V @ -0.6mA max.
High:	+2.7V @+20mA max.
· *Output Voltage:*	
Low:	Min. 0V; Max. 0.5V
High:	Min. +2.7V
· *Driving Capacity:*	
Low:	Max. +0.5V at 24mA (Sink)
High:	Min. 2.4V at -3.0mA (Source)
· *Operating Temperature:*	*0° C ~ 50° C*
· *Storage Temperature:*	*-20° C ~ 80° C*
· *Humidity:*	*5 ~ 95%, non-condensing*
· *Connector:*	one 37-pin D-type and one 40-pin ribbon connector
· *Dimension:*	Compact size, only 98mm (H) X 147mm (L)
· *Power Consumption:*	+5 V @ 500 mA max.

Installation

Because the PCI-7200 is a plug and play device, the interrupt number and I/O port address are assigned by system BIOS. There is no jumper or DIP switch on-board for configuration settings. Choose a PCI expansion slot and make sure this slot supports bus master mode data transfer.

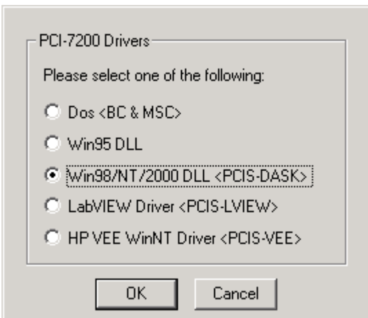
Hardware Installation Procedure

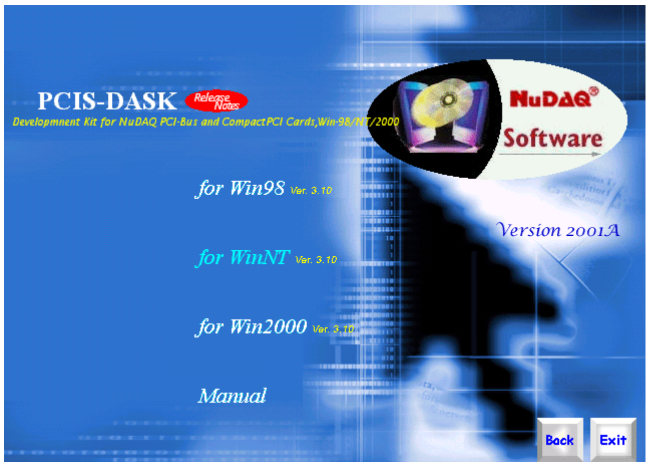
1. Turn off your computer
2. Turn off all accessories (printer, modem, monitor, etc.) connected to computer.
3. Remove the cover from your computer.
4. Select a 32-bit PCI expansion slot. PCI slots are shorter than ISA or EISA slots and are usually white or ivory. *Caution!! Don‘t put the PCI -7200 card into ISA or EISA slot.*
5. Before handling the PCI-7200, discharge any static buildup on your body by touching the metal case of the computer. Hold the edge and do not touch the components.
6. Position the PCI-7200 board into the free PCI slot you selected
7. Secure the PCI-7200 in place at the rear panel of the system unit using screw removed from the slot.

Note. It is of no use to install the backplane with the band ribbon cable as this is not used in *QINSy*.

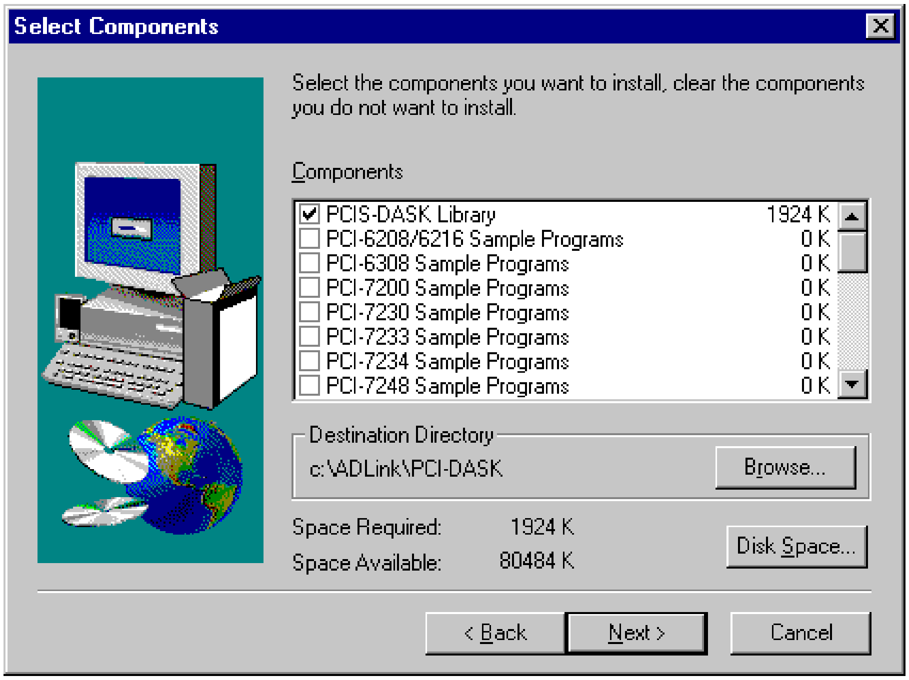
Software Installation Procedure

1. Place *ADLink All-in-One CD* into the appropriate CD-ROM drive.
2. If autorun is not invoked automatically, please click *Start* button on the Taskbar, then choose *Ru*n.
3. Type x:\setup *(x* identifies drive that contains the compact disc) in *Open* text box, then click *O*K.
4. Setup first displays the main screen. Select *NuDAQ PCI*.
5. Setup then displays a list of ADLink available PCI cards. Select *PCI-7200*.
6. Now a small pop-up screen shows up near the cursor, select the *Drivers* entry.
7. This shows up the PCI-7200 Drivers, select *Win98/NT/2000 DLL <PCIS-DASK>* and press *OK* (see figure below, left).
8. Select in the PCIS-DASK Menu, either WinNt or Win2000, depending on your current operating system. This selection will invoke the proper Setup wizard.



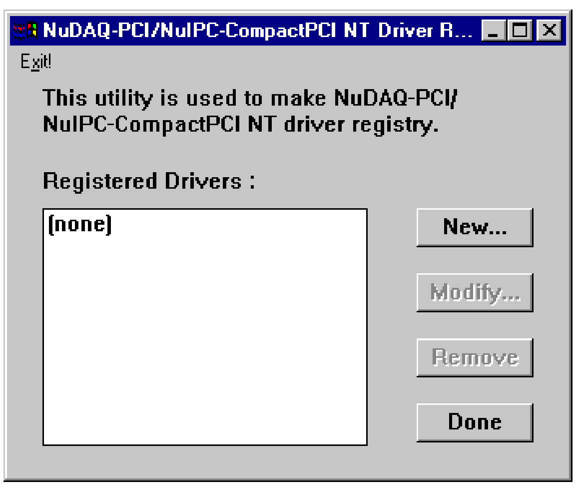


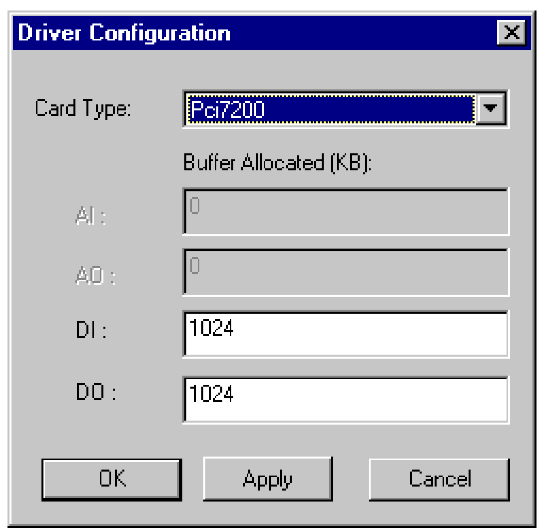
Setup first displays a Welcome dialog box. Please click **Next** button to continue the installation. When Setup displays a User Information dialog box, please fill items in the dialog box. Setup then prompts a dialog box for you to specify the destination directory for ***PCIS-DAS***K. The default path is C:\ADLink\Pci-dask. If you want to install ***PCIS-DASK*** in another directory, please enter the directory you would like to install ***PCIS-DAS***K. Then you click **Next** button and Setup will show the next window where you choose the setup. Choose **Custom** and click **Next**. Now you can select the required components. Make sure the ***PCIS-DASK*** Library is selected. Unselect all the others (sample programs) and click **Next**. The wizard now asks for confirmation to install the required files. When the software component installation process is completed, Setup will launch the NuDAQ PCI Configuration Utility, *PciUti*l. This utility is provided for making the driver registries and card configuration.



PCI Configuration Setup

First Press **New** button. Next select PCI-7200 and leave buffer sizes at their default values of 1024 kB. Press **Apply** button, **OK** button and **Done** button. This closes the application. Next Setup will ask to restart your machine, press restart Now and **Finish**. New settings should be in effect as soon as machine is restarted.





2.1.5 ADLink NuDaq PCI-9118DG Digital I/O Card

The ADLink NuDaq PCI-9118DG is a 16 channel A/D convertor card with the following features:

The PCI-9118 PCI Bus Advanced Data Acquisition Card provides the following advanced features:

- 32-bit PCI-Bus, plug and play
- 12-bit (9118DG/HG) or 16-bit (9118HR) analog input resolution
- On-board A/D 1K FIFO memory
- Channel-Gain queue for high speed acquisition at different gain
- Up to 330KHz (9118DG/HG) or 100 KHz (9118HR) A/D sampling rate

Bipolar or Unipolar input signals

- Auto-scanning channel selection
- 16 single-ended or 8 differential analog input channels
- Bipolar or Unipolar input signals
- Programmable gain of x1, x2, x4, x8 (9118DG/HR) or x1, x10, x100, x1000 (9118HG)
- **Overvoltage Protection :** 70V peak-to-peak
- **Accuracy :** 0.01% of FSR □1 LSB
  0.02% of FSR □1 LSB
- **Input Impedance :** 10,000 MOhm// 6pF
- **Connector :** 50-pin D-type SCSI-II connector
- **Operating Temperature :** 0C ~ 60C
- **Storage Temperature :** -20C ~ 80C
- **humidity :** 5 ~ 95%, non-condensing
- **Power Consumption :**
  PCI-9118DG/HG
  +5V@450mA typical
  +12V@200mA typical
  -12V@50mA typical
  PCI-9118HR
  +5V@485mA typical
  +12V@180mA typical
  -12V@50mA typical
- **Dimension :** Compact size only 102mm (H) x 173mm (L)

Hardware configuration

The PCI cards (or CompactPCI cards) are equipped with plug and play PCI controller, it can request base addresses and interrupt according to PCI standard. The system BIOS will install the system resource based on the PCI cards' configuration registers and system parameters (which are set by system BIOS). Interrupt assignment and memory usage (I/O port locations) of the PCI cards can be assigned by system BIOS only. These system resource assignments are done on a board-by-board basis. It is not suggested to assign the system resource by any other methods.

PCI slot selection

The PCI card can be inserted to any PCI slot without any configuration for system resource.

Installation Procedure

1. Turn off your computer.
2. Turn off all accessories (printer, modem, monitor, etc.) connected to your computer.
3. Remove the cover from your computer.
4. Do not setup any jumpers on the board, factory default (no jumpers) is fine.
5. Select a 32-bit PCI slot. PCI slot are short than ISA or EISA slots, and are usually white or ivory.
6. Before handling the PCI cards, discharge any static buildup on your body by touching the metal case of the computer. Hold the edge and do not touch the components.
7. Position the board into the PCI slot you selected.
8. Secure the card in place at the rear panel of the system.

Software configuration

After installing the PCI card, power up the computer. The Plug and Play operating system will recognize new hardware and asks for a driver location. Enter the Adlink all-in-one in the CDROM station and assign this station. Now driver will be installed. After installing the Windows device driver we must install the appropriate DLLs. Start the Adlink all in one CD, browse through menu items 'Driver installation/NuDaq PCI/PCI9118Win98/NT/2000/XP (PCIS-DASK) and follow the setup instructions (this can be rather slow, be patient). Select the typical configuration. After setup is complete, machine will be restart and the PCI configuration setup program will pop-up. Select the correct card type 9118DG and setup AI input buffer to 1024 kB. Restart machine ones more. This completes the installation procedure.

The Connector at the backplane of the PCI card has the following layout:

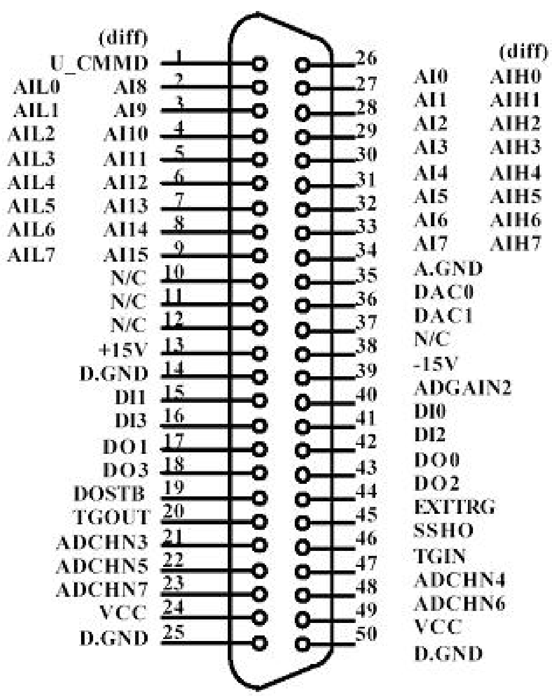


Figure 3.1 Pin Assignment of CN1

2.2 TRIGGER DEVICES

2.2.1 QPS PPS Adapter

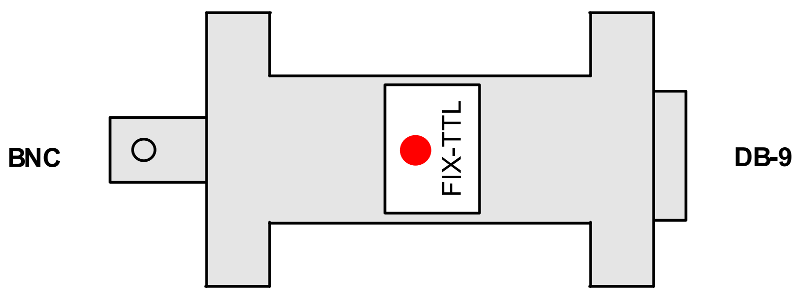
Last modified: 1999-Aug-18

General Description

The QPS PPS Adapter is a hardware extension manufactured by QPS to be used with the Acquisition Software. It has the possibility to receive a TTL pulse that can be used for PPS (Pulse-Per-Second) support.

Device Description

The QPS PPS Adapter only supports one trigger in port that can receive a TTL pulse (FIX-TLL).



QPS PPS Adapter - Top View

Interfacing Notes

Preferably, the PPS adapter is plugged into COM port 1 or 2 of the computer. However, if a cable is going to be used, then power is required, which should be supplied on pin 4 of the DB-9 connector on the adapter.

The serial cable connection between the PPS adapter and the COM port should then be wired as follows:

DB-9 QPS		DB-9 COM	DB-25 COM
Pin 2 FIX in	----------------------	Pin 2 FIX in	Pin 3 FIX in
Pin 4 5V in	----------------------	Pin 4 5V out	Pin 20 5V out
Pin 5 SG	----------------------	Pin 5 SG	Pin 7 SG

2.2.2 QPS Trigger Device MK 2

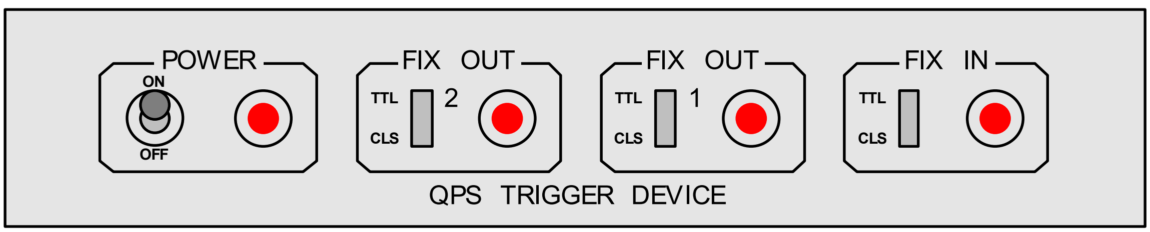
Last modified: 1997-May-01

General Description

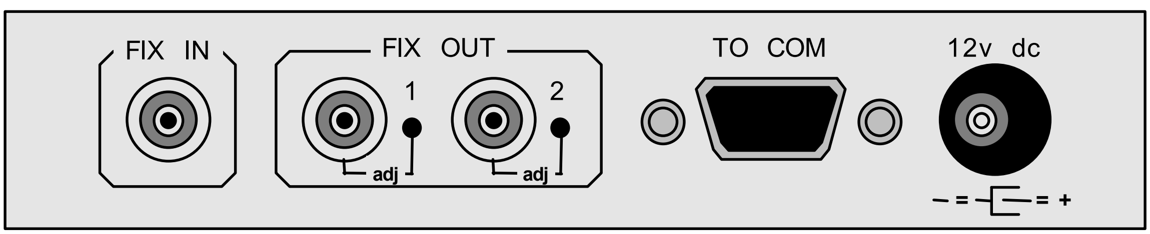
The QPS Trigger Device MK 2 is a hardware extension manufactured by QPS to be used with the Acquisition Software. It has the possibility to receive and/or send closure (CLS) or TTL pulses. Outgoing closure or TTL pulses can be used to trigger external devices, whereas incoming closure or TTL pulses can be used for PPS (Pulse-Per-Second) support or fixmark triggering from other navigation systems.

Device Description

The QPS Trigger Device supports 2 trigger out ports (FIX OUT) and 1 trigger in port (FIX IN). All ports can be configured to send (receive) closure or TTL pulses. The selection can be made with the switches on the front panel of the trigger box. The switch in the up position (TTL) sets the particular port to TTL mode, down (CLS) sets it to closure mode. All trigger ports are BNC connectors on the rear panel of the trigger box. The length of the trigger out pulses can be adjusted with the 2 pot meters next to the BNC connectors. The length of the pulses can be set between 0.1 second (100 milliseconds) and 2.2 second (2200) milliseconds. The time that the trigger LED is on, corresponds with the length of the pulse.



QPS Trigger Device - Front Panel



QPS Trigger Device - Rear Panel

Interfacing Notes

If **trigger out** is used the trigger box needs to be powered by a 12 Volts DC adapter (9 Volts will actually be enough). The serial connection between the QPS trigger box and the COM port should be wired as follows:

DB-9 QPS		DB-9 COM	DB-25 COM
Pin 3 FIX out	----------------------	Pin 3 FIX out	Pin 2 FIX out
Pin 5 SG	----------------------	Pin 5 SG	Pin 7 SG

If **trigger in** is used, the connection between the trigger box and the COM port should be wired as follows:

DB-9 QPS		DB-9 COM	DB-25 COM
Pin 2 FIX in	----------------------	Pin 2 FIX in	Pin 3 FIX in
Pin 5 SG	----------------------	Pin 5 SG	Pin 7 SG

Trigger in and trigger out can be used simultaneously by using two separate cables and three connectors, by connecting (pin 2, 3 and 5 of) the DB9 connector on the rear panel of the QPS trigger box to two different PC COM ports. The wiring of the two cables should be in accordance to the two diagrams given above:

DB-9 QPS
Pin 2 FIX in
Pin 3 FIX out
Pin 5 SG

DB-9 IN	DB-25 IN
Pin 2 FIX in	Pin 3 FIX in
Pin 5 SG	Pin 7 SG

DB-9 OUT	DB-25 OUT
Pin 3 FIX out	Pin 2 FIX out
Pin 5 SG	Pin 7 SG

If **trigger in** is the ***only*** option used, for PPS support for instance, powering is still required, but it can also be supplied through the DB9 connector on the rear panel, instead of from the external adapter. If this last option is chosen the serial connection between the trigger box and the COM port should be wired as follows:

DB-9 QPS		DB-9 COM	DB-25 COM
Pin 2 FIX in	----------------------	Pin 2 FIX in	Pin 3 FIX in
Pin 4 5V in	----------------------	Pin 4 5V out	Pin 20 5V out
Pin 5 SG	----------------------	Pin 5 SG	Pin 7 SG

If this wiring does not power up the QPS trigger box, the external adapter will have to be used.

2.2.3 QPS Trigger Device MK 3

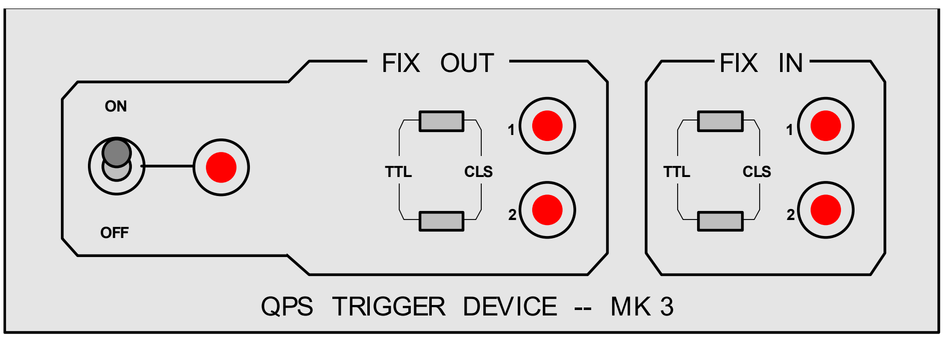
Last modified: 1999-Aug-18

General Description

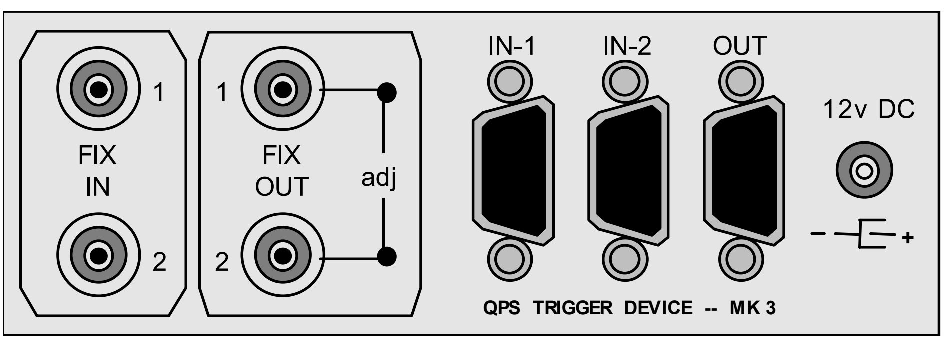
The QPS Trigger Device MK 3 is a hardware extension manufactured by QPS to be used with the *QINSy* online package. It has the possibility to receive and/or send two closure (CLS) or TTL pulses. Outgoing closure or TTL pulses can be used to trigger external devices, whereas incoming closure or TTL pulses can be used for PPS (Pulse-Per-Second) support and fixmark triggering from other navigation systems.

Device Description

The QPS Trigger Device supports 2 trigger out ports (FIX OUT) and 2 trigger in ports (FIX IN). All ports can be configured to send (receive) closure or TTL pulses. The selection can be made with the switches on the front panel of the trigger box. The switch in the left position (TTL) sets the particular port to TTL mode, right (CLS) sets it to closure mode. All trigger ports are BNC connectors on the rear panel of the trigger box. The length of the trigger out pulses can be adjusted with the 2 pot meters next to these BNC connectors. The length of the pulses can be set between 0.1 second (100 milliseconds) and about 2 second (2000) milliseconds. The time that the trigger LED is illuminated corresponds with the length of the pulse.



QPS Trigger Device - Front Panel



QPS Trigger Device - Rear Panel

Interfacing Notes

See the corresponding section under QPS Trigger Device MK 2. For PPS, connect the PPS Pulse from the GPS receiver to the BNC connector " Fix In 1", and connect the serial cable between the 9 pin "Fix In 1" (NOT Fix Out) on the fix box to the 9 or 25 pin on the computer. If PPS is connected to "Fix In 2", connect the serial cable to 9 pin "Fix In 2".

2.2.4 QPS Trigger Device MK 4

Last modified: 2001-May-07

General Description

The QPS Trigger Device MK 4 is a hardware extension manufactured by QPS to be used with the *QINSy* online package. It has the possibility to receive and/or send <u>two</u> closure (CLS) or TTL pulses. Outgoing closure or TTL pulses can be used to trigger external devices, whereas incoming closure or TTL pulses can be used for PPS (Pulse-Per-Second) support <u>and</u> fixmark triggering from other navigation systems.

The input signals now support both positive and negative triggering, to be selected using the two red jumpers on the main print board. To avoid interference, both the FIX IN connections are provided with an input signal block of 0.5 second after receiving a pulse. The output signals are only available for positive triggering. All the input and output connections are safeguarded conform the EMC and EMI electronical directions.

The power supply can be between 100 and 240 V AC 50-60 Hz. The selection can be changed using a button on the front panel. The selected option is indicated by a LED. A 630 mA fuse is used at the power entry.

Device Description

The two adjusters on the back panel work as follows. CW will shorten the duration of the outgoing pulse, CCW will lengthen the duration of the outgoing pulse. The two red jumpers on the main print board can be used to select positive (P) or negative (N) triggering. This can be checked as follows. Switch input to CLS and connect shield and core of the BNC connector. If the pulse LED reacts at once, then the triggering is positive, if the pulse LED reacts when the connetion is broken again, then the triggering is negative.

<u>Note.</u> Always leave the cooling slots open. Never change the adjuster on the power supply (12V).

To be completed.

Interfacing Notes

Cable length between trigger device and computer must be shorter than 290 cm, because of EMC directions.

DB-9 QPS		**DB-9 COM**	**DB-25 COM**
Pin 2 FIX in	--------------------	Pin 2 FIX in	Pin 3 FIX in
Pin 3 FIX out	--------------------	Pin 3 FIX out	Pin 2 FIX out
Pin 5 SG	--------------------	Pin 5 SG	Pin 7 SG

Cable length between trigger device and survey unit must be as short as possible, especially for TTL (PPS).

BNC QPS		**BNC QPS**
Shield	----------------	Signal Ground
Core	----------------	+5 (with TTL)

To be completed.

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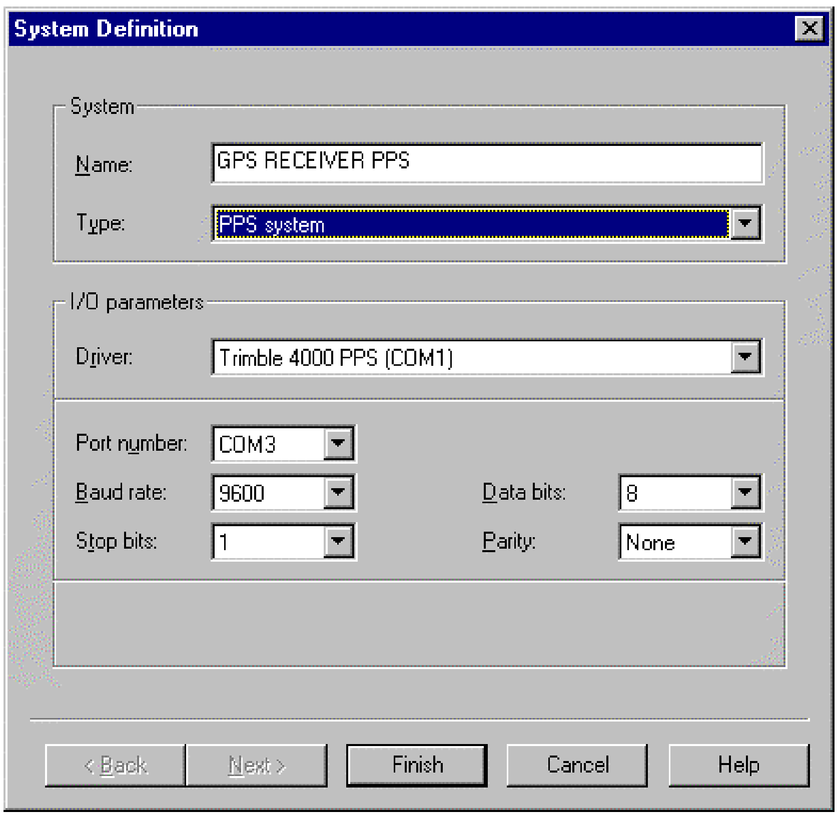
3. DRIVERS

3.1 PPS SYSTEM DRIVERS

Database Setup

Select item "Auxiliary systems" and add a "PPS system" to the Acquisition Software Database . If a PPS system is added for an "Object", then the system will still be defined as an "Auxiliary system". Select driver corresponding to the GPS receiver and the COM port to which the PPS pulse is connected (through the PPS adapter or a DB-9 line out from a QPS Trigger Box). The I/O parameters should be configured for the port that receives the time output string from the GPS receiver. Update rate and latency are 0.0 seconds. See example below.



See for more information the Database Setup Help topic of the Online help.

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3.1.1 Ashtech PPS

Input / Output:	Input	*Driver class type:*	PPS
Executable name:	DrvPpsAshtech.exe	*Drivers.io options:*	1 | 2
Last modified:	2002-Sep-6		

Driver Description

Driver for Ashtech PPS (Pulse-Per-Second) support. Driver to be used to obtain highly accurate PPS pulse and UTC or GPS time string from an Ashtech GPS receiver. The pulse can be used for exact time-tagging. The Ashtech PPS driver automatically decodes which type of message the Ashtech receiver sends.

Format Description

The Ashtech proprietary ASCII Trigger Time Tag messages are of fixed length: 31 characters including termination characters <CR><LF>. The TTT output strings always start with sequence "$PASHR,TTT", followed by two fields: day of week (SUN=1) and GPS time tag of the PPS signal.

```
$PASHR,TTT,x,hh:mm:ss.sssssss
12345678901234567890123456789
```

Format Example

```
$PASHR,TTT,3,18:01:33.1200417
$PASHR,TTT,3,18:01:34.1200417
$PASHR,TTT,3,18:01:35.1200417
```

Format Description

The Ashtech PPS Time Tag messages are of fixed length: 19 characters including termination characters <CR><LF>. The PPS output strings always start with sequence "$PASHR,PPS", followed by one field which contains the GPS time in seconds of the week.

```
$PASHR,PPS,dddddd
12345678901234567
```

Format Example

```
$PASHR,PPS,467778
$PASHR,PPS,467779
$PASHR,PPS,467780
```

System Configuration

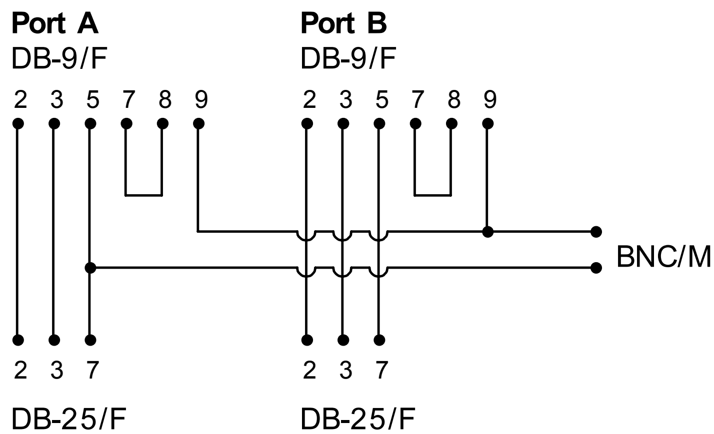
See the chapter on "Pulse Generation Parameters" in the manuals of the various Ashtech GPS receivers.

Note. Since tested versions of Ashtech ADU2 receivers do not send a time notification when using the 1PPS pulse, one should use the "$PASHR,TTT" message to obtain the GPS time of the pulse. In order to obtain this time, a closed loop can be rigged, to send the 1PPS signal to the 'Camera In' or 'Event Mark' pin. In effect the ADU2 is sending a pulse to itself as well as to *QINSy.* The TTT message will be output on the selected port on each trigger epoch. The "$PASHR,TTT" string will carry the GPS time of each pulse.

(continued on next page)

Interfacing Notes

The Ashtech ADU2 cabling diagram for PPS is given below. Port A pin 9 is PPS out, port B pin 9 is Event In. See for information about the cabling between the Trigger Box and the PC the trigger devices section.



Ashtech ADU2 - Cabling Diagram

Database Setup

See description under “PPS SYSTEM DRIVERS”.

Drivers.io Options

Command line parameter 1 or 2 indicates the COM port to which the PPS pulse is connected.

3.1.2 DeepC IMU PPS

Input / Output:	Input	*Driver class type:*	PPS
Executable name:	DrvPpsDeepCImu.exe	*Drivers.io options:*	1 | 2
Last modified:	2004-May-13		

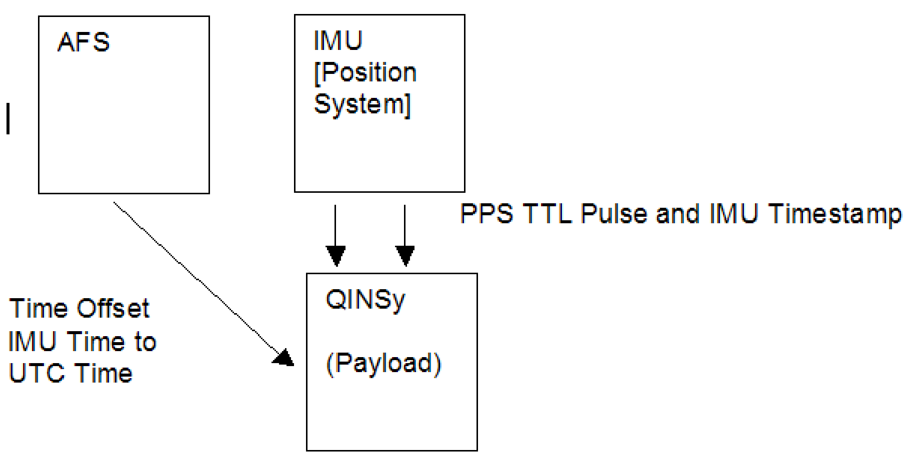
Driver Description

This driver will synchronise the *QINSy* and payload computer time to the iMar IMU Inertial Navigation System on board of the DeepC AUV. It uses the PPS TTL pulse, the time tags from the serial time messages and the IMU Clock Offset value from another *QINSy* Driver.

The IMU (Inertial Motion Unit) inertial navigation system synchronizes to the GPS PPS time when the AUV is surfaced. The IMU synchronizes its own clock to the GPS and delivers the TTL pulse to *QINSy*. It is unfortunately not possible to output a UTC time string directly from the IMU. The IMU sends us only a real time message at approx 30 Hz with the attitude/position of the vessel. Beside pitch/roll values, the string also contains the timestamp of the observation. This timestamp can be used as time input for this driver. The timestamp is not output in UTC but in seconds since start up (IMU Time). It can only be corrected to UTC when the IMU Clock Offset (=UTC – IMU Time) is known. This offset is only known in the AFS (Automatische Fuhrungs System), the control program of the AUV. It is output to *QINSy* through the AFS network Driver. The AFS_PAYLOAD message is sent to *QINSy* 10 times per second. A dedicated internal memory link is laid between the AFS Driver and the PPS Driver to transfer the IMU Clock Offset.

<u>Note: The PPS Driver will never work properly if the AFS Driver (DrvDeepCAfs.exe) is not also included in the template setup!!</u>

System Overview



Format Description

The IMU sends the following messages:

$IMRPY   Roll/pitch/Yaw data at 30 Hz.
$IMLLH At 1 Hz.

$IMxxx,Sec Since IMU Startup, ???,???,???*CC

Field 1: Identifier (driver expects $Imxxx, xxx = can be anything)
Field 2: Time since startup of IMU in seconds.
Field 6: Checksum from I to *

Other fields are not used and therefore irrelevant.

Example:
$IMRPY,0002034.360,-000.796,-10.631,+000.400*4D
$IMRPY,0002034.390,-000.796,-10.631,+000.399*45
$IMLLH,0002034.400,+007.159660,+49.273880,+210.000*54

System Configuration

Make sure that the iMar unit outputs serial data at a high frequency of at least 20 Hz. The serial data must be real time, no great latencies are allowed. The driver expects that when the PPS pulse is received the IMU internal clock will cross over zero seconds, e.g. when the pulse is sent by the IMU then it's internal time should be xxx.000.

Decoding Notes

PPS Time tag is expected within 500 milliseconds after the pulse, if this is not the case the no update can be calculated. The driver expects to read 120 bytes from the time port before time can be calculated. By reading this number of bytes the driver will fetch at least one complete string of the time port; a single message will not be longer then approximately 50-60 bytes.

Database Setup

See description under "PPS SYSTEM DRIVERS".

Drivers.io Options

Command line parameter 1 or 2 indicates the COM port to which the PPS pulse is connected.

3.1.3 Magnavox PPS

Input / Output:	Input	*Driver class type:*	PPS
Executable name:	DrvPpsMagnavox.exe	*Drivers.io options:*	1 | 2
Last modified:	1997-Sep-08		

Driver Description

Driver for Magnavox PPS (Pulse-Per-Second) support. Driver to be used to obtain highly accurate PPS pulse and UTC string from a Magnavox 9212 GPS receiver. The pulse can be used for exact time tagging.
The PPS pulse is generated as a pulse on the auxiliary port of the MX 9212 receiver. Prior to the pulse an ASCII output string with the exact time of the pulse is available at the control port of the receiver.

Format Description

The Magnavox proprietary ASCII Time Recovery Results Sentences can be of variable length, since the receivers use a free-format parsing algorithm. The sentences always start with sequence "$PMVXG,830" and are output approximately 1 second preceding the corresponding 1PPS output.

```
$PMVXG,830,V,YYYY,MM,DD,HH:MM:SS,T,M,OOOOOO,EEEEE,BBBBBB,LS*CS
12345678901234567890123456789012345678901234567890123456789012
```

Field	*Format*	*Description*	*Values, Range, Units*
01	$PMVXG	start of sentence	"$PMVXG"
02	830	sentence identifier	830
03	V	time mark validity	T = valid; F = not valid
04	YYYY	Year	1993 ... 9999
05	MM	Month	01 ... 12
06	DD	Day	01 ... 31
07	HH:MM:SS	Time	00:00:00 …23:59:59
08	T	time synchronization	U = UTC; G = GPS
09	M	operating mode	D = dynamic; S = static
10	OOOOOO	oscillator offset	PPB
11	EEEEE	time mark error	Nsec
12	BBBBBB	user time bias	Nsec
13	LS	leap second flag	0 or ±1
14	CS	optional checksum	XOR from "$" to "*" exclusive

Format Example

```
$PMVXG,830,F,1993,03,11,18:45:47,U,D,000436,-0029,000000,00*15
$PMVXG,830,T,1993,03,17,22:28:52,U,D,000456,-0005,000010,00*0E
```

System Configuration

To use a Magnavox 9212 receiver for PPS, the $PMVXG,830 type string must be activated. If the Magnavox 9212 active raw data driver is used, the driver will activate this string on the control port that the driver uses. Otherwise, use the Magnavox CDU program to activate the string on one of the ports. See the "Magnavox DGPS 12 channel operator's manual" for instructions on the use of the CDU program.

(continued on next page)

Interfacing Notes

The Magnavox PPS pulse has the following characteristics: positive slope, 0 to 12 volts, and a duration of 0.5 milliseconds. This pulse needs to be translated to an RS-232 serial signal before it can be fed into a computer. This is done in the QPS Trigger Box. The PPS pulse is fed into the trigger box and the line out from the trigger box is attached to a computer's serial port. In total the PPS setup will need 2 serial ports, one for the actual pulse, via the trigger box, the other is needed for the ASCII time string corresponding with the pulse. It is recommended to connect the trigger box to a serial port on the motherboard of the PC and not to an extended serial port like a Digiboard port. The ASCII string can be connected to any available serial port.

The cable wiring between Magnavox 1PPS output connector and QPS trigger box FIX IN for PPS must be:

SMB MX		**BNC QPS**
Shield	----------------	Shield
Center Conductor	----------------	Core

The cable for the ASCII time string between the Magnavox multiport interface cable CDU port 1 and the PC serial COM port must be as follows:

DB-25 CDU Port		**DB-9 COM**	**DB-25 COM**
Pin 3 TXD	-----------------	Pin 2 RXD	Pin 3 RXD
Pin 7 SG	-----------------	Pin 5 SG	Pin 7 SG

Alternatively the PC serial COM port can be connected directly to the multiport interface connector:

DB-25 MultiPort		**DB-9 COM**	**DB-25 COM**
Pin 11 TXD	-----------------	Pin 2 RXD	Pin 3 RXD
Pin 24 SG	-----------------	Pin 5 SG	Pin 7 SG

If the PPS pulse is used together with the active raw data driver, data coming from the receiver must be split:

DB-25 CDU Port
Pin 2 RXD
Pin 3 TXD
Pin 7 SG

DB-9 RAW	**DB-25 RAW**
Pin 3 TXD	Pin 2 TXD
Pin 2 RXD	Pin 3 RXD
Pin 5 SG	Pin 7 SG

DB-9 PPS	**DB-25 PPS**
Pin 2 RXD	Pin 3 RXD
Pin 5 SG	Pin 7 SG

See for information about the cabling between the QPS Trigger Box and the PC, the trigger devices section.

Database Setup

See description under "PPS SYSTEM DRIVERS".

Drivers.io Options

Command line parameter 1 or 2 indicates the COM port to which the PPS pulse is connected.

3.1.4 NMEA $GP PPS

Input / Output:	Input	*Driver class type:*	PPS
Executable name:	DrvPpsNMEA.exe	*Drivers.io options:*	1 | 2
Last modified:	1999-Nov-02		

Driver Description

Driver for PPS (Pulse-Per-Second) support where the corresponding UTC time is decoded from a NMEA $GPZDA, $GPGGA, $GPRMC, or $GPGGK sentence. The driver automatically determines from which $GPXXX sentence the PPS timetag is decoded, which is the first sentence to arrive at COM port after PPS pulse. The pulse can be used for exact time tagging. The PPS pulse is generated as a pulse on an output port of a GPS receiver. Within a few hundred milliseconds after the PPS pulse is received at the COM port, a NMEA string with the exact UTC time of the pulse should be available at a control port of the receiver.

Important. *Driver will only work properly if decoded UTC timetag corresponds exactly to PPS pulse. In case a NMEA string arrives too late (or too early) or has got latency, QINSy PPS support will not work.*

Format Description

The NMEA $GPXXX sentences contain UTC time (and date). The integer part of the UTC time field should correspond to the UTC time of the PPS pulse. The decimal part of the UTC time field is *not* decoded, since *QINSy* assumes that the PPS pulse is always output at a whole number of UTC (or GPS time) seconds. Refer to *NMEA 0183- Standard For Interfacing Electronic Devices - Version 2.nn* for more information.

```
$GPZDA,hhmmss.ss,dd,mm,yyyy,aa,bb[*hh]<CR><LF>
```

Field	Format	Description	Values, Range, Units
01	$GPZDA	message type identifier	"$GPZDA"
02	hhmmss.ss	UTC time: hour, minutes, seconds	00...23, 00...59, 00.00...59.99
03-05	dd,mm,yyyy	UTC date: day, month, year	01...31, 01...12, 0000...9999
06-07	xx,xx	local zone hours and minutes	-13…+13, 00…+59
08	hh	optional checksum	XOR from "$" to "*" exclusive
	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

```
$GPGGA,hhmmss.ss,llll.ll,a,yyyyy.yy,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx[*hh]<CR><LF>
```

Field	Format	Description	Values, Range, Units
01	$GPGGA	message type identifier	"$GPGGA"
02	hhmmss.ss	UTC time: hour, minutes, seconds	00...23, 00...59, 00.00...59.99
	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

```
$GPRMC,hhmmss.ss,A,llll.ll,a,yyyyy.yy,a,x.x,x.x,ddmmyy,x.x,a[*hh]<CR><LF>
```

Field	Format	Description	Values, Range, Units
01	$GPZDA	message type identifier	"$GPZDA"
02	hhmmss.ss	UTC time: hour, minutes, seconds	00...23, 00...59, 00.00...59.99
10	ddmmyy	UTC date: day, month, year	01...31, 01...12, 00...99
	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

(continued on next page)

```
$GPGGK,hhmmss.ss,ddmmyy,llll.llll,N,yyyyy.yyyy,W,x,x,x.x,x.x,M[*hh]<CR><LF>
```

Field	***Format***	***Description***	***Values, Range, Units***
01	$GPZDA	message type identifier	"$GPZDA"
02	hhmmss.ss	UTC time: hour, minutes, seconds	00...23, 00...59, 00.00...59.99
03	ddmmyy	UTC date: day, month, year	01...31, 01...12, 00...99
	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

System Configuration

It is important that one of the above mentioned $GPXXX sentences is the *first* data string that is output after the PPS pulse. If other NMEA strings are sent, these strings must be output after the $GPXXX string.

Database Setup

See description under "PPS SYSTEM DRIVERS".

Drivers.io Options

Command line parameter 1 or 2 indicates the COM port to which the PPS pulse is connected.

3.1.5 NMEA ZDA PPS

Input / Output:	Input	*Driver class type:*	PPS
Executable name:	DrvPpsZDA.exe	*Drivers.io options:*	1 | 2
Last modified:	2003-Apr-04		

Driver Description

Driver for PPS (Pulse-Per-Second) support where the corresponding UTC time is decoded from a NMEA ZDA string. The pulse can be used for exact time tagging. The PPS pulse is generated as a pulse on an output port of a GPS receiver. Within a few hundred milliseconds after the PPS pulse is received at the COM port, a ZDA output string with the exact UTC time of the pulse should be available at a control port of the receiver.

Important. *Driver will only work properly if decoded UTC timetag corresponds exactly to PPS pulse. In case a NMEA string arrives too late (or too early) or has got latency, QINSy PPS support will not work.*

Format Description

The NMEA $--ZDA sentence contains UTC, day, month, year (and local time zone). The integer part of the UTC time field should correspond to the UTC time of the PPS pulse. The decimal part of the UTC time field is *not* decoded, since *QINSy* assumes that the PPS pulse is always output at a whole number of UTC seconds. Refer to *NMEA 0183- Standard For Interfacing Electronic Devices - Version 2.nn* for more information.

```
$--ZDA,hhmmss.ss,dd,mm,yyyy,aa,bb*hh
123456789012345678901234567890123456
```

Field	*Format*	*Description*	*Values, Range, Units*
01	$--ZDA	message type identifier	i.e. "$GPZDA"
02	hhmmss.ss	UTC time: hour, minutes, seconds	00...24, 00...60, 00.00...59.99
03-05	dd,mm,yyyy	UTC date: day, month, year	01...31, 01...12, 0000...9999
06-07	xx,xx	local zone hours and minutes	-13…+13, 00…+59
08	hh	optional checksum	XOR from "$" to "*" exclusive
	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

System Configuration

It is important that the $--ZDA sentence is the *first* data string that is output after the PPS pulse. If other NMEA strings are sent, for example $GPGGA positions, these strings must be output after the ZDA string.

Database Setup

See description under "PPS SYSTEM DRIVERS".

Drivers.io Options

Command line parameter 1 or 2 indicates the COM port to which the PPS pulse is connected.

3.1.6 NMEA ZDA PPS (No TTL)

Input / Output:	Input	*Driver class type:*	PPS
Executable name:	DrvPpsNoTTL.exe	*Drivers.io options:*	*NOCS, NSYNC, ZDA*
Last modified:	1999-Dec-23		

Driver Description

Driver for PPS (Pulse-Per-Second) support where the UTC time is decoded from a NMEA $--ZDA sentence. No PPS TTL pulse is required for this driver. The driver assumes that the UTC time that is present in the NMEA $--ZDA sentence is valid for the exact moment that the receiver outputs the first character of the sentence. During testing it was found that this method has an accuracy of approximately 0.05 seconds. However this accuracy may be receiver dependent.

Important. *The driver only works properly if the decoded UTC time corresponds exactly to moment is the receiver outputs the NMEA string. In case the NMEA string has latency the QINSy PPS support will have less accuracy.*

Format Description

The NMEA $--ZDA sentence contains UTC, day, month, year (and local time zone). Refer to *NMEA 0183-Standard for Interfacing Electronic Devices - Version 2.nn* for more information.

```
$--ZDA,hhmmss.ss,dd,mm,yyyy,aa,bb*hh
123456789012345678901234567890123456
```

Field	*Format*	*Description*	*Values, Range, Units*
01	$--ZDA	message type identifier	i.e. “$GPZDA”
02	Hhmmss.ss	UTC time: hour, minutes, seconds	00...24, 00...60, 00.00...59.99
03-05	Dd,mm,yyyy	UTC date: day, month, year	01...31, 01...12, 0000...9999
06-07	Xx,xx	local zone hours and minutes	-13…+13, 00…+59
08	Hh	optional checksum	XOR from “$” to “*” exclusive
	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

System Configuration

It is advised to make sure that the NMEA $--ZDA sentence is the *only* data string that is output by the receiver. It is also advised to output the NMEA $--ZDA sentence at the *highest* baud rate possible to ensure highest accuracy.

Database Setup

See description under “PPS SYSTEM DRIVERS”.

Drivers.io Options

Command line parameter *NOCS* disables the checksum checking. Command line parameter *NSYNC* disables the system time synchronisation. Command line parameter *ZDA* instructs the driver decode the NMEA $--ZDA sentence. Currently only the NMEA $--ZDA sentence is supported by this driver.

3.1.7 NMEA ZDA PPS (Trimble AgGPS)

Input / Output:	Input	*Driver class type:*	PPS
Executable name:	DrvPpsZDA.exe	*Drivers.io options:*	1 | 2
Last modified:	1999-Jun-01		

Driver Description

Driver for PPS (Pulse-Per-Second) support where the corresponding UTC time is decoded from a NMEA ZDA string. See for more information the paragraph on the "NMEA ZDA PPS" driver.

Format Description

See description under "NMEA ZDA PPS".

System Configuration

Make sure that the NMEA ZDA string is selected for output on port A (B). This can be done with the buttons on the front panel of the AgGPS receiver. See the Trimble AgGPS manual for details on the procedure.

Note. *It is important that the $GPZDA sentence is the first data message that is output after the PPS pulse. If other NMEA strings are sent, e.g. positions, these strings must be output after the ZDA string. If $GPGGA sentences are sent before ZDA sentences and PTNL,GGK sentences after, then only the latter can be used.*

Interfacing Notes

The 1PPS is available on port A (B) of the receiver if this port is configured for output of a ZDA string on the same port. The port output has to be split in two: one part carrying the RS232 output (2-way) to a COM port, and a COAX cable to supply the pulse to the QPS Trigger box. The wiring of the PPS cable is:

DB-9 Port A or B			**DB-9 *QINSy***	
Pin 2	RXD	-----------------	Pin 2	RXD
Pin 3	TXD	-----------------	Pin 3	TXD
Pin 5	GND	-----------------	Pin 5	GND
			COAX	
Pin 5	GND	-----------------	Shield	GND
Pin 9	PPS	-----------------	Core	PPS

Database Setup

See description under "PPS SYSTEM DRIVERS".

Drivers.io Options

Command line parameter 1 or 2 indicates the COM port to which the PPS pulse is connected.

3.1.8 Novatel GPSCard (TSS POS/MV) PPS

Input / Output:	Input	*Driver class type:*	PPS
Executable name:	DrvPpsNovatel.exe	*Drivers.io options:*	1 | 2
Last modified:	2000-Dec-01		

Driver Description

Driver for Novatel GPSCard, as integrated in the TSS POSM/V system, PPS (Pulse-Per-Second) support. Driver to be used to obtain highly accurate PPS pulse and TM1B/POS1B strings from a Novatel GPSCard receiver. The pulse can be used for exact time tagging. This driver is specifically designed and tested for the TSS POS/MV system.

The PPS is output through the PPS port, at the back of the PCS unit. Very shortly after the pulse is sent (about 50-100 ms), a binary TM1B record output string with the exact time of the pulse is available at the Diff Port of the POS/MV PCS unit. Along with the TM1B message also a POS1B message is sent.

Format Description

The POS/MV outputs UTC time information in the proprietary binary TM1B Record that is sent once a second, very shortly after the PPS pulse is generated. The format of the TM1B message is given below.

Novatel TM1B record:

Message ID	03
Message Length	52 bytes
Checksum	XOR operation of all the bytes including the header bytes and checksum field set to 00

Item	*Bytes*	*Description*	*Values*
1	00	Sync Byte 1	Always 0xAA
2	01	Sync Byte 2	Always 0x44
3	02	Sync Byte 3	Always 0x11
4	03	Checksum	
5	04 – 07	Message ID	Always 0x03
6	08 – 11	Message byte count (length)	Always 0x34
7	12 – 15	GPS week number (receiver time)	
8	16 – 23	GPS seconds of week (receiver time)	
9	24 – 31	Clock offset	Typically 0.078 µs
10	32 – 39	Standard deviation of clock offset	Typically 0.021 µs
11	40 – 47	UTC offset	Negative GPS leap seconds
12	48 – 51	Clock mode status	0=good, -1 to –20 = bad

Following formulas are needed to calculate UTC from GPS system time as provided by a TM1B Record:
GPS Time = receiver time [item 7 and 8] - Clock offset [item 9]
UTC Time = GPS Time + UTC offset [item 11]

(Continued on next page)

If Clock mode status is not equal to zero then GPS time is inaccurate and driver will reject the time string.

The binary POS1B message contains information on the calculated position and current time. Although the content of this message is not used for decoding time data, it IS used to assist the driver with decoding the TM1B message. If the Novatel GPS Card does NOT send the POS1B message then the PPS driver will not work correctly!

The format of the POS1B message is described below:

Message ID 01
Message Length 88 bytes
Checksum XOR operation of all the bytes including the header bytes and checksum field set to 00

Item	*Bytes*	*Description*	*Values*
1	00	Sync Byte 1	Always 0xAA
2	01	Sync Byte 2	Always 0x44
3	02	Sync Byte 3	Always 0x11
4	03	Checksum	
5	04 – 07	Message ID	Always 0x01
6	08 – 11	Message byte count (length)	Always 0x58
7	12 – 15	GPS week number (receiver time)	
8	16 – 23	GPS seconds of week (receiver time)	
9	24 – 31	Latitude	
10	32 – 39	Longitude	
11	40 – 47	Height	
12	48 – 55	Undulation	
13	56 – 60	Datum ID	
14	61 – 67	Latitude Std. Dev.	
15	68 – 75	Longitude Std. Dev.	
11	76 – 83	Height Std. Dev.	
12	84 – 88	Solution status	

TM1B Format Example

```
AA 44 11 E1 03 00 00 00 34 00 00 00 42 00 00 00
16 FC FF FF AF D0 03 41 1A EF 2C CC A2 DF B0 BE
4D E1 D2 14 E4 DD 2F 3E A8 ED A4 93 00 00 2A C0
00 00 00 00
```

POS1B Format Example

```
AA 44 11 BE 01 00 00 00 58 00 00 00 4C 00 00 00 33 33 33 33 4B 30 FF 40 7E C8 47
48 48 DF 47 40 9F D8 7F 18 2F DD 0A C0 00 8C C8 8F BF 14 DE BF 18 91 13 EA C5 2C
49 40 3D 00 00 00 3E AD 60 F7 2E 61 07 40 DC EE B9 B4 6B 93 FE 3F E9 3F FE 1E A9
CC 14 40 00 00 00 00
```

(Continued on next page)

System Configuration

The Novatel GPS Card must output 1 TM1B Message per second and four POS1B Messages per second.

This is the default output for the POS/MV 320 PCS – Version 3 system with firmware 1.17 or higher. Older systems may not have this set as default. In that case it is advised to obtain a firmware update from TSS.

For stand-alone Novatel GPS Cards, the output must be programmed by serial link, refer to Novatel documentation for more details. The following two so-called logs must be programmed:

TM1B:	OnTime, Period: 1 Second	Offset: 0 Seconds
POS1B:	OnTime, Period: 0.25 Seconds	Offset: 0 Seconds

Do not use baud rates slower then 4800 baud otherwise the 140 required characters of the time strings will not arrive within the required time. This PPS driver works best with baud rates in between 4800 and 19K2.

Interfacing Notes

The Novatel GPS Card PPS pulse has the following characteristics: normally high, active low, pulse duration 0.2 milliseconds. The falling edge of the pulse corresponds with the following time message.
The PPS pulse is output by the POS/MV on the BNC connector marked PPS, on the back of the PCS. The TM1B Messages are output, together with POSB messages, on pin 3 of the 9 pins D type male connector, marked DIFF on the back of the PCS.

The PPS pulse needs to be translated to an RS-232 serial signal before it can be fed into a computer. This is done in the QPS Trigger Box, version mkIV or higher. Older versions of the Trigger Box are **not compliant** with the short PPS pulse as sent by the Novatel Gpscard. Some older versions of the FIX-PPS devices may also not work with the GpsCard.

The PPS pulse is fed into the trigger box and the line out from the trigger box is attached to a computer's serial port. In total the PPS setup will need 2 serial ports, one for the actual pulse, via the trigger box, the other is needed for the ASCII time string corresponding with the pulse. It is recommended to connect the trigger box to a serial port on the motherboard of the PC and not to an extended serial port like a Digiboard port. The ASCII string can be connected to any available serial port.

The cable wiring between POS/MV PPS output connector and QPS trigger box FIX IN for PPS must be:

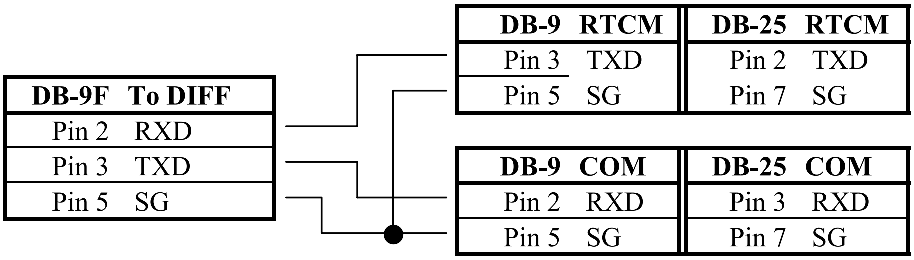
BNC PPS POS/MV		BNC QPS
Shield	----------------	Shield
Core	----------------	Core

Cable for the ASCII time string between POS/MV DIFF port and PC serial COM port must be as follows:

DB-9F To DIFF		DB-9 COM	DB-25 COM
Pin 3 TXD	-----------------	Pin 2 RXD	Pin 3 RXD
Pin 5 SG	-----------------	Pin 5 SG	Pin 7 SG

(Continued on next page)

If the DIFF port is already in use for input of RTCM corrections, then the following splitter cable is required:



See for information about the cabling between the QPS Trigger Box and the PC, the trigger devices section.

Database Setup

See description under “PPS SYSTEM DRIVERS”.

Drivers.io Options

Command line parameter 1 or 2 indicates the COM port to which the PPS pulse is connected.

3.1.9 Sercel #T PPS

3.1.10 Aquarius SVAR!M PPS

Input / Output	Input	*Driver class type*	PPS
Executable name	DrvPpsSercel.exe	*Drivers.io options*	1 | 2 | AQUARIUS
Last modified:	2001-May-08		

Driver Description

Driver for DNSP/Sercel PPS (Pulse-Per-Second) support. Driver to be used to obtain highly accurate PPS pulse and UTC string from a NR203 or Aquarius GPS receiver. The pulse can be used for exact time-tagging. The PPS pulse is generated as a TTL pulse on the auxiliary port of the Sercel receiver. At the same time an ASCII output string with the exact UTC time of the pulse is available at a serial output port of the receiver. The driver automatically determines which time mark message (“#T” or “!M”) is available for decoding.

Format Description

The *QINSy* Sercel PPS driver can decode the GPS week number and GPS time of week in seconds from either a Raw Data Time Mark message that includes a “#T” data string or a (Aquarius) Time Mark Tag that includes a “!M” data string. With the “#T”format, the “*1” data string is not decoded, since it is not needed for the accuracy level of timekeeping within *QINSy* (1 ms). The “#T” message always contains 37 bytes. The “!M” format is not fixed in length. At present, the GPS status byte is not evaluated, since during field tests it became clear that status 9 (GPS not valid) occurred too often for the PPS driver to function properly.

<u>Sercel Raw Data Time Mark (#T)</u>

```
<stx><cr><lf>
#T wwww xxxxxxx<cr><lf>
*1 tttttttttt<cr><lf>
<etx>
```

Bytes	*Format*	*Description*	*Values, Range, Units*
01	<stx>	start of message	ASCII 02 (02 Hex)
02-03	<cr><lf>	carriage return line feed	ASCII 13 ASCII 10
04-05	#T	message first line identifier	“#T”
06		Space	ASCII 32 (20 Hex)
07-10	Wwww	GPS week number	000 … 9999
11		Space	ASCII 32 (20 Hex)
12-18	Xxxxxxx	GPS week time	units 10^-1 s (0.1 s)
19-20	<cr><lf>	carriage return line feed	ASCII 13 ASCII 10
21-22	*1	message second line identifier	“*1”
23		Space	ASCII 32 (20 Hex)
24-34	Tttttttttt	GPS time modulo 10 s +- 2 ms	units 10^-10 s
35-36	<cr><lf>	carriage return line feed	ASCII 13 ASCII 10
37	<etx>	end of message	ASCII 03 (03 Hex)

(continued on next page)

Format Description (continued)

Aquarius Time Mark Tag (!M)

```
<stx><cr><lf>
!M,xxxx,xxxxxx.x<cr><lf>
*1,x,xxxxxxxxxxx<cr><lf>
*2,x,hhmmss.sss<cr><lf>
*3,x,xxx<cr><lf>
<etx>
```

Field	*Format*	*Description*	*Values, Range, Units*
01	<stx>	start of message	ASCII 02 (02 Hex)
02	<cr><lf>	carriage return line feed	ASCII 13 ASCII 10
03	!M	message first line identifier	"!M"
04	xxxx	GPS week number (GPSW)	0 … 9999
05	xxxxxx.x	GPS week time (GPST)	low significant digit 10^-1 second
06	<cr><lf>	carriage return line feed	ASCII 13 ASCII 10
07	*1	message second line identifier	"*1"
08	x	GPS status (FIXS)	0 = solution computed | 9 = not valid
09	xxxxxxxxxxx	GPS time [mod 10] (GPST)	low significant digit 10^-10 s
10	<cr><lf>	carriage return line feed	ASCII 13 ASCII 10
11	*2	message third line identifier	"*2"
12	x	GPS status (FIXS)	0 = solution computed | 9 = not valid
13	hhmmss.sss	UTC time of event (TUTC)	hours, minutes, seconds
14	<cr><lf>	carriage return line feed	ASCII 13 ASCII 10
15	*3	message fourth line identifier	"*3"
16	x	event origin (EVENT)	
17	xxx	event counter [mod 256]	
18	<cr><lf>	carriage return line feed	ASCII 13 ASCII 10
19	<etx>	end of message	ASCII 03 (03 Hex)

Format Example

Using the *QINSy* IO Test Utility or HyperTerminal, the Raw Data Time Mark message looks like this:

```
☻
#T  984 2379810
*1 10000000391
♥
```

Using the *QINSy* IO Test Utility or HyperTerminal, the Aquarius Time Mark message looks like this:

```
☻
!M,1113,205200.0
*1,0,205200.0000000
*2,0,085959.999
*3,1,1
♥
```

(continued on next page)

System Configuration

To configure a ***Sercel NR203*** receiver for PPS use, activate the Raw Data Time Mark (or Raw Data Time Tagging) message on Port A (I or J), to be triggered by the 1PPS output on the AUX port of the receiver:

- Press [**AUX**] and select "**9-INP/OUTP**"
- Select "**2-OUTPUT**" and "**1-MESSAGES**"
- Select "**n**" for the message type ("Msg")
  where "n" contains the Raw Data Time Mark
  ("n" is a number depending on the NR203 version, and the uploaded configuration data.)
- Select "**A**" (or **"I"** or **"J")** for the port ("Port")
- Select "**ON**" for enabling the output ("Status")
- Select "**TRG1**" for the trigger mode ("Mode")

Move the cursor between the parameters, using [□] or [□] and select the desired option using [□] or [□].
After making the necessary choices, press [□] to store any changes.

Note. *The Raw Data Time Mark message including the "#T" data string must always be the first data message that is output on the port after the PPS pulse, i.e. before for example a $GPZDA message.*

Falling/rising edge of PPS Signal

Aquarius 5000 receivers: the falling edge of the pulse is synchronized to GPS time, this is Sercel default. Although previous confpack software suggested that the active edge can be changed, this is not the case.

Aquarius 2 recievers: the active edge can not be programmed, instead both falling and rising edge TTL signals are available from the output ports (refer to manual).
Always use the falling edge!!!

Interfacing Notes

It is important that when using this driver you should always set the PPS adapter to trigger to rising edge. The fact that the Aquarius actually is falling edge active is already compensated for in the driver itself (the driver applies half a second offset to the time).

The TTL pulse coming from a Sercel needs to be translated to an RS-232 serial signal before it can be fed into a computer. This is done in the QPS Trigger Box. The PPS pulse is fed into the trigger box and the line out from the trigger box is attached to a computer's serial port. In total the PPS setup will need 2 serial ports, one for the actual pulse, via the trigger box, the other is needed for the ASCII time string belonging with the pulse. It is recommended to connect the trigger box to a serial port on the motherboard of the PC and not to an extended serial port like a DigiBoard port. The ASCII string can be connected to any available serial port.

The cable wiring between the Sercel AUX port and the QPS trigger box FIX IN for PPS must be as follows.

DB-9 AUX		BNC QPS
Pin 1	----------------------	Shield
Pin 5	----------------------	Core

The cable for the ASCII time string between Sercel Port A and the PC serial COM port must be as follows.

DB-9 Port A		DB-9 COM	DB-25 COM
Pin 2 TXD	----------------------	Pin 2 RXD	Pin 3 RXD
Pin 5 SG	----------------------	Pin 5 SG	Pin 7 SG

(continued on next page)

Interfacing Notes (continued)

If RS232C Port A cannot be used, for example if it is used for raw data, then RS422 Port I or J can be used. The wiring for the ASCII time string between RS422 Port I (or J) and a serial COM port must be as follows.

DB-9 Port I
Pin 1 SG
Pin 8 TXD+
Pin 9 TXD–

DB-9 COM	DB-25 COM
Pin 2 RXD	Pin 3 RXD
Pin 5 SG	Pin 7 SG

To interface the **Aquarius** PPS pulse to the QPS Trigger Box, use a coax cable with two BNC connectors:

BNC-SERCEL		BNC QPS
Shield	----------------------	Shield
Core	----------------------	Core

If there is no separate PPS option on the **Aquarius**, the PPS pulse can be obtained through the RS-422 port:

DB-15 Port X
Pin 6 SG
Pin 7 SG
Pin 11 PPS+
Pin 12 PPS–

Database Setup

See description under “PPS SYSTEM DRIVERS”.

Drivers.io Options

Command line parameter 1 or 2 indicates the COM port to which the PPS pulse is connected.

If an Aquarius receiver is used and the pulse synchronization is on the falling edge (DNSP default as of December 1999), the command line option AQUARIUS must be used. This corrects the time tag with 0.5 seconds. The PPS pulse has a length of exactly 0.5 seconds, so the rising edge is 0.5 seconds after the falling edge and therefore also 0.5 seconds after the GPS second. For Aquarius 2 (DSNP default as of April 2003) this is now set on the rising edge.

Additional Information

The cable to configure a Sercel NR203 receiver, using the ConfGPS utility, between Sercel Port A and COM port must be as given below. At the COM port connector, pin 1, pin 4 and pin 6 should be interconnected.

DB-9 Port A		DB-9 COM
		1+4+6
Pin 2 TXD	----------------------	Pin 2 RXD
Pin 3 RXD	----------------------	Pin 3 TXD
Pin 5 SG	----------------------	Pin 5 SG
Pin 7	----------------------	Pin 7
Pin 8	----------------------	Pin 8

(end of section)

3.1.11 Trimble 4000 PPS

Input / Output:	Input	*Driver class type:*	PPS
Executable name:	DrvPpsTrimble.exe	*Drivers.io options:*	1 | 2
Last modified:	1999-Aug-17		

Driver Description

Driver for Trimble PPS (Pulse-Per-Second) support. Driver to be used to obtain highly accurate PPS pulse and UTC string from a Trimble 4000 series GPS receiver. The pulse can be used for exact time-tagging.
The PPS pulse is generated as a TTL pulse on the auxiliary port of the Trimble receiver. At the same time an ASCII output string with the exact UTC time of the pulse is available at one of the I/O ports of the receiver.

Format Description

The Trimble 1PPS output ASCII time tags appearing on the receiver port are of fixed length: 26 characters including termination characters <CR><LF>. The time tags are issued prior to the arrival of the PPS pulse.

The status indicator “ab” has the following meaning: “a” is position-fix type and implied time accuracy; “b” is number of satellites tracked, up to 9; “??” not accurate, not tracking satellites, uses receiver clock.

```
UTC·YY.MM.DD·HH:MM:SS·ab
123456789012345678901234
```

Format Example

```
UTC 99.08.17 16:29:29 57
UTC 99.08.17 16:29:30 57
UTC 99.08.17 16:29:31 57
```

System Configuration

To configure a Trimble 4000 receiver for PPS use, press the CONTROL function key on the receiver. Press ‘MORE’ until ‘1PPS OUTPUT’ is visible on the screen. Select this option by pressing the corresponding button. In the ‘1PPS OUTPUT’ option, 3 parameters can be set; the 1PPS output must be enabled, the slope needs to be positive and the I/O port for the ASCII time string needs to be specified. QPS strongly advises to use I/O port 2 for this purpose, since in most cases I/O port 1 will be in use for the RCI (Remote Control Interface) protocol to collect raw ranges from the receiver. The baud rate for the ASCII time string port must be set in the ‘BAUDRATE/FORMAT’ option of the CONTROL menu. *QINSy* will support baud rates up to 57600 bps, and it is advisable to use a baud rate as high as possible to maximize the throughput speed.

Interfacing Notes

The TTL pulse coming from a Trimble needs to be translated to an RS-232 serial signal before it can be fed into a computer. This is done in the QPS Trigger Box. The PPS pulse is fed into the trigger box and the line out from the trigger box is attached to a computer’s serial port. In total the PPS setup will need 2 serial ports, one for the actual pulse, via the trigger box, the other is needed for the ASCII time string belonging with the pulse. It is recommended to connect the trigger box to a serial port on the motherboard of the PC and not to an extended serial port like a DigiBoard port. The ASCII string can be connected to any available serial port.

(continued on next page)

Interfacing Notes (continued)

See for information about the QPS Trigger Box the trigger devices section. The wiring must be as follows.

The PPS cable between the Trimble AUX port (LEMO-7) and the trigger box BNC connector (FIX IN):

LEMO-7 AUX		BNC QPS
Pin 1	----------------------	Shield
Pin 2	----------------------	Core

The trigger cable between the trigger box line out (TO COM) and the computer serial port (on motherboard):

DB-9 QPS		DB-9 COM	DB-25 COM
Pin 2	----------------------	Pin 2	Pin 3
Pin 4	----------------------	Pin 4	Pin 20
Pin 5	----------------------	Pin 5	Pin 7

The I/O cable for the ASCII time string and/or RCI between Trimble I/O port and the computer serial port:

LEMO-5 I/O		DB-9 COM	DB-25 COM
Pin 3	----------------------	Pin 3	Pin 2
Pin 4	----------------------	Pin 5	Pin 7
Pin 5	----------------------	Pin 2	Pin 3

LEMO-7 I/O		DB-9 COM	DB-25 COM
Pin 1	----------------------	Pin 5	Pin 7
Pin 3	----------------------	Pin 3	Pin 2
Pin 7	----------------------	Pin 2	Pin 3

Database Setup

See description under “PPS SYSTEM DRIVERS”.

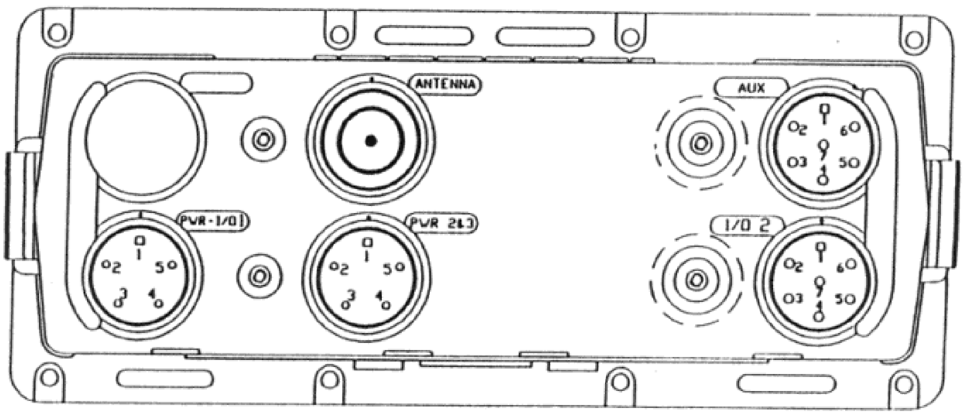
Drivers.io Options

Command line parameter 1 or 2 indicates the COM port to which the PPS pulse is connected.

(continued on next page)

Additional Information

The following picture shows pin layouts of the connectors and their locations on the rear panel of a Trimble.



Trimble 4000 Receiver - Rear Panel

PWR - I/O 1	
PIN 1	BAT1
PIN 2	BAT1 RTN
PIN 3	RXD1
PIN 4	SGND
PIN 5	TXD1

PWR 2&3	
PIN 1	BAT2
PIN 2	BAT RTN
PIN 3	DMT DATA
PIN 4	BAT 3
PIN 5	DMTPWR

PWR - I/O 2	
PIN 1	SGND
PIN 2	SPARE
PIN 3	RXD2
PIN 4	RTS2
PIN 5	CTS2
PIN 6	SPARE
PIN 7	TXD2

AUX	
PIN 1	GND
PIN 2	1PPS
PIN 3	SPARE
PIN 4	SPARE
PIN 5	SPARE
PIN 6	EVENT IN
PIN 7	SPARE

Trimble 4000 Receiver - Wiring Diagram

3.1.12 Trimble 4000 PPS (Trimble 7400)

Input / Output:	Input	*Driver class type:*	PPS
Executable name:	DrvPpsTrimble.exe	*Drivers.io options:*	1 | 2
Last modified:	1999-May-01		

Driver Description

The 7400 series receivers supply a PPS pulse on the AUX port. Together with a time-stamp string on one of the four I/O ports the receiver can be used with the Trimble 4000 PPS driver.

System Configuration

Using the remote controller program (RemCon), setup the receiver to output the PPS and time tag as follows:

- Click the CONTROL key
- Click ALPHA to go one page down
- Click the <1PPS OUTPUT> soft key
- Select using the ALPHA and ENTER key:
- Enable: **ON**
- Ascii time tag **port 1** … **port 4**. Select the port to which *QINSy* is connected (1 to 4)

Interfacing Notes

The 1PPS is available on port 4 (AUX) of the receiver. The wiring of the PPS cable is the same as for the Trimble 4000 series receiver, as described in the previous section.

The time-tag can be output on any of the 4 I/O ports. See for the cable wiring details the description of the 7400 receiver in the chapter 'SATELLITE NAVIGATION SYSTEM DRIVERS'.

Note. For the PPS time-tag only one way traffic (i.e. output from the receiver) is needed. The timetag can also be output on port 4, which is the same port that supplies the pulse. A special cable is needed in that case.

Database Setup

See description under "PPS SYSTEM DRIVERS".

Drivers.io Options

Command line parameter 1 or 2 indicates the COM port to which the PPS pulse is connected.

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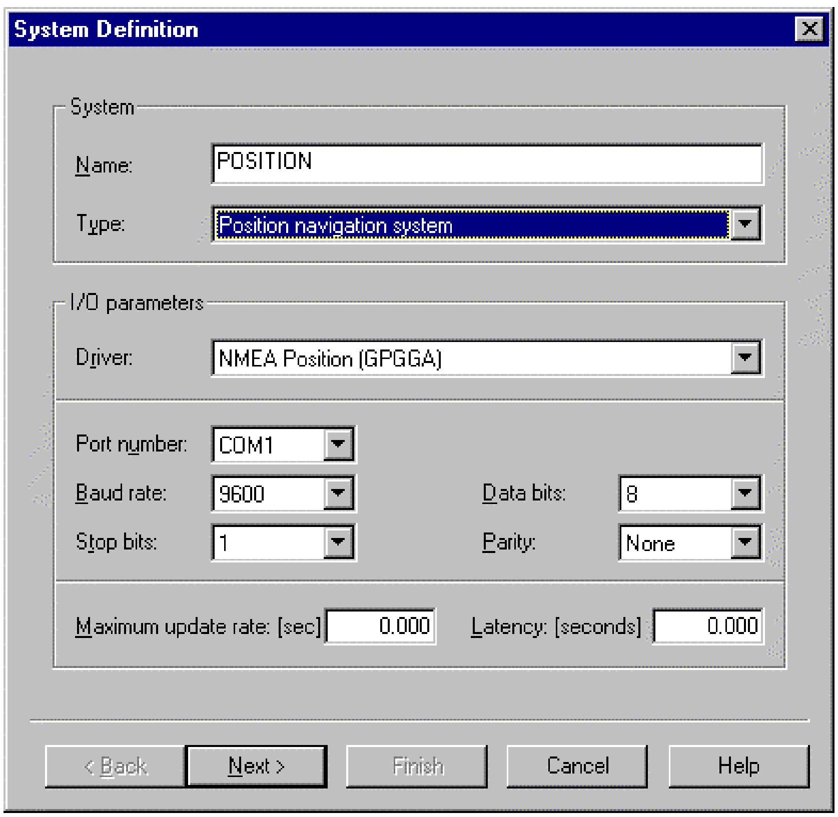
3.2 POSITION NAVIGATION SYSTEM DRIVERS

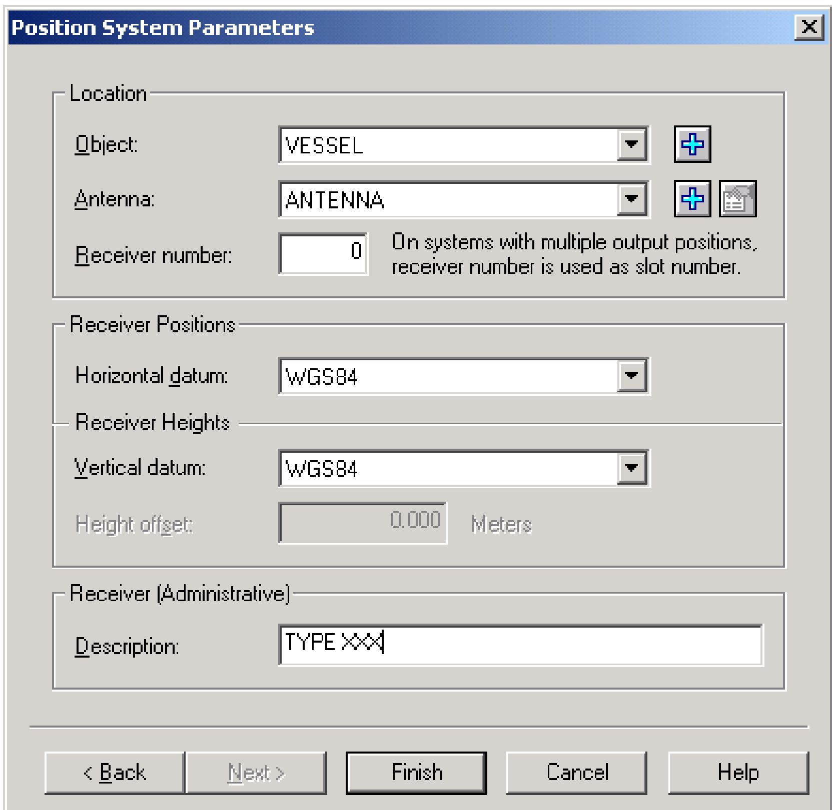
Database Setup

First define and select the “Object” on which the antenna is located. Select item “Systems” and define a new “Position navigation system”. Select the appropriate driver and interface parameters. Press the “Next” button to complete the setup. Select object and node for the antenna. Press the “Finish” button to save the system.



Database Setup (continued)

A new antenna node can be added by pressing the button; to change its properties, press the button.



Note 1. In order to decode different positions from one data string, add a “Position navigation system” for each of the positions to decode. Probably this means adding a new “Object” for each of the positions as well. Be sure to select the same driver and I/O parameters. Enter the appropriate slot number as receiver number.

See for more information the *QINSy* DB Setup Help Topics or the *QINSy* Knowledge Base.

3.2.1 Aquarius 5000 Series KART / LRK

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvNMEA.exe	*Drivers.io options:*	*various*
Last modified:	1999-Oct-21		

Driver Description

The Aquarius 5000 series can be fitted with a real time kinematic unit (reference or mobile) using DSNP KART (L1) or LRK® (L1/L2) techniques. The position output usually is a standard NMEA sentence.

The KART-A / LRK-A (A for Accurate 1-Hz rate) solution for a mobile unit is output when there is synchronization of a GPS fix with the received data from the reference station. If reference station data is received, output rate is 1 per second and the position will be very accurate. If reference station data is missed, then the Aquarius will wait until the next synchronization. There is no filtering applied to the positions.

The KART-R / LRK-R (R for Real-time 10-Hz rate) is based on the KART-A / LRK-A solutions, but the output positions are extrapolated to real-time solutions at an output rate of 10 times per second. The positions will exhibit more noise, but a solution will always be available. There is no position filtering applied.

Format Description

Refer to the corresponding NMEA position sentence driver for more information on the Aquarius format.

System Configuration

QPS strongly recommends to use the KART-A / LRK-A output positions in *QINSy* when there is also motion sensor data available. In this case the extrapolated positions computed by *QINSy* will be more accurate.

Database Setup

See description under “POSITION NAVIGATION SYSTEM DRIVERS”.

3.2.2 Aquarius RTK (GPGGA or GPLRK)

Input / Output:	Input & Output	*Driver class type:*	Terminated <LF>
Executable name:	DrvSercelAquariusUI.exe	*Drivers.io options:*	none
Last modified:	2003-March-25		

Driver Description

Driver to decode NMEA-0183 $GPGGA & $PDAS,QUAL sentences, ór LRK Accurate/Real-time sentences, containing Global Positioning System position fix data and position fix quality information.

To function correctly the driver requires all sentences to be outputted by the Aquarius receiver. That means, for the GGA sentences: the $GPGGA and $PDAS message should be outputted at the same time, in order to be accepted by the driver, and for the LRK sentences: the $GPLRKA, $GQLRKA, $GPLRKR and $GQLRKR message should be outputted at the same time, in order to be accepted by the driver.

Apart from reading and decoding these sentences, this driver can also send commands to the receiver causing the receiver to select a new reference station ($PDAS,FIXMOD & $PDAS,DGPS,MODE sentences).

Format Description

Each sentence is variable in length, depending on the length of the fields.

$GPGGA Format description

#	*Format*	*Description*	*Values, Range, Units*
01	"$"	start character	"$" (24 Hex)
02	Aaccc	address field	"GPGGA"
03	","	field delimiter	"," (2C Hex)
04	hhmmss.ss	UTC of position (hours,minutes,seconds)	0…23, 0…59, 0.00…59.99
05	","	field delimiter	"," (2C Hex)
06	llll.llllll	latitude (degrees, minutes)	0…90, 0.00…59.999999
07	","	field delimiter	"," (2C Hex)
08	A	latitude (northern or southern)	"N" or "S"
09	","	field delimiter	"," (2C Hex)
10	yyyyy.yyyyyy	longitude (degrees, minutes)	0…180, 0.00…59.999999
11	","	field delimiter	"," (2C Hex)
12	A	longitude (eastern or western)	"E" or "W"
13	","	field delimiter	"," (2C Hex)
14	X	GPS quality indicator	0-3 = Straight GPS 4-5 = 2D+T DGPS 6-9 = 3D+T DGPS 10-13 = EDGPS 14-19 = KINEMATIC
15	","	field delimiter	"," (2C Hex)
16	Xx	Number of satellites in use (≠ in view)	
17	","	field delimiter	"," (2C Hex)
18	x.x	HDOP (horizontal dilution of precision)	-1 = not available
19	","	field delimiter	"," (2C Hex)
20	x.x	Altitude above MSL (geoid)	Meters
21	","	field delimiter	"," (2C Hex)
22	"M"	Altitude units (meters)	"M"

23	“,”	field delimiter	“,” (2C Hex)
24	x.x	Altitude of MSL (geoid) above ellipsoid	Meters
25	“,”	field delimiter	“,” (2C Hex)
26	“M”	Altitude units (meters)	“M”
27	“,”	field delimiter	“,” (2C Hex)
28	x.x	Age of DGPS corrections	Seconds
29	“,”	field delimiter	“,” (2C Hex)
30	xxxx	Differential reference station id	
31	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

$PDAS,QUAL Format Description

#	*Format*	*Description*	*Values, Range, Units*
01	“$”	start character	“$” (24 Hex)
02		address field	“PDAS,QUAL”
03	“,”	field delimiter	“,” (2C Hex)
04	x.x	Standard deviation of Latitude	
05	“,”	field delimiter	“,” (2C Hex)
06	x.x	Standard deviation of Longitude	
07	“,”	field delimiter	“,” (2C Hex)
08	x.x	Standard deviation of Altitude	
09	“,”	field delimiter	“,” (2C Hex)
10	X	Kinematic mode	1 = EDGPS 2 = INIT KART 3 = INIT LRK 4 = KART 5 = LRK
11	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

$PDAS,FIXMODE Format Description

#	*Format*	*Description*	*Values, Range, Units*
01	“$”	start character	“$” (24 Hex)
02		address field	“PDAS,FIXMOD”
03	“,”	field delimiter	“,” (2C Hex)
04	X	DGPS fix mode	Always 7 = KART or LRK fix mode (with OTF initialization)
05	“,”	field delimiter	“,” (2C Hex)
06	X	Source of corrections	Always 1 = DGPS/KART/LRK without WAAS/EGNOS pseudoranges
07	“,”	field delimiter	“,” (2C Hex)
08	X	Refence station id	
09	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

$PDAS,DGPS,MODE Format Description

#	*Format*	*Description*	*Values, Range, Units*
01	“$”	start character	“$” (24 Hex)
02		address field	“PDAS,DGPS,MODE”
03	“,”	field delimiter	“,” (2C Hex)
04	“1”	Line number	Always 1
05	“,”	field delimiter	“,” (2C Hex)
06	“D”	Port number	Always D = Port D
07	“,”	field delimiter	“,” (2C Hex)

08	"R"		Always R = Receiver
09	","	field delimiter	"," (2C Hex)
10	Xx	Transmitter id	Reference station id
11	","	field delimiter	"," (2C Hex)
12		Empty field	
13	","	field delimiter	"," (2C Hex)
14		Empty field	
15	","	field delimiter	"," (2C Hex)
16	X	Reference station id (primary station)	
17	","	field delimiter	"," (2C Hex)
18	X	Reference station id (secondary station)	
19	","	field delimiter	"," (2C Hex)
20	X	Reference station id (tertiary station)	
21	","	field delimiter	"," (2C Hex)
22	X	Reference station id (quaternary station)	
23	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Remark: Fields 17–22 are not used and therefore not outputted by the driver.

$GPLRKA

Field	***Format***	***Description***	***Values, Range, Units***
1	$GPLRKA	Message Identifier	Always $GPLRKA
2	Hhmmss.ss	UTC time of accurate solution No extrapolation made	Hour, minutes and seconds
3	1234.123456	WGS84 Latitude accurate solution	Degrees, minutes
4	N	WGS84 Latitude hemisphere	N or S
5	12345.123456	WGS84 Longitude accurate solution	Degrees, minutes
6	E	WGS84 Longitude hemisphere	E or W
7	12	Accurate solution quality figure	0..3 Straight GPS 4..5 2D+T DGPS 6..9 3D+T DGPS 10..13 EDGPS 14..19 KINEMATIC
8	12	Count of SV's used in accurate solution	
9	1.12	Horizontal DOP accurate solution	(-1:not available)
10	12.123	Altitude above MSL accurate solution	Meters
11	M	Height unit	M for meters
12	12.123	Altitude of MSL above geoid	Meters
13	M	Height unit	M for meters
14	12	Age of DGPS corrections involved in accurate solution	Seconds
15	1234	Identification of reference station involved in accurate solution	
16	*12	Checksum	
17	<cr><lf>		

All fields are separated by a comma.

$GQLRKA

Field	Format	Description	Values, Range, Units
1	$GQLRKA	Message Identifier	Always $GQLRKA
2	12	Solution type	-1 Hold 0 GPS 1 DGPS1 2 DGPS2 3 DGPS3 4 DGPS4 5 MDGPS 6 EDGPS 8 KART 9 Init KART 20 GNOS 25 WADGPS 31 LRK 32 Init LRK 33 Wide Lane 34 Init Wide Lane
3	12.345	DRMS of accurate solution	Meters
4	12.345	Standard deviation of Northing KA	
5	12.345	Standard deviation of Easting KA	
6	12.345	Standard deviation of Altitude KA	
7	123	UHF reception level	dB
8	1234567	Distance between reference station and mobile	Meters
9	*12	Checksum	
10	<cr><lf>		

All fields are separated by a comma.

$GPLRKR

Field	Format	Description	Values, Range, Units
1	$GPLRKR	Message Identifier	Always $GPLRKR
2	Hhmmss.ss	UTC time of real-time solution	Hour, minutes and seconds
3	1234.123456	WGS84 Latitude real-time solution	Degrees, minutes
4	N	WGS84 Latitude hemisphere	N or S
5	12345.123456	WGS84 Longitude real-time solution	Degrees, minutes
6	E	WGS84 Longitude hemisphere	E or W
7	12	Real-time solution quality figure	0..3 Straight GPS 4..5 2D+T DGPS 6..9 3D+T DGPS 10..13 EDGPS 14..19 KINEMATIC
8	12	Count of SV's used in real-time solution	
9	1.12	Horizontal DOP real-time solution	(-1:not available)
10	12.123	Altitude above MSL real-time solution	Meters
11	M	Height unit	M for meters
12	12.123	Altitude of MSL above geoid	Meters
13	M	Height unit	M for meters
14	12	Age of DGPS corrections	Seconds
15	1234	Reference station	
16	*12	Checksum	
17	<cr><lf>		

All fields are separated by a comma.

$GQLRKR

Field	Format	Description	Values, Range, Units
1	$GQLRKR	Message Identifier	Always $GQLRKR
2	12	Solution type	-1 Hold 0 GPS 1 DGPS1 2 DGPS2 3 DGPS3 4 DGPS4 5 MDGPS 6 EDGPS 8 KART 9 Init KART 20 GNOS 25 WADGPS 31 LRK 32 Init LRK 33 Wide Lane 34 Init Wide Lane
3	12.345	DRMS of real-time solution	Meters
4	12.345	Standard deviation of Northing KR	
5	12.345	Standard deviation of Easting KR	
6	12.345	Standard deviation of Altitude KR	
7	123	UHF reception level	dB
8	1234567	Distance between reference station and mobile	Meters
9	*12	Checksum	
10	<cr><lf>		

All fields are separated by a comma.

GGA Format Example

```
$GPGGA,104101.07,5149.695871,N,00443.244094,E,19,06,2,13.864,M,47.176,M,1.0,0001
$PDAS,QUAL,0.018,0.018,0.023,5
$GPGGA,104102.07,5149.695870,N,00443.244095,E,19,06,2,13.865,M,47.176,M,1.0,0001
$PDAS,QUAL,0.018,0.018,0.023,5

$PDAS,FIXMOD,7,1,30
$PDAS,DGPS,MODE,1,D,R,30,,,30
```

LRK Format Example

```
$GPLRKA,095223.08,5120.386905,N,00313.167651,E,18,08,01.15,0053.466,M,0000.000,M,02.0,0080,*05
$GQLRKA,31,00.020,00.015,00.013,00.026,068,0002983,*0E
$GPLRKR,095224.88,5120.386907,N,00313.167652,E,17,08,01.15,0053.464,M,0000.000,M,02.0,0080,*15
$GQLRKR,31,00.030,00.024,00.018,00.045,068,0002983,*10

$PDAS,FIXMOD,,,80
$PDAS,DGPS,MODE,1,D,R,80,,,80
```

(continued on next page)

Decoding Notes

About the GGA sentences:
The receiver must output $GPGGA and $PDAS message at the same time.

The “altitude above MSL (geoid)” and “Altitude of MSL (geoid) above ellipsoid” are added together to obtain the antenna height above the WGS-84 ellipsoid.

In the Positioning Display the user will see a value for the Solution mode, this reflects the kinematic mode of the PDAS message (where 1: EDGPS, 2: INIT KART, 3: INIT LRK, 4: KART, 5: LRK). This value can also be monitored using a Raw Data Alert (Position mode outside limit), in the Alert Display.

The latitude standard deviation, longitude standard deviation & altitude standard deviation are combined into a RMS value that may be monitored using the Alert display and/or Positioning System display.

About the LRK sentences:
The receiver must output $GPLRKA, $GQLRKA, $GPLRKR and $GQLRKR at the same time (The A stands for accurate, the R stands for realtime).

The “altitude above MSL (geoid)” and “Altitude of MSL (geoid) above ellipsoid” are added together to obtain the antenna height above the WGS-84 ellipsoid.

When a valid LRK-A message is received, this will be used.
When the LRK-A message is not valid (e.g. d/t loss of basestation reception), the driver automatically decodes the position from the LRK-R message.

In the Positioning Display the user will see a value for the Solution mode, this reflects the kinematic mode of the GQLRKx message (where –1: Hold, 0: GPS, 1: DGPS1, 2: DGPS2, 3: DGPS3, 4: DGPS4, 5: MDGPS, 6: EDGPS, 8: KART, 9: Init KART, 20: GNOS, 25: WADGPS, 31: LRK, 32: Init LRK, 33: Wide Lane, 34: Init Wide Lane). This value can also be monitored using a Raw Data Alert (Position mode outside limit), in the Alert Display.

Further, the driver's dialog will show some other values from the received messages. These are the distance to the active base station in [m], and the UHF reception level in [dB]. These values are only updated online, and are not stored in the raw db.

Interfacing Notes

Because this driver both receives sentences from the receiver as well as sends sentences to the receiver a two-way cable is required. The cable-wiring diagram below shows which pins should be connected.

RS-232 Sensor Port A/B		DB-9 COM	DB-25 COM
Pin 2 TXD	-----------------	Pin 2 RXD	Pin 3 RXD
Pin 3 RXD	-----------------	Pin 3 TXD	Pin 2 TXD
Pin 5 SG	-----------------	Pin 5 SG	Pin 7 SG

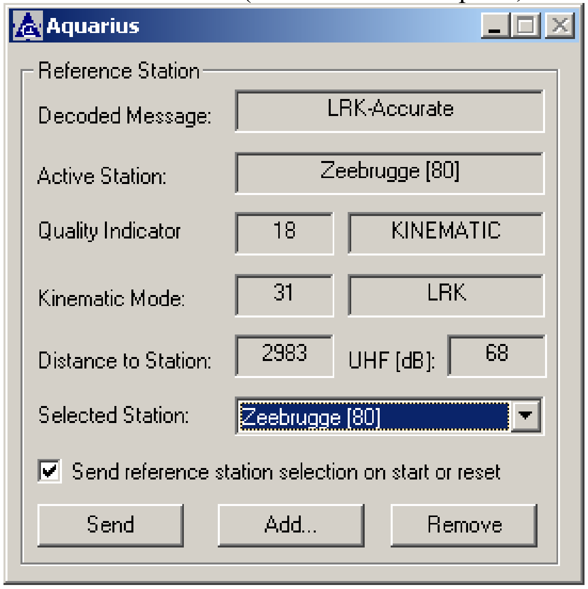
(continued on next page)

Database Setup

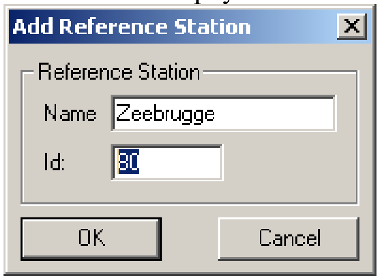
See description under “POSITION NAVIGATION SYSTEM DRIVERS”.

Controller Online

The first time Online (on the current computer, for the current user account) the driver dialog is empty.



Click Add to open the Add Reference Station dialog, where you can enter the Name and Id.
Click OK to accept your entries.



The reference details are stored in the Windows registry, under the QPS registry key of the Current User.

With at least one station defined, a station can be selected from the list.

WARNING. The action of selecting a station from the list, causes the driver to send the $PDAS,FIXMOD and $PDAS,DGPS,MODE sentences to the receiver, whereby the receiver will change reference station.

3.2.3 Ashtech CBEN ($PASHR,CBN)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvAshtechCBEN.exe	*Drivers.io options:*	*NOCS*
Last modified:	1999-Oct-06		

Driver Description

Driver for Ashtech CBEN sentences, containing Global Positioning System position fix data from Ashtech Z12 RTK GPS Receiver. The driver will decode the Position, the PDOP, the Number of Sv's and the RMS value (Root Mean Square).Additionally, if the $GPGGA message is also coming in at the same I/O port, the driver will decode the GPS Quality indicator, the HDOP value, the Reference station ID and Age of differential corrections from this message.

Driver can also send commands from a configuration file to the Ashtech receiver. If a configuration file is saved to the file name: "DrvAshtechCBEN.txt" in the *QINSy* program folder then this file will be send to the receiver at start-up of *QINSy* Controller and whenever an I/O Reset is executed. If the file is not found then it will not send anything to the receiver. Note that you must have a bi-directional serial cable installed between *QINSy* computer a receiver in order to do this.

Format Description

Refer to Ashtech Z12 operator's manual for more information.

$PASHR,CBN,hhmmss.ss,????,ss,ppp.p,llll.lllllll,a,yyyyy.yyyyyyy,a,+hhhhh.hhhh,aa.aaa,bb.bbb,cc.ccc,
+xx.xxx,+xx.xxx,+xx.xxx,aaaaaa,+xxx.xxx,+xxx.xxx,+xxx.xxx,xx.xxx,xx.xxx,xx.xxx*hh<CR><LF>

hhmmss.ss	UTC Time of position fix
????	?
ss	Number of satellites
ppp.p	PDOP value
llll.lllllll	(WGS'84) Latitude (decimal minutes)
a	Hemisphere of latitude (N/S)
yyyyy.yyyyyyy	(WGS'84) Longitude (decimal minutes)
a	Hemisphere of longitude (E/W)
+hhhhh.hhhh	(WGS'84) Height of position
aa.aaa,bb.bbb,cc.ccc	The three components to calculate the Root Mean Square value as follows: RMS = $\sqrt{(a^{2} + b^{2} + c^{2})}$
+xx.xxx,+xx.xxx,+xx.xxx	?
aaaaaa	?
+xxx.xxx,+xxx.xxx,+xxx.xxx	?
xx.xxx,xx.xxx,xx.xxx	?
*hh	Checksum, XOR from "$" to "*" exclusive
<CR><LF>	Carriage return and Linefeed character

Format Example

```
$PASHR,CBN,083005.00,????,06,002.4,5153.3218567,N,00418.7987198,E,+00052.3139,00.031,00.012,00.021,
+00.000,+00.000,+00.000,221001,-000.009,-000.022,+000.000,00.000,00.000,00.000*0D
$PASHR,CBN,083006.00,????,06,002.4,5153.3218592,N,00418.7987330,E,+00052.3105,00.031,00.012,00.021,
+00.000,+00.000,+00.000,221001,+000.001,+000.009,+000.000,00.000,00.000,00.000*0A
$PASHR,CBN,083007.00,????,06,002.4,5153.3218537,N,00418.7987181,E,+00052.3027,00.031,00.012,00.021,
+00.000,+00.000,+00.000,221001,-000.001,+000.011,-000.000,00.000,00.000,00.000*04
```

(continued on next page)

Decoding Notes

CBEN message.
Use a “Positioning System Display” to see the number of satellites that was used to compute the GPS position (indicated by the activated satellite buttons) and the PDOP and RMS values. Use an “Alert Display” to setup a raw data alert for “Position RMS outside limit” or “Quality indicator outside limit”.
Use an “Observation Physics Display” to see the three components of the RMS value as quality indicator, or a “Position System Display” where they are the SD-values for the latitude, longitude and height observation.
GPGGA message.
Use a “Positioning System Display” to see GPS quality indicator (solution mode field), HDOP value and the Differential corrections age. Use an “Alert Display” to setup an raw data alert for “Position mode outside limit“.

System Configuration

Enable on the receiver the CBEN and the NMEA GGA message. If PPS is used, the PPS message should also be enabled, and it is important that this PPS message is always the first one of all outputted messages.

Registry Options

Sending configuration file: the timeout that the driver waits after a single line is sent to the receiver is default 500 milliseconds. If this is not sufficient then you can change the value in the registry. The following key should be changed:

`[HKEY_CURRENT_USER\Software\QPS\QINSy\7.0\Drivers\DrvAshtechCBEN\Settings]`

Registry Key	*Default*	*Description*
Wait After Line Send [msec]	500	Time that is waited inside the driver after sending aline

Sending Commands

Example:

```
$PASHS,RST
$PASHS,BEEP,OFF
$PASHS,SPD,D,6
$PASHS,RDP,TYP,THL
$PASHS,RDP,LOD,D
$PASHS,ANT,0.000,0.0,0.0,0.0,0.0
$PASHS,ANR,ON
$PASHS,RTC,AUT,Y
$PASHS,CPD,MTP,2
$PASHS,CPD,FST,ON
$PASHS,CPD,AFP,95.0
$PASHS,CPD,DYN,3
$PASHS,PEM,5
$PASHS,NME,PER,0.5
$PASHS,NME,GGA,A,ON
```

Note: The driver will pause a certain time (see registry setting Wait After Line Send [msec]) after every line that is sent in order to give the Ashtech receiver time to catch up.
Note: No guarantee can be given that the commands are properly interpreted by the GPS receiver.

Database Setup

See description under “POSITION NAVIGATION SYSTEM DRIVERS”.

3.2.4 Ashtech GG24 GPS + GLONASS (Position)

Input / Output:	Input (User Interface)	*Driver class type:*	Terminated <LF>
Executable name:	DrvAshtechGG24.exe	*Drivers.io options:*	*none*
Last modified:	2000-Jan-04		

Driver Description

Driver for Ashtech output sentences, containing Global Positioning System position fix data from Ashtech GG24 Receiver. The driver will decode position data from $PASHR,POS, $GPRRE and $GLRRE sentences.

Format Description

Refer to GG24 GPS+Glonass Reference Manual, NMEA Data Message Commands, for more information.
GPS satellite numbers are given in message $GPRRE, GLONASS satellite numbers in message $GLRRE.

$PASHR,POS,n,qq,hhmmss.ss,ddmm.mmmmm,s,dddmm.mmmmm,s,
saaaaa.aa,seeeee,ttt.t,ggg.g,svvv,pp.p,hh.h,vv.v,tt.t,vvvv*cc<CRLF>

n	differential correction mode; 0 = no diff.corr. used, 1 = diff.corr used
qq	number of sattelites used for position computation
hhmmss.ss	UTC time of position computation
ddmm.mmmmm,s	WGS84 latitude; degrees, minutes (5 decimals), N/S
dddmm.mmmmm,s	WGS84 longitude; degrees, minutes (5 decimals), E/W
saaaaa.aa	height (altitude) above WGS84 ellipsoid; s = +/- (sign)
seeeee	reserved field (usually empty)
ttt.t	course over ground in degrees
ggg.g	speed over ground in knots
svvv	vertical velocity in decimeters/second; s = +/- (sign)
pp.p	PDOP (positional dilution of precision)
hh.h	HDOP (horizontal dilution of precision)
vv.v	VDOP (vertical dilution of precision)
tt.t	TDOP (time dilution of precision)
vvvv	firmware version id (ASCII)

$GPRRE,qq,ss,sxxx.x,.....,hhhh.h,vvvv.v*cc<CRLF>
$GLRRE,qq,ss,sxxx.x,.....,hhhh.h,vvvv.v*cc<CRLF>

qq	number of sattelites used for position computation
ss	PRN number; GPS: 1..32, GLONASS: 33..56
sxxx.x	range residual magnitude in meters; s = +/- (sign)
hhhh.h	horizontal RMS position error (68%) for mixed constellation in meters
vvvv.v	vertical RMS position error (68%) for mixed constellation in meters

Format Example

```
$PASHR,POS,0,15,091155.00,5200.50713,N,00422.12109,E,+00097.46,,000.0,000.0,+000,01.1,00.7,00.8,00.6,GC00*1B
$GPRRE,08,01,-038.4,04,+005.6,05,+037.9,07,+002.9,09,+003.1,24,+000.8,06,+030.5,30,-042.3,0053.0,0063.6*7D
$GLRRE,07,50,+000.2,49,-001.0,41,-002.4,40,+003.5,51,-000.3,47,-000.5,48,+007.9,0053.0,0063.6*6C
$PASHR,POS,0,15,091200.00,5200.50693,N,00422.12171,E,+00095.84,,000.0,000.0,+000,01.1,00.7,00.8,00.6,GC00*12
$GPRRE,08,01,-040.0,04,+006.9,05,+035.6,07,+004.5,09,+002.7,24,+002.3,06,+030.9,30,-042.9,0053.3,0064.0*77
$GLRRE,07,50,-000.3,49,-001.3,41,-002.6,40,+003.6,51,+000.1,47,-000.3,48,+007.1,0053.3,0064.0*61
```

(continued on next page)

Interfacing Notes

The Ashtech GG24 receiver has got three male 9 pin connectors for serial input/output: port A, B and C. A typical setup could be to use port A to output the position, port B to output the PPS time tag and to use port C to receive differential corrections from a shore station (via a Satel box). Some specific commands, using the Ashtech "$PASHS" format, have to be sent to the GG24 receiver to enable these user-definable I/O options.

Communications with the Ashtech GG24 receiver require handshaking, so the usual wiring of only the pins 2, 3 and 5 (RXD, TXD and Signal Ground) is not sufficient. One must use a specific serial interface cable or wire an interface cable according to the standard RS-232C (DTE Wiring) protocol, see Wiring Diagram 1. See Wiring Diagram 2 for the wiring from receiver port C to the Satel box, which has a 15 pins connector.

The PPS pulse is output as a TTL pulse on pin 9 of port A. The Ashtech manual refers to this pulse as the TTT event marker. The signal must be converted by the QPS PPS/fix box, via a coax cable, as follows. The BNC connector goes to "Fix In" of the PPS/fix box, the other end of the coax cable must be connected to pin 9 (PPS pulse) and pin 5 (signal ground) of GG24 port A. In order to receive the time tag message, one must split the same PPS signal from port A and feed it back into port B of the Ashtech GG24 receiver, i.e.pin 9 port A (PPS pulse out) to pin 9 port B (Event pulse in) and pin 5 port A to pin 5 port B (Signal Ground).

Refer to the sections "Ashtech PPS" and "Ashtech ADU2" for more detailed information on system setup.

GG24		COM	COM
DB-9		DB-9	DB-25
1 + 6	-------------	4	20
2	-------------	3	2
3	-------------	2	3
4	-------------	1 + 6	6
5	-------------	5	7
6 + 1	-------------	4	20
7	-------------	8	5
8	-------------	7	4
9	-------------	X	X

Wiring Diagram 1

GG24		SATEL
DB-9		DB-15
1	-------------	X
2	-------------	9
3	-------------	11
4	-------------	15
5	-------------	8
6	-------------	7
7	-------------	6
8	-------------	13
9	-------------	X
		1 + 14
		3 + 4

Wiring Diagram 2

Controller Setup

First time online, restore the "Ashtech GG24" driver window on the Windows taskbar and set the validation options, by selecting menu "Options – Validation Settings…" or pressing the left button "Change Settings". The user can define allowable position mode, position error limits, minimum number of satellites and DOP limits. Another user-definable option is the logging of (discarded or all) position data to an ASCII file.

Use a "Positioning System Display" to see the satellites that were used to compute the GPS position and the PDOP and RMS values. Use an "Alert Display" to setup an "Position RMS outside limit" raw data alert. Use an "Observation Physics Display" to see the three components of the RMS value as quality indicator, or a "Position System Display" where they are the SD-values for the latitude, longitude and height observation.

Database Setup

See description under "POSITION NAVIGATION SYSTEM DRIVERS".

3.2.5 AUV/Buoy Tracking (PARADIGM)

Input / Output: Input
Executable name: DrvAUVBuoyTracking.exe
Last modified: 2003-July-28
Driver class type: Terminated <CR>
Drivers.io options: *none / format / Id*

Driver Description

Driver to decode range measurements between an AUV and floating buoys on the watersurface, and to decode the GPS positions of these buoys.
See chapter SURFACE NAVIGATION SYSTEM DRIVERS about how to decode the range measurements.

Example data:

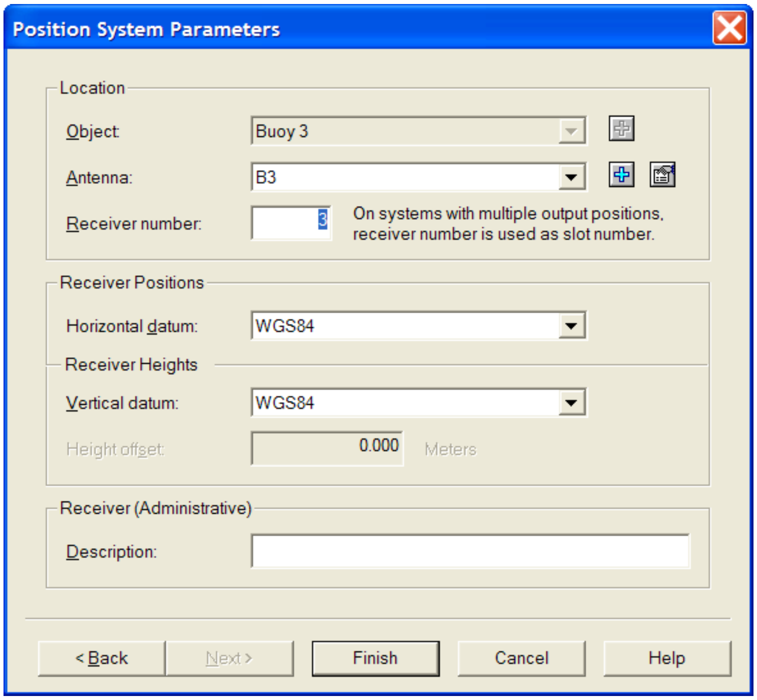
```
G2,235548,2726.6582,N,07854.6230,W,2,10,0.8,1.6,
G3,235548,2725.7536,N,07849.0707,W,2,10,0.8,3.2,
G1,235548,2725.6634,N,07847.1891,W,2,10,0.8,0.9,
#B0,P,3
P3
P1
P2
#B1,C
C1,00,00,B6
#B3,C
C3,00,03,B2
#B3,R
R3,01,7A02
#B1,C
C1,00,00,B7
#B3,C
C3,00,01,B3
#B1,C
C1,00,00,B7
#B3,C
C3,00,01,B3
#B1,C
C1,00,00,B7
#B3,C
C3,00,01,B3
#B0,G,D
#B1,C
G3,235600,2725.7539,N,07849.0706,W,2,10,0.8,2.3,
G2,235600,2726.6583,N,07854.6229,W,2,10,0.8,1.3,
G1,235600,2725.6638,N,07847.1895,W,2,10,0.8,-0.7
#B0,P,3
P3
P1
P2
#B1,C
C1,00,00,B6
#B3,C
C3,00,03,B2
#B3,R
R3,02,7EC1
```

(continued on next page)

Database Setup

See description under "POSITION NAVIGATION SYSTEM DRIVERS".

Define for each buoy a new Vessel object and attach a new Positioning System to it. The receiver number on the second page of the Position System Parametrs must be the buoy address (a decimal buoy identification number, range 1..15)



3.2.6 Center Source Position

Input / Output:	Input (User Interface)	*Driver class type:*	Freebase
Executable name:	DrvCentertSourcePosition.exe	*Drivers.io options:*	*none*
Last modified:	2003-April-16		

Driver Description

This driver has user-interface, and therefore always present in the Windows taskbar, when being on-line.
It will calculate a "weighted mean" position from a user-definable list with node positions. The user may give a weight for each selected position. Several methods can be selected to calculate the horizontal and vertical components.

Example of a simple scenario:

The user has a ROV object, positioned by USBL.
In the past you had to create a setup with a loopback cable and an extra output and input driver, to get the calculated ROV position stored in the recorded database. This is not needed anymore, just select this driver in your setup, and select online the ROV object in the driver's position list.

Example of more complicated scenario:

The user has a vessel that is towing a fish, this fish is towing a centre buoy and this buoy is towing a tailbuoy. All these objects are positioned independantly, e.g. with USBL. With this driver you can calculate a point somewhere along this chain, e.g. the centre of a virtual electormagnetic source.

Further, the driver takes care of the following situation:
When the towfish is lowered, the other towed object (inclusive the "virtual" centre source) will normally follow with a delay. The vertical component for the calculated centre source position will be corrected for this delay. All depends on the user-definable settings.

See for more information document HowToCentreSourcePositionDriver.doc

Database Setup

See also description under “POSITION NAVIGATION SYSTEM DRIVERS”.

Add a new system to your database template of type Positioning System, and select the driver “Center Source Position”. No I/O parameters are needed.

IMPORTANT:

Select on the 2nd page of the wizard for Horizontal and Vertical datum: **Survey Datum.**

3.2.7 DeepC AUV Position

Input / Output:	Bi-Directional (Network)	*Driver class type:*	TCP Client
Executable name:	DrvDeepCAFS.exe	*Drivers.io options:*	*none*
Last modified:	2004-Feb-13		

Please refer to Miscellaneous system “DeepC AUV AFS Control” for more information.

3.2.8 DNAVN AUXCOM3 Position

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvAuxcom3.exe	*Drivers.io options:*	CS | NOCS
Last modified:	1997-May-01		

Driver Description

Driver for DNAVN ASCII Position Archive Data Stream (AUXCOM3) input strings. Driver to be used to decode strings containing position and solution results from external position navigation systems.

Format Description

Each AUXCOM3 record is variable in length, depending on the number of satellites tracked. The maximum record size, however, is limited by 15 SV's and is 211 bytes, computed as follows: header/position = 86 bytes, plus 15 SV's of 8 bytes per SV = 120 bytes, plus trailer = 5 bytes.

The fields within the output record are of fixed length. Some fields are output as a single, hexadecimal digit (0-9, A-F). Each bit in such a field is a binary flag, organised from the most significant bit (MSB) to the least significant bit (LSB). Hex flag fields are represented by "x". Other fields are "n" (for decimal digit or part of decimal number), "mmddyy" (month, day, year), "hhmmss (hours, minutes, seconds), and "ddmmss" (degrees, minutes, seconds). Characters that do not change are indicated by quotes: ‘ ‘.

Byte	*Format*	*Description*	*Values, Range, Units*
01	‘[‘	start character	ASCII 91
02	n	day of week	0..6, 0 = Sunday
03	nnn	day of year	1..366
06	mmddyy	date	month, day, year
12	hhmmss.s	UTC (time of record)	hours, minutes, seconds
20	ss.s	time of record minus time of fix	seconds
24	n	datum flag	1 = WGS84
25	‘N’ or ‘S’	latitude	northern or southern
26	ddmmss.ss	latitude	degrees; minutes; seconds
35	‘E’ or ‘W’	longitude	eastern or western
36	dddmmss.ss	longitude	degrees; minutes; seconds
45	‘+’ or ‘–’	height	above or below ellipsoid
47	nnnn.n	height	meters wrt ellipsoid
53	nnn.n	course over ground	degrees true
58	nnn.n	speed over ground	knots
63	nnn	3D position error	1 sigma meters
66	nnn	2D position error	1 sigma meters
69	nn.n	PDOP or F-test	
73	nn.n	HDOP	
77	n	operating mode	0 = no solution, 1 = 4 SV, 2 = 3 SV + alt aid, 3 = 3 SV + clk aid, 4 = 2 SV + alt/clk aid, 5 = all SV in view
78	n	receiver mode	7 = C/A, L1 only, carrier aided
79	n	receiver dynamics	0 = static, 1 = low, …, 9 = high
80	n	position quality	0 = bad, …, 9 = good
81	n	differential quality	0 = no corr., 1 = bad, …, 9 = good

82	mmss	time since last correction	minutes, seconds maximum age is 60 seconds
86	x	number of SV tracked	maximum number = 'F' = 15
…			
+1	nn	PRN number	
+3	nn	SNR	Trimble units
+5	nnn	range residual	meters
+8	x	status flag	BIT 0 is elevation (0 = above mask), BIT 1 is SV health (0 = SV healthy)
…			
N	']'	stop character	ASCII 93; N = 87 + number SV × 8
+1	xx	checksum	exclusive or from '[' to ']' inclusive
+1	<CR><LF>	record termination	

Format Example

```
[1365123197235959.901.11N521122.81E0051657.15+0058.0001.1002.2  3  2 3.3 2.2579990011A
0105005002050050030500500405005005050050060500500705005008050050090500501005005 0]
```

Decoding Notes

The following fields are not used by *QINSy* (with column): course over ground (53), speed over ground (58), 3D position error (63), 2D position error (66), receiver code (78), receiver dynamics (79), position quality (80), differential quality (81), time since last correction (82), satellite data other than PRN numbers.

Interfacing Notes

No specific interfacing or configuring recommendations. See Chapter 1 for general interfacing remarks.

Database Setup

See description under “POSITION NAVIGATION SYSTEM DRIVERS”.

Drivers.io Options

Command line option “NOCS” is used to disregard the checksum field; with “CS” this check is always done.

3.2.9 EIVA NaviPac Position

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	EIVANaviPacPosition.ini	*Drivers.io options:*	none
Last modified:	2001-Jan-29		

Driver Description

Manual Generic Driver to decode the EIVA (HPBasic) NaviPac datastring.

Format Description

X_X_HH:MM:SS__EEEEEEE.EE__NNNNNNN.NN_X.XXX_<CR><LF>

Where:

X:	Unknown / Not used
_:	Space Character
HH:MM:SS:	System Time
E:	Easting
N:	Northing
<CR><LF>:	Carriage Return + Linefeed Character

Format Example

```
0 0 09:06:34  1486679.52  6224692.31 0.000 <CR><LF>
0 0 09:06:35  1486679.52  6224692.31 0.000 <CR><LF>
0 0 09:06:35  1486679.53  6224692.34 0.000 <CR><LF>
0 0 09:06:36  1486679.53  6224692.36 0.000 <CR><LF>
0 0 09:06:36  1486679.52  6224692.36 0.000 <CR><LF>
0 0 09:06:37  1486679.52  6224692.36 0.000 <CR><LF>
0 0 09:06:37  1486679.52  6224692.36 0.000 <CR><LF>
0 0 09:06:38  1486679.52  6224692.37 0.000 <CR><LF>
0 0 09:06:38  1486679.52  6224692.37 0.000 <CR><LF>
```

Decoding Notes

Easting and Northing are converted to latitude and longitude.

Database Setup

To decode the ***position***, add a “Variable Node” for the correct object to the *QINSy* Database. Add a “Position navigation system” and set the appropriate driver and interfacing parameters. Select the survey datum for the (satellite) system and select the correct node as receiver.

3.2.10 Fugro MRDGPS (PGS DGPS QC Format)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvFugroMRDGPS.exe	*Drivers.io options:*	*None*
Last modified:	2002-Oct-02		

Driver Description

Driver to be used to decode strings containing position and solution results from external position navigation systems, like Fugro MRDGPS, using the PGS DGPS QC Format.

Format Description

Each message is variable in length, depending on the number of satellites tracked and the number of reference stations used. The fields within the message are of fixed length and located on a fixed column. The message is CRLF terminated.

```
[FUGRO MRDGPS V 2.06.06   www ssssss.sa.aa DD MM.mmmmmmN DDD MM.mmmmmmE HH.hh  H.h  V.v  u.uuu
v.v    c.c    v.v    v.v   e.e S SV nn nn nn nn nn nn nn nn nn ST iiiaa.a  u.uuu w.ww SV]<CR><LF>

 [                            Message Start Character
FUGRO MRDGPS V 2.06.06        Label                                 (Not Used by QINSy)
www                           WN                                    (Not Used by QINSy)
ssssss.s                      TIME (GPS Weekseconds)
a.aa                          AGE                                   (Not Used by QINSy)
DD MM.mmmmmmN                 Latitude (WGS'84)
DDD MM.mmmmmmE                Longitude (WGS'84)
HH.hh                         Height (WGS'84)
H.h                           HDOP
V.v                           VDOP
u.uuu                         UV (Unit Variance)                    (Not Used by QINSy)
v.v                           V Lat                                 (Not Used by QINSy)
c.c                           CoV                                   (Not Used by QINSy)
v.v                           V Lon                                 (Not Used by QINSy)
v.v                           V Hgt                                 (Not Used by QINSy)
e.e                           ER (External Reliability)             (Not Used by QINSy)
S                             S                                     (Not Used by QINSy)
SV                            SV (Number of satellites used)
nn nn nn nn nn nn nn nn nn    Satellite PRN number (amount depends on previous SV number
ST                            STN (Number of Reference stations used)
iii                           Station ID
aa.a                          Age
u.uuu                         UV                                    (Not Used by QINSy)
w.ww                          W                                     (Not Used by QINSy)
SV                            SV                                    (Not Used by QINSy)

…                             Number of "iiiaa.a  u.uuu w.ww SV" message depends on the STN number

]                             Message End character
<CR><LF>                      Termination characters (Carriage Return and Linefeed)
```

Format Example

```
[FUGRO MRDGPS V 2.06.06   163 548164.00.82 62 21.256630N 006 05.095044E 64.01  1.0  1.9  0.582
0.2   -0.1    0.2    1.5    2.0 3  9  2 22  1 24 13 27  8  4 10  8 63026.8  0.534 1.00  9 58029.8
0.338 1.00  9 62010.6  0.624 0.60  9 57126.8  1.073 0.54  9 69011.8  0.261 0.40  9 52113.0  1.147
0.35  9 53028.0  0.318 0.29  9 43128.6  0.620 0.19  8]
```

Database Setup

See description under "POSITION NAVIGATION SYSTEM DRIVERS".

3.2.11 Geotracer 3000 GPS (NMEA $GPGGK)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvGeoTracer.exe	*Drivers.io options:*	*none*
Last modified:	1998-Nov-19		

Driver Description

Driver for NMEA-0183 $GPGGK sentences, containing Global Positioning System position fix data from GeoTracer 3000 GPS Receiver.

Format Description

Refer to *NMEA 0183- Standard For Interfacing Electronic Devices - Version 2.30* for more information.

Field	***Format***	***Description***	***Values, Range, Units***
01	"$"	start character	"$" (24 Hex)
02	aaccc	address field	"GPGGK"
03	","	field delimiter	"," (2C Hex)
04	hhmmss.ss	UTC (hours,minutes,seconds)	0…23, 0…59, 0.00…59.99
05	","	field delimiter	"," (2C Hex)
06	ddmm.mm..mm	latitude (degrees, minutes)	0…90, 0.00…59.99999999
07	","	field delimiter	"," (2C Hex)
08	a	latitude (northern or southern)	"N" or "S"
09	","	field delimiter	"," (2C Hex)
10	dddmm.mm..mm	longitude (degrees, minutes)	0…180, 0.00…59.99999999
11	","	field delimiter	"," (2C Hex)
12	a	longitude (eastern or western)	"E" or "W"
13	","	field delimiter	"," (2C Hex)
14	x	GPS quality indicator	0 = fix not available or invalid; 1 = GPS SPS mode, fix valid; 2 = DGPS SPS mode, fix valid; 3 = GPS PPS mode, fix valid
15	","	field delimiter	"," (2C Hex)
16	xx	satellites in use (≠ in view)	00…12
17	","	field delimiter	"," (2C Hex)
18	x.x	HDOP (horizontal DOP)	
19	","	field delimiter	"," (2C Hex)
20	x.x	Ellipsoidal Height	
21	","	field delimiter	"," (2C Hex)
22	"M"	altitude units (meters)	"M"
23	","	field delimiter	"," (2C Hex)
30	xxxx	differential reference station id	0000…1023
31	"*"	checksum field delimiter	"*" (2A Hex)
32	hh	checksum	XOR from "$" to "*" exclusive
33	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

(continued on next page)

Format Example

```
$GPGGK,144847.00,5157.99732780,N,00557.00448031,E,3,06,2.4,EHT50.217,M,0123*7B
$GPGGK,144848.00,5157.99733640,N,00557.00447261,E,3,06,2.4,EHT50.231,M,0123*74
$GPGGK,144849.00,5157.99733567,N,00557.00447581,E,3,06,2.4,EHT50.235,M,0123*7E
$GPGGK,144850.00,5157.99733658,N,00557.00447560,E,3,06,2.4,EHT50.209,M,0123*79
```

Decoding Notes

The GPS quality indicator will be stored in the database during a logging session. In Analyse it can be seen as the CalcMode of the Positioning system. During an online session it can be seen in the Positioning System Display as Solution Mode. The numeric value is visible in the Sd fields for the latitude, longitude and height observations and as the Quality Factor in the Observation Physics display. The number of satellites that was used to compute the position is indicated in the Positioning System display by the activated satellite button.

Interfacing Notes

No specific interfacing or configuring recommendations. See Chapter 1 for general interfacing remarks.

Database Setup

See description under “POSITION NAVIGATION SYSTEM DRIVERS”.

3.2.12 iXSea GAPS ($PTSAG Message)

3.2.13 iXSea GAPS ($PTSAG Message) (With UTC)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvIxseaGaps.exe	*Drivers.io options:*	*PPS*
Last modified:	2004-March-18		

Driver Description

Driver to decode the absolute or relative positioning message from an iXSea GAPS (Global Acoustic Positioning System), a fully integrated (INS and GPS) portable USBL system.
This section will describe how to decode the absolute positioning message. To decode the relative positioning message, see the driver description under chapter USBL SYSTEM DRIVERS.

Format Description - GAPS Positioning Messages

<u>Absolute Positioning Message</u>

Message	$PTSAG,#NNNNN, hhmmss.sss,jj,mm,aaaa,TTT,DDMM.MMMM,H,DDDMM.MMMM,D,V, DDDD.D,1, DDDD.D *CK	
Wording	Geographical coordinates and depth	
Field 0	$PTSAG	
Field 1	Frame number	
Field 2	Hour	hour, minute, second, milliseconds
Field 3	Day	0 to 31
Field 4	Month	1 to 12
Field 5	Year	
Field 6	Transponder #	0 : Ship 1 to 128 : Transponder # -1 to –127 : Unexpected reply
Field 7	Latitude	degrees, minutes and 1/10000
Field 8	Hemisphere	N or S
Field 9	Longitude	In degrees, minutes and 1/10000
Field 10	Direction	E or W
Field 11	Position validity	F : valid, O : not valid
Field 12	Calculated Depth	In meters
Field 13	Depth validity	1 (always)
Field 14	Sensor depth	In meters

-Position validity: for compatibility with Posidonia systems, "F" stands for "valid".

-Sensor depth: if the Acoustic Transponder has no sensor, the value transmitted is 9999.

Format Example

```
$PTSAG,#08191,180814.510,10,10,2003,0,4336.3830,N,00719.2940,E,F,0000,0,0000*2B
$PTSAG,#08192,180814.510,10,10,2003,3,4336.5239,N,00718.7622,E,F,1227.9,1,9999.9*26
$PTSAX,#08193,180814.510,10,10,2003,3,-641.5,416.0,F,1227.9,1,1227.9*2D
$PTSAG,#08194,180819.541,10,10,2003,0,4336.3790,N,00719.2980,E,F,0000,0,0000*2E
$PTSAG,#08195,180819.541,10,10,2003,3,4336.5236,N,00718.7620,E,F,1228.0,1,9999.9*23
$PTSAX,#08196,180819.541,10,10,2003,3,-624.5,452.8,F,1228.0,1,1227.9*2C
```

Decoding Notes

- Date and time from the message may be decoded, but only if you are sure that this is UTC time AND that *QINSy* also uses PPS. In that case you have to select the driver with the “With UTC”-option. Otherwise the data will be timestamped when it is received at the I/O port.
- Data is only accepted when the Position Validity (field 11) indicates a ‘F’.
- The Frame number (field 1) is not used by *QINSy*, but it is decoded for test purposes. You may monitor this frame number by using a Positioning Display, and check the Differential Age value.
- The depth validity (field 13) nor the sensor depth (field 14) are decoded.

Interfacing Notes

No specific interfacing or configuring recommendations. See Chapter 1 for general interfacing remarks. The driver does not send any commands to the GAPS.

Database Setup

See also description under “POSITION NAVIGATION SYSTEM DRIVERS”.

Add a Positioning System in your template and select the driver “iXSea GAPS ($PTSAG Message)”

Note. It is important to set the receiver number on the Position System Parameters wizard page. This number must be the same as the Transponder # (from field 6) and must be 0 (zero) to decode the ship’s position. Also important is to set the Horizontal and Vertical Datum correct. The Horizontal datum must be the datum of the latitude and longitude field (probably WGS84). The Vertical datum must be a MSL model, because the driver will decode field 12, the calculated depth as height reference.

3.2.14 Javad IMU Unit (Position)

Input / Output:	Input (two-way)	*Driver class type:*	Counted
Executable name:	DrvJavadAT4.exe	*Drivers.io options:*	None
Last modified:	2004-June-15		

Driver Description

Driver to decode message from Javad AT4 or from Javad IMU unit.
These messages may contain attitude (roll, pitch and heading) data, external event markers, **position (lat/lon/height) data**, and/or sensors information data.

Messages from the Javad AT4 that will be decoded are [AR] and/or [XA] records.
These records are defined in the Topcon GPS Receiver Interface Language (GRIL) Manual, version 2.2.
The [AR] records contain roll and pitch (no heave available!) and heading information
The [XA] records contain the external event markers

Messages from the Javad IMU unit that will be decoded are [ap], [SE], [po], and/or [at] records.
The [ap] records contain roll and pitch (no heave available!), heading, and **position information**.
The [SE] records contain sensor information (acceleration and angular velocities around the axis).
The [po] records contain **position information**.
The [at] records contain roll and pitch (no heave available!) and heading information.

The driver will detect automatically the different message types.

Format Description

[ap] Attitude Data {size = 42}

```
struct ap
{
  u4 t;                      //*** internal time in msec.
  f4 rollins;                //*** INS roll in rad.
  f4 pitchins;               //*** INS pitch in rad.
  f4 headins;                //*** INS heading in rad.
  f8 xposins;                //*** INS x-position in m.
  f8 yposins;                //*** INS y-position in m.
  f8 zposins;                //*** INS z-position in m.
  u1 valid_flag;             //*** it takes 1 or 0 only
  u1 cs;                     //*** Checksum
};
```

[po] Position Data {size = 30}

```
struct po
{
  u4 t;                      //*** internal time in msec.
  f8 xposins;                //*** INS x-position in m.
  f8 yposins;                //*** INS y-position in m.
  f8 zposins;                //*** INS z-position in m.
  u1 valid_flag;             //*** it takes 1 or 0 only
  u1 cs;                     //*** Checksum
};
```

Example datastrings:

[ap] Records (binary):

```
ap02AhVS.....e..:..!@;F..M.EA.*.:..@A.V....TA..
ap02ArVS.D....S.:..!@.N..M.EA|..:..@Ah6....TA..
ap02A|VS..).....:..!@....M.EAJ..:..@A.M....TA..
ap02A.VS..>.....:..!@.F..M.EA.w.:..@AT.....TA.q
```

3.2.15 Javad NAVPOS Positioning / Data Link Quality

Input / Output:	Input	*Driver class type:*	Terminated
Executable name:	DrvJavadGril.exe	*Drivers.io options:*	*n/a*
Last modified:	2003-October-6		

Driver Description

Driver for decoding the Javad NAVPOS message. This driver can be used as a positioning system but can also decode the quality of the data link, which is used for differential corrections. The horizontal velocity can also be decoded as a speed.

Format Description

Field	***Format***	***Description***	***Values, Range, Units***
1	NPxxx	Message identifier	
2	NAVPOS	Message title	
3	c	UTC time indicator	"V" if valid, "N" if not valid
4	xxxxxx.xx	UTC time	HHMMSS.ss
5	m	Position computation indicator	"0" if valid, if not checksum will follow after this field
6	mm	Position and Velocity computation mode	See GRIL manual for reference
7	{x,x}	Number of GPS and GLONASS satellites	
8	s	Reference geodetic datum identifier	For example: "W84" is WGS84
9	HXXoXX'XX.xxxxxx"	Latitude	Hemisphere (H) Degrees (XX)o Minutes (XX)' Seconds (XX.xxxxxx)"
10	HXXXoXX'XX.xxxxxx"	Longitude	Hemisphere (H) Degrees (XXX)o Minutes (XX)' Seconds (XX.xxxxxx)"
11	+XXXXX.xxxx	Height above ellipsoid	Meters
12	c	Geoid indicator	"V" if valid, "N" if not valid
13	X.xxxx	Geoidal separation	Meters, no fixed length
14	X.xx	HDOP	No fixed length
15	X.xx	VDOP	No fixed length
16	X.xxx	RMS horizontal position	No fixed length, meters
17	X.xxx	RMS vertical position	No fixed length, meters
18	X.xxxx	Horizontal velocity	No fixed length, kilometers / hour
	+X.xxxx	Vertical velocity	No fixed length, kilometers / hour
19	XXX.xxx	True Heading	Degrees
20	C	Magnetic heading indicator	"V" if valid, "N" if not valid
21	XXX.xxx	Magnetic heading	Degrees
22	X.xxx	RMS horizontal velocity	No fixed length, meters / second
23	X.xxx	RMS vertical velocity	No fixed length, meters / second
24	X.xx	Data link quality	Percent (0.00 to 100.00)
25	XXX	Age of last RTCM, CMR or JPS message	Max 999, estimated 1, seconds
26	@hh	Checksum	

Format Example

```
NP0B3,NAVPOS,V,171630.00,0,RR,{11,00},W84,N59o16'40.989309",E011o06'02.593318",
+00068.6311,V,+040.4376,0.81,1.23,0.007,0.010,0.0019,-0.0112,357.239,V,357.187,
0.010,0.015,100.00,001,@4B
```

Database Setup

-*Add a Positioning Navigation System*
See also description under “POSITION NAVIGATION SYSTEM DRIVERS”. Select the *Javad NAVPOS position* and set the correct communication parameters.

-*Add a Miscellaneous System*
Select the *Javad NAVPOS Data Link Quality* and set the correct communication parameters. Next give the observation a name.

-*Add a Speed Log System*
Select the *Javad NAVPOS Speed* and set the correct communication parameters. Next add a speed observation and give it a correct name. For the unit of the speed select km/h.

Controller Setup

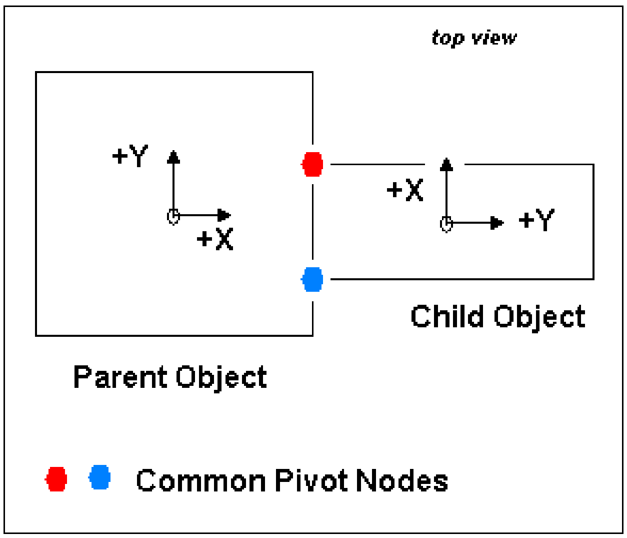
The Data Link Quality can be used in an Alert Display or in an Observation Physics Display.

3.2.16 Linked Object Position

Input / Output:	Input	*Driver class type:*	FreeBase
Executable name:	DrvLinkedObjectPosition.exe	*Drivers.io options:*	*none*
Last modified:	2002-Apr-29		

Driver Description

This driver can be used for calculating position, heading and attitude of an object (child) that is connected (linked) to another object (parent) through two common node pairs. This driver will use the grid position of the common nodes on the parent object to generate position, attitude and heading observations for the child object. This driver can be used to position grab shells, Cranes, suction hopper arms etc. Selection of nodes and observation must be done through the drivers user interface, during online session.



Above, a top view is given of 2 objects that are linked together with 2 common pivot nodes. These nodes have a local definition on both objects. The child object can rotate around a pivot axis that is defined by the common pivot nodes. The angle of this rotation can be supplied by any observation decoded by *QINSy*. *This Axis must be orthogonal with respect to the local coordinate systems for both objects.* If Axis is not orthogonal then driver will not output any results.

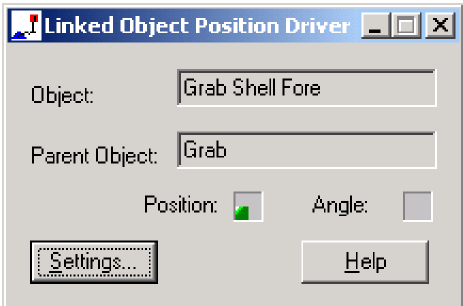
A Parent Object named “Grab” has got 2 nodes:
top: Ref Pivot 1 Fore (+**X**,+Y, +**Z**)
bottom: RefPivot 2 Fore (+**X**, -Y, +**Z**) [only Y coordinates differ]

A Child Object named “Grab Shell Fore” has 2 nodes:
top: Fore Pivot 1 (+X, -Y, +Z)
bottom: Fore Pivot 2 (-X, -Y, +Z) [only X coordinates differ]

The driver uses the coordinates of the two node pairs to define the attitude translation form Parent Object to Child Object. The observed rotation angle is applied as an offset to the translated attitude.

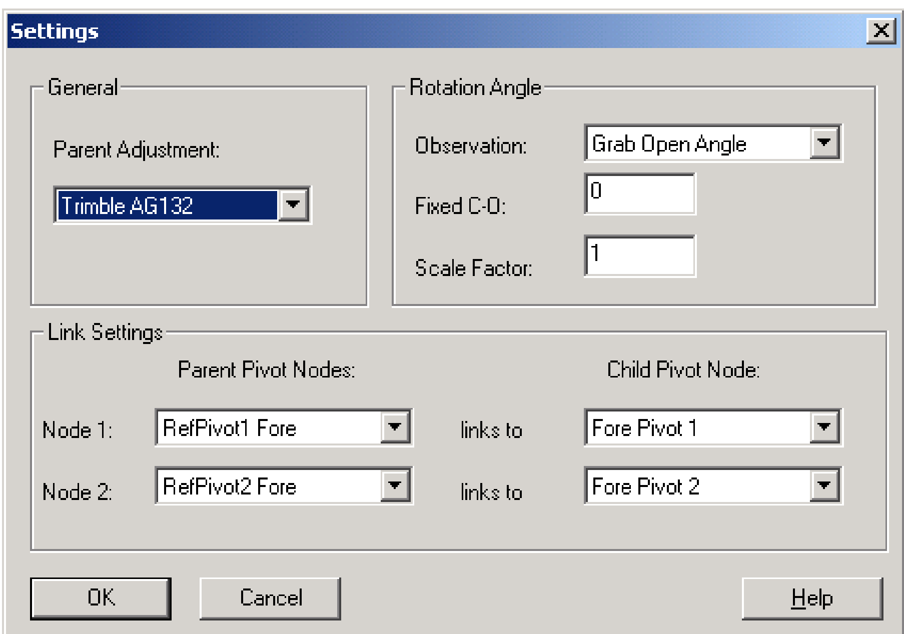
This example results in the following translations:
The parents’ object positive pitch (bow up) can be translated to a child objects’ positive roll (stb down).
The parents’ object positive roll (stb down) can be translated to a child objects’ negative pitch (bow down).
The parents’ object heading can be translated to the child objects’ heading by adding +90°.

Display of driver:



Object	Object on which the positioning system is mounted.
Parent Object	Connected object where position is obtained.
Position	Rotating led that updates every time an output position/attitude/hdg is generated.
Angle	Update when Fresh angle data has arrived.
Settings…	Button that will show the Settings dialog.
Help	Button that will activate context sensitive help.

Settings dialog:



Parent Computation	Computation that delivers the input position.
Observation	Rotation Angle.
Fixed C – O	Offset on observed angle (default: 0).
Scale Factor	Factor applied to observed (default: 1).
Nodes	Nodes that define the pivot axis (see above).

Note: The C-O and scale factor are applied ON TOP OFF the offsets as defined in DbSetup for the selected observation.

Database Setup

-Add a Positioning Navigation System
See also description under “POSITION NAVIGATION SYSTEM DRIVERS”.
Instead of entering I/O parameters, a port number should be entered. This port number has nothing to do with interfacing but is used to connect a Linked object position, Linked Object heading and Linked Object pitch roll driver together.

Note: selected output Datum is not relevant.

-Add a Gyro System
Add a *“Gyro’s and compasses”* system to the database and select the “Linked Object Heading” system, using the same port number as the positioning system above. Press “Next” button to define the properties of the true bearing observation. Keep defaults.

-Add a Ptch and Roll System
Add a “Pitch, roll and heave sensor” system to the database and select the “Linked Object Attitude” system, using the same port number as the positioning system above. Press Next to define the properties, keep defaults.

3.2.17 Naval GPS Data Link (PLO)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvNavalGpsLink.exe	*Drivers.io options:*	NOCS | CS | REG
Last modified:	2003-Aug-20		M | F | E | G | U

Driver Description

Driver for Naval GPS Datalink Controller Output. Driver supports multiple vessels (positions and headings).

Format Description

Naval GPS data transmission format of data stream sent from GPS Datalink Controller to radio transmitter and from radio receiver to shore data system. Basically it passes along what it receives from the GPS receiver in use. Thus the byte size of the items may vary depending upon the data presented by the GPS receiver.
All messages start with "^" and end with <CR><LF>. Individual items are separated by a space ("_").

#	*Format*	*Item Description*	*Values, Range, Units*
01	^	Header	"^" (5E Hex or ASCII 94)
02	XXX_	Compass	000 to 359
03	X_	Time Slot	1 to 8
04	HH:MM:SS_	Time	00:00:00 to 23:59:59
05	DD:MM.MMMMN_	Latitude	90:00.0000S to 90:00.0000N
06	DDD:MM.MMMMN_	Longitude	180:00.0000W to 180:00.0000E
07	X_	GPS Quality	0=invalid, 1=GPS, 2=DGPS
08	XX_	Satellites Used	0 to 10
09	XX.XX_	Horizontal DOP	1.00 to 99.9
10	XXXXX.XX_	Elevation wrt MSL	-30000 to 30000
11	XX	Checksum	00 to 99
33	<CR><LF>	Terminators	<CR><LF> (0D Hex, 0A Hex)

Note. The data string can be preceded by random characters which may include the '^' character.

Format Example

```
^025 1 11:07:13 47:41.092200N 122:19.343912W 2 04 2.5 12.37 B4
^025 2 11:07:13 47:41.092200N 122:19.343912W 2 05 2.5 24.74 BA
```

Drivers.io Options

Drivers.io command line parameter "NOCS" disregards the checksum field. Omitting this parameter or using parameter "CS" will **not** decode the data when the checksum calculation fails. Parameter "REG" will read 3 parameters from registry, see below. If "REG" is not found on the command line, then the parameters "M", "F", "E" can be used to indicate that elevations are in metres, US survey feet, or (English) feet, respectively. The elevation is always saved in the survey units that have been selected in the database setup program. Parameters "G" and "U" can be used to indicate that time is GPS time or UTC time, respectively.

(continued on next page)

Registry Options

`[HKEY_CURRENT_USER\Software\QPS\QINSy\7.0\Drivers\PLO\Settings]`

If parameter “REG” is found on the Drivers.io command line, the following 3 PLO input/output driver setup parameters are read from registry: time separator character (by default ‘:’), UTC GPS time indication (‘U’ or ‘G’, by default ‘U’), and height unit (1 to 14, by default 1). The time separator is not important for input. The height units are according to the *QINSy* unit.dll, 1 is meters, 2 is feet, 3 is yards, 4 is US survey feet, etcetera.

Database Setup

See description under “POSITION NAVIGATION SYSTEM DRIVERS”.

In order to use ***multiple vessel positions***, add a new “Object” for each vessel and add a “System” of type “Position navigation system” to each of the vessels. Be sure to select the same driver and I/O parameters. Enter the appropriate time slot number as receiver number. Since elevations can be with respect to mean sea level, be sure to select the appropriate vertical datum. In order to decode (also) the ***compass headings***, add a “System” of type “Gyro” to each vessel. Enter the time slot numbers as gyro observation slot identifier.

3.2.18 NMEA Position ($--LLQ)

3.2.19 NMEA Position (GPGGA)

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvNMEA0183.exe	*Drivers.io options:*	MSL | ELL | NOCS
Last modified:	2003-Feb-04		

Driver Description

Driver decodes the $--LLQ message, containing position and quality information. Also decodes standard $GPGGA messages.

Format Description

$--LLQ,hhmmss.ss,ddmmyy,xxxx.xxxx,M,xxxx.xxxx,M,x,x,xx.xx,xxxx.xxxx,M*hh<CR><LF>

Field	*Format*	*Description*	*Values, Range, Units*
1	$--LLQ	Header, including talker ID	"$--LLQ"
2	hhmmss.ss	UTC time of position	hhmmss.ss
3	Ddmmyy	UTC date	Mmddyy
4	xxxx.xxxx	Easting	Meters
5	M	Meter	Fixed
6	xxxx.xxxx	Northing	Meters
7	M	Meter	Fixed
8	X	GPS quality	0 = not valid 1 = GPS nav fix 2 = DGPS fix 3 = RTK fix
9	X	Number of satellites	
10	xx.xx	Position quality	Meters
11	xxxx.xxxx	Height	Meters
12	M	Meter	Fixed
13	*hh	Checksum	XOR from "$" to "*"
14	<CR><LF>	Termination characters	<CR><LF>

Format Example

```
$RTLLQ,173123.0,082001,000305.468,m,000299.276,m,3,06,00.02,000051.812,m,*69
$RTLLQ,173124.0,082001,000305.468,m,000299.277,m,3,06,00.02,000051.812,m,*71
$RTLLQ,173125.0,082001,000305.468,m,000299.277,m,3,06,00.02,000051.813,m,*73
```

Format Description

Each $GPGGA sentence is variable in length, depending on the altitude and age values that are encoded. However, most fields in the string are of fixed length; only altitude and age fields are of variable length. Refer to *NMEA 0183- Standard For Interfacing Electronic Devices - Version 2.30* for more information.

#	*Format*	*Description*	*Values, Range, Units*
01	"$"	start character	"$" (24 Hex)
02	aaccc	address field	"GPGGA"
03	","	field delimiter	"," (2C Hex)
04	hhmmss.ss	UTC of position (hours,minutes,seconds)	0…23, 0…59, 0.00…59.99
05	","	field delimiter	"," (2C Hex)
06	llll.llllll	latitude (degrees, minutes)	0…90, 0.00…59.999999
07	","	field delimiter	"," (2C Hex)
08	a	latitude (northern or southern)	"N" or "S"
09	","	field delimiter	"," (2C Hex)
10	yyyyy.yyyyyy	longitude (degrees, minutes)	0…180, 0.00…59.999999
11	","	field delimiter	"," (2C Hex)
12	a	longitude (eastern or western)	"E" or "W"
13	","	field delimiter	"," (2C Hex)
14	x	GPS quality indicator	0 = fix not available or invalid; 1 = GPS SPS mode, fix valid; 2 = DGPS SPS mode, fix valid; 3 = GPS PPS mode, fix valid
15	","	field delimiter	"," (2C Hex)
16	xx	number of satellites in use (≠ in view)	00…12
17	","	field delimiter	"," (2C Hex)
18	x.x	HDOP (horizontal dilution of precision)	
19	","	field delimiter	"," (2C Hex)
20	x.x	antenna altitude above MSL (geoid)	
21	","	field delimiter	"," (2C Hex)
22	"M"	altitude units (meters)	"M"
23	","	field delimiter	"," (2C Hex)
24	x.x	geoidal separation above ellipsoid	
25	","	field delimiter	"," (2C Hex)
26	"M"	altitude units (meters)	"M"
27	","	field delimiter	"," (2C Hex)
28	x.x	age of differential GPS data	
29	","	field delimiter	"," (2C Hex)
30	xxxx	differential reference station id	0000…1023
31	"*"	checksum field delimiter	"*" (2A Hex)
32	hh	checksum	XOR from "$" to "*" exclusive
33	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Format Example

```
$GPGGA,230744.00,2943.519964,N,09533.031905,W,1,07,1.2,0.3,M,-23.6,M,,*5D
$GPGGA,230744.00,2943.526631,N,09533.030167,W,1,07,1.2,-0.3,M,-23.6,M,,*7E
$GPGGA,230745.00,2943.520001,N,09533.030739,W,1,06,1.3,-0.3,M,-23.6,M,,*71
```

Decoding Notes

The driver converts the grid coordinates from the LLQ to geographical coordinates. The checksum from this message is not used in this driver. The decoding of the GPGGA message is a bit different then usual. Instead of rejecting a complete message when the *age of differential GPS data* and *differential reference station id* mis the rest of the message will still be used.

Drivers.io options

The drivers.io options have no effect on the LLQ message decoding.
The NOCS makes the driver ignore the checksum of the GPGGA. MSL Gets the altitude from the message and adds the geoidal separation before storing it in the Db. ELL Stores the height on the ellipsoid.

Database Setup

To use this driver create a new system. Choose *Position Navigation System* and browse for *NMEA Position ($--LLQ)* or *NMEA Position (GPGGA)*.

See description under “POSITION NAVIGATION SYSTEM DRIVERS”.

3.2.20 NMEA Position (GPGGA Ashtech)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvNMEA.exe	*Drivers.io options:*	*format*
Last modified:	1997-May-01		

Driver Description

Driver for NMEA-0183 $GPGGA sentences, containing Global Positioning System position fix data.

Format Description

Each $GPGGA sentence is variable in length, depending on the altitude and age values that are encoded. However, most fields in the string are of fixed length; only altitude and age fields are of variable length. Refer to *NMEA 0183- Standard For Interfacing Electronic Devices - Version 2.30* for more information.

#	*Format*	*Description*	*Values, Range, Units*
01	"$"	start character	"$" (24 Hex)
02	aaccc	address field	"GPGGA"
03	","	field delimiter	"," (2C Hex)
04	hhmmss.ss	UTC of position (hours,minutes,seconds)	0…23, 0…59, 0.00…59.99
05	","	field delimiter	"," (2C Hex)
06	llll.llllll	latitude (degrees, minutes)	0…90, 0.00…59.999999
07	","	field delimiter	"," (2C Hex)
08	a	latitude (northern or southern)	"N" or "S"
09	","	field delimiter	"," (2C Hex)
10	yyyyy.yyyyyy	longitude (degrees, minutes)	0…180, 0.00…59.999999
11	","	field delimiter	"," (2C Hex)
12	a	longitude (eastern or western)	"E" or "W"
13	","	field delimiter	"," (2C Hex)
14	x	GPS quality indicator	see next page
15	","	field delimiter	"," (2C Hex)
16	xx	number of satellites in use (≠ in view)	00…12
17	","	field delimiter	"," (2C Hex)
18	x.x	HDOP (horizontal dilution of precision)	
19	","	field delimiter	"," (2C Hex)
20	x.x	antenna altitude above MSL (geoid)	
21	","	field delimiter	"," (2C Hex)
22	"M"	altitude units (meters)	"M"
23	","	field delimiter	"," (2C Hex)
24	x.x	geoidal separation above ellipsoid	
25	","	field delimiter	"," (2C Hex)
26	"M"	altitude units (meters)	"M"
27	","	field delimiter	"," (2C Hex)
28	x.x	age of differential GPS data	
29	","	field delimiter	"," (2C Hex)
30	xxxx	differential reference station id	0000…1023
31	"*"	checksum field delimiter	"*" (2A Hex)
32	hh	checksum	XOR from "$" to "*" exclusive
33	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

#	Format	Description	Values, Range, Units
14	x	GPS quality indicator	0 = fix not available or invalid; 1 = GPS SPS mode, fix valid; 2 = DGPS SPS mode, fix valid; 3 = GPS PPS mode, fix valid

Format Example

```
$GPGGA,230744.00,2943.519964,N,09533.031905,W,1,07,1.2,0.3,M,-23.6,M,,*5D
$GPGGA,230744.00,2943.526631,N,09533.030167,W,1,07,1.2,-0.3,M,-23.6,M,,*7E
$GPGGA,230745.00,2943.520001,N,09533.030739,W,1,06,1.3,-0.3,M,-23.6,M,,*71
```

Decoding Notes

Antenna altitude and geoidal separation are added to obtain the antenna height above the WGS-84 ellipsoid, except in the "GPGGA Ashtech" version, where antenna altitude in field 20 is above the WGS-84 ellipsoid.

Interfacing Notes

No specific interfacing or configuring recommendations. See Chapter 1 for general interfacing remarks.

Database Setup

See description under "POSITION NAVIGATION SYSTEM DRIVERS".

3.2.21 NMEA Position (GPGGA Western)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvNMEAWGC.exe	*Drivers.io options:*	1 | MSL | ELL
Last modified:	1997-Jun-16		

Driver Description

Driver for concatenated NMEA-0183 $GPGGA sentences, containing GPS position fix data, each string preceded by a two character header with the mobile unit ID and an event flag. Driver to be used by WGC.

Format Description

Each $GPGGA sentence is variable in length, depending on the altitude and age values that are encoded. However, most fields in the string are of fixed length; only altitude and age fields are of variable length. Refer to *NMEA 0183- Standard For Interfacing Electronic Devices - Version 2.30* for more information. Each $GPGGA sentence is preceded by a two character header to indicate the mobile unit identifier.

Format WGC header:

#	*Format*	*Description*	*Values, Range, Units*
01	X	vessel id	1…9 and A…F
02	C	event flag	"+" (2B Hex) or "#" (23 Hex)

Format NMEA $GPGGA string:

#	*Format*	*Description*	*Values, Range, Units*
01	"$"	start character	"$" (24 Hex)
02	aaccc	address field	"GPGGA"
03	","	field delimiter	"," (2C Hex)
04	hhmmss.ss	UTC of position (hours,minutes,seconds)	0…23, 0…59, 0.00…59.99
05	","	field delimiter	"," (2C Hex)
06	llll.llllll	latitude (degrees, minutes)	0…90, 0.00…59.999999
07	","	field delimiter	"," (2C Hex)
08	a	latitude (northern or southern)	"N" or "S"
09	","	field delimiter	"," (2C Hex)
10	yyyyy.yyyyyy	longitude (degrees, minutes)	0…180, 0.00…59.999999
11	","	field delimiter	"," (2C Hex)
12	a	longitude (eastern or western)	"E" or "W"
13	","	field delimiter	"," (2C Hex)
14	x	GPS quality indicator	0 = fix not available or invalid; 1 = GPS SPS mode, fix valid; 2 = DGPS SPS mode, fix valid; 3 = GPS PPS mode, fix valid
15	","	field delimiter	"," (2C Hex)
16	xx	number of satellites in use (≠ in view)	00…12
17	","	field delimiter	"," (2C Hex)
18	x.x	HDOP (horizontal dilution of precision)	
19	","	field delimiter	"," (2C Hex)
20	x.x	antenna altitude above MSL (geoid)	
21	","	field delimiter	"," (2C Hex)

22	“M”	altitude units (meters)	“M”
23	“,”	field delimiter	“,” (2C Hex)
24	x.x	geoidal separation above ellipsoid	
25	“,”	field delimiter	“,” (2C Hex)
26	“M”	altitude units (meters)	“M”
27	“,”	field delimiter	“,” (2C Hex)
28	x.x	age of differential GPS data	
29	“,”	field delimiter	“,” (2C Hex)
30	xxxx	differential reference station id	0000…1023
31	“*”	checksum field delimiter	“*” (2A Hex)
32	hh	checksum (XOR from “$” to “*” exclusive)	
33	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Format Example

```
5+$GPGGA,230744.00,2943.519964,N,09533.031905,W,1,07,1.2,0.3,M,-23.6,M,,*5D
7+$GPGGA,230744.00,2943.526631,N,09533.030167,W,1,07,1.2,-0.3,M,-23.6,M,,*7E
B+$GPGGA,230745.00,2943.520001,N,09533.030739,W,1,06,1.3,-0.3,M,-23.6,M,,*71
5+$GPGGA,230746.00,2943.520133,N,09533.031742,W,1,07,1.2,0.1,M,-23.6,M,,*50
7+$GPGGA,230746.00,2943.526802,N,09533.030004,W,1,07,1.2,-0.4,M,-23.6,M,,*71
B+$GPGGA,230747.00,2943.520133,N,09533.030578,W,1,06,1.3,-0.7,M,-23.6,M,,*70
```

Decoding Notes

Antenna altitude and geoidal separation are added to obtain the antenna height above the WGS-84 ellipsoid.

Interfacing Notes

No specific interfacing or configuring recommendations. See Chapter 1 for general interfacing remarks.

Database Setup

See description under “POSITION NAVIGATION SYSTEM DRIVERS”.

Add a “Variable Node” for the GPS position antenna to the *QINSy* Database. Add a “Position navigation system” using the appropriate driver and interfacing parameters. Select the satellite system and datum. Select the receiver position and enter the receiver number. Be sure to enter the same number as the vessel identifier for the mobile unit for which the NMEA $GPGGA positions are to be decoded (slot number).

The driver is able to decode more than one mobile unit position from the same COM port link. Just add a “Variable Node” and a “Position navigation system” with driver “NMEA position (GPGGA Western)” for each of the mobile units. Be sure to select the same COM port number and interface parameters for each of these systems, and that each receiver number corresponds to the mobile unit which is to be decoded. *QINSy* will regard each of the systems as separate GPS systems, but only one driver process has to be started, and only one COM port has to be used to obtain all the data. Do not forget to setup separate computations.

3.2.22 NMEA Position (GPGLL Height=0)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvNMEA.exe	*Drivers.io options:*	*format*
Last modified:	1997-May-01		

Driver Description

Driver for NMEA-0183 $GPGLL sentences, containing geographic position (latitude, longitude) and UTC.

Format Description

Each $GPGLL sentence is variable in length, depending on the number of digits for the decimal fractions. Refer to *NMEA 0183- Standard For Interfacing Electronic Devices - Version 2.30* for more information.

#	*Format*	*Description*	*Values, Range, Units*
01	"$"	start character	"$" (24 Hex)
02	aaccc	address field	"--GLL"
03	","	field delimiter	"," (2C Hex)
04	llll.llllll	latitude (degrees, minutes)	0…90, 0.00…59.999999
05	","	field delimiter	"," (2C Hex)
06	a	latitude (northern or southern)	"N" or "S"
07	","	field delimiter	"," (2C Hex)
08	yyyyy.yyyyyy	longitude (degrees, minutes)	0…180, 0.00…59.999999
09	","	field delimiter	"," (2C Hex)
10	a	longitude (eastern or western)	"E" or "W"
11	","	field delimiter	"," (2C Hex)
12	hhmmss.ss	UTC of position (hours,minutes,seconds)	0…23, 0…59, 0.00…59.99
13	","	field delimiter	"," (2C Hex)
14	"A"	status of data	"A" = valid; "V" = not valid
15	"*"	checksum field delimiter	"*" (2A Hex)
16	hh	checksum (XOR from "$" to "*" exclusive)	
17	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Decoding Notes

Vessel position height is always 0 m. Calculation mode is 2D (3+ SV) for valid data and 0 for unvalid data.

Interfacing Notes

No specific interfacing or configuring recommendations. See Chapter 1 for general interfacing remarks.

Database Setup

See description under "POSITION NAVIGATION SYSTEM DRIVERS".

3.2.23 NMEA Position (GPRMC With UTC)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvNMEA.exe	*Drivers.io options:*	*none*
Last modified:	1997-May-01		

Driver Description

Driver for NMEA-0183 $GPRMC sentences, containing Recommended Minimum specific GPS data.

Format Description

Each $GPRMC sentence is variable in length, depending on the number of digits for the decimal fractions. Refer to *NMEA 0183- Standard For Interfacing Electronic Devices - Version 2.30* for more information.

#	*Format*	*Description*	*Values, Range, Units*
01	"$"	start character	"$" (24 Hex)
02	aaccc	address field	"--RMC"
03	","	field delimiter	"," (2C Hex)
04	hhmmss.ss	UTC of position (hours,minutes,seconds)	0…23, 0…59, 0.00…59.99
05	","	field delimiter	"," (2C Hex)
06	"A"	status of data	"A" = valid; "V" = receiver warning
07	","	field delimiter	"," (2C Hex)
08	llll.llllll	latitude (degrees, minutes)	0…90, 0.00…59.999999
09	","	field delimiter	"," (2C Hex)
10	a	latitude (northern or southern)	"N" or "S"
11	","	field delimiter	"," (2C Hex)
12	yyyyy.yyyyyy	longitude (degrees, minutes)	0…180, 0.00…59.999999
13	","	field delimiter	"," (2C Hex)
14	a	longitude (eastern or western)	"E" or "W"
15	","	field delimiter	"," (2C Hex)
16	x.x	speed over ground (knots)	
17	","	field delimiter	"," (2C Hex)
18	x.x	course over ground (degrees True)	
19	","	field delimiter	"," (2C Hex)
20	ddmmyy	date (day,month,year)	1…31, 1…12, 00…99
21	","	field delimiter	"," (2C Hex)
22	x.x	magnetic variation (degrees)	
23	","	field delimiter	"," (2C Hex)
24	a	magnetic variation (easterly or westerly)	"E" or "W"
25	"*"	checksum field delimiter	"*" (2A Hex)
26	hh	checksum (XOR from "$" to "*" exclusive)	
27	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Database Setup

See description under "POSITION NAVIGATION SYSTEM DRIVERS".

3.2.24 NMEA Position + Heading ($--GGA/$--HDT)

3.2.25 NMEA Position + Heading (CheckSum)

3.2.26 NMEA Position + Heading (No CheckSum

3.2.27 POS M/V (NMEA GGA GST GSA + HDT)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvPositionNMEA.exe	*Drivers.io options:*	NOCS | NOTH
Last modified:	2001-Jan-24		1 | 2 | 3

!!! WARNING !!!

This driver can be used when a NMEA position, NMEA quality sentence(s) and a NMEA heading are received on <u>the same port with the same update rate</u>. If the gyro is updating faster than the positions, the data have to be splitted and separate position and gyro systems have to be used on different ports. The driver also assumes that the position sentence is outputted first, before quality and gyro heading.

Driver Description

Driver for NMEA $--GGA, $--RMC, $--GGK, or $--GLL sentences, containing (GPS or RTK) position data. Driver can also be used to decode quality information from NMEA $--GST, $--GSA, or $PDAS,QUAL sentences, and/or to decode gyro heading from NMEA $--HDT, $--HDG, or $-- HDM sentences.

The driver will automatically detect the position format from the first (supported) NMEA position sentence. It will also automatically decode all NMEA quality sentences and copy the values to the previously decoded position data buffer. Driver will automatically detect the heading format from the first NMEA gyro string. The timetag of (all) the data is determined from the position sentence, i.e. the timetag of the (first) heading (after the position data) is copied from the position buffer update time. However, the data buffers are not updated until the last sentence from an NMEA block is received. NMEA blocks are determined as follows.

<u>Auto-Detection of NMEA Formats</u>
(1) After starting up, or after a “Reset I/O” command has been issued by the *QINSy* Controller, the driver waits for the first NMEA position sentence that can be decoded alright. The NMEA type of this sentence will determine the next NMEA position sentences that are decoded. **(2)** All NMEA quality information sentences and NMEA gyro compass sentences that are received before the second NMEA position sentence will be considered to be part of one NMEA block. **(3)** The format of the last NMEA quality information sentence or NMEA gyro compass sentence will be used to define the NMEA sentence that will trigger an update of the driver data buffers. There is a command line option to disregard gyro compass sentences as trigger strings. **(4)** If only NMEA position sentences are received (during the auto-detection phase), then the driver position data buffer is updated for each valid NMEA position sentence of the right format. **(5)** Be aware that the auto-detection process will take at least two valid position sentences (twice the position update cycle time) after starting up the driver. **(6)** The auto-detection process will be restarted after each “Reset I/O” command.

Format Description

See for the $--GGA, $--RMC, $--GGK, or $--GLL sentence descriptions the various NMEA positioning system driver format descriptions elsewhere. See for the NMEA $--HDT, $--HDG, or $-- HDM sentence descriptions the various NMEA gyro system driver format descriptions. Quality formats are given next.

Format Description (continued)

```
$--GST,hhmmss.ss,x.x,x.x,x.x,x.x,x.x,x.x,x.x*hh<CR<LF>
```

#	*Format*	*Description*	*Values, Range, Units*
01	“$”	start character	“$” (24 Hex)
02	aaGST	address field (talker and formatter)	e.g. “GPGST”
03	hhmmss.ss	UTC time of associated GGA fix	0…23, 0…59, 0.00…59.99
04	x.x	RMS value of sd of range inputs	meters
05	x.x	sd of semi-major axis of error ellipse	meters
06	x.x	sd of semi-minor axis of error ellipse	meters
07	x.x	orientation of major axis of error ellipse	degrees from true north
08	x.x	standard deviation of latitude error	meters
09	x.x	standard deviation of longitude error	meters
10	x.x	standard deviation of altitude error	meters
11	hh	checksum	XOR from “$” to “*” exclusive
12	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

```
$--GSA,a,x,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,x.x,x.x,x.x*hh<CR<LF>
```

#	*Format*	*Description*	*Values, Range, Units*
01	“$”	start character	“$” (24 Hex)
02	aaGSA	address field (talker and formatter)	e.g. “GPGSA”
03	a	navigation mode of associated GGA fix	“M” manual, “A” automatic
04	x	solution mode of associated GGA fix	“1” no fix, “2” 2D, “3” 3D
05	xx	ID number of satellite 1 used in solution	ID 1-32 for GPS satellites
…	xx	…	ID 33-64 for WAAS system
16	xx	ID number of satellite 12 used in solution	ID 65-96 for GLONASS
17	x.x	PDOP value of navigation solution	
18	x.x	HDOP value of navigation solution	
19	x.x	VDOP value of navigation solution	
20	hh	checksum	XOR from “$” to “*” exclusive
21	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

```
$PDAS,QUAL,x.xxx,y.yyy,z.zzz,MKIN[*5D]<CR><LF>
```

#	*Format*	*Description*	*Values, Range, Units*
01	“$”	start character	“$” (24 Hex)
02	PDAS	address field	“PDAS”
03	QUAL	address field	“QUAL”
04	x.xxx	standard deviation of latitude	0.018 meters
05	y.yyy	standard deviation of longitude / Easting	0.019 meters
06	z.zzz	standard deviation of height / Altitude	0.028 meters
07	MKIN	kinematic mode	1 (= EDGPS), 2 (= INIT KART) 3 (= INIT LRK), 4 (= KART) 5 (= LRK)
08	“*”	checksum field delimiter (optional)	“*” (2A Hex)
09	hh	checksum (optional)	XOR from “$” to “*” exclusive
10	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Decoding Notes

Driver will not decode any xxGGA, xxGLL or xxGGK strings if the position fields are empty. Example:

```
$GPGGA,,,,,0,00,1.0,00065.000,M,00000.000,M,0.00,*4D
```

Format Examples

```
$INRMC,112545,A,2637.9681,N,05009.4071,E,00.0,182.3,240500,,*38<CR><LF>

$PTNL,GGK,172814.00,071296,3723.46587704,N,12202.26957864,W,3,06,1.7,EHT-6.777,M*48

$GPGGA,072840.20,5352.726971,N,00842.847935,E,0,00,1.0,00065.000,M,00000.000,M,0.00,*4D
$HEHDT,226.2,T*2B

$INGGA,120000.045,4928.46282,N,00008.01717,E,4,00,1.0,55.14,M,,,2.0,0001*34
$INGST,120000.045,,0.7,0.6,88.1,0.7,0.7,0.7*6C
$INGSA,A,3,1,3,5,7,9,11,13,15,,,,,1.1,2.2,3.3
$INHDT,52.7,T*15

$GPGGA,104101.07,5149.695871,N,00443.244094,E,19,06,2,13.864,M,47.176,M,1.0,0001
$PDAS,QUAL,0.018,0.018,0.023,5

$GLL,0447.01472,S,01151.07695,E,05,D,9,ID1
$HCHDM,162.3,M*2F
```

System Configuration

Driver can be used to decode '$PDAS,QUAL' quality messages after enabling them in a DSNP Aquarius RTK receiver by defining the following string in its Configuration Setup (KART Real Time solution):

```
'$PDAS,QUAL',',NPKRSD:1:3,',',EPKRSD:1:3,',',HPKRSD:1:3,',',MKIN
```

Drivers.io Options

Command line parameter "NOCS" will disregard all checksum fields. Parameter "NOTH" will ***not*** accept an NMEA gyro compass sentence as buffer update trigger sentence, i.e. the data buffers are updated after each NMEA position sentence (or accompanying quality sentence if one was encountered during auto-detection). Command line parameters "1", "2" or "3" are only applicable to GGA sentences. Default is "3" which means that the height value is obtained as the sum of the first and second height fields in a GGA sentence, i.e. the antenna altitude field and the geoidal separation field. Add a "1" to the drivers.io command line to decode only the first field (if it is already the height above the ellipsoid), add '2' to decode only the second field. Be aware that the command line for the corresponding entry for the heading driver must also be changed.

Database Setup

See description under "POSITION NAVIGATION SYSTEM DRIVERS".

The "NMEA Position + Heading ($--GGA/$--HDT)" and "POS M/V (NMEA GGA GST GSA + HDT)" entries have been retained for backwards compatibility. They are the same as the "CheckSum" driver.

When the NMEA input data block also contains a $--HDT (or $--HDG or $--HDM) sentence, the driver can also be used to decode the heading data. The driver currently only supports ***true heading*** observations, so if a HDM heading is obtained, magnetic variation should be entered as for example a (C-O) value, with negative values for westerly variations, since (C-O) values are added to the raw heading observations, or a $--HVD or $--HVM sentence should be included. Values obtained from HDT and HDG strings are always true headings.

Add a system of type “Gyro’s and compasses”, select the same NMEA driver and enter the same serial I/O parameters as with the NMEA position driver. See the description under “GYRO SYSTEM DRIVERS”. When this “NMEA Position + Heading” driver is used, a serial interface cable does ***not*** have to be splitted.

As mentioned above, the heading is only updated when the position is updated. If this is not wanted, then a separate NMEA gyrocompass driver must be defined on another port and the serial input must be ***splitted***.

Controller Setup

$--GST and/or $--GSA

The statistical information from $--GST and $--GSA sentences are shown in a Positioning System Display.

The RMS value of the range inputs from the $--GST sentence is displayed in the MDE box. The age of the DGPS data from the $--GGA sentence is displayed in the Unit Variance box. When no $--GSA sentence is available, the Satellites tab just indicates the number of satellites in use (decoded from $--GGA sentence).

The standard deviations of the latitude, longitude and altitude (height) errors are shown in an Observation Physics Display as the so-called quality indicator of the corresponding positioning system observation.

The various statistical measures can be used to define an alert and even to pause storage when such a value is above a certain limit. Start up an Alert Display and add an alert of type “Raw Data Alert”. Possible alerts:

- Position mode outside limit alert on GPS solution mode value in $--GGA sentence
- Position RMS outside limit alert on semi-major axis value from a $--GST sentence
- Quality indicator outside limit alert on standard deviation value from $--GST sentence

The position mode and position RMS alerts can only be defined for the system. The quality indicator (sd) alerts must be defined for the system and the specific observation, latitude, longitude or altitude (height).

$PDAS,QUAL

The statistical information from $--GGA and $PDAS messages are shown in a Positioning System Display.

The RMS value of the $--GGA position inputs from the $PDAS message is displayed in the ‘Quality measures - a’ box. The standard deviations of the latitude, longitude and altitude (height) values from the $PDAS messages are shown in the ‘SD’s - Latitude, Longitude, Height’ boxes.

The standard deviations of the latitude, longitude and altitude (height) errors are shown in an Observation Physics Display as the so-called quality indicator of the corresponding positioning system observation.

The various statistical measures can be used to define an alert and even to pause storage when such a value is above a certain limit. Start up an Alert Display and add an alert of type “Raw Data Alert”. Possible alerts:

- Position mode outside limit alert on Kinematic Mode value in $PDAS message
- Position RMS outside limit alert on combined standard deviation value from $PDAS message
- Quality indicator outside limit alert on standard deviation value from $PDAS message

The position mode and position RMS alerts can only be defined for the system. The quality indicator (sd) alerts must be defined for the system and the specific observation, latitude, longitude or altitude (height).

3.2.28 Racal BasMon DeltaFix Binary (Fixed E,N)

3.2.29 Racal BasMon DeltaFix Binary (False E,N)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvBasmonBinary.exe	*Drivers.io options:*	F | 0
Last modified:	2000-Aug-14		

Driver Description

Driver for Racal BasMon DeltaFix-LR (binary) strings which have already been extracted from the Basmon RTCM Type 16 message. Driver to be used to decode strings containing base station health monitor data.

Format Description

Each Basmon string will be of the same length, 14 bytes. The strings are binary encoded, 6 bits/byte, with bytes 7,6 fixed at "01", e.g. 0 = 40h and 63 = 7Fh. No comma delimiters are provided.

#	*Bytes*	*Description*	*Values, Range, Units*
1	[0,1]	Station identification	0 – 1023
2	[2,4]	UTC of solution	"hhmmss"
3	[5,6]	Instantaneous delta Easting	0.1m units (+/– 102.4m offset)
4	[7,8]	Instantaneous delta Northing	0.1m units (+/– 102.4m offset)
5	[9]	Number of SV's used in solution	0 – 63
6	[10]	HDOP of solution configuration	0 – 63
7	[11]	Age (latency) of RTCM data	0 – 63 seconds
8	[12,13]	Terminator	<CR><LF>

Format Example

F4 68 50 6D 56 7F 61 40 5F 44 49 47 OD OA, equivalent to "OhPmVΔa@_DIG" <CR><LF> in ASCII.

Decoding Notes

The delta Easting and delta Northing values are added to the coordinates of a certain *fixed node* (depending on whether the driver is of "fixed E,N" or "false E,N" option) before they are fed into the *QINSy* system.

QINSy thus uses (and stores) the *recomputed* reference station *coordinates.* Also in a Positioning System Display, these recomputed coordinates are shown. The latency of the RTCM corrections is shown as a DOP value (labelled "RTCM"), below the HDOP. The number of satellites is shown as a row of depressed buttons under the "Satellites" tab. The highest depressed button indicates the number of SV's in the solution.

Interfacing Notes

No specific interfacing recommendations; see Chapter 1 of this manual for general interfacing remarks.

(continued on next page)

Database Setup

See description under “POSITION NAVIGATION SYSTEM DRIVERS”.

The procedure for setting up the *QINSy* Database parameters for these drivers depends on the “E,N” option:

BASMON DELTAFIX-LR DRIVER OPTION “fixed E,N”

<u>QINSy 6.3 (QINSy 6.4 with DbEdit.exe)</u>

Delta E,N are added to the (first) fixed node with the same (P2/94) identifier as the station identification in the decoded Basmon string. The QPS id is not important. Be sure to add this “Fixed Node”, as well as a “Position Navigation System” using driver “Racal BasMon DeltaFix binary **(fixed E,N)**”, with a receiver at a “Variable Node”, to the *QINSy* database. Use a unique name for the fixed node, since the *QINSy* system will only show the QPS id in the various displays, not the P2/94 identifier.

<u>QINSy 6.5 (QINSy 6.4 with DbSetup.exe)</u>

Delta E,N are added to the (first) fixed node with a **node name** that begins with the same identifier as the station identification in the decoded Basmon string, for example “1000 BASMON” to decode a Basmon station with id 1000. Be sure to add such a “Fixed Node”, as well as a “Position Navigation System” using driver “Racal BasMon DeltaFix binary **(fixed E,N)**”, with a receiver at a “Variable Node” (usually with zero offsets), to the *QINSy* database. The originally decoded delta Easting and delta Northing coordinates are copied to the SD’s of the longitude and latitude (respectively) and can be seen in a Positioning System Display or as quality indicator values in a Observation Physics Display.

<u>QINSy 6.3 or QINSy 6.4 or QINSy 6.5</u>

To display the (originally decoded) delta Easting and delta Northing, configure a Scatterplot Display to display the variable node versus the reference fixed node. Do not forget to define an computation for the variable node with only the three position system observations .

BASMON DELTAFIX-LR DRIVER OPTION “false E,N”

<u>QINSy 6.3 or QINSy 6.4 or QINSy 6.5</u>

Delta E,N are added to an internal fixed node with the same coordinates as the origin of the projection, using the false easting and northing. The station identification number is not important with this option and does not need to be known. To be able to display the (originally decoded) delta Easting and delta Northing values, be sure to add a “Fixed Node” with the same (false) coordinates as the origin of the projection (identifier not important), and a“Position Navigation System” using driver “Racal BasMon DeltaFix binary **(false E,N)**”, with a receiver at a “Variable Node”, to the *QINSy* database.

To display the delta Easting and delta Northing, configure a Scatterplot Display to display the variable node versus the false reference fixed node. Do not forget to define an computation for the variable node with only the position system coordinates as connected observations .

3.2.30 Racal BasMon DeltaFix-LR RTCM 6-of-8 / 8-of-8 (Fixed E,N)

3.2.31 Racal BasMon DeltaFix-LR RTCM 6-of-8 / 8-of-8 (False E,N)

Input / Output:	Input	*Driver class type:*	Counted
Executable name:	DrvBasmonType16.exe	*Drivers.io options:*	SIX | EIGHT F| F | 0
Last modified:	2000-Aug-14		

Driver Description

Driver for Racal BasMon DeltaFix-LR (binary) strings which have not yet been extracted from the Basmon RTCM Type 16 message. Driver to be used to decode strings containing base station health monitor data.

Format Description

Each original Basmon string will be of the same length, 14 bytes. The strings are binary encoded, 6 bits/byte, with bytes 7,6 fixed at “01”, e.g. 0 = 40h and 63 = 7Fh. No comma delimiters are provided.

#	*Bytes*	*Description*	*Values, Range, Units*
1	[0,1]	Station identification	0 – 1023
2	[2,4]	UTC of solution	“hhmmss”
3	[5,6]	Instantaneous delta Easting	0.1m units (+/– 102.4m offset)
4	[7,8]	Instantaneous delta Northing	0.1m units (+/– 102.4m offset)
5	[9]	Number of SV’s used in solution	0 – 63
6	[10]	HDOP of solution configuration	0 – 63
7	[11]	Age (latency) of RTCM data	0 – 63 seconds
8	[12,13]	Terminator	<CR><LF>

Format Example

F4 68 50 6D 56 7F 61 40 5F 44 49 47 OD OA, equivalent to “OhPmV∆a@_DIG” <CR><LF> in ASCII.

Decoding Notes

The Basmon DeltaFix-LR drivers will search all incoming RTCM data for type 16 messages and extract the original string from such an RTCM type 16 message. RTCM data should be standard 6 bits per byte format.

The delta Easting and delta Northing values are added to the coordinates of a certain *fixed node* (depending on whether the driver is of “fixed E,N” or “false E,N” option) before they are fed into the *QINSy* system.

QINSy thus uses (and stores) the *recomputed* reference station *coordinates.* Also in a Positioning System Display, these recomputed coordinates are shown. The latency of the RTCM corrections is shown as a DOP value (labelled “RTCM”), below the HDOP. The number of satellites is shown as a row of depressed buttons under the “Satellites” tab. The highest depressed button indicates the number of SV’s in the solution.

Interfacing Notes

No specific interfacing recommendations; see Chapter 1 of this manual for general interfacing remarks.

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Database Setup

See description under “POSITION NAVIGATION SYSTEM DRIVERS”.

The procedure for setting up the *QINSy* Database parameters for these drivers depends on the “E,N” option:

BASMON DELTAFIX-LR DRIVER OPTION “fixed E,N”

QINSy 6.3 (QINSy 6.4 with DbEdit.exe)

Delta E,N are added to the (first) fixed node with the same (P2/94) identifier as the station identification in the decoded Basmon string. The QPS id is not important. Be sure to add this “Fixed Node”, as well as a “Position Navigation System” using driver “Racal BasMon DeltaFix RTCM #of8 **(fixed)**”, with a receiver at a “Variable Node”, to the *QINSy* database. Use a unique name for the fixed node, since the *QINSy* system will only show the QPS id in the various displays, not the P2/94 identifier.

QINSy 6.5 (QINSy 6.4 with DbSetup.exe)

Delta E,N are added to the (first) fixed node with a **node name** that begins with the same identifier as the station identification in the decoded Basmon string, for example “1000 BASMON” to decode a Basmon station with id 1000. Be sure to add such a “Fixed Node”, as well as a “Position Navigation System” using Racal BasMon DeltaFix RTCM #of8 **(fixed)**”, with a receiver at a “Variable Node” (usually with zero offsets), to the *QINSy* database. The originally decoded delta Easting and delta Northing coordinates are copied to the SD’s of the longitude and latitude (respectively) and can be seen in a Positioning System Display or as quality indicator values in a Observation Physics Display.

QINSy 6.3 or QINSy 6.4 or QINSy 6.5

To display the (originally decoded) delta Easting and delta Northing, configure a Scatterplot Display to display the variable node versus the reference fixed node. Do not forget to define an computation for the variable node with only the position system observations .

BASMON DELTAFIX-LR DRIVER OPTION “false E,N”

QINSy 6.3 or QINSy 6.4 or QINSy 6.5

Delta E,N are added to an internal fixed node with the same coordinates as the origin of the projection, using the false easting and northing. The station identification number is not important with this option and does not need to be known. To be able to display the (originally decoded) delta Easting and delta Northing values, be sure to add a “Fixed Node” with the same (false) coordinates as the origin of the projection (identifier not important), as well as a “Position Navigation System” using driver “Racal BasMon DeltaFix RTCM #of8 **(false)**”, with a receiver at a “Variable Node”, to the database.

To display the delta Easting and delta Northing, configure a Scatterplot Display to display the variable node versus the false reference fixed node. Do not forget to define an computation for the variable node with only the position system coordinates as connected observations .

3.2.32 Range Site Data Format (Geodesic)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvRSDF.exe	*Drivers.io options:*	*none*
Last modified:	2004-Mar-19		

Driver Description

Driver for US Navy's Naval Undersea Warfare Center (NUWC) RSDF position, heading and speed data. The Range Site Data Format (RSDF) and Range Site Data Format Geodesic (RSDFG) are used to send data from remote ranges to NUWC Keyport's Range Information Display Center (RIDC) over a high speed data link. The RSDF input driver can be used together with the RSDF output driver to buffer the input data stream, insert and convert position records and/or change the RSDF format, and output the updated data stream.
See for more information on the Range Site Data Format (Geodesic), the documentation from the NUWC.

Decoding Notes

The driver automatically detects the format in which the positions are encoded, RSDF or RSDFG, by determining the number of fields in a position record: RSDFG position records have two fields more. Course values in RSDF records are assumed to be grid bearings; course values in RSDFG records are assumed to be true bearings. Speed values are always assumed to be in knots. Length units (X, Y, Z, altitudes) are assumed to be in US survey feet by default, but this can be changed in the registry.

Depending on the actual database setup, the records that can be decoded by the RSDF-RSDFG are:

- HS - Run Statistics Header
- PP - Processed PSK Data
- PC - Processed Cinesextant Data
- PG - Processed GPS
- PR - Processed Radar
- BC - Block Byte Count
- CS - Checksum Information

Records that are not decoded, but are passed through when an RSDF output driver is running, are:

- CT - CTD Data
- CC - CTD Statistics
- SR - Run Security
- HR - Run ID Header
- DV - Sound Velocity Data
- VC - Sound Velocity Comments
- MK - Mark Information
- TO - Time Only
- TC - Trailer Comments
- ED - End Record

Some of the passed-through records remain unaltered, other records are changed, depending on user settings. See the RSDF-RSDFG output driver description for more information on the buffering mechanism options.

Registry Options

`[HKEY_CURRENT_USER\Software\QPS\QINSy\7.0\Drivers\RSDF\Settings]`

Registry Key	*Default*	*Records*	*Description, Values*
Year Modulus	1900	HS	year number to add to decoded year value
Time Frame	1	HS	block time not used (0), UTC (1) or local time (2)
Timing Offset	0	PF,PG,PP,PR	offsets not used (0), to be added (1) or subtracted (2)
Length Unit	4	PF,PG,PP,PR	meters (1), int. feet (2), yards (3), US survey feet (4)

Note. If HS Time Frame is set to 0, then PPS time is used, i.e. time of arrival of the first byte at COM port.
Note. If HS Time Frame is set to 2, then HS block times are supposed to be in the local system time of the computer on which *QINSy* is running. All timetags are converted to UTC using the local time zone setting.

Note. If an RSDF output driver is running, then these registry settings can be changed using the “Formats...” dialog button on the output driver window. It is therefore recommended to always add an RSDF output driver to the database setup, even if no output data is to be sent, so that a user can always check and change these settings.

Database Setup

See description under “POSITION NAVIGATION SYSTEM DRIVERS”.

In order to use ***multiple vessel positions***, add a new “Object” for each vessel and add a “System” of type “Position Navigation System” to each of the vessels. Be sure to select the same driver and I/O parameters. Enter the appropriate object ID or PSK code as receiver number. Since altitudes can be with respect to mean sea level, be sure to select the appropriate vertical datum. In order to decode the ***compass headings***, add a “System” of type “Gyro” to each vessel. Enter the object ID or PSK code as gyro observation slot identifier. To decode the ***speeds***, add a “System” of type “Speed Log” to each vessel. Use object ID as slot number.

PP records. For PSK (PP) records, there is an option to decode only the positions from a certain array, using the slot number "PSK_Code*100 + array_number". For example, when using slot "11", all PP records with PSK Code 11 will be decoded. If there is more than one PP record with this code in a valid RSDF block (from HS record to CS record), only one position is decoded by the RSDF input driver (usually the last one). When using slot "1104", the input driver will only decode PP records with PSK Code 11 and array 4.

Note. Make sure that all RSDF systems and observations have receiver numbers or slot numbers defined.

Controller Option

To be able to monitor the user-defined security classification, the title bar of the Controller can display the contents of the “survey type” field in the “general” category of the database setup program. This string value must be entered during the database setup process. In case the field is empty or contains an unrecognized value, the security classification string is not displayed. Note: strings will be handled case-non-sensitive.

If the survey type field contains one of three pre-defined values, “unclassified”, “confidential” or “secret”, the Controller title will be modified according to one of the following formats:

“template database name – Controller [Unclassified]”
“template database name – Controller [Confidential]”
“template database name – Controller [Secret]”

3.2.33 REDAS – Fish Position

Input / Output:	Input	*Driver class type:*	Terminated '&'
Executable name:	REDAS-FishPosition.ini	*Drivers.io options:*	none
Last modified:	2002-July-18		

3.2.34 REDAS – Vessel Position + Gyro

Input / Output:	Input	*Driver class type:*	Terminated '&'
Executable name:	REDAS-VesselPosition+Gyro.ini	*Drivers.io options:*	none
Last modified:	2002-July-18		

3.2.35 REDAS – Vessel Position + Gyro + Depth

Input / Output:	Input	*Driver class type:*	Terminated '&'
Executable name:	REDAS-VesselPosition+Gyro+Depth.ini	*Drivers.io options:*	none
Last modified:	2002-July-18		

Driver Description

Manual Generic Driver to decode the REDAS (Vessel & Fish Data) datastring.

Format Description

See chapter for output driver "REDAS (Vessel and Fish Positions)"

Format Example

```
*106,13/12/00,08:40:38.7,08:40:38.7,0.00,0.00,0.00,0.00,654902.31,3522107.02,0.36,336.48,156.00,
-3567220.5000,113926.26&<CR><LF>
*107,13/12/00,08:40:40.7,08:40:40.7,0.00,0.00,0.00,0.00,654902.10,3522107.04,0.33,324.78,156.50,
-3567220.5000,113926.26&<CR><LF>
*108,13/12/00,08:40:42.7,08:40:42.7,0.00,0.00,0.00,0.00,654903.19,3522107.31,0.34,342.59,156.10,
-3567220.5000,113926.26&<CR><LF>
```

Decoding Notes

Easting and Northing are converted to latitude and longitude. Heading is decoded if a true bearing observation is connected.

Database Setup

To decode the ***position***, add a "Variable Node" for the correct object to the *QINSy* Database. Add a "Position Navigation System" and set the appropriate driver and interfacing parameters. Select the survey datum for the (satellite) system and select the correct node as receiver.

To decode the ***heading***, add a "System" of type "Gyro's and Compasses", select driver "REDAS – Vessel Position + Gyro + Depth", and connect the heading observation. To decode all observations (Vessel Position and Depth), add all system types to the *QINSy* database and make sure to select the same driver name and serial interfacing parameters for the systems.

To decode the ***depth***, add a "System" of type "Echosounder", select driver "REDAS – Vessel Position + Gyro + Depth", and connect the transducer node. To decode all observations (Gyro and Vessel Position), add all system types to the *QINSy* database and make sure to select the same driver name and serial interfacing parameters for all systems.

3.2.36 REMUS AUV ($CARXD)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvRemusAUV.exe	*Drivers.io options:*	NOCS | WHOI
Last modified:	2003-Aug-20		

Driver Description

Driver to decode positions, headings, depths, altitude and CAD/CAC target information from a Autonomous Underwater Vehicle (AUV). This paragraph describes the communication protocol to interface with the Utility Acoustic Modem (UAM) of a Remote Environmental Measuring UnitS (REMUS) AUV, developed by Woods Hole Oceanographic Institution (WHOI). The communication protocol consists of two layers.

(1) ACOMMS NMEA-like micro-modem protocol to transfer data from a buoy to other locations.
(2) Hexadecimal coded structure to transfer data from a REMUS AUV to the buoy.

Format Description

$CARXD,SRC,DEST,ACK,F#,HH…HH*CS

#	*Format*	*Field Description*	*Decoding Notes*
01	$CARXD	Modem reports received data in binary format	check message
02	SRC	Source unit designated as transmitter	AUV identifier
03	DEST	Destination unit designated as receiver	not decoded
04	ACK	ACK bit, 0 or 1	not decoded
05	F#	Frame number	not decoded
06	HH...HH	Hex coded data bytes received from source unit	AUV observations
07	*CS	Hex coded checksum (8 bit XOR of sentence)	check message
08	<CR><LF>	Terminators	find message

See for description of REMUS AUV data, documentation of Woods Hole Oceanographic Institution.

The REMUS AUV driver will decode the following messages that can be transferred in the HH field:
MDAT_STATE : state information : latitude, longitude, heading, depth, fix_age, mission_mode
MDAT_BATHY : bathymetry data : latitude, longitude, depth, altitude
MDAT_CTD : CTD data : latitude, longitude, depth
MDAT_CADCAC : target data : latitude, longitude, score, target ID
CADCAC stands for Computer Aided Detection / Computer Aided Classification

Format Example

```
$CARXD,4,6,1,1,4379636c6520546573742046726f6d2053656375726574352 54*3D
$CARXD,1,6,1,2,0E86FA11AD20C9011B4432BF47D1000000240104 2F0E7D87FA111620C95A200A*00
```

Decoding Notes

The MDAT_STATE message is always decoded if a positioning system, gyro system or depth/altitude system has been defined in the database setup. By default, MDAT_BATHY and MDAT_CTD are **not** decoded; they are only decoded if certain registry options have been set and if a positioning system or depth/altitude system has been defined. MDAT_CADCAC is only decoded if an AIS system has been defined in the database.

The time information contained in the MDAT_STATE is currently **not** used by the REMUS AUV driver, because QPS hasn't got enough information to be able to assess its usability. The other messages have no time field. Positions and other observations are now time-tagged at the moment they arrive at the COM port.

Operation Mode. The position mode (solution mode) of a position contains the vehicles operation mode from the MDAT_STATE messages. Its value can be monitored in a Positioning System Display or it can be used to set a raw data alert in a Alert Display. Normal mission operation has got a value 6, but value 7 has also been encountered. *Note.* In *QINSy* versions prior to 2004.02.25 these were decoded as 12 and 14.

Battery Percentage. The quality field of a heading, depth or altitude observation contains the percentage of the battery capacity that remains from the MDAT_STATE messages. It can be monitored in an Observation Physics Display or Alpha Numerical Display, or it can be used to set a raw data alert in a Alert Display.

***CAD/CAC Targets*.** Each MDAT_CADCAC message contains three sets of detected targets. The name of a detected target will be "CADCAC [n]", where 'n' is the source unit that detected the target. Each detection will have 3 scores representing the results of 3 different processing algorithms. A perfect score is 100%. The average score is saved as AIS call sign and the 3 individual scores are saved as AIS destination, so that they can be made visible in a Navigation Display. The three detected targets are saved as observations in the raw database (if recording is on) and exported to a line database as points, for example target 'i' from AUV 'n':

Name	*Radius1*	*Attribute1*	*Comment*
CADCAC [n] i	100 – (average score)	average score	score 1, score 2, score 3; average; lat; lon

Note. The radius is an indication of the average score; the smaller the radius, the better the confidence.

Drivers.io Options

Drivers.io command line parameter "NOCS" disregards the checksum field. Omitting this parameter or using parameter "CS" will **not** decode the data when the checksum calculation fails. Parameter "WHOI" will set the format to the one described in this paragraph, but this is the only format the current driver supports.

Registry Options

`[HKEY_CURRENT_USER\Software\QPS\QINSy\7.0\Drivers\WHOI\Settings]`

Registry Key	*Default*	*Values*	*Description*
Decode Bathy	-1	-1, 0, 1, 2	Disregard MDAT_BATHY (-1) or decode Nth position
Decode CTD	-1	-1, 0, 1	Disregard MDAT_CTD (-1) or decode Nth position

Note. The position index to decode is zero-based, so enter 0 for first data set, 1 for the second one, etcetera.

Communication with REMUS AUV's through a buoy can be very slow, only a couple of MDAT_STATE messages per minute, so it is advisable to also use positions from the MDAT_BATHY and MDAT_CTD messages. According to WHOI personnel, these positions are valid as well. Apparently, the last data set in the messages is the most recent one, so use 2 for registry key "Decode Bathy" and 1 for "Decode CTD".

(continued on next page)

Database Setup

See description under "POSITION NAVIGATION SYSTEM DRIVERS".

In order to use ***multiple AUV positions***, add a new "Object" for each AUV and add a "System" of type "Position navigation system" to each of the objects. Be sure to select the same driver and I/O parameters. Enter the appropriate source unit as receiver number. Since depths can be with respect to mean sea level, make sure to select the appropriate vertical datum. In order to decode the ***headings***, add a "System" of type "Gyro" to each object. Enter the source unit as gyro observation slot id. To decode ***depths and/or altitudes***, add a "System" of type "Underwater Sensor" to each object and add a depth and/or an altitude observation. Use source unit as slot number. *Note*. Altitude values are only present in MDAT_BATHY messages.

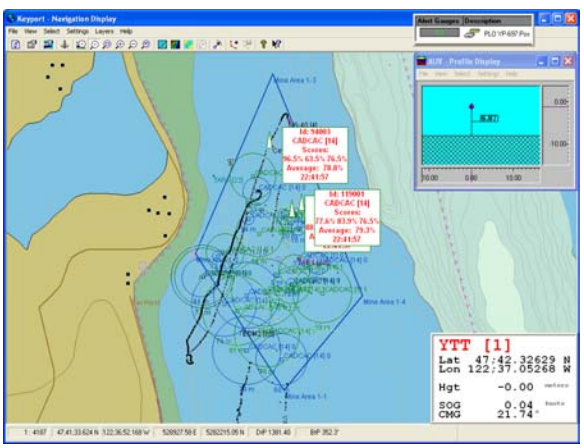
***CAD/CAC targets*.** In order to decode the CAD/CAC messages, add a system of type "AIS system" to the database setup, with driver "REMUS AUV ($CARXD) CAD/CAC Targets", which will end up under "Auxiliary Systems". All decoded CAD/CAC targets will be stored real-time to a line database called "CADCAC Detection.pro" in the line data folder of the current project. The targets can be monitored in an Observation Physics Display and will pop up in a Navigation Display, if the proper settings have been set.

Online Setup

CAD/CAC targets. In order to monitor the decoded CAD/CAC targets in an Observation Physics Display, select the AIS system name. The name of an AIS target is displayed as "type (id) name", so for example the first detection with target ID 3 from a CADCAC message will be displayed as "mine (3001) CADCAC [n]".
CAD/CAC targets. Decoded targets can be shown on a Navigation Display in two manners. (1) "Layers – Line Database ...". Add the "CADCAC Detection.pro" from the current project. The detected targets will be shown as points, with the radius indicating the average score. (2) "Layers – AIS Targets ...". Show targets including information or not. Newly detected targets will be visible for 30 seconds (registry setting).

Offline Options

CAD/CAC targets. If CAD/CAC targets have been saved to a storage database, the export option in the Raw Data Manager ("Replay" button in the *QINSy* Console) can be used to export them to a line database file.
If CAD/CAC targets have been saved to a line database (i.e. "CADCAC Detection.pro" in the line data folder of the current project), they can be shown, edited and deleted using the Line Data Manager. Select "Edit Points" to get the list of targets. Hovering over a target will pop up a window showing scores and position.



3.2.37 RWSLod (0 Message)

3.2.38 Sercel Axyle (0 Message) No PPS

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvRWSLod.exe	*Drivers.io options:*	*none*
Last modified:	2000-Jan-27		

Driver Description

Driver for RWSLod 0 message. Driver to be used to decode strings containing RD Easting, Northing, and height and quality information from external satellite receiver. The driver converts the RD coordinates to latitude and longitude.

Format Description

Each message has a variable length. A text label that designates the start of the particular item proceedes each item in the message. All fields are separated by spaces.

Field	*Format*	*Description*	*Values, Range, Units*
1	<SPC><SPC><SPC>0	Message Identifier	Always 3 spaces and 0
2	Hh:mm:ss.sss	Time	00:00:00.000 – 23:59:59.999
3	Y=12345678.12	RD Northing	Meters
4	X=12345678.12	RD Easting	Meters
5	H=12345678.12	RD Height (above NAP)	Meters
6	S=123.12	Speed	
7	C=1234	Heading	
8	Q=1	Quality indicator	Stored in calculation mode field
9	N=12	Number of used satellites	Stored

Format Example

```
   0  6:48:13.200 Y=  501949.87 X=  157248.87 H=       8.46 S=  0.02 C=   0 Q=8  N= 8 <CR><LF>
   0  6:48:13.800 Y=  501949.88 X=  157248.87 H=       8.46 S=  0.02 C=   0 Q=8  N= 8 <CR><LF>
```

Decoding Notes

The driver does not decode fields 6 and 7. The RD position is converted to a geographical position using the survey projection and selected datum. Time is only used when PPS is active or when USETIME option (Axyle) is active.

The Height field (field 5) is optional and can be omitted in the output string. *QINSy* will assume height to be zero in that case.

System Configuration

The datum selected for this positioning system should always be identical to Survey Datum and the projection should be identical to the projection as programmed inside the (GPS) receiver. When used in the Netherlands this should be Bessel and RD.

Interfacing Notes

No specific interfacing or configuring recommendations. See Chapter 1 for general interfacing remarks.

Drivers.io Options

USETIME: When this option is used the time that was decoded from the message is always used as the observation time regardless the fact that *QINSy* works without PPS. In normal operation the absence of PPS would force the usage of the message arrival time being used as the observation time. This behaviour is overruled with the USETIME option. This option was implemented for usage with a, *QINSy* time synchronised, Sercel Axyle AP1 receiver.

Interfacing Notes

No specific interfacing or configuring recommendations. See Chapter 1 for general interfacing remarks.

Database Setup

See description under “POSITION NAVIGATION SYSTEM DRIVERS”.

3.2.39 Seatex Integrated GPS / GLONASS (NMEA GNS Format)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvSeatexNMEAGNS.exe	*Drivers.io options:*	*none*
Last modified:	1998-Nov-18		

Driver Description

Driver for NMEA-0183 $--GNS sentences, containing integrated GPS / GLONASS position solution.

Format Description

Each $GPRMC sentence is variable in length, depending on the number of digits for the decimal fractions. Refer to *NMEA 0183- Standard For Interfacing Electronic Devices - Version 2.30* for more information.

#	*Format*	*Description*	*Values, Range, Units*
01	"$"	start character	"$" (24 Hex)
02	--GNS	address field	"--GNS"
03	","	field delimiter	"," (2C Hex)
04	Hhmmss.ss	UTC of position (hours,minutes,seconds)	0…23, 0…59, 0.00…59.99
05	","	field delimiter	"," (2C Hex)
06	Llll.llllll	latitude (degrees, minutes)	0…90, 0.00…59.999999, degrees 2 digits, minutes 4 digits.
07	","	field delimiter	"," (2C Hex)
08	A	latitude (northern or southern)	"N" or "S"
09	","	field delimiter	"," (2C Hex)
10	Yyyyy.yyyyyy	longitude (degrees, minutes)	0…180, 0.00…59.999999, degrees 3 digits, minutes 4 digits.
11	","	field delimiter	"," (2C Hex)
12	A	longitude (eastern or western)	"E" or "W"
13	","	field delimiter	"," (2C Hex)
14	c--c	mode indicator	see table below
15	","	field delimiter	"," (2C Hex)
16	Xx	numbers of satellites	00…99
17	","	field delimiter	"," (2C Hex)
18	x.x	horizontal dilution of precision	
19	","	field delimiter	"," (2C Hex)
20	x.x	antenna altitude above MSL	meters
21	","	field delimiter	"," (2C Hex)
22	x.x	age of differential data	
23	","	field delimiter	"," (2C Hex)
24	Xxxx	differential reference station ID	
25	"*"	checksum field delimiter	"*" (2A Hex)
26	Hh	checksum (XOR from "$" to "*" exclusive)	
27	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Database Setup

See description under "POSITION NAVIGATION SYSTEM DRIVERS".

3.2.40 Sercel 103 NMEA Position (ZDA & GLL)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvNR103NMEA.exe	*Drivers.io options:*	*format*
Last modified:	1997-May-01		

Driver Description

Driver for Sercel NR103 and NR203 ZDA and GLL sentences, containing UTC and geographic position (latitude, longitude, height).

Format Description

This format is not a standard NMEA 183 format. The ZDA string contains the time and date of the fix, and the GLL string contains the latitude, longitude and height. An example of the combined data string is:

Note. *Be sure that the time field in the ZDA string is configured to output hundreds of seconds, because QPS personnel has seen that a Sercel receiver can truncate the number of seconds, not round it properly.*

#	*Format*	*Description*	*Values, Range, Units*
01	ZDA	Message type identifier	"ZDA"
02	","	field delimiter	"," (2C Hex)
03	hhmmss.ss	UTC time: hour, minutes and seconds	0..24, 0..60, 0.0..59.9
04	","	field delimiter	"," (2C Hex)
05	dd,mm,yyyy	Utc date: day month year	1..31, 1..12, 0000..9999
06	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)
#	***Format***	***Description***	***Values, Range, Units***
01	GLL	Message type identifier	"GLL"
02	","	field delimiter	"," (2C Hex)
03	ddmm.mmmm	Latitude (degrees, minutes)	0…90, 0.00…59.999999
04	","	field delimiter	"," (2C Hex)
05	N	latitude hemisphere	"N" or "S"
06	","	field delimiter	"," (2C Hex)
07	dddmm.mmmm	Longitude (degrees, minutes)	0…180, 0.00…59.999999
08	","	field delimiter	"," (2C Hex)
09	E	longitude hemisphere	"E" or "W"
10	","	field delimiter	"," (2C Hex)
11	xx.xx	altitude above MSL	Meters if next field is "M"
12	","	field delimiter	"," (2C Hex)
13	"M"	height unit	"M" for meters
14	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Format Example

```
$
ZDA,175949.99,17,11,1998,12.0
GLL,5148.391484,N,528.023770,E,52.73,M
```

Database Setup

See description under "POSITION NAVIGATION SYSTEM DRIVERS".

3.2.41 Sercel 103 NMEA Position ($GPGGA)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvNR103NMEA.exe	*Drivers.io options:*	*format*
Last modified:	1997-May-01		

Driver Description

Driver for Sercel NR103 and NR203 $GPGGA sentence, containing UTC time, geographic position (latitude, longitude, height), and quality numbers (quality of the solution, number of satellites and HDOP).

Driver can also be used together with $PSER,ATT or $A attitude strings from Sercel NR230 attitude sensor.

Format Description

Note. *Be sure that the time field in the GGA string is configured to output hundreds of seconds, because QPS personnel has seen that a Sercel receiver can truncate the number of seconds, not round it properly.*

#	*Format*	*Description*	*Values, Range, Units*
01	$GPGGA	Message type identifier	“GGA”
02	“,”	field delimiter	“,” (2C Hex)
03	hhmmss.ss	UTC time: hour, minutes and seconds	0..24, 0..60, 0.0..59.99
04	“,”	field delimiter	“,” (2C Hex)
03	ddmm.mmmm	Latitude (degrees, minutes)	0…90, 0.00…59.999999
04	“,”	field delimiter	“,” (2C Hex)
05	N	latitude hemisphere	“N” or “S”
06	“,”	field delimiter	“,” (2C Hex)
07	dddmm.mmmm	Longitude (degrees, minutes)	0…180, 0.00…59.999999
08	“,”	field delimiter	“,” (2C Hex)
09	E	longitude hemisphere	“E” or “W”
10	“,”	field delimiter	“,” (2C Hex)
11	x	Fix quality	Sercel Quality indicator
12	“,”	field delimiter	“,” (2C Hex)
13	x	number of satellites used	
14	“,”	field delimiter	“,” (2C Hex)
15	xxx	HDOP	unitless
16	“,”	field delimiter	“,” (2C Hex)
17	xx.xx	altitude above MSL	Meters if next field is “M”
18	“,”	field delimiter	“,” (2C Hex)
19	“M”	height unit	“M” for meters
20	xx.xx	altitude of MSL above geoid	Meters if next field is “M”
21	“,”	field delimiter	“,” (2C Hex)
22	“M”	height unit	“M” for meters
23	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Format Example

```
$GPGGA,172452.99,5224.337,N,00452.979,E,9,8,1,35,M,82,M
```

(continued on next page)

Interfacing Notes

No specific interfacing or configuring recommendations. See Chapter 1 for general interfacing remarks.

Database Setup

See description under "POSITION NAVIGATION SYSTEM DRIVERS".

Driver can also be used together with $PSER,ATT or $A attitude strings from Sercel NR230 attitude sensor.

3.2.42 Sercel Aquarius RTK (GPGGA)

This driver has been renamed.

See description for driver “**Aquarius RTK (GPGGA or GPLRK)**”

3.2.43 Shallow Water Range Format #2

Input / Output:	Input	*Driver class type:*	Terminated <CRLF>
Executable name:	DrvShallowWaterRange.exe	*Drivers.io options:*	-
Last modified:	2000-July-14		

Driver Description

Driver for decoding data strings in the Shallow Water Range Format #2, containing X, Y, Z range co-ordinates of tracked vessel(s), vessel identification code and time associated with the position.

Format Description

Each message has a variable length. All fields are separated by spaces.

Field	*Format*	*Description*	*Values, Range, Units*
01	$SW	Message type identifier	"$SW"
02	" "	Space delimiter	<SPACE>
03	dd	Vessel identification code	0-99
04	" "	Space delimiter	<SPACE>
05	xxxxxxx	X range co-ordinate	±999999 in International Feet
06	" "	Space delimiter	<SPACE>
07	yyyyyyy	Y range co-ordinate	±999999 in International Feet
08	" "	Space delimiter	<SPACE>
09	zzzzz	Altitude or Depth co-ordinate +z implies altitude above mean sea level -z implies depth below mean sea level	±9999 in International Feet
10	" "	Space delimiter	<SPACE>
11	yyddd	Two digit year and day of the year associated with the track point	yy : 00-99 ddd : 001-366
12	" "	Space delimiter	<SPACE>
13	sssss.sss	Seconds since midnight associated with the track point	00000.000 – 86399.000
14	<CR><LF>	Termination characters	<CR><LF> (0D Hex, 0A Hex)

Format Example

```
$SW 2 1234567 3456789 -12.4 00187 12345.678
```

Interfacing Notes

No specific interfacing or configuring recommendations. See Chapter 1 for general interfacing remarks.

Database Setup

See description under "POSITION NAVIGATION SYSTEM DRIVERS".

Add a "Variable Node" for the vessel/target node to the *QINSy* Database. Add a "Position navigation system" using the appropriate driver and interfacing parameters. Select the object, the tagret node and the receiver number. Be sure to enter the same number as the vessel identification code, which is present in the data string, for which the positions are to be decoded (used as slot number in *QINSy*).

3.2.44 Simrad HPR LBL (Position Output)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvSimradLBLPosition.exe	*Drivers.io options:*	*none*
Last modified:	1998-Nov-11		

Driver Description

Driver to decode Simrad HPR 400 LBL position and depth in NMEA 0183 format.

Format Description

Refer to the "*Standard for interfacing Marine Electronics Devices NMEA 0183 Version 2.20*".

```
$PSIMLBP,hhmmss.ss,c—c,c—c,c—c,aa_,x.x,x.x,x.x,x.x,x.x,x.x,x.x*hh<CRLF>
```

#	*Field*	*Name*	*Explanation*
1	$	Start character	
2	PSIMLBP	Address	propr. Simrad address for LBL position.
3	,hhmmss.ss	Clock	clock in hours, minutes, seconds (decimal fraction optional).
4	,c—c	Tp array	transponder array for which origin is valid.
5	,c—c	Type	type of item positioned (vessel or ROV).
6	,c—c	Status	status of position. 'A' is OK.
7	,aa_	Coördinates	see description below.
8	,x.x	X coördinate	see description below.
9	,x.x	Y coördinate	see description below.
10	,x.x	Depth	depth of position.
11	,x.x	Major	major axis of error ellipse.
12	,x.x	Minor	minor axis of error ellipse.
13	,x.x	Direction	direction of major axis in error ellipse.
14	,x.x	Res rms	root mean square value of normalised residuals.
15	*hh	Checksum	empty or checksum.
16	CRLF	Termination	

Coordinate System

The cartesian coördinates are the position of the vessel or ROV in metres relative to the origin of the transponder array. The Eastings and Northings are the UTM coördinates of the vessel or ROV.

Coördinate	Coördinate system	X Coördinate	Y Coördinate
Cartesian N/E	C	North	East
Cartesian E/N	L	East	North
UTM N/E	U	Northings	Eastings
UTM E/N	E	Eastings	Northings

(continued on next page)

Decoding Notes

The driver only uses the UTM N/E or UTM E/N coordinates. Easting and Northing are converted to latitude and longitude. Depth is decoded as negative height. The RMS value is used for latitude/longitude/height SD.

Use an “Alert Display” to setup an “Position RMS outside limit” raw data alert to test this RMS value.

Database Setup

See description under “POSITION NAVIGATION SYSTEM DRIVERS”.

To decode the ***position***, add a “Variable Node” for the Simrad LBL transducer to the *QINSy* Database. Add a “Position navigation system” and set the appropriate driver and interfacing parameters. Select the survey datum for the (satellite) system and select the LBL transducer node as receiver.

3.2.45 Sonardyne APS3 (Position Output)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvSonardyneAPS3.exe	*Drivers.io options:*	N | DT x.x (age)
Last modified:	1998-Jul-01		

Driver Description

Driver to decode Sonardyne Acoustic Positioning System (APS3) position and/or heading in FXT format. Other APS3 output string formats, TRACV and NAVCO output strings, have not yet been implemented.

Format Description

Each APS3 FXT record is fixed in length, leading zeros must be included. Since QPS has encountered different variations of this format, the time field is not used (decoded) in the present *QINSy* driver.

#	*Format*	*Description*	*Values, Range, Units, Units*
01	“FXT”	start of data	“FXT”
02	“;”	field delimiter	“;”
03	hh:mm:ss	Time of position	hours : minutes : seconds
04	“,”	field delimiter	“,”
05	Exxxxxx.xx	Easting	metres
06	“,”	field delimiter	“,”
07	Nxxxxxxx.xx	Northing	metres
08	“,”	field delimiter	“,”
09	Dxxxx.xx	Depth	metres
10	“,”	field delimiter	“,”
11	Axx.xx	Position RMS	metres
12	“,”	field delimiter	“,”
13	Hxxx.x	Heading	degrees
14	“,”	field delimiter	“,”
15	Tn	Target number	1 to 5 in Multi-Track
16	<CR><LF>	record termination	CarriageReturn LineFeed

Format Example

Example string logged onboard vessel “Louis G Murray” (owned by De Beers Marine):

```
FXT;00005.54,TARGET Vessel    ,E793298.12,N6248948.10,D0010.00,A05.07,H000.0
```

Decoding Notes

Easting and Northing are converted to latitude and longitude. Depth is decoded as negative height. The RMS value is used for latitude/longitude/height SD. Heading is decoded if a true bearing observation is connected.

Use an “Alert Display” to setup an “Position RMS outside limit” raw data alert to test the RMS value.

Database Setup

To decode the ***position***, add a “Variable Node” for the Sonardyne APS3 transducer to the *QINSy* Database. Add a “Position navigation system” and set the appropriate driver and interfacing parameters. Select the survey datum for the (satellite) system and select the APS3 transducer node as receiver.

Database Setup (continued)

To decode the ***heading***, add an "Observation" of type "Bearing, true", add a "System" of type "Gyro", select driver, and connect the heading observation. To decode all observations, add both system types to the *QINSy* database and make sure to select the same driver name and serial interfacing parameters for both systems.

Format Description *(TRACV format is for future reference)*

To select TRACV or NAVCO output format, the "NavCompOut=" line in the APS3 INI file has to be edited. Both strings have fixed length fields and so are not delimited. The TRACV output will place leading zeros in a field if the number is too small, whereas the NAVCO output will place leading spaces in front of a number.

Example TRACV string logged onboard vessel "Louis G Murray" (owned by De Beers Marine):

```
111:14:21900793429.4406248881.2504.90010.0000:00:0000000.0000:00:000
MTT:TT:TTTEEEEEEEE.EENNNNNNNN.NNQQ.QHHHH.HHZZ:ZZ:ZZZYYYY.YYXX:XX:XXX
01234567890123456789012345678901234567890123456789012345678901234567
```

#	*Format*	*Description*	*Values, Range, Units, Units*
01	M	Mobile number	1 to 5
02	TT:TT:TTT	Time of data	hours : minutes : 0.1 seconds
03	EEEEEEEE.EE	Easting	(metres ?)
04	NNNNNNNN.NN	Northing	(metres ?)
05	QQ.Q	RMS of data	(metres ?)
06	HHHH.HH	Precision depth	metres of feet (unitsof Tcvr 1)
07	ZZ:ZZ:ZZZ	Time of precision observation	hours : minutes : 0.1 seconds
08	YYYY.YY	Corrected depth of reference sensor	(metres ?)
09	XX:XX:XXX	Time of corrected depth observation	hours : minutes : 0.1 seconds

Example NAVCO string logged onboard vessel "Louis G Murray" (owned by De Beers Marine):

```
 11105227 12  79339147 624887613  1001  55$RSVHT  0.0 0.0  0.0
MMTTTTTTTAAAEEEEEEEEEENNNNNNNNNNHHHHHFQQQQ$RSVHTBBB.BDD.DGGG.G
01234567890123456789012345678901234567890123456789012345678901
```

#	*Format*	*Description*	*Values, Range, Units*
01	MM	Mobile number	1 to 5
02	TTTTTTT	Time of data	hours : minutes : 0.1 seconds
03	AAA	Age of data	0.1 seconds
04	EEEEEEEEEE	Easting	0.01 (metres ?)
05	NNNNNNNNNN	Northing	0.01 (metres ?)
06	HHHHH	Depth	metres of feet (unitsof Tcvr 1)
07	F	constant	"1"
08	QQQQ	RMS of data	0.1 (metres ?)
09	"$RSVHT"	start of NMEA string	"$RSVHT"
10	BBB.B	Mobile bearing	degrees
11	DD.D	Dangle angle	degrees
12	GGG.G	Dangle bearing	degrees

Note 1. Eastings, northings and depth and bearing are zero for sensor only targets.
Note 2. Dangle angle and dangle bearing are zero for navigating targets.

3.2.46 Sonardyne LUSBL (LBL / USBL, V5 / V6)

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvSonardyneLUSBL.exe	*Drivers.io options:*	V5 | V6
Last modified:	1999-Oct-21		

Driver Description

This driver will decode LBL and USBL measurements from the Sonardyne LUSBL unit with firmware version 5 and version 6. In version 5 only one LBL position can be decoded as well as multiple USBL measurements. In version 6 multiple LBL positions and USBL measaurements can be decoded.

Format Description

The output format depends on the initialization string send to the LUSBL computer on startup, or when resetting the I/O in *QINSy*. The following strings are sent:
Version 5:
LBL:`select,1,\rselect,2,filt_e,filt_n,filt_d\r`
USBL: `select,2,\rselect,1,index,filt_e,filt_n,filt_d\r`
Version 6:
Initialization: `select,1,\rselect,2,\r`
LBL:`select,2,name,east,north,depth,h_ell_drn,h_ell_maj,h_ell_min,z_err\r`
USBL:`select,1,name,index,east,north,depth,quality\r`

Decoding Notes

As the LUSBL system outputs in meters, the driver will convert it to the survey units used in *QINSy*.
For version 6 in LBL mode the `z_err` value will be set as the sd of the depth in *QINSy*. In USBL mode the `quality` value will be set to the quality indicator value in *QINSy*.

System Configuration

In version 5 it is not possible to output LBL data and USBL data on one port. In version 6 it is possible to output multiple LBL positions and USBL measurements on one port. In DB Setup you can then define the LBL systems and USBL system on the same port.

Interfacing Notes

Type of cable wiring (two-way). Cable wiring diagrams:

DB-25 Sensor		DB-9 COM	DB-25 COM
Pin 2 RXD	-----------------	Pin 3 TXD	Pin 2 TXD
Pin 3 TXD	-----------------	Pin 2 RXD	Pin 3 RXD
Pin 7 SG	-----------------	Pin 5 SG	Pin 7 SG

Database Setup

LBL Setup:
First define and select the “Object” on which the LBL transponder is located. Select item “Systems” and defined a new “Position navigation system”. Select the ***Sonardyne LUSBL LBL driver*** and interface parameters. Press the “Next” button to complete the setup. Select object and node for the transponder. Press the “Finish” button to save the system.

A new transponder node can be added by pressing the button; to change its properties, press the button.

For every transponder on the object a new system must be defined (with the same driver and eventually on the same COM port). To identify the transponder the system name must be the same as the transponder name (e.g. CRAWLER or RANGEMASTER). The receiver ID must be a unique number (0 – 999).

USBL Setup:
To decode the ***X, Y and Z*** observations, add a variable node for the USBL transponder. Add a “System” of type “USBL Sensor”, and select the ***Sonardyne LUSBL USBL driver***. There is no need to define the three observations separately, since they are automatically added and connected to the system. Change Parameters and Corrections to match the sign conventions and corrections for this system. See the *”Clarifications of rotation”* that are part of the module’s Help, for a better understanding of how to use the conventions.

A new transponder node can be added by pressing the button; to change its properties, press the button.

Connect the variable USBL node on the Targets tabsheet and enter the correct Slot Id. The Slot Id depends on the used transponder/responder. In version 5 the driver will decode the USBL transponder index. In version 6 the driver will decode the name of the transponder (e.g 305 or MINIROVNAV (max 10 characters)).

Drivers.io Options

“V5” will decode output from version 5 firmware.
“V6” will decode output from version 6 firmware.

3.2.47 Subsea Telemetry Format

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvSubseaTelemetry.exe	*Drivers.io options:*	*NOCS*
Last modified:	2000-April-19		

Driver Description

Driver to decode position or heading data which originates from the Subsea telemetry system. Data may hold multiple positions. Encoding is handled as described in 3.18.51

The format followed for the transfer of data in/out using the SubSea Telemetry option is based upon the NMEA 0183 message formats for heading and position. The NMEA 0183 documentation detailing the standard GGA and HDT messages is appended.

Note that there are several points where the actual message form varies from the standard :

- The address fields have been altered to reflect the code of the vessel originating the data. The result is that $GPGGA is altered to $Gc where c is the code (0-10)of the originating vessel, and $HEHDT is altered to $Hc.
- If the heading and the position are output simultaneously, the <cr><lf> is removed from the end of the $Gc string (leaving the *hh) and the $Hc string is appended to the end with its *hh<cr><lf> left intact.
- In the output, if any fields are unknown, eg Geoid separation, they are set to 0.
- The GPS status is interpreted as defined by Sercel (for the NR103/NR203 receivers), not as detailed in the NMEA 0183 document.

Note that the latitude and longitude must be in WGS84.

Format Description

SUBSEA TELEMETRY FORMAT:

```
$G1,152055.00,5659.6671,N,00201.1311,W,99,00,0.0,0.0,M,,,00,0000*32$H1,355,T*1E
$G2,152054.00,5659.6645,N,00201.2174,W,99,00,0.0,0.0,M,,,00,0000*35$H2,000,T*1E
$G3,152054.00,5659.6524,N,00201.1114,W,99,00,0.0,0.0,M,,,00,0000*35$H3,000,T*1F
```

#	*Format*	*Description*	*Values, Range, Units*
01	$Gn	Identifier where n is vessel Id	n = 0 – ….
02	,hhmmss.ss	Time	
03	,ddmm.mmm	Latitude (WGS-84)	
04	,N	Hemisphere	N or S
03	,ddd,mm.mmmm	Longitude (WGS-84)	
04	,E	Hemisphere	E or W
05	,99		Ignored
06	,00		Ignored
07	,0.0		Ignored
08	,a.a,M	Altitude above MSL	Positive sign = up
09	*hh	Checksum	Checksum
10	$Hn	Identifier where n is vessel Id	n = 0 – 9
11	,ddd,T	True heading	Degrees
12	*hh	Checksum	Checksum
12	<cr><lf>	Carriage Return Line Feed	

Decoding Notes

Heading is only decoded if a Subsea Telemetry (Heading) driver is defined.

Interfacing Notes

No specific interfacing or configuring recommendations. See Chapter 1 for general interfacing remarks.

(continued on next page)

Database Setup

See description under “POSITION NAVIGATION SYSTEM DRIVERS”.

The Subsea Telemetry driver can be used to obtain a position and/or a gyro reading. Select a different system with its own type for each one of the data types to be decoded. Be sure to define the same interfacing parameters, including driver description and COM port number and settings, for all of these systems.

To use the ***position***, add a “Variable Node” for the antenna to the *QINSy* Database. Add a “System” of type “Position navigation system” and define the interfacing parameters. Select the satellite system and its datum. Select receiver position and enter receiver number. This number is used as a slot number to decode the correct positon from the data message.

To use the ***gyro reading***, add a “Variable Node” for the (gyro)compass to the *QINSy* Database (if it differs from the object’s reference point). Add a “Observation” of type “Bearing, magnetic” or “Bearing, true” and select the appropriate unit. Select the (gyro)compass node as “At node” and the “Null node” as “To node”. Add a new “System” of type “Gyro or compass” and define the I/O parameters. Connect the observation. Enter the slot number corresponding to the heading you wich to decode from the data message.

Choose the ***No checksum*** option to disable the checksum check.

3.2.48 Syledis SR3 Position (Position | Heading | Speed)

Input / Output:	Input	*Driver class type:*	Terminated <CF>
Executable name:	DrvSyledisSR3Pos.exe	*Drivers.io options*	*none*
Last modified:	1999-Oct-29		

Driver Description

Driver for Syledis SR3 messages. Driver is able of decoding position in Northing / Easting format. Besides, this driver can be used to decode heading in degrees (no decimals) or speed in knots (one decimal).

Format Description

Item	*Description*	
Start of text	<SPACE>	
Timestamp	300H101138	Day = 300 Time = 10:11:38
Space	<SPACE>	
Northing in meters	Y+0385922.2	(1 decimal accuracy)
Space	<SPACE>	
Easting in meters	X+0059403.5	(1 decimal accuracy)
Space	<SPACE>	
Heading and speed	013V0011	H = 013 degrees V = 1.1 knots
Space	<SPACE>	
Quality	Q1011028	Filtering strictness = 1 DRMS = 11 m LPME = 28 m
Carriage Return	<CR>	
Line Feed	<LF>	

- DRMS = Deviation Root Mean Square (in meters), LPME = Line Position Mean Error (in meters);
- Gyro value (if decoded) is in degrees, has no decimals and is most likely COG;
- Speed value (if decoded) is in knots, has one decimal and is most likely SOG;
- Height value is not supplied and considered to be 0 (for computation.exe);
- Timetag is ignored as it is unclear how its relation is to UTC;
- Depending on the flag set in drivers.io either DRMS, LPME or the filter quality flag is copied to the positioning data as quality indicator. Default behaviour is DRMS as the quality indicator.

Format Example

Example of Syledis SR3-strings logged onboard vessel “Arne” (owned by Rijkswaterstaat):

```
300H101138 Y+0385922.2 X+0059403.5 013V0011 Q1011028<CF><LF>
```

Decoding Notes

At the moment Latitude / Longitude format, which can be selected via the Syledis SR3 computer, is not supported meaning that only Northing / Easting format can be decoded well. Easting and Northing are converted to latitude and longitude using defined projection and selected system datum parameters.

Database Setup

See description under “POSITION NAVIGATION SYSTEM DRIVERS”.

3.2.49 Trimble 4000 (ASCII Printout)

3.2.50 Trimble 4000 (ASCII Printout) DGPS Check

3.2.51 Trimble 4000 (ASCII Printout) RTK Check

Input / Output:	Input	*Driver class type:*	Terminated 0x03
Executable name:	DrvTrimbleASCII.exe	*Drivers.io options:*	DGPS | RTK
Last modified:	2003-Aug-20		

Driver Description

Driver for the computed receiver position by a Trimble receiver in ASCII Cycle Printout format.

In case of the "Trimble 4000 (ASCII Printout) DGPS Check" driver, only differential positions are accepted, i.e. positions with status 'd' (or 'f' or 'i'). In case of the "Trimble 4000 (ASCII Printout) RTK Check" driver, only RTK fixed solutions are accepted, i.e. positions with status 'i'. See for more information below.

Format Examples

Example data of CYCLE PRINTOUT data when differential corrections are lost:

```
 ID DAY DOY   DATE      TIME    LATITUDE    LONGITUDE    HGT  PDOP CLOCK
  V.VEL  H.VEL   HDG  FREQ.OFFSET CONT S  SVS
[00 MON 227 14-AUG-00 14:59:23 26:52.6475N 050:26.5502E +0012 02.2 772643
 -000.04 010.44 225.4 -1.0100E-07 2,20,19,8,1,27,13,31,3]
```

Example of CYCLE PRINTOUT data with differential corrections:

```
 ID DAY DOY   DATE      TIME    LATITUDE    LONGITUDE    HGT  PDOP CLOCK
  V.VEL  H.VEL   HDG  FREQ.OFFSET CONT S  SVS
[00 MON 227 14-AUG-00 14:46:43d26:54.1706N 050:28.3304E -0002 02.3 849159
 +000.00 010.67 228.9 -1.0026E-07 20,19,8,1,27,13,31,3]
```

Decoding Notes

The GPS solution mode (that can occur at character position 31 in the modified Trimble ASCII Cycle Printout) is converted to a position mode (see Positioning System Display) and interpreted as follows:

char	***Solution Mode***	***Position Mode***	***No Check***	***DGPS Check***	***RTK Check***
' '	autonomous solution	0	Decoded	Not Decoded	Not Decoded
'd'	DGPS corrections OK	1	Decoded	Decoded	Not Decoded
'f'	RTK float solution	2	Decoded	Decoded	Not Decoded
'i'	RTK fixed solution	3	Decoded	Decoded	Decoded
??	unsupported mode	9	Decoded	Decoded	Decoded

Database Setup

See description under "POSITION NAVIGATION SYSTEM DRIVERS".

3.2.52 Trimble TSIP Position

Input / Output: Input (two-way) *Driver class type:* Terminated 0x03
Executable name: DrvTrimbleSIP.exe *Drivers.io options:* *none*
Last modified: 1999-Sep-15

Driver Description

Driver for the computed receiver position in TSIP format. The *QINSy* driver will configure the receiver.

Format Description

The data is binary and wrapped in a standard TSIP wrapper. The data byte format for this report 0x84 is:

#	***Bytes***	***Description***	***Values, Range, Units***
1	[0,7]	Latitude	radians, + for north
2	[8,15]	Longitude	radians, + for east
3	[16,23	Altitude	meters above ellipsoid
4	[24,31]	Clock bias	meters
5	[32,35]	Time of fix	GPS seconds of the week

Note: The driver sets the altitude to the height above the ellipsoid, the tme of fix is set to GPS time.

Database Setup

See description under "POSITION NAVIGATION SYSTEM DRIVERS".

3.2.53 UDI-NAV Header (Heading | Position)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvHdrUDINav.exe	*Drivers.io options:*	*none*
Last modified:	1999-May-31		

Driver Description

Driver for old and new UDI header telegrams. Driver is able of decoding grid position as well as grid heading from three different telegrams as found in the UDI software. The following formats are supported: UDI Nav Header; Fugro UDI Surface Position Telegram; Fugro UDI Acoustic Position Telegram.

Format Description

UDI NAV HEADER:

```
????FFFtttttttttttttttttttEEEEEEEEEENNNNNNNNNNeeeeeeeeeennnnnnnnnnGGGGGKKKKKKKK<CR><LF>
```

#	*Format*	*Description*	*Values, Range, Units*
01	????	Unknown	Ignored
02	FFF	Fix number	Ignored
03	Tttttttttttttttttt	Julian day in seconds	Ignored
04	EEEEEEEEEE	Easting	Grid easting
03	NNNNNNNNNNN	Northing	Grid Northing
04	EEEEEEEEEE	Secondary easting	Grid easting
05	NNNNNNNNNNN	Secondary northing	Grid northing
06	GGGGG	Vessel heading (grid)	Converted by driver to true heading
07	KKKKKKKK	Vessel Kp	Ignored
08	<CR>	Carriage Return	0x0D
09	<LF>	Line Feed	0x0A

Decoding Notes

Easting and Northing are converted to latitude and longitude using defined projection and selected system datum parameters. Heading is only decoded if a UDI Nav Header Heading driver is defined.

Format Description (continued)

SURFACE POSITION TELEGRAM:

```
XXyyy12301:01:01.001 Apr 19840501234.886781234.650501266.436782134.73004.2  23.873   -12<CR><LF>X
```

Note: When radio systems are used the data radio control bytes **may or may not** be stripped by the radios.

#	*Format*	*Description*	*Values, Range, Units*
01	XX	Data radio control	0xC0, 0x00
02	Yyy	Header	0xCF, 0xE4, 0xDD
03	Zzz	Code	> 100 and < 200 for surface position
04	Hh:mm:ss.s	Time	Ignored
03	Dd mmm yyyy	Date	Ignored
04	Xxxxxxx.xx	Vessel reference point Easting	Grid easting
05	Xxxxxxx.xx	Vessel reference point Northing	Grid northing

06	Xxxxxxx.xx	Vessel measure point Easting	Grid easting
07	Xxxxxxx.xx	Vessel measure point Northing	Grid northing
08	Xxx.x	Standard deviation prime system	Ignored
09	Xxx.x	Vessel heading (grid)	Converted by driver to true heading
10	Xxx.x	Speed made good	Ignored
11	Xxxx.xxx	Vessel Kp	Ignored
12	Xxxxxx	Distance offtrack	Ignored
13	<CR>	Carriage Return	0x0D
14	<LF>	Line Feed	0x0A
15	X	Data radio control	0xC0

Decoding Notes

Easting and Northing are converted to latitude and longitude using defined projection and selected system datum parameters. Heading is only decoded if a UDI Nav Header Heading driver is defined.

Format Description (continued)

ACOUSTIC POSITION TELEGRAM:

```
XXyyy12301:01:01.001 Apr 1984123451234567.891234567.89123.411234.5123451234.567<CR><LF>X
```

Note: When radio systems are used the data radio control bytes **may or may not** be stripped by the radios.

#	*Format*	*Description*	*Values, Range, Units*
01	XX	Data radio control	0xC0, 0x00
02	Yyy	Header	0xCF, 0xE4, 0xDD
03	Zzz	Code	> 200 and < 300 for acoustic position
04	Hh:mm:ss.s	Time	Ignored
03	Dd mmm yyyy	Date	Ignored
04	Xxxxx	Transponder address	Ignored
05	Xxxxxxx.xx	Acoustic measure point Easting	Grid easting
06	Xxxxxxx.xx	Acoustic measure point Northing	Grid northing
08	Xxx.x	Standard deviation acoustic fix	Ignored
09	X	Number of ranges used in fix	Ignored
10	Xxxx.x	Depth transponder	Reversed by driver to height
11	Xxxxx	Fix number	Ignored
12	Xxxx.xxx	Kp acoustic fix	Ignored
13	<CR>	Carriage Return	0x0D
14	<LF>	Line Feed	0x0A
15	X	Data radio control	0xC0

Decoding Notes

Easting and Northing are converted to latitude and longitude using defined projection and selected system datum parameters. Depth is decoded as negative height.

Interfacing Notes

No specific interfacing or configuring recommendations. See Chapter 1 for general interfacing remarks.

(continued on next page)

Database Setup

See description under "POSITION NAVIGATION SYSTEM DRIVERS".

The UDI-NAV header can be used to obtain a position and/or a gyro reading. Select a different system with its own type for each one of the data types to be decoded. Be sure to define the same interfacing parameters, including driver description and COM port number and settings, for all of these systems.

To use the ***position***, add a "Variable Node" for the antenna to the *QINSy* Database. Add a "System" of type "Position navigation system" and define the interfacing parameters. Select the satellite system and its datum. Select receiver position and enter receiver number. The latter is not required, it is not used in this driver.

To use the ***gyro reading***, add a "Variable Node" for the (gyro)compass to the *QINSy* Database (if it differs from the object's reference point). Add a "Observation" of type "Bearing, magnetic" or "Bearing, true" and select the appropriate unit. Select the (gyro)compass node as "At node" and the "Null node" as "To node". Add a new "System" of type "Gyro or compass" and define the I/O parameters. Connect the observation.

3.2.54 WinSocket NMEA Position (GPGGA)

Input / Output:	Input (TCP/IP)	*Driver class type:*	TCP/IP Client
Executable name:	DrvNMEASocket.exe	*Drivers.io options:*	N | ELL | MSL | NOCS
Last modified:	2004-Aug-03		

Driver Description

Driver to decode NMEA '$GPGGA' sentences (or '$PTNL,GGK' sentences) from a TCP/IP network connection. Driver does ***not*** handle NMEA sentences from UDP/IP connections, see remarks below.

Format Description

See for the $--GGA (or $--GGK) sentence descriptions the various NMEA positioning system driver format descriptions elsewhere. See *NMEA 0183- Standard For Interfacing Electronic Devices - Version 2.30*.

Decoding Notes

If PPS is connected, then the time field from the input data string is used. Otherwise, the timetag will be set when the last byte of the NMEA sentence is recieved. Since data transfer over TCP/IP network connections can vary considerably, there is ***no*** correction for string length and latency applied. Therefore, only use this driver when PPS is connected, or when exact timing of positions is not an issue.

Drivers.io Options

Command line parameter 'N' indicates the type of NMEA sentence that will be decoded. Currently only '1' (GPGGA) and '1024' (GGK, e.g. Trimble TNL) are supported. The 'NOCS' parameter will make the driver ignore the checksum field. 'MSL' gets the altitude from the message and adds the geoidal separation before storing it. 'ELL' will only decode the altitude field and store it as height on the ellipsoid.

Online Setup

The NMEA WinSocket driver only supports TCP/IP network connections, not UDP/IP communications.

TCP/IP (Transmission Control Protocol / Internet Protocol) is based on a connection between 2 computers. ***UDP*** (User Datagram Protocol) is based on connectionless communication. The primary difference between TCP and UDP lies in their respective implementations of reliable messaging. TCP includes support for guaranteed delivery, meaning that the recipient automatically acknowledges the sender when a message is received, and the sender waits and retries in cases where the receiver does not respond in a timely way. UDP, on the other hand, does not implement guaranteed message delivery. A UDP datagram can get 'lost' on the way from sender to receiver, and the protocol itself does nothing to detect or report this condition. However, UDP messaging will be faster, since UDP packets are limited in size and no connection setup is required. TCP is used for normal Internet traffic and applications such as web servers and FTP, whereas UDP is ideal for applications like video streaming and online gaming, where speed takes precedence over lost packets.

Database Setup

See description under "POSITION NAVIGATION SYSTEM DRIVERS".

Enter port number and IP adress from the sending computer on the TCP/IP network.

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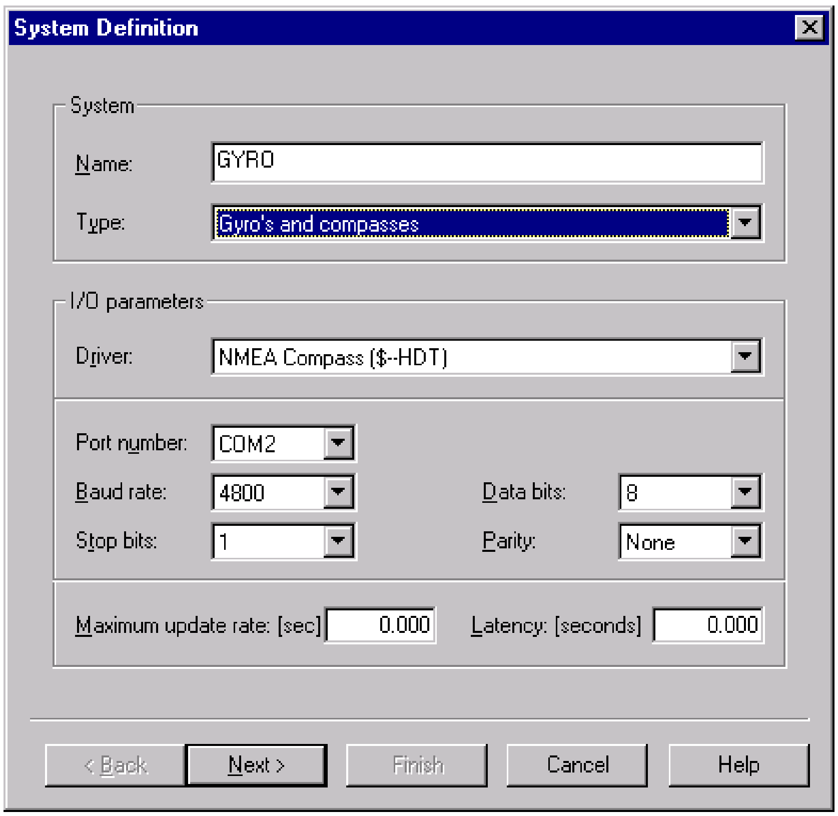
3.3 GYRO'S AND COMPASSES SYSTEM DRIVERS

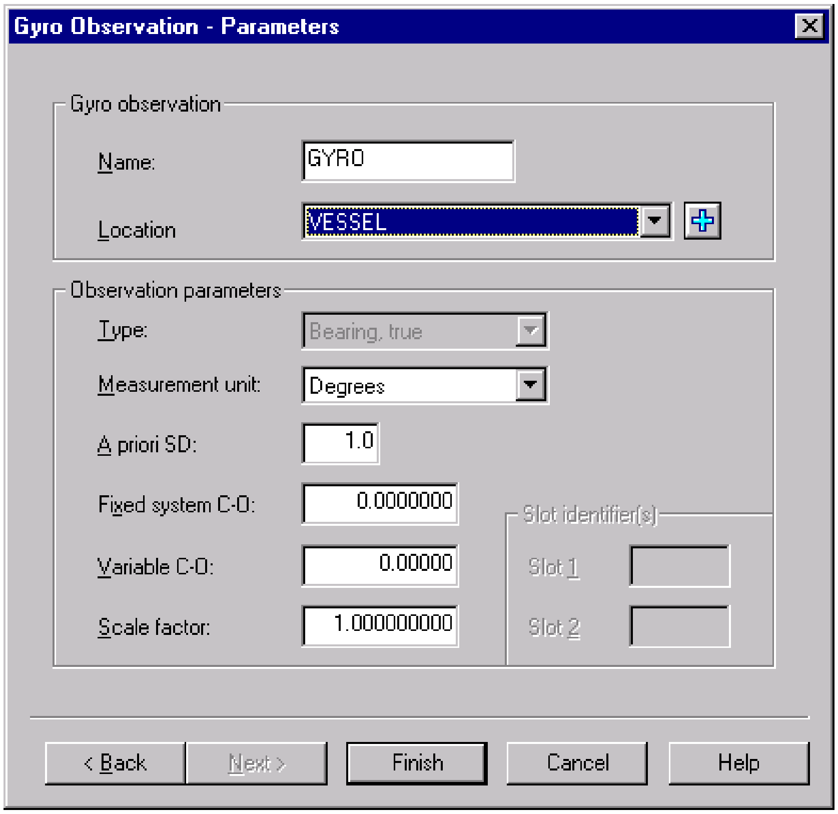
Database Setup

First define and select the "Object" on which the gyro or compass is located. Add a new system of type "Gyro's and compasses" and select the appropriate driver and interface parameters. Press "Next" button to finish the setup. There is no need to define a ***true bearing*** observation, since it is automatically added to the system. Select the object for which the gyro observation is valid. Enter the observation parameters, such as unit and (C-O) value, and its slot number, if needed. Finally, press "Finish" button to save the system.



Database Setup (continued)

A new object can be added by pressing the button. Be aware that in this case it does not refer to a node.



See for more information the *QINSy* DB Setup Help Topics or the *QINSy* Knowledge Base.

3.3.1 Digilog (ASCII)

3.3.2 Digilog (Modified Anschutz)

Input / Output:	Input	*Driver class type:*	Terminated
Executable name:	DrvGyroDigilog.exe	*Drivers.io options:*	*format* | OI
Last modified:	2000-Jan-19		

Driver Description

Driver for Digilog gyro compass output sentences, containing (gyro)compass heading, pitch and roll data. Driver can be used as gyro system, to obtain the heading, and as MRU system, to obtain the pitch and roll. Two formats can be decoded, the Digilog ASCII comms format and the Modified Anschutz format, matching the Anschutz telegram format with the addition of pitch and roll encoded in the magnetic heading locations. The ASCII SG Brown format output by a Digilog compass can be decoded using Sperry Repeater (ASCII). When option "OISTAR" has been selected, the driver will use timetags from preceding OiSTAR headers.

Format Description

Digilog ASCII comms format sentences are 20 bytes long, including termination characters <CR><LF>.

```
HxxxxPsxxxxRsxxxxT<CR><LF>
```

#	*Format*	*Description*	*Values, Units*
01	H	heading flag	"H"
02	xxxx	decimal heading value	0.1 degrees
03	P	pitch flag	"P"
04	sxxxx	decimal pitch angle value	0.1 degrees
05	R	roll flag	"R"
06	sxxxx	decimal roll angle value	0.1 degrees
07	T	status flag	"E" exact heading available "T" timeout "H" heating "S" settling "N" unvalid
08	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Digilog Modified Anschutz sentences are 18 bytes long, including start (STX) and end (ETX) identifiers.

```
STX<B1><B2><B3><B4><B5><B6><B7><B8><B9><B10><B11><B12><B13><B14><B15><B16>ETX
```

#	*Format*	*Description*	*Values, Units*
STX	STX	start identifier	02 Hex
b1	01xxxxxx	gyro reading	12 bits continued in <b2>
b2	01xxxxxx	gyro reading	LSB = 0.0878906 degrees
b3	01xxxxxx	course changing	clock frame pulse of 80 ms
b4	01sxxxxx	pitch value	12 bits; s = sign bit (0 = positive, 1 = negative)
b5	01xxxxxx	pitch value	LSB = 0.0878906 degrees
b6	01sxxxxx	roll value	12 bits; s = sign bit (0 = positive, 1 = negative)
b7	01xxxxxx	roll value	LSB = 0.0878906 degrees
b8	01vxmxxx	rate of turn	18 bits continued in <b9><b10>
b9	01xxxxxx	rate of turn	v = sign bit (0 = positive, 1 = negative)
b10	01xxxxxn	rate of turn	m = 2636.718 °/min, n = 0.08046 °/min

#	Format	Description	Values, Units
b11	01abcdef	status	12 bits continued in <b12>
b12	01ghijkl	status	f g indicate data status flags
b13	01nnnnnn	compass data	18 bits continued in <b14><b15>
b14	01xxxxxx	compass data	see Digilog gyro compass user manual
b15	01xxxxxx	compass data	for desciption of compass data fields
b16	01xxxxxx	checksum	FF EOR b1 to b5 AND 00111111 OR 01000000
ETX	ETX	end identifier	03 Hex

Decoding Notes

The quality indicator (see Observation Physics Display) is obtained from the status flags as follows.

qi	Status	Description	Value ASCII (T)	Value Anschutz (fg)
+1	valid	exact heading	"E"	"11"
–2	invalid	sensor timeout	"T"	N/A
–3	invalid	heating phase	"H"	"10"
–4	invalid	settling phase	"S"	"01"
–5	invalid	no valid heading	"N"	"00"
–1	invalid	no data found	N/A	N/A

The quality indicator of the pitch and roll observations are copied from the heading observation when the pitch and roll data fields are valid, otherwise it is set to –1 to indicate that no valid data field was found. The quality indicator of the heave observation is always –1, since there is no heave data field available.

Drivers.io Options

Command line parameter "OI" indicates that timetags are obtained from preceding "OiSTAR" headers, if available. Otherwise the time of the first incoming byte is used. "2" indicates Modified Anschutz format.

Database Setup

See description under "GYRO SYSTEM DRIVERS".

To decode the ***pitch and roll***, add a "System" of type "Pitch, roll and heave", select the Digilog driver, and define the MRU observation parameters. To decode all three observations (pitch, roll and heading), add both these system types to the *QINSy* database and make sure to select the same driver name and the same serial I/O parameters for both systems. See description under "PITCH ROLL AND HEAVE SENSOR DRIVERS".

3.3.3 Gyrocompass (Binary Heading)

Input / Output:	Input	*Driver class type:*	Flush
Executable name:	DrvGyro.exe	*Drivers.io options:*	NOAS | *format*
Last modified:	2001-Jan-05		

Driver Description

Driver for decoding binary heading data strings from various gyro's (Lehmkuhl, Robertson, Sperry, Brown).

Format Description

Each binary heading data string contains (3) address bytes and 4 value bytes representing an azimuth (true heading) with a resolution of 0.1 degree. For Lehmkuhl and Robertson types of gyro's, the value bytes are *counted up*, for Sperry and Brown types of gyro's, the value bytes are *counted down*. For Brown types of gyro's, the decimal part of the azimuth value is considered to be in $1/60^{th}$ degrees, not in $1/100^{th}$ degrees.

Decoding Notes

When the driver is started and after a "Reset System I/O", driver versions from *QINSy* 6.60.010105 onwards will check if the sense of the data bytes is alright or should be reversed, as follows. If the decoding of the original data byte sense fails, then the driver tries to decode the date byte string in the reversed sense. If this succeeds, then the format mode is reversed from *counted down* to *counted up*, or vice versa. The quality indicator of the gyro heading observation is then set to 2, instead of 1 (negative quality indicates bad data).

Older *QINSy* drivers for *counted down* formats will ***not*** decode *counted up* data bytes, and vice versa.

Drivers.io Options

Command line parameter "NOAS" disables the autosensing check after a reset; *"format"* indicates type and sense of data value bytes. "BROWN" will not only assume that the byte sense is *counted down* (which will be corrected if raw data byte sense is *counted up*), but will also (and always) apply a factor to the decimals.

Database Setup

See description under "GYRO SYSTEM DRIVERS".

Note 1.

Be aware that a Brown type of gyro that is outputting data in "Robertson" format, could still output the data bytes *counted down*, not *counted up* like an original Robertson type of gyro. In this case, select the "Sperry (Binary)" driver or the "Robertson (Reversed Binary)" driver (latter entry only available from *QINSy* 6.6).

Note 2.

If the quality indicator of the gyro heading is 2, then the gyro type does NOT correspond to the raw data.

In this case, another driver should be selected, although *QINSy* 6.6 drivers use autosensing to do this.

3.3.4 iXSea /Photonetics Octans MRU ($HEHDT)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvPhotoneticsOctans.exe	*Drivers.io options:*	U | O | NOCS
Last modified:	2004-Jul-16		

Driver Description

Driver for iXSea (previously Photonetics) Octans solid state VRU NMEA messages $PHTRH or $PHTRO and/or $PHSPD and/or $HEHDT, referred to in the manuals as GYROCOMPAS 2. Output type.
Driver to be used to decode roll-pitch-heave observations, local speeds and/or heading.

Format Description

The $HEHDT message is exactly the NMEA0183 sentence,

```
$HEHDT - True Heading
$HEHDT,x.x,T[*hh]<CR><LF>
```

Heading:	x.x	value

The $PHTRH message is a proprietary NMEA0183 sentence,

```
$PHTRH - Pitch, Roll, Heave
$PHTRH,x.x,c,x.x,c,x.x,c[*hh]<CR><LF>
```

Pitch:	x.x	absolute value
Sign of pitch:	c	M=Up P=Down
Convention:	+	M BOW UP
Roll:	x.x	absolute value
Sign of roll:	c	B=Portside Down T=Starboard Down
Convention:	+	T PORT UP
Heave:	x.x	absolute value
Sign of heave:	c	O=Plus U=Minus ***or*** U=Plus O=Minus *(see remark on firmware version)*
Convention:	+	O UP ***or*** U Up

The $PHTRO message is a proprietary NMEA0183 sentence,

```
$PHTRO - Pitch, Roll
$PHTRO,x.x,c,x.x,c[*hh]<CR><LF>
```

Pitch:	x.x	absolute value
Sign of pitch:	c	M=Up P=Down
Convention:	+	M BOW UP
Roll:	x.x	absolute value
Sign of roll:	c	B=Portside Down T=Starboard Down
Convention:	+	T PORT UP

The $PHSPD message is a proprietary NMEA0183 sentence,

```
$PHSPD - X1, X2 and X3 speed
$PHSPD,x.xxx,y.yyy,z.zzz[*hh]<CR><LF>
```

Speed across centerline unit:	x.xxx	m/s	signed value
Speed along centerline unit:	y.yyy	m/s	signed value
Speed along vertical axis unit:	z.zzz	m/s	signed value

Firmware Versions

The Photonetic manuals used to describe that 'U' is plus for heave up, but when older Octans systems were lifted, the heave sign character used to be 'O'. In recent firmware versions, this problem has been solved, so iXSea Octans systems will output a 'U' when the Octans is lifted, which corresponds to the manuals.

QPS is not sure in which firmware version this problem has been solved, but Photonetics has confirmed us that Octans firmware 4.6, or higher, should be according to the "Heave Up 'U' conventions. Use the I/O Test Utitlity in *QINSy* to check which is the output character when the Octans is lifted, 'U' or 'O'.

Drivers.io Options

Command line parameter "U" will decode a 'U' heave sign as heave up, whereas parameter "O" will decode a 'O' heave sign as heave up. "NOCS" will not decode and test the checksum field in the messages.

Database Setup

See description under "GYRO SYSTEM DRIVERS".

To decode also the ***pitch, roll*** and ***heave***, add a "System" of type "Pitch, Roll and Heave Sensor", select the driver, and define the driver parameters. To decode all four observations (pitch, roll, heave and heading), add both these system types to the *QINSy* database and make sure to select the same gyro driver as the MRU driver (regarding the heave convention) and the same I/O parameters for both systems.

3.3.5 Javad AT4 or IMU Unit (Heading)

Input / Output:	Input (two-way)	*Driver class type:*	Counted
Executable name:	DrvJavadAT4.exe	*Drivers.io options:*	None
Last modified:	2004-June-15		

Driver Description

Driver to decode message from Javad AT4 or from Javad IMU unit.
These messages may contain attitude (roll, pitch and **heading**) data, external event markers, position (lat/lon/height) data, and/or sensors information data.

Messages from the Javad AT4 that will be decoded are [AR] and/or [XA] records.
These records are defined in the Topcon GPS Receiver Interface Language (GRIL) Manual, version 2.2.
The [AR] records contain roll and pitch (no heave available!) and **heading information**
The [XA] records contain the external event markers

Messages from the Javad IMU unit that will be decoded are [ap], [SE], [po], and/or [at] records.
The [ap] records contain roll and pitch (no heave available!), **heading**, and position information.
The [SE] records contain sensor information (acceleration and angular velocities around the axis).
The [po] records contain position information.
The [at] records contain roll and pitch (no heave available!) and **heading information**.

The driver will detect automatically the different message types.

Format Description

[ap] Attitude Data {size = 42}

```
struct ap
{
  u4 t;                      //*** internal time in msec.
  f4 rollins;                //*** INS roll in rad.
  f4 pitchins;               //*** INS pitch in rad.
  f4 headins;                //*** INS heading in rad.
  f8 xposins;                //*** INS x-position in m.
  f8 yposins;                //*** INS y-position in m.
  f8 zposins;                //*** INS z-position in m.
  u1 valid_flag;             //*** it takes 1 or 0 only
  u1 cs;                     //*** Checksum
};
```

[at] Attitude Data {size = 18}

```
struct at
{
  u4 t;                      //*** internal time in msec.
  f4 rollins;                //*** INS roll in rad.
  f4 pitchins;               //*** INS pitch in rad.
  f4 headins;                //*** INS heading in rad.
  u1 valid_flag;             //*** it takes 1 or 0 only
  u1 cs;                     //*** Checksum
};
```

[AR] Rotation angles {size = 21}

```
struct AR
{
  u4 time;                    // time of day [ms]
  f4 pitch, roll, heading;    // [degrees]
  u1 type[3];                 // solution type for the three baseline
                              // vectors
                              // 3: phase differential float
                              // 4: phase differential fixed
  u1 flag;                    //Flag:
                              // 0 – rotation angels are
                              // not valid
                              // 1 – rotation angels are valid
  u1 cs;                      // checksum
};
```

Example datastrings:

[ap] Records (binary):

```
ap02ATVS........:..!@.4..M.EA...:..@A......TA..
ap02A^VS..d..a..:..!@.=..M.EA...:..@A.v....TA..
ap02AhVS.....e..:..!@;F..M.EA.*.:..@A.V....TA..
ap02ArVS.D....S.:..!@.N..M.EA|..:..@Ah6....TA..
ap02A|VS..).....:..!@....M.EAJ..:..@A.M....TA..
ap02A.VS..>.....:..!@.F..M.EA.w.:..@AT.....TA.q
ap02A.VS.....A..:..!@F.M.EA.Y.:..@A......TA..
ap02A.VS.@-.....:..!@..v.M.EA^:.:..@A......TA..
ap02A.VS.T....F.:`.!@.6..M.EA..z:..@A2(....TA..
ap02A.VS.Q...#..:..!@....M.EAE.v:..@A......TA.[
ap02A.VS...../..:..!@....M.EA.Rs:..@A.....TA..
```

[AR] Records (binary):

```
AR015*.t."...Q0.....B.....
AR015\.t.YT...K...0.B.....
AR015..t.u....[..K[.B.....
AR015..t.m..=..I.F^.B.....
AR015..t.y\...<..NY.B....
AR015$.t...K.|;]<&#.B.....
AR015V.t..C......:?.B....,
AR015..t..6.>m...&B.B.....
AR015..t.9_.=.3W..k.B....)
```

Database Setup

See description under “GYRO SYSTEM DRIVERS”.

Please notice to set the unit for the heading to <u>Degrees</u>, even when decoding the [ap] or [at] records

3.3.6 KVH ROV GyroTrac (Heading)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	KVHROVGyroTrac.ini	*Drivers.io options:*	*none*
Last modified:	2002-Jan-29		

Driver Description

Driver for KVH ROV GyroTrac, ASCII string
Driver to be used to decode roll-pitch and/or heading observations (no heave information available).
The third field contains the heading, in tenth of degrees

Format Description

See description under “PITCH ROLL AND HEAVE SENSOR DRIVERS”,
KVH ROV GyroTrac (Pitch and Roll).

Example datastrings:

```
%-22,-21,1381
%-22,-21,1381
%-22,-21,1381
%-22,-21,1381
%-22,-22,1381
%-22,-22,1381
```

Database Setup

See description under “GYRO SYSTEM DRIVERS”.

3.3.7 Litef Gyro LFK95 (Binary) (Heading)

Input / Output:	Input	*Driver class type:*	Counted
Executable name:	DrvLitefGyroLFK95.exe	*Drivers.io options:*	NOCS | V
Last modified:	2000-Feb-03		

Driver Description

Driver for Litef Gyro LFK95 (FOG Gyro Compass System) in Standard Binary Output Format.
Driver to be used to decode roll-pitch and/or heading observations (no heave information available).

Format Description

See description under “PITCH ROLL AND HEAVE SENSOR DRIVERS”, ***Litef Gyro LFK95 (Binary).***

Database Setup

See description under “GYRO SYSTEM DRIVERS”.

3.3.8 NMEA Anschutz (HEHCC)

3.3.9 NMEA Gyrocompass (HEHDT)

3.3.10 NMEA Magnetic Heading (HDG/HDM/HCC/HCD)

3.3.11 NMEA True Heading Gyrocompass (HDG/HDT)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvGyroNMEA.exe	*Drivers.io options:*	*format* | NOCS | OI
Last modified:	1997-May-01		

Driver Description

Driver for NMEA-0183 $--Hxx sentences, containing true and/or magnetic (gyro)compass heading data. $--HCC, $--HCD and $HDM sentences contain magnetic headings, $--HDT sentences contain true headings, $--HDG strings contain magnetic heading, deviation and varition, from which true headings can be obtained.

Format Description

Each $--Hxx sentence is variable in length, depending on the number of digits for the decoded heading(s). Refer to *NMEA 0183- Standard For Interfacing Electronic Devices - Version 2.30* for more information.

Format NMEA $HEHCC string:

#	*Format*	*Description*	*Values*
01	"$"	start character	"$" (24 Hex)
02	aaccc	address field	"HEHCC"
03	","	field delimiter	"," (2C Hex)
04	x.x	compass heading (degrees)	
05	"*"	checksum field delimiter	"*" (2A Hex)
06	hh	checksum (XOR from "$" to "*" exclusive)	
07	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Format NMEA $HEHDT string:

#	*Format*	*Description*	*Values*
01	"$"	start character	"$" (24 Hex)
02	aaccc	address field	"HEHDT"
03	","	field delimiter	"," (2C Hex)
04	x.x	heading (degrees True)	
05	","	field delimiter	"," (2C Hex)
06	"T"	heading (True)	"T"
07	"*"	checksum field delimiter	"*" (2A Hex)
08	hh	checksum (XOR from "$" to "*" exclusive)	
09	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Database Setup

See description under "GYRO SYSTEM DRIVERS".

3.3.12 SeaEye Boxer ROV (Heading)

Input / Output:	Input	*Driver class type:*	*Counted* <LF>
Executable name:	DrvSeaEyeBoxer.exe	*Drivers.io options:*	*none*
Last modified:	2004-May-18		

Driver Description

Driver for decoding heading, depth and CP (Cathode Protection) voltage from a SeaEye Boxer Camera ROV.

Format Description

The system outputs a binary serial stream. The start of a new packet can be recognized by the two header bytes, 2B and 21 (hexadecimal). The various fields contain undimensioned raw values only. The driver will convert the values to a readable heading in degrees, depth in survey units and CP value in Volts.

#	*Format*	*Description*	*Values*
01	Byte	ID Byte 1	2Bh
02	Byte	ID Byte 2	21h
03	Byte	Length	Typically 21
04	Byte	????	Always B4h
05	Byte	Compass Status	See below
06 -13	Bytes	Unknown	0
14	Byte	Sort of Sync Byte?	Always F0h
15 + 16	WORD	Compass Value (10 Least Sig. Bits)	0-1024
17+18	WORD	Depth Value	0-65535
19+20	WORD	CP Value	0-2048
21	Byte	Pan	????
22	Byte	Tilt	????
23+24	WORD	Checksum from #04 up to #22 [Sum]	0-65535

Note: All integers are Intel Byte ordered {LSB, MSB}

Decoding Notes

The Driver will only properly decode the values if the checksum is correct. If checksum is invalid then the driver will not output any data!

The following formulas were used inside the driver to convert the values:

Heading = Value * 360 /1024
Depth Frequency = 750 * 65535 / (65535 – Value)
Depth in Feet = (Depth Frequency – 1000) * 1123 / 5000
Cp Voltage = (Value – 2048) * 2.5 / 2048

Quality Indicators:

The status of the Compass is translated to a readable Quality Indicator:

Status:	Value:	*QINSy* Quality Indicator
NotCalibrated	'0'	-6
CalStart	'1',	-5
FieldTooLarge	'2'	-4
FieldTooWeak	'3'	-3
CorrTooLarge	'4'	-2
InitInProgress	'R'	-1
InitReady	'I'	0
Calibrated	'C'	1

The corresponding raw value is stored as the Quality indicator value for Depth and CP observations.

Depth is always converted to the current survey units.

Database Setup

See description under "GYRO SYSTEM DRIVERS".

-Add a "Gyro" system, and select this driver. Select a COM port and setup communication parameters.

Add an "Underwater Sensor" system to decode the depth value from the message, and select the "Depth – SeaEye Boxer ROV" system. Select the same COM port as the Gyro system. Select an ROV Depth Observation and the appropriate node set the unit to "Survey Unit".

-Add a "Miscellaneous" system if the CP Value must be decoded too. Select the same COM port as the Gyro system. Add an observation with a scale factor of 1.000 if you require the CP value in volts.

Choose for all these systems the same COM port, this way all systems will be supported by one driver program.

3.3.13 SG-Brown 1000-A Gyrocompass (ASCII Heading)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvGyroSGBASCII.exe	*Drivers.io options:*	*none*
Last modified:	1999-May-06		

Driver Description

Driver for decoding 1/6th degree ASCII heading data strings from SG-Brown 1000-A/SG-Brown Meridian Surveyor and SG-Brown S1000 gyro's.

Format Description

Each ASCII heading data string represents an azimuth (true heading) with a resolution of 0.1667 degree, and is terminated by <CR><LF>. An example of an ASCII data string from a gyrocompass is given below.

```
2512<CR><LF>          251.333 degrees (251 + 2 / 6)
```

#	*Format*	*Description*	*Values*
01	Xxxx	compass heading (0.167 degrees)	0000 – 3599
02	<CR><LF>	termination characters	<0x13><0x10>

Database Setup

See description under "GYRO SYSTEM DRIVERS".

3.3.14 Sperry Gyrocompass (ASCII Heading)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvGyroSperry.exe	*Drivers.io options:*	*none*
Last modified:	1998-Apr-29		

Driver Description

Driver for decoding ASCII heading data strings from Sperry gyro's.
Driver for decoding 1/10th degree ASCII heading data strings from SG-Brown 1000-A/SG-Brown Meridian Surveyor and SG-Brown S1000 gyro's.

Format Description

Each ASCII heading data string represents an azimuth (true heading) with a resolution of 0.1 degree, and is terminated by <CR><LF>. An example of an ASCII data string from a Sperry gyrocompass is given below.

```
0138<CR><LF>           13.8 degrees
```

#	*Format*	*Description*	*Values*
01	xxxx	compass heading (0.1 degrees)	0000 – 3599
02	<CR><LF>	termination characters	<0x13><0x10>

Database Setup

See description under "GYRO SYSTEM DRIVERS".

3.3.15 UDI Nav Header Heading

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvHdrUDINav.exe	*Drivers.io options:*	*none*
Last modified:	1999-May-31		

Driver Description

Driver for old and new UDI header telegrams. Driver is cable of decoding grid position as well as grid heading from three different telegrams as found in the UDI software. The following formats are supported:

- UDI Nav Header
- Fugro UDI Surface Position Telegram
- Fugro UDI Acoustic Position Telegram

For format details see **UDI Nav Header Position** description. All headings mentioned in the formats are grid headings that are converted to true heading by the driver.

Database Setup

See description under “GYRO SYSTEM DRIVERS”.

Driver can also be used together with the UDI Nav Header Position driver. See description for details.

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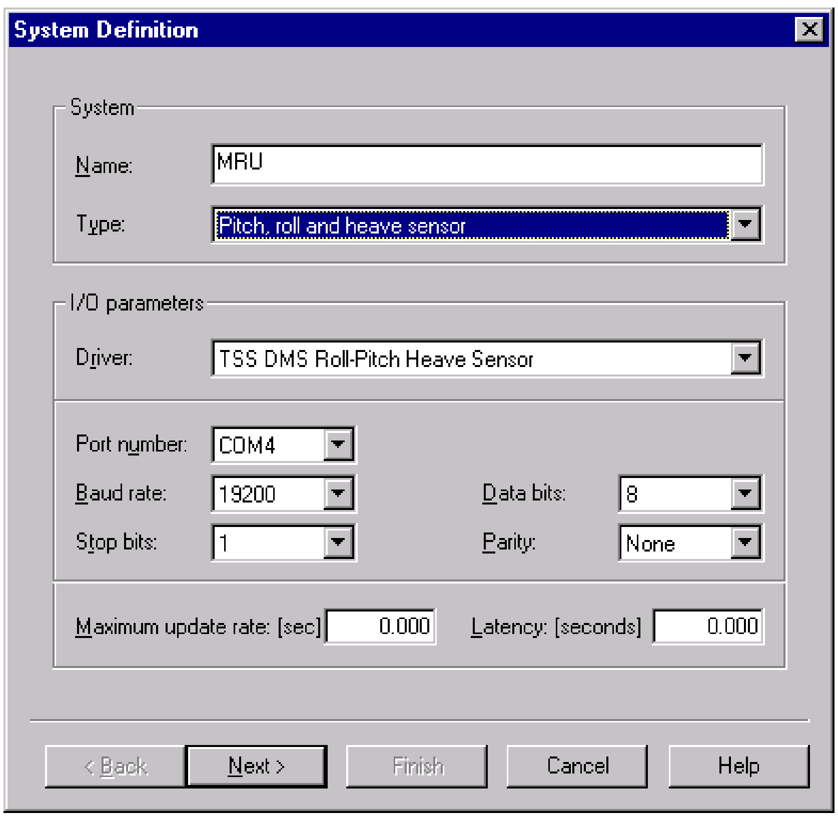
3.4 PITCH, ROLL AND HEAVE SENSOR DRIVERS

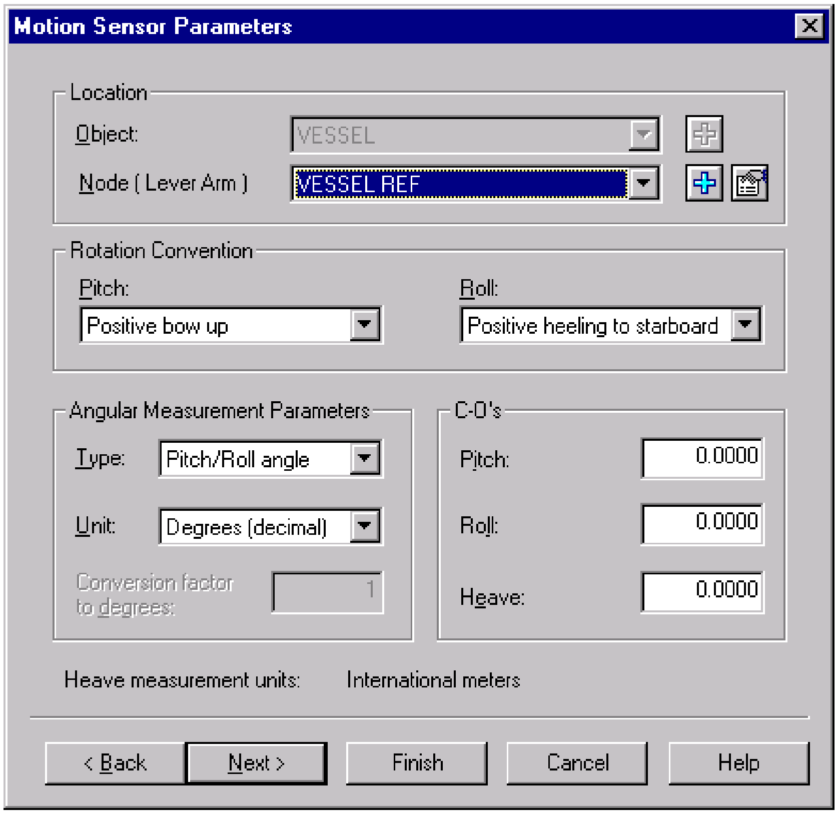
Database Setup

First define and select the "Object" on which the MRU (Motion Reference Unit) is located. Add a new system of type "Pitch, roll and heave sensor". Select the appropriate driver and interface parameters. Press "Next" button to finish the setup. There is no need to define the three ***pitch, roll and heave*** observations separately, since they are automatically added to the system. Select the node for which the observations are valid, i.e. lever arm node if motion data is not corrected to the vessel reference point and the reference node if the data are corrected before output. If the MRU node has got a non-zero offset, then *QINSy* will apply a so-called lever arm correction for pitch and roll induced heave. Change the parameters to match the rotation sign convention and measurement units of the format description. Finally, press "Finish" to save the system or press "Next" first to enter some administrative information about the quality indicators that are decoded.



Database Setup (continued)

A new MRU node can be added by pressing the  button; to change its properties, press the  button.



See for more information the *QINSy* DB Setup Help Topics or the *QINSy* Knowledge Base.

3.4.1 Atlas Dynabase C R-P-H (0.0055 deg)

3.4.2 Atlas Dynabase C R-P-H (0.0100 deg)

Input / Output:	Input	*Driver class type:*	Counted
Executable name:	DrvAtlasMRUDynabaseC.exe	*Drivers.io options:*	DynaC NEW
Last modified:	2003-Apr-04		

Driver Description

Driver for Atlas MRU (Motion Reference Unit) binary messages in Dynabase C format. Driver to be used to decode roll-pitch-heave observations.

Format Description

The Standard Atlas binary message is a string of 9 bytes according to the following format:

```
SRrPpHhQS
123456789
```

Field	*Definition*	*Units*	*Value*
S	Start character (ASCII 10 Hex)	-	-
Rr	Roll – MSB & LSB	(**)	
Pp	Pitch – MSB & LSB	(**)	
Hh	Heave – MSB & LSB	1 cm	
Q	Status code	-	0 – 7 (*)
S	Stop character (ASCII 10 Hex)	-	-

(*) = see following table
(**) = The unit may be either 0.0100° or approximately 0.0055° depending on the driver version used

Status Code	*Mode*	*Description*	*Condition*
0	Unaided	No input (bad data)	Settled
1	Unaided	No input (***)	Settling
2	GPS Aided	Input from GPS	Settled
3	GPS Aided	Input from GPS (***)	Settling
4	Heading Aided	Input from Gyro	Settled
5	Heading Aided	Input from Gyro (***)	Settling
6	Full Aided	Input from GPS and Gyro	Settled
7	Full Aided	Input from GPS and Gyro (***)	Settling

(***) = still awaiting end of 3 min. settling period after Dynabase C power-on or a mode change.

Fixed length message, using single-byte, 16-bit 2-complement numbers. MSB is transmitted first for the multi-byte elements. The sign convention is such that +ve heave is above datum (meaning upwards), +ve pitch is bow up and +ve roll is port side up.

Database Setup

See description under “PITCH ROLL AND HEAVE SENSOR DRIVERS”.

3.4.3 Hippy Datawell Piro MRU

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvDatawellPiro.exe	*Drivers.io options:*	A | B | C | D
Last modified:	1998-Jun-02		

Driver Description

Driver for Hippy Datawell Piro (Motion Reference Unit) ASCII message. Driver to be used to decode roll-pitch-heave observations and or the heading. To date, QPS has only experienced the four analogue outputs from Datawell Piro unit in volts passed through an Analogue-Digital converter that outputs an ASCII string.

Format Description

```
SA.AAA SB.BBB SC.CCC SD.DDD<CR><LF>
```

S	Sign (+ or -)
A	Digit (0..9) from channel A
B	Digit (0..9) from channel B
C	Digit (0..9) from channel C
D	Digit (0..9) from channel D
<CR><LF>	CarriageReturn + LineFeed

The length is 29 bytes, inclusive <CR><LF>. The Roll and Pitch values are 10 times the ARCSIN, the Heave is in centimetres, whilst the Heading is in radians. Which value is on which channel depends upon how the Datawell Piro is connected to the ADC unit.

Format Example

```
 9.174 -0.156 -0.019 +9.125
 9.150 -0.146 -0.019 +9.101
 9.145 -0.141 -0.029 +9.096
 9.150 -0.141 -0.014 +9.096
```

Database Setup

See description under “PITCH ROLL AND HEAVE SENSOR DRIVERS”.

To decode the ***heading***, add a “System” of type “Gyro”, select the driver, and define the heading parameters. To decode all four observations (pitch, roll, heave and heading), add both these system types to the *QINSy* database and make sure to select the same driver name and the same I/O parameters for both systems.

3.4.4 iXSea /Photonetics Octans MRU ($PHTRH / $PHTRO)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvPhotoneticsOctans.exe	*Drivers.io options:*	U | O | NOCS
Last modified:	2004-Jul-16		

Driver Description

Driver for iXSea (previously Photonetics) Octans solid state VRU NMEA messages $PHTRH or $PHTRO and/or $PHSPD and/or $HEHDT, referred to in the manuals as GYROCOMPAS 2. Output type.
Driver to be used to decode roll-pitch-heave observations, local speeds and/or heading.

Format Description

The $HEHDT message is exactly the NMEA0183 sentence,

```
$HEHDT - True Heading
$HEHDT,x.x,T[*hh]<CR><LF>
```

Heading:	x.x	value

The $PHTRH message is a proprietary NMEA0183 sentence,

```
$PHTRH - Pitch, Roll, Heave
$PHTRH,x.x,c,x.x,c,x.x,c[*hh]<CR><LF>
```

Pitch:	x.x	absolute value
Sign of pitch:	c	M=Up P=Down
Convention:	+	M BOW UP
Roll:	x.x	absolute value
Sign of roll:	c	B=Portside Down T=Starboard Down
Convention:	+	T PORT UP
Heave:	x.x	absolute value
Sign of heave:	c	O=Plus U=Minus ***or*** U=Plus O=Minus *(see remark on firmware version)*
Convention:	+	O UP ***or*** U Up

The $PHTRO message is a proprietary NMEA0183 sentence,

```
$PHTRO - Pitch, Roll
$PHTRO,x.x,c,x.x,c[*hh]<CR><LF>
```

Pitch:	x.x	absolute value
Sign of pitch:	c	M=Up P=Down
Convention:	+	M BOW UP
Roll:	x.x	absolute value
Sign of roll:	c	B=Portside Down T=Starboard Down
Convention:	+	T PORT UP

The $PHSPD message is a proprietary NMEA0183 sentence,

```
$PHSPD – X1, X2 and X3 speed
$PHSPD,x.xxx,y.yyy,z.zzz[*hh]<CR><LF>
```

Speed across centerline unit:	x.xxx	m/s	signed value
Speed along centerline unit:	y.yyy	m/s	signed value
Speed along vertical axis unit:	z.zzz	m/s	signed value

Firmware Versions

The Photonetic manuals used to describe that 'U' is plus for heave up, but when older Octans systems were lifted, the heave sign character used to be 'O'. In recent firmware versions, this problem has been solved, so iXSea Octans systems will output a 'U' when the Octans is lifted, which corresponds to the manuals.

QPS is not sure in which firmware version this problem has been solved, but Photonetics has confirmed us that Octans firmware 4.6, or higher, should be according to the "Heave Up 'U' conventions. Use the I/O Test Utitlity in *QINSy* to check which is the output character when the Octans is lifted, 'U' or 'O'.

Drivers.io Options

Command line parameter "U" will decode a 'U' heave sign as heave up, whereas parameter "O" will decode a 'O' heave sign as heave up. "NOCS" will not decode and test the checksum field in the messages.

Database Setup

See description under "PITCH ROLL AND HEAVE SENSOR DRIVERS".

To decode the ***heading***, add a "System" of type "Gyro", select the driver, and define the heading parameters. To decode all four observations (pitch, roll, heave and heading), add both these system types to the *QINSy* database and make sure to select the same gyro driver as the MRU driver (regarding the heave convention) and the same I/O parameters for both systems.

3.4.5 iXSea Phins standard ($HEHDT) / ($PIXSE,ATITUDE, ~POSITI, ~SPEED_)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvIxseaPhins.exe	*Drivers.io options:*	*none*
Last modified:	2003-01-06		

Driver Description

This driver decodes iXSea Phins standard output protocol messages. The Phins standard output protocol messages are NMEA 0183 compatible. The driver is capable of decoding messages concerning: heading, attitude, position, speed, standard deviations and the Phins status.

Format Description

Heading – $HEHDT,x.xx,T*hh<CR><LF>

Field	*Format*	*Description*	*Values, Range, Units*
1	$HEHDT	Message type identifier	"$HEHDT"
2	x.xx	True heading	0.00…360.00 (degrees)
3	T		"T"
4	*hh	Checksum	XOR from "$" to "*" exclusive
5	<CR><LF>	Termination characters	<CR><LF> (0D Hex, 0A Hex)

```
$HEHDT,49.732,T*14
```

Roll and Pitch – $PIXSE,ATITUD,x.xx,y.yy*hh<CR><LF>

Field	*Format*	*Description*	*Values, Range, Units*
1	$PIXSE,ATITUD	Message type identifier	"$PIXSE,ATITUD"
2	x.xx	Roll	Degrees (positive heeling to starboard)
3	y.yy	Pitch	Degrees (positive bow down)
4	*hh	Checksum	XOR from "$" to "*" exclusive
5	<CR><LF>	Termination characters	<CR><LF> (0D Hex, 0A Hex)

```
$PIXSE,ATITUD,-0.588,0.474*4D
```

Speed – $PIXSE,SPEED_,x.xx,y.yy,z.zz*hh<CR><LF>

Field	*Format*	*Description*	*Values, Range, Units*
1	$PIXSE, SPEED_	Message type identifier	"$PIXSE, SPEED_"
2	x.xx	North speed	Meters / second
3	y.yy	West speed	Meters / second
4	z.zz	Vertical speed	Meters / second
5	*hh	Checksum	XOR from "$" to "*" exclusive
6	<CR><LF>	Termination characters	<CR><LF> (0D Hex, 0A Hex)

```
$PIXSE,SPEED_,0.0000,0.0000,0.0000*51
```

Position – $PIXSE,POSITI,x.xx,y.yy,z.zz*hh<CR><LF>

Field	Format	Description	Values, Range, Units
1	$PIXSE, POSITI	Message type identifier	"$PIXSE, POSITI"
2	x.xx	Latitude	Degrees
3	y.yy	Longitude	Degrees
4	z.zz	Altitude	meters
5	*hh	Checksum	XOR from "$" to "*" exclusive
6	<CR><LF>	Termination characters	<CR><LF> (0D Hex, 0A Hex)

```
$PIXSE,POSITI,48.87000648,0.99997750,3.490*53
```

Position Standard Deviation – $PIXSE,STDPOS,x.xx,y.yy,z.zz*hh<CR><LF>

Field	Format	Description	Values, Range, Units
1	$PIXSE, STDPOS	Message type identifier	"$PIXSE, STDPOS "
2	x.xx	Latitude standard deviation	
3	y.yy	Longitude standard deviation	
4	z.zz	Altitude standard deviation	
5	*hh	Checksum	XOR from "$" to "*" exclusive
6	<CR><LF>	Termination characters	<CR><LF> (0D Hex, 0A Hex)

```
$PIXSE,STDPOS,50.000,50.000,50.000*43
```

Phins Status – $PIXSE,STATUS,hhhhhhhh*hh<CR><LF>

Field	Format	Description	Values, Range, Units
1	$PIXSE, STDPOS	Message type identifier	"$PIXSE, STDPOS "
2	hhhhhhhh	Phins status	hexadecimal
3	*hh	Checksum	XOR from "$" to "*" exclusive
4	<CR><LF>	Termination characters	<CR><LF> (0D Hex, 0A Hex)

$PIXSE,STATUS,30000000*40

The hexadecimal value of the Phins status is decoded as follows.

Bit	*Description*
0	Log valid
1	GPS valid
2	Depth valid
3	USBL valid
4	Reserved
5	Reserved
6	Reserved
7	Configuration saved to EEPROM
8	FOG X1 Error
9	FOG X2 Error
10	FOG X3 Error
11	Optical source error
12	Accelerometer X1 error
13	Accelerometer X2 error
14	Accelerometer X3 error
15	Sensor error memory

Bit	*Description*
16	Serial input A error
17	Serial input B error
18	Serial input C error
19	FIFO full
20	Serial output A full
21	Serial output B full
22	Serial output C full
23	Reserved
24	Serial input A activity
25	Serial input B activity
26	Serial input C activity
27	Reserved
28	Heading not valid
29	Attitude not valid
30	User control flag
31	System restarted

Decoding Notes

The speed vectors decoded from the "$PIXSE,SPEED_" message are converted to one vertical speed vector, a horizontal speed vector and it's heading. It is necessary that the complete "Phins Standard" is sent, in order to decode any data.

Database Setup

To decode the messages mentioned above four systems have to be chosen from in the Db Setup.

- Heading: Gyro's and Compasses, iXSea Phins standard ($HEHDT)
- Attitude: Pitch, Roll and Heave sensors, iXSea Phins standard ($PIXSE ATITUDE)
- Position: Position Navigation System, iXSea Phins standard ($PIXSE POSITI)
- Speed: Speed Log, iXSea Phins standard ($PIXSE SPEED_)

When one of the above drivers is chosen, the "Phins Status" message will be decode automatically. When the position is decoded, the "Position standard deviation" message will be decoded too.

3.4.6 Javad AT4 or IMU Unit (R-P)

Input / Output:	Input (two-way)	*Driver class type:*	Counted
Executable name:	DrvJavadAT4.exe	*Drivers.io options:*	None
Last modified:	2004-June-15		

Driver Description

Driver to decode message from Javad AT4 or from Javad IMU unit.
These messages may contain attitude (**roll, pitch** and heading) data, external event markers, position (lat/lon/height) data, and/or sensors information data.

Messages from the Javad AT4 that will be decoded are [AR] and/or [XA] records.
These records are defined in the Topcon GPS Receiver Interface Language (GRIL) Manual, version 2.2.
The [AR] records contain **roll and pitch (no heave available**!) and heading information
The [XA] records contain the external event markers

Messages from the Javad IMU unit that will be decoded are [ap], [SE], [po], and/or [at] records.
The [ap] records contain **roll and pitch (no heave available**!), heading, and position information.
The [SE] records contain sensor information (acceleration and angular velocities around the axis).
The [po] records contain position information.
The [at] records contain **roll and pitch (no heave available**!) and heading information.

The driver will detect automatically the different message types.

Format Description

A GRIL output message consists of several different parts. The first part is a two byte record identifier followed by a 3 byte the record length field and the actual data record. The driver currently decodes the AR-message which contains the following fields

Field	*Format*	*Description*	*Values, Range, Units*
Identifier	Char [2]	Record identifier	Always “AR”
Length	Char [3]	Length coded as ASCII chars	“015” hex = 21 bytes
Time	Integer	GPS Time of day	Milliseconds
Pitch	Float	Pitch of local reference frame	Degrees
Roll	Float	Roll of local reference frame	Degrees
Heading	Float	Heading of local reference frame	Degrees
Type	Char [3]	Solution type of each vector	3 = phase difference float 4 = phase difference fixed
Flag	Char	Flags	0 = rotation angles are invalid 1 = rotation angles are valid
CS	Char	Checksum	

Decoding Notes

The solution type & checksum fields are not decoded. The flag field is decoded as the quality indicator. A zero value is decoded as –1 and a value of 1 is decoded as zero. Sign convention is +ve heading is clockwise, +ve pitch is bow up and +ve roll is starboard side down.

The driver also decodes the XA-message which contains the following fields

Field	***Format***	***Description***	***Values, Range, Units***
Identifier	Char [2]	Record identifier	Always “XA”
Length	Char [3]	Length coded as ASCII chars	“00A” hex = 10 bytes
ms	Integer	Millisecond part of event time tag	Milliseconds
ns	Integer	Nanosecond part of event time tag	Nanoseconds
Scale	Char	Time scale	0 = GPS 1 = UTC_USNO 2 = GLONASS 3 = UTC_SU 4…254 = Reserved
CS	Char	Checksum	

Decoding Notes

A generic observation is filled with value 0.0 and the observation time is set to the value decoded from the data. The quality indicator is set to the decoded scale.

Database Setup

See description under “PITCH ROLL AND HEAVE SENSOR DRIVERS”.

To decode the ***heading***, add a “System” of type “Gyro”, select the driver, and define the heading parameters. To decode all four observations (pitch, roll, heave and heading), add both these system types to the *QINSy* database and make sure to select the same driver name and the same I/O parameters for both systems.

The unit for roll, pitch and heading must be set to **Degrees**

To decode the ***event marker***, add a “System” of type “Miscellenaous”, select the driver *Javad AT4 Event Marker.* Add a new generic observation and give it a correct name. If the roll, pitch or heading are also decoded, make sure that the same I/O parameters are selected for both systems.

3.4.7 KVH ROV GyroTrac (Pitch and Roll)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	KVHROVGyroTrac.ini	*Drivers.io options:*	*none*
Last modified:	2002-Jan-29		

Driver Description

Driver for KVH ROV GyroTrac, ASCII string
Driver to be used to decode roll-pitch and/or heading observations (no heave information available).

Format Description

ASCII String, fields are comma separated, Start Identifier character is "%"
The first field contains the pitch value in tenth of degrees.
The second field contains the roll value in tenth of degrees.
The third field contains the heading in tenth of degrees

Example datastrings:

```
%-22,-21,1381
%-22,-21,1381
%-22,-21,1381
%-22,-21,1381
%-22,-22,1381
%-22,-22,1381
```

Database Setup

See description under "PITCH ROLL AND HEAVE SENSOR DRIVERS".

To decode the ***heading***, add a "System" of type "Gyro", select the driver, and define the heading parameters. To decode all observations (pitch, roll, and heading), add both these system types to the *QINSy* database and make sure to select the same driver name and the same I/O parameters for both systems.

3.4.8 Litef Gyro LFK95 (Binary) (Pitch-Roll)

Input / Output:	Input	*Driver class type:*	Counted
Executable name:	DrvLitefGyroLFK95.exe	*Drivers.io options:*	NOCS | V
Last modified:	2000-Feb-29		

Driver Description

Driver for Litef Gyro LFK95 (FOG Gyro Compass System) in Standard Binary Output Format.
Driver to be used to decode roll-pitch and/or heading observations (no heave information available).

Format Description

The Standard Binary Output Message is a string of 20 bytes according to the following format.

Element	*Comment*	*Bytes*	*Value*
Identifier		1	Hex 3
Heading	1)	3	0.000° – 359.995° (in units of 0.005493°)
Roll	1)	3	-180.000° – 179.885° (in units of 0.005493°)
Pitch	1)	3	-180.000° – 179.885° (in units of 0.005493°)
X'Rate	Not used	3	
Y'Rate	Not used	3	
Z'Rate	Not used	3	
Checksum	3)	1	XOR, AND MASK

Comments.

1) The three bytes contain, besides the actual value, also the following information:

- Mode flag 0 = GyroCompass, 2 = TestMode, 3 = Alignment Mode
- SF flag 0 = System OK, 1 = System Failure
- RG flag 0 = Specified Accuray, 1 = Reduced Accurary
- Validity flag 0 = Data Invalid, 1 = Data Valid

2) If DRIVERS.IO command line parameter V is used, data is only updated when all flags are okay, i.e. Mode = 0, SF = 0, RG = 0, and Validity = 1

3) If DRIVERS.IO command line Parameter NOCS is used, the checksum of the message will be ignored.

Sign convention is +ve heading is clockwise, +ve pitch is bow up and +ve roll is starboard side down.

Database Setup

See description under "PITCH ROLL AND HEAVE SENSOR DRIVERS".

To decode the ***heading***, add a "System" of type "Gyro", select the driver, and define the heading parameters. To decode all four observations (pitch, roll, heave and heading), add both these system types to the *QINSy* database and make sure to select the same driver name and the same I/O parameters for both systems.

3.4.9 Seatex Seapath MRU Binary Standard

3.4.10 Seatex Seapath MRU Binary Format11

Input / Output:	Input	*Driver class type:*	Counted
Executable name:	DrvSeapathMRU.exe	*Drivers.io options:*	11 | NOCS
Last modified:	2001-Jan-07		

Driver Description

Driver for Seatex Seapath/MRU binary messages in Standard, Format 11, EM1000 or EM3000 format. Driver to be used to decode roll-pitch-heave, heading and/or lat-lon-height observations from Seapath (or MRU) motion reference units. The EM1000 or EM3000 formats are covered by the Simrad driver.

Format Description

The Standard Seapath binary message is a string of 52 bytes according to the following format.

Element	*Scale*	*Units*	*Format*	*Bytes*	*Value*
Header			ASCII	1	'q'
Length			unsigned	1	49
Token			unsigned	1	0 - 255
Time			integer	4	0 - 999999999
Latitude	90 / 2^30	°	integer	4	–2^30 - 2^30
Longitude	90 / 2^30	°	integer	4	–2^30 - 2^30
Height		m	float	4	
Heave		m	float	4	
North velocity		m/s	float	4	
East velocity		m/s	float	4	
Down velocity		m/s	float	4	
Roll		rad	float	4	
Pitch		rad	float	4	
Heading		rad	float	4	0 - 2 PI
Status			bit-fields	4	
Checksum			unsigned	1	0 - 255

Fixed length message, using single-byte unsigned, four-byte 2-complement integer, four-byte ieee floating point data elements. MSB is transmitted first for the multi-byte elements. Length is number of bytes between length field and checksum field. Checksum is modulo 256 of all bytes between length and checksum.

The sign convention is such that +ve heave is down, +ve pitch is bow up and +ve roll is port side up.

Decoding Notes

The Seapath MRU driver will reverse the sign of the heave so that +ve heave is up, as is standard in *QINSy*. All units are converted to meters and degrees, respectively. If a status bit for a Seapath observation type (i.e. position, heave, roll-pitch, or heading) is "invalid", then the quality indicator is set to –1. If a status bit is "reduced" then the quality indicator is set to 0.11. If a status bit is OK, then the quality indicator is +1.
If checksum fails, and data are still decoded (parameter "NOCS"), then quality indicator is set to –999.

(continued on next page)

Format Description (continued)

The Seapath Format 11 binary message is a string of 42 bytes according to the following format.

Element	***Scale***	***Units***	***Format***	***Bytes***	***Value***
Header			ASCII	1	‘q’
Time		s	integer	4	since 01-01-1970
Time	0.01	s	unsigned	1	0 – 99
Latitude	90 / 2^30	°	integer	4	–2^30 - 2^30
Longitude	90 / 2^30	°	integer	4	–2^31 - 2^31
Height	0.01	m	integer	4	
Heave	0.01	m	integer	2	
North velocity	0.01	m/s	integer	2	
East velocity	0.01	m/s	integer	2	
Down velocity	0.01	m/s	integer	2	
Roll	90 / 2^14	°	integer	2	–2^15 - 2^15
Pitch	90 / 2^14	°	integer	2	–2^15 - 2^15
Heading	90 / 2^14	°	integer	2	0 - 2^16
Roll rate	90 / 2^14	°/s	integer	2	–2^15 - 2^15
Pitch rate	90 / 2^14	°/s	integer	2	–2^15 - 2^15
Yaw rate	90 / 2^14	°/s	integer	2	–2^15 - 2^15
Status			bit-fields	2	
Checksum			unsigned	2	16-bit CRC

See description under Standard Binary table on previous page for more information on format and decoding.

The checksum, calculated as a 16-bit block Cyclic Redundancy Check of all bytes between, but not including the header and checksum fields, is currently not supported because QPS lacks a description of the algorithm.

Drivers.io Options

Command line parameter “11” will decode the “Format 11” data strings (length 42 bytes), otherwise the “Standard” data strings (52 bytes) are expected. Parameter “NOCS” for “Standard” format will continue decoding the data if the checksum value does not correspond to the actual data; quality is set to –999.

Database Setup

See description under “PITCH ROLL AND HEAVE SENSOR DRIVERS”.

To decode the ***heading***, add a “System” of type “Gyro”, select the driver, and define the heading parameters. To decode all four observations (pitch, roll, heave and heading), add both these system types to the *QINSy* database and make sure to select the same driver name and the same I/O parameters for both systems.

To decode the ***position*** from the Seapath binary data string, add a “System” of type “Position Navigation System”, select the Seatex Seapath driver, and define the antenna node and reference datum. To decode all possible observations (pitch, roll, heave, heading and position), add all three types of system types to the *QINSy* database and make sure to select the same driver and the same I/O parameters for all systems.

3.4.11 Seatex Seapath MRU NMEA ($PSXN)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvSeapathMRUASCII.exe	*Drivers.io options:*	NMEA | SOUNDER
Last modified:	2000-Mar-30		

Driver Description

Driver for Seatex Seapath/MRU ASCII strings in NMEA or Sounder format. Driver to be used to decode roll-pitch-heave and/or heading observations from Seapath (or MRU) motion reference units. The current NMEA message ($PSXN,23) supports both roll-pitch-heave and heading observations. The older (unused?) NMEA message ($PSXN,10) and the Sounder format are limited to roll-pitch-heave only.

Format Description

The old NMEA message ($PSXN,10) has the following format description:

```
$PSXN,nn,ttt,r.rrr,p.ppp,h.hhh,sss,x,x*hh<CR><LF>
```

#	*Format*	*Description*	*Values*
01	“$”	start character	“$” (24 Hex)
02	“PSXN”	address field for SeateX Norway	“PSXN”
03	“,”	field delimiter	“,” (2C Hex)
04	Nn	message id	10 = data stable, 11 = data unstable
05	“,”	field delimiter	“,” (2C Hex)
06	Ttt	user defined token	10…100; 019 = data stable
07	“,”	field delimiter	“,” (2C Hex)
08	r.rrr	roll (rad) in scientific format	e.g. 5.100e-2 ≡ 0.051 rad
09	“,”	field delimiter	“,” (2C Hex)
10	p.ppp	pitch (rad) in scientific format	e.g. –5.100e-2 ≡ –0.051 rad
11	“,”	field delimiter	“,” (2C Hex)
12	h.hhh	heave (m) in scientific format	e.g. 1.234e+0 ≡ 1.234 m
13	“,”	field delimiter	“,” (2C Hex)
14	Sss	seconds since 1 January 1970 00:00:00	771598427 ≡ 14 June 1994 12:53:47
15	“,”	field delimiter	“,” (2C Hex)
16		empty field (heading ???)	
17	“,”	field delimiter	“,” (2C Hex)
18		empty field (heading ???)	
19	“*”	checksum field delimiter	“*” (2A Hex)
20	Hh	checksum (XOR from “$” to “*” exclusive)	
21	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Format Example

```
$PSXN,10,019,5.100e-2,-5.100e-2,1.234e+0,771598427,,*61
```

(continued on next page)

The current NMEA message ($PSXN,23) has the following format description:

`$PSXN,nn,r.rr,p.pp,d.dd,h.hh*hh<CR><LF>`

#	*Format*	*Description*	*Values*
01	"$"	Start character	"$" (24 Hex)
02	"PSXN"	Address field for SeateX Norway	"PSXN"
03	","	Field delimiter	"," (2C Hex)
04	Nn	message id	Always 23
05	","	Field delimiter	"," (2C Hex)
06	r.rr	Roll in degrees (positive with port side up)	
07	","	Field delimiter	"," (2C Hex)
08	p.pp	Pitch in degrees (positive with bow up)	
09	","	Field delimiter	"," (2C Hex)
10	d.dd	True heading in degrees	Between 0.00 and 359.99
11	","	Field delimiter	"," (2C Hex)
12	h.hh	Heave in meters (positive down)	
13	","	Field delimiter	"," (2C Hex)
17	"*"	Checksum field delimiter	"*" (2A Hex)
18	Hh	Checksum (XOR from "$" to "*" exclusive)	
19	<CR><LF>	Termination characters	<CR><LF> (0D Hex, 0A Hex)

Format Example

`$PSXN,23,2.36,3.86,5.02,0.00*35`

Database Setup

See description under "PITCH ROLL AND HEAVE SENSOR DRIVERS".

To decode the ***heading***, add a "System" of type "Gyro", select the driver, and define the heading parameters. To decode all four observations (pitch, roll, heave and heading), add both these system types to the *QINSy* database and make sure to select the same driver name and the same I/O parameters for both systems

3.4.12 Seatex Seapath MRU Sounder Sentence

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvSeapathMRUASCII.exe	*Drivers.io options:*	NMEA | SOUNDER
Last modified:	2000-Mar-30		

Driver Description

Driver for Seatex Seapath (or MRU) ASCII messages in NMEA or Sounder format. Driver to be used to decode roll-pitch-heave observations from Seapath (or MRU) motion reference units. Opposite to the binary Seatex Seapath output formats, there is no heading observation included in this ASCII message.

Format Description

The Sounder Sentence protocol has format (length is 27 bytes):

```
:aabbbb shhhhxsrrrr spppp<CR><LF>
```

#	*Format*	*Description*	*Values or Scale*
01	“**:**”	start character	“**:**” (3A Hex)
02	aa	2 character Hex number sway acceleration	0.03835 m/ss
03	bbbb	4 character Hex number heave acceleration	0.000625 m/ss
04	“ “	space character	“ ” (20 Hex)
05	s	heave sign	“–” (2D Hex) or “ ” (20 Hex)
06	hhhh	heave in 0.01 metres	+ve is upwards
07	x	warning character	“?” (3F Hex) for unstable data
08	s	roll sign	“–” (2D Hex) or “ ” (20 Hex)
09	hhhh	roll in 0.01 degrees	e.g. 0087 ≡ 0.87 °
10	“ “	space character	“ ” (20 Hex)
11	s	pitch sign	“–” (2D Hex) or “ ” (20 Hex)
12	hhhh	pitch in 0.01 degrees	e.g 0378 ≡ 3.78 °
13	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Format Example

```
:1a36b0 -0254 -0087  0378
```

Database Setup

See description under “PITCH ROLL AND HEAVE SENSOR DRIVERS”.

3.4.13 Sercel 230 Heading, Roll and Pitch

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvNR103NMEA.exe	*Drivers.io options:*	*format*
Last modified:	1997-May-01		

Driver Description

Driver to be used to decode roll-pitch-heave and/or heading from NR 230 $A and $PSER,ATT strings.

Format Description

#	*Format*	*Description*	*Values or Scale*
01	"$PSER,ATT"	identifier	
02	","	field terminator	
03	hhmmss.sss	time of data, hours, minutes, seconds	00..23, 00..59, 00..59.99
04	","	field terminator	
05	dd	day	00..31
06	","	field terminator	
07	mm	month	00..12
08	","	field terminator	
09	yyyy	year	0000..9999
10	","	field terminator	
11	hhh.h	True heading	degrees
12	","	field terminator	
13	"T"	True heading indicator	"T"
14	","	field terminator	
15	xx.xx	Roll	degrees
16	","	field terminator	
17	xx.xx	Pitch	degrees
18	","	field terminator	
19		IGNORED	
20	<CR><LF>	String terminator	<CR><LF> (0D Hex, 0A Hex)
#	***Format***	***Description***	***Values or Scale***
01	"$A"	identifier	
02	","	field terminator	
03	s.s	Delta time	seconds
04	","	field terminator	
08	hhh.h	True heading	degrees
04	","	field terminator	
09	"T"	True heading indicator	"T"
04	","	field terminator	
10	xx.xx	Roll	degrees
04	","	field terminator	
11	xx.xx	Pitch	degrees
04	","	field terminator	
12	x	unknown, IGNORED	
	<CR><LF>	string terminator	CR><LF> (0D Hex, 0A Hex)

(continued on next page)

Format Example

```
$PSER,ATT,215816.200,30,08,1997,+220.73,T,+00.54,-0.41,00.8,09>05,015,0
$A,0.1,+220.73,T,+00.54,-00.41,0
```

Database Setup

See description under “PITCH ROLL AND HEAVE SENSOR DRIVERS”.

To decode the ***heading***, add a “System” of type “Gyro”, select the driver, and define the heading parameters. To decode all four observations (pitch, roll, heave and heading), add both these system types to the *QINSy* database and make sure to select the same driver name and the same I/O parameters for both systems.

3.4.14 Simrad EM1000 (R-P-H)

3.4.15 Simrad EM3000 (R-P-H)

Input / Output:	Input	*Driver class type:*	Counted
Executable name:	DrvSimradMRU.exe	*Drivers.io options:*	EM1000 | EM3000 | OI
Last modified:	2002-Dec-24		

Driver Description

Driver to be used to decode roll-pitch-heave observations from motion reference units outputting data in the Simrad EM1000 or EM3000 format.

Format Description

The Simrad EM1000 and EM3000 message is a binary string of 10 bytes according to the following format.

Element	*Scale*	*Units*	*Format*	*Bytes*	*Range*
Status			unsigned	1	(1)(2)
Header			unsigned	1	90h
Roll	0.01	°	integer	2	–9000 – 9000(3)
Pitch	0.01	°	integer	2	–9000 – 9000(3)
Heave	0.01	m	integer	2	–2000 – 2000(3)
Heading	0.01	°	unsigned	2	0 – 35999(3)

(1) EM1000: always 00h
(2) EM3000: status byte can have values using following convention:
- 90h: Valid measurements with full accuracy
- 91h to 99h: Valid measurements with reduced accuracy (decreasing accuracy with increasing number)
- 9Ah to 9Fh: Non-valid measurements but normal operation (i.e. configuration or calibration mode)
- A0h to AFh: Non-valid measurements with sensor error status

(3) If a value outside the range is detected the observation is rejected by the driver. In this case the last valid value will be remembered and the quality indicator will be set to -1.0.

Note. The sign convention is such that '+ve' pitch is bow up and '+ve' roll is port side up.

Decoding Notes

For both message types s the status field is used to set the quality indicator. For the EM1000 message the quality indicator is set to 1.00 when a 00h byte is encountered and a –1.00 if any other bytes is encountered. For the EM3000 message the quality indicator is set using the following table:

Status Byte	*Quality Indicator*
90h	1.00
91h – 9Fh	+1.10 to +2.50 (step size 0.10)
A0h - AFh	-1.00 to -2.50 (step size 0.10)
Other	-1.00

Drivers.io Options

Command line parameters "EM1000" and "EM3000" indicate the message type as being decoded. "OI" indicates that the timetags are obtained from preceding "OiSTAR" headers, if available. Otherwise the first incoming byte is timetagged.

Database Setup

See description under "PITCH ROLL AND HEAVE SENSOR DRIVERS".

3.4.16 TSS 320 / 335 / DMS-05 (R-P-H)

Input / Output: Input (one-way)
Executable name: DrvTSSNew.exe
Last modified: 2000-Dec-05

Driver class type: Counted
Drivers.io options: OCTANS | OI 320 | DMS

Driver Description

Driver to be used to decode roll-pitch-heave observations from TSS motion reference units.

Format Description

Decodable TSS messages are ASCII strings according to the TSS1 or TSS3 format. Both formats contain 27 characters, including start and end fields. All fields contain measurements in real-world units; accelerations are supplied in ASCII-coded hexadecimal values and heave, roll and pitch as ASCII-coded decimal values.

`TSS1 PACKET   :XXAAAA_MHHHHQMRRRR_MPPPPZZ`

Field	*Format*	*Description*	*Range*	*Units*
01	"**:**"	start of packet character	":"	3A Hex
02	XX	horizontal acceleration	0 to 9.81 m/s²	3.83 cm/s²
03	AAAA	vertical acceleration	–20.48 to +20.47 m/s²	0.0625 cm/s²
04	_	space character	" "	20 Hex
05	MHHHH	**heave**	–99 to +99 m	0.01 m
06	Q	status flag	"u,U,g,G,H,f,F", "?", " "	*see note*
07	MRRRR	**roll**	–99 to +99 °	0.01 °
08	_	space character	" "	20 Hex
09	MPPPP	**pitch**	–99 to +99 °	0.01 °
10	ZZ	termination characters	<CR><LF>	0D Hex 0A Hex

`TSS3 PACKET   :RMhhhh_MHHHHQMRRRR_MPPPPZZ`

Field	*Format*	*Description*	*Range*	*Units*
01	"**:**"	start of packet character	":"	3A Hex
02	"R"	remote heave identifier	"R"	52 Hex
03	Mhhhh	remote heave	–99 to +99 m	1 cm
04	_	space character	" "	20 Hex
05	MHHHH	**heave**	–99 to +99 m	0.01 m
06	Q	status flag	"u,U,g,G,H,f,F", "?", " "	*see note*
07	MRRRR	**roll**	–99 to +99 °	0.01 °
08	_	space character	" "	20 Hex
09	MPPPP	**pitch**	–99 to +99 °	0.01 °
10	ZZ	termination characters	<CR><LF>	0D Hex 0A Hex

Signs. M is space if positive or minus if negative. ***Heave.*** Positive heave is above datum (upwards). ***Roll.*** Positive roll is port-side up, starboard down. ***Pitch.*** Positive pitch is bow up, stern down.

Status. "U","G","H","F" indicate a settled condition; "u","g","h","f" are given during the 3 minutes settling period. "U" is unaided mode,"G" is GPS aided mode, "H" is heading aided mode, "F" is full aided mode. For TSS 320 messages, the status field is used to indicate heave quality control: space = OK, "?" = FAIL.

Format Examples

```
:003D50  0000  1482  0085
:003D4E  0000 -1490  0065
:003D51 -0005 -0037  0074
```

Decoding Notes

Accelerations and remote heave data (fields 2 and 3 in both formats) are not decoded by the *QINSy* driver.

The status or heave reliability field value is used to set the quality indicator. Quality +1 means reliable data. If a "?" is encountered at position 14, then the quality of the heave observation is set to –1. If the status field contains a "u","g","h" or "f" (small caps), then the quality indicators of heave, pitch and roll are set to –1.

Drivers.io Options

Command line parameters "320" and "DMS" indicate TSS unit types, but make no difference. "OCTANS" indicates a reversed heave value input; the driver will correct for this (!). "OI" indicates that the timetags are obtained from preceding "OiSTAR" headers, if available. Otherwise the first incoming byte is timetagged.

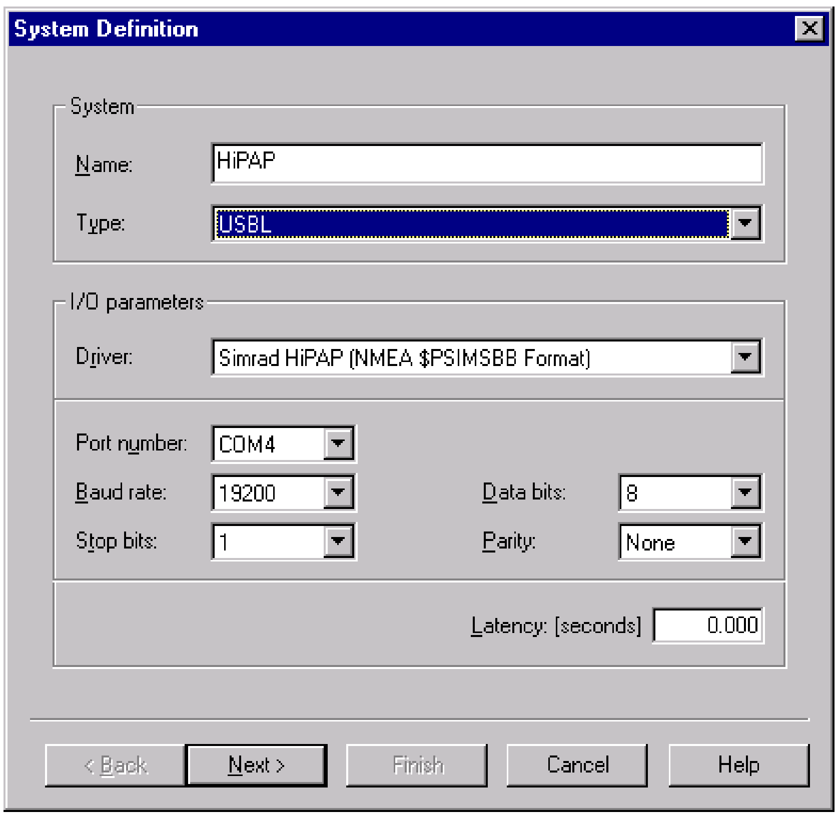
Database Setup

See description under "PITCH ROLL AND HEAVE SENSOR DRIVERS".

3.5 USBL SYSTEM DRIVERS

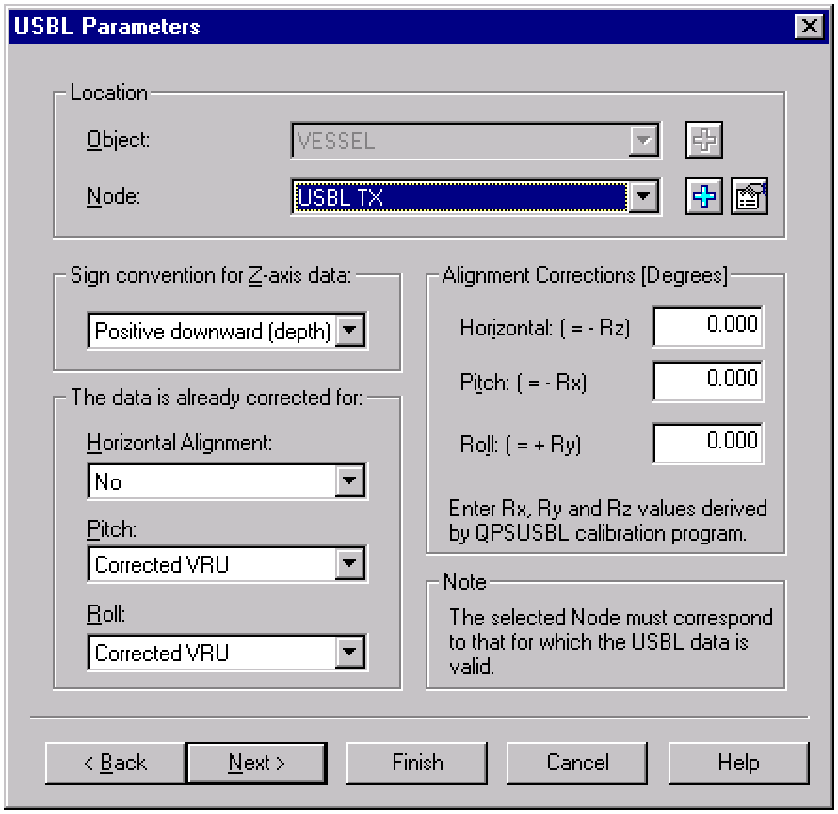
Database Setup

First define and select the “Object” on which the USBL transducer is located and the “Object” on which the USBL transponders are located. Select the item “Systems” under the object with the USBL transducer and define a new system of type “USBL”. Select the appropriate driver and interface parameters. Press “Next” button to continue the setup. There is no need to define the three ***X, Y and Z*** observations separately, since they are automatically added and connected to the system. Select the node for which the USBL observations are valid, i.e. transducer node if USBL data is not corrected for vessel reference point and the reference node if the data are corrected before output, and enter the various conventions and corrections. Press “Next” button again to define various administrative definitions. Press “Next” button and add all available USBL targets. The slot number depends on the used transponder or responder. Finally, press “Finish” to save system.



Database Setup (continued)

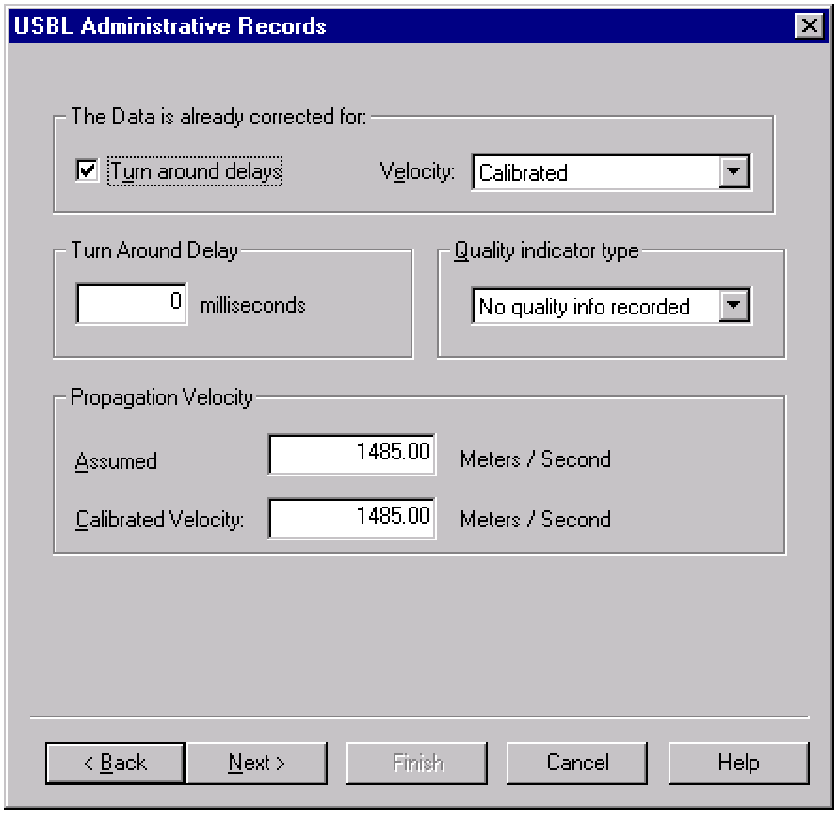
A new transducer node can be added by pressing the  button; to change its properties, press  button.



Press "Help" or refer to the *QINSy* Knowledge Base to find detailed information on the corrections that are defined on the "USBL Parameters" page, especially section "USBL Clarification Of USBL Configuration".

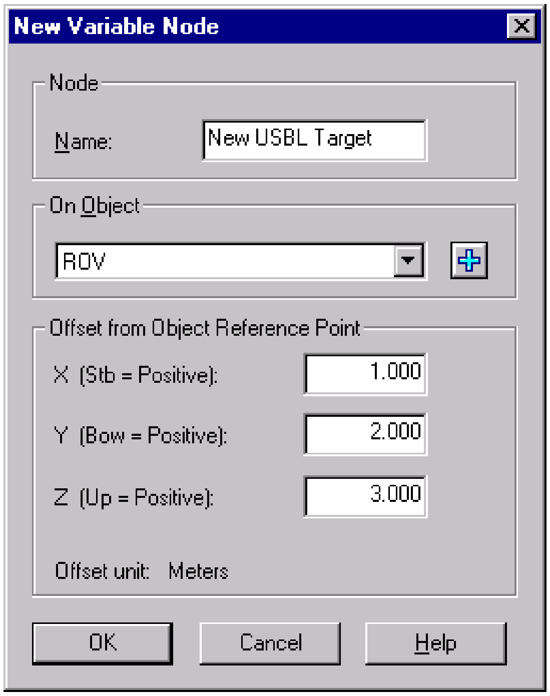
Database Setup (continued)

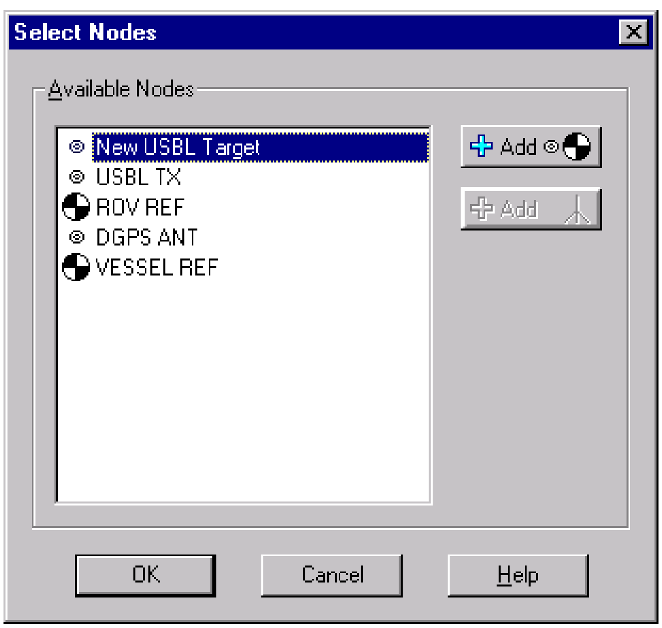
Selections you make on this page are for administrative purposes only, and are not actively used by *QINSy*.



Database Setup (continued)

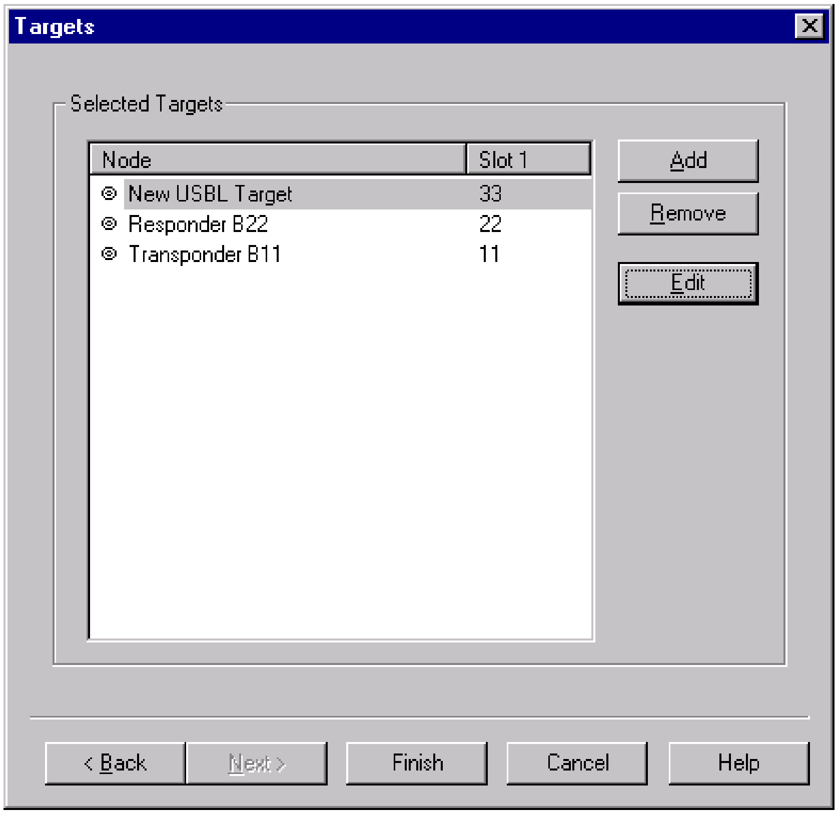
A USBL target can be added by pressing the “Add” and  buttons. First, enter all transponders and responders. Then select a target from the list of available nodes and press “OK” to add the new target.





Database Setup (continued)

The slot number depends on the used transponder or responder. See USBL driver description for details.



See for more information the *QINSy* DB Setup Help Topics or the *QINSy* Knowledge Base.

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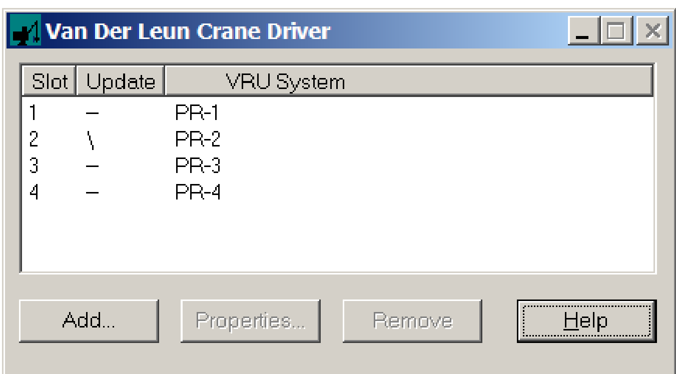
3.5.1 Crane Tool VanDerLeun (QATT/QXYZ) (dX dY dZ)

Input / Output:	Input with User Interface	*Driver class type:*	Terminated <LF>
Executable name:	DrvCraneVanDerLeun.exe	*Drivers.io options:*	None
Last modified:	2004-March-29		

Driver Description

The Crane Tool VanDerLeun Driver decodes #QATT, #QXYZ and / or #QD messages from the Van Der Leun dredging computer that is mounted o/b cranes used for dredging. The dredging computer will deliver relative position, attitude and heading of one or more boom segments and the grab. *QINSy* will decode the position information as USBL, so it is not a real USBL system. The driver has got a user-interface for assign the VRU systems to the slot information, this is not supported in DbSetup for these systems.

The driver can decode three types of strings, the #QATT for heading and attitude, the #QXYZ for USBL and the #QD for the draught ("inzinking"). All strings contain a slot number. For the heading, USBL and Draught system you should enter a slot number in DbSetup. For the Attitude (VRU) system you should assign the slotnumber to a VRU system with the User interface. The relationships VRU system – slot number will be stored in the registry and are automatically retrieved when the driver starts. If the VRU system is not selected in the User Interface then it will not decode any VRU data!



Format Description

#QATT:

Field	*Format*	*Description*	*Values, Range, Units*
01	#QATT	Message type identifier	"#QATT"
02	x	Slot Identifier	1..255
03	x	Relative Slot Identifier	0..255
04	x.x	Pitch	
05	"T"	Pitch mode	T=True, E=Error
06	"U"	Pitch sign	U= + bow up, D= + bow down
07	x.x	Roll	
08	"T"	Roll mode	T=True, E=Error
09	"S"	Roll sign	S= + healing Stb, P= + healing Prt
10	x.x	Heading	
11	"R"	Heading mode	T=True, R=Relative to field 03, E=Error
12	"D"	Pitch, Roll, Heading Unit	D=Deg, G=Grad, R=Rad

13	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Note: Fields are delimited by a comma separator.
Example:

```
#QATT,1,0,0.23,T,U,0.2,T,S,272.1,T,D<CR><LF>
#QATT,2,1,-0.12,T,U,1.02,T,S,10.32,R,D<CR><LF>
```

When the pitch / roll sensor fails following string will be the output;

```
#QATT,2,1,-0.12,E,U,1.02,E,S,10.32,R,D<CR><LF>
```

Or:

```
#QATT,2,1,,E,U,,E,S,10.32,R,D<CR><LF>
```

```
#QXYZ:
```

Field	***Format***	***Description***	***Values, Range, Units***
01	#QXYZ	Message type identifier	"#QXYZ"
02	x	Slot Identifier	0..255
04	x.x	X	+ to starboard
05	x.x	Y	+ to bow
06	x.x	Z	+ to sky
07	"T"	XYZ mode	T=True
08	M	Unit	M=Meter, E=Error
13	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Note: Fields are delimited by a comma separator.
Example:

```
#QXYZ,3,12.3,-50.2,-6,T,M<CR><LF>
```

```
#QD:
```

Field	***Format***	***Description***	***Values, Range, Units***
01	#QD	Message type identifier	"#QD"
02	x	Slot Identifier	0..255
04	x.x	D	- to sky
05	"T"	XYZ mode	T=True
06	M	Unit	M=Meter, E=Error
07	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Note: Fields are delimited by a comma separator.
Example:

```
#QD,1,1.3,T,M<CR><LF>
```

Full Example:

```
#QATT,1,0,0.23,T,U,1.02,T,S,,T,D<CR><LF>
#QATT,2,1,-30.24,T,U,1.02,T,S,0,R,D<CR><LF>
#QATT,3,2,-81.32,T,U,1.02,T,S,0,R,D<CR><LF>
#QATT,4,3,0,T,U,0,T,S,10.32,R,D<CR><LF>
```

Decoding Notes

#QATT messages contain a parent slot id. This slot id may be used for relative heading mode. Heading can be relative or absolute. If relative, the heading is computed by adding the parent's heading to the decoded heading. If pitch/roll/heading error flag is set (character ‘E’) then Quality indicators will be set to –1 else Quality indicator is set to +1.

Driver does not convert units or conventions. You should use the unit/convention settings in DbSetup.

Database Setup

See description under “USBL SYSTEM DRIVERS”.

All Slot Numbers should be numerical!

-Add a “Gyro” system, and select this driver. Select same COM port as the USBL system. Select appropriate slot number and units.

- Add a “Pitch Roll and Heave” system, and select this driver. Select same com port as the USBL system. Select appropriate convention.
Note: Slot numbers can not be entered here, do this when controller is started with the U/I of the driver.

Add an “Underwater Sensor” system to decode the draught value from the #QD message, and select the “Depth – Crane ToolVanderLeun (QD)” driver. Add a ROV Depth observation and define its slot number. The unit must be meters.

Choose for all these systems the same COM port and baudrate, this way all systems will be supported by one driver program.

Drivers.io Options

None

3.5.2 CutterSuction Tool VanDerLeun (dX dY dZ)

Input / Output:	Input with User Interface	*Driver class type:*	Terminated <CR>
Executable name:	DrvCutterAnalogUI.exe	Drivers.io options:	*format* | *trigger*
Last modified:	2000-Jan-31		

Driver Description

The CutterSuction Tool driver calculates a relative X, Y, and Z between two objects, a vessel (or ROV) and a CutterSuction head. It is not a real USBL system, but actually a pseudo USBL system. It receives via an A/D converter vertical and/or horizontal angles. The driver has got a user-interface to enter the range between the from object node and the to object node, (C-O) values, input units (and limits) and angle computation mode. The driver will use the slant range and the two angles to calculate the pseudo USBL dX, dY and dZ values.

Presently, only the VanDerLeun format is supported (Installatiebouw Van Der Leun, Sliedrecht, Nederland). The VanDerLeun A/D converter sends four ASCII strings, containing vessel depth or draft ("inzinking"), vertical angle ("hoek ladder"), and two dummy strings which can be used for future driver extensions.

Format Description

The ***VanDerLeun format*** data strings contain 11 bytes, including <CR>, and start with an identifier.

```
A 0 0 ± 0 0 0 . 0 0 <CR>
0 1 2 3 4 5 6 7 8 9  10
```

A 0 1 = vessel draft "inzinking"
A 0 2 = vertical angle "hoekladder"
A 0 3 = reserved for future extension
A 0 4 = reserved for future extension

If a sensor signal is not active, the input data will contain the string "NO_SIGN", where '_' denotes a space.

Decoding Notes

The values that are obtained from the input data strings, as well as the values used to compute the dX, dY, dZ values and the computed dX, dY, dZ values are shown in the driver window. When a value does not update, for example a depth reading "NO SIGN", then the box is empty. In this case, the old input value is retained, but the quality indicator of the observation is set to –1, as can be seen in an Observation Physics Display.

Database Setup

See description under "USBL SYSTEM DRIVERS".

To compute ***dX, dY and dZ*** observations, create an new object, e.g. "Suction Head"; this will automatically add a reference node, which will be the "USBL target transponder". Subsequently, add a "USBL" system, select the driver "CutterSuction Tool *format* (dX, dY, dZ)", and set the appropriate serial RS232 parameters. On the USBL Parameters tabsheet, the Location should be the node at which the angles are measured. Set the Sign convention for Z-axis data to positive downward if vertical angles are measured positive downward. Set all alignments to "No". Set the Alignment corrections to 0, if input data limits are to be defined in the driver. Skip the Administrative Records tabsheet. On the Targets tabsheet, select the suction head reference node.

(continued on next page)

Database Setup (continued)

In order to decode (also) the ***depth*** measurement, add a system of type “Surface navigation system” to the object on which the depth sensor is located. Select the "Depth - CutterSuction Tool *VanderLeun*" driver and interface parameters as with the USBL system. Press the “Next” button to continue the setup. Select the object and press the “Add” button to add an observation of type “ROV depth” to the system. Define a new “At Node” if necessary. Press “OK” to save the observation. Press “Next” button, select depth observation and enter the appropriate unit. “Apply Properties to Observation” and “Finish” the system setup. See the description under “UNDERWATER SENSOR DRIVERS” for more information on this type of system.

Controller Setup

First time online, restore the “Cutter Tool Driver” window, visible on the Windows NT taskbar, and press “Settings…” button to define the driver’s decoding and computation properties. Be sure to define ranges and equivalents for “Angle Limits” and/or “Depth Limits” if input data value units are volts or (milli)amperes.

Be sure to add the Cutter Tool USBL system to an computation in order to position the suction head node(s).

The depth observation can be used in the Controller “Height” settings dialog as “ROV” depth, to compute relative heights with respect to the water level. A vertical height difference between this water level and the survey datum should be entered as geoidal separation or tide value. See *QINSy* Help for more information.

Drivers.io Options

Command line parameters in “drivers.io” file are used to indicate the format, e.g. “VDL” for VanDerLeun format, and data string to trigger a driver update, e.g. “A02” to compute and send USBL data to *QINSy*.

3.5.3 Dredging Tool (dX dY dZ)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvDredgingTool.exe	*Drivers.io options:*	OI
Last modified:	1998-Jul-15		

Driver Description

The Dredging Tool Driver calculates a relative X, Y, and Z between the ROV and a Dredge Head. It is not a real USBL system, but actually a pseudo USBL system. It receives via an A/D converter a horizontal and a vertical angle. The driver has got a user-interface, so online a range (between the ROV and the dredge head) can be entered. The driver will use this range and the two angles to calculate the dX, dY and dZ.

The driver receives an ASCII datastring, containing four values, each one representing a channel. The user may define in the driver which channel provides the horizontal and which channel the vertical angle. The unit of this incoming data can be defined: degrees or radians (default). The user may enter an (C-O) value for each angle, which will be applied to the observation. The entered value should always be in degrees.

The definitions of the angles and range are as follows:

- The range must be the slant range.
- The horizontal angle is the gyro angle relative to the ROV heading. Zero degrees being in the direction of the heading of the ROV. A positive angle (clockwise to the right) will result in a positive dX.
- The vertical angle is the pitch angle of the dredging pipe. Zero degrees being horizontal, positive angle being downwards, resulting in a positive dZ.

Format Description

```
SD.DDD SD.DDD SD.DDD SD.DDD<CR><LF>
```

S is + or - ; D is digit from 0..9 ; <CR><LF> is carriage return and linefeed

Format Example

```
-0.015 -0.015 -0.015 -0.005
-0.005 -0.005 -0.015 -0.015
```

Database Setup

See description under “USBL SYSTEM DRIVERS”.

To decode the ***X, Y and Z*** observations, create an new object, e.g. "Dredging Head"; this will automatically add a reference node, which will be our "transponder". Do not enter a shape, since its rotation is not defined.

Add a “USBL” system, and select driver "Dredging Tool (dX, dY, dZ)". There is no need to define the three observation separately, since they are automatically added and connected to the system. On the Parameters tabsheet, set the Sign convention for Z-axis data to positive downward and the three alignments should be set to "No". The vessel location should the ROV object. If you do not enable the reduction to ship's reference point, you must select a node, located on the ROV object, on the Corrections tabsheet. The calculated X/Y/Z will be relative between this node and the "transponder". So define this transponder on the Targets tabsheet: Add a node from the Dredging Head object as a transponder. There is no need to set a slot number.

3.5.4 IHC Dredge Monitoring ($PIHC)

Input / Output:	Input	*Driver class type:*	*U/I* Term. <CR>
Executable name:	DrvDredgeMonitoring.exe	*Drivers.io options:*	IHC | NV | IX | IY
Last modified:	2004-Jan-07		

Driver Description

Driver to decode the suction head position (X, Y and Z) from the IHC Dredge Monitoring message as USBL values. This driver can also compute the Tons Dry Solid (TDS) figure representing the load of the dredger using the generally accepted "Rijkswaterstaat" of the Netherlands - TDS formula. Therefore it requires the hopper volume and current displacement from the IHC String as well as some user-defined fields. The user must define a KP versus water density / solid density table and the empty hopper displacement.

The following fields are decoded: X,Y,Z zuigkop and status baggeren (8,9,10,3) for USBL and displacement (11) and hopper volume (20) for TDS calculation.

Format Description

The ASCII telegram format is given in the following table. All items are comma separated. String is terminated by carriage return and linefeed..

Nr.	Veld	Waarde	Eenheid	min	max	Opmerking
1	header	$PIHC				
2	hoppernaam	Mellina				
3	**status: baggeren**	**0/1**	**integer**	**0**	**1**	**Normaal gesproken wordt de status als 1 waarde weergegeven**
4	status: vol varen	0/1	integer	0	1	leegvaren=1; baggeren=2; vol varen=3; dumpen=4
5	status: dumping	0/1	integer		0	1 wal persen=5; onbekend=6/0
6	status: wal persen	0/1	integer	0	1	
7	status: leeg varen	0/1	integer	0	1	
8	**X-positie zuigkop**		**m**	**0**	**99.99**	**tov inlaat**
9	**Y-positie zuigkop**		**m**	**0**	**99.99**	**tov inlaat**
10	**Z- zuigkop**		**m**	**0**	**-99.99**	**tov waterlijn**
11	displacement (waterverplaatsing)		ton	0	9999	waterverplaatsing schip
12	diepgang voor		m	0	99.99	
13	diepgang achter		m		0	99.99
14	hopper level 1		m	0	99.99	vulhoogte hopper
15	hopper level 2		m	0	99.99	vulhoogte hopper
16	hopper level 3		m	0	99.99	vulhoogte hopper
17	hopper level 4		m	0	99.99	vulhoogte hopper
18	hopper level 5		m	0	99.99	vulhoogte hopper
19	hopper level 6		m	0	99.99	vulhoogte hopper
20	hopper volume		cubm	0	9999	mengsel volume in hopper
21	density		ton/cubm.	0	1.99	dichtheid mengsel in zuigpijp
22	velocity		m/sec	0	9.99	snelheid mengsel in zuigpijp
23	pressure before dredgepump		bar	0	9.99	vacuum bij zuigkop
24	pressure after dredgepump		bar	0	19.99	pompdruk
25	PMO status	0/1	integer	0	1	status van 'arm mengsel over boord' klep (open dicht)
26	ballast volume		cubm	0	9999	inhoud van ballasttank
	CR / LF					

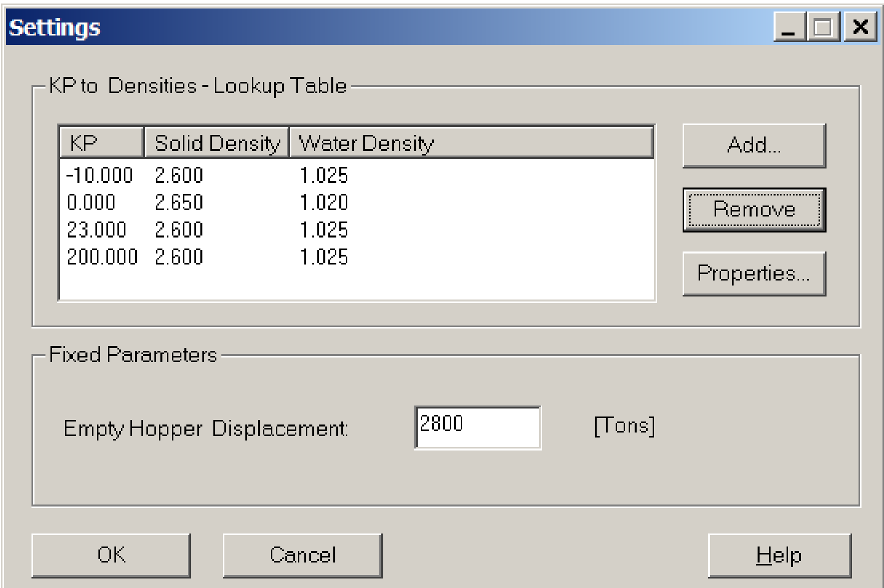
Format Example

```
$PIHC,Mellina,1,0,0,0,0,15,30,-10,5000,1.3,1.7,5.1,5.2,5.3,5.4,5.5,5.6,5000,1.5,1.3,0,15,0,150
$PIHC,Mellina,1,0,0,0,0,16,31,-11,5000,1.3,1.7,5.1,5.2,5.3,5.4,5.5,5.6,5000,1.5,1.3,0,15,0,150
```

```
$PIHC,Mellina,1,0,0,0,0,17,32,-12,5000,1.3,1.7,5.1,5.2,5.3,5.4,5.5,5.6,5000,1.5,1.3,0,15,0,15
```

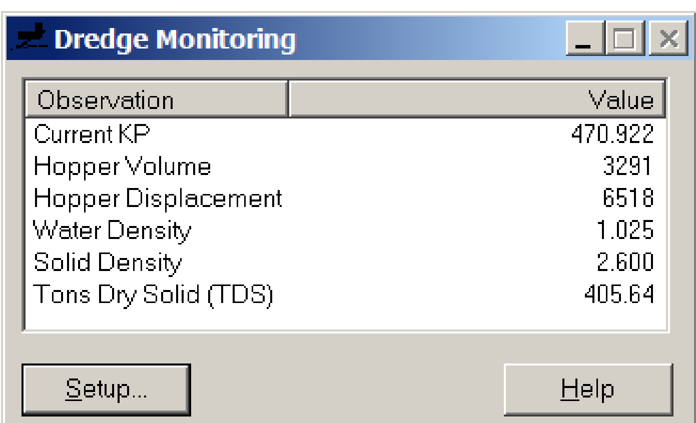
Driver Setup

The user must enter a KP versus Water and solid density table and the empty displacement of the hopper. Press the “Setup” button on the driver’s window. This will show the Setup dialog as shown below:



The driver will select/interpolate the appropriate densities from this table. It uses the KP value of the steered node with respect to the currently selected mainline as the input value. If the table is empty then the TDS calculation is not performed. The Table is stored in the registry of the PC. These values will be automatically retrieved on start-up of the driver.

Main window Explanation:



If driver is properly Setup and the positioning is valid then the figures as shown in the picture above will be refreshed whenever a new string arrives from the IHC dredging computer.

Explanation of fields in main window:

Current KP	Shows calculated KP of steered node with respect to mainline
Hopper volume	Current volume of load in hopper (from IHC)
Hopper displacement	Current hopper displacement (from IHC)
Water Density	Density used for TDS calculation, derived from current KP and user-defined table
Solid Density	Density used for TDS calculation, derived from current KP and user-defined table
Tons Dry Solid(TDS)	Calculated TDS

Database Setup

See description under "USBL SYSTEM DRIVERS".

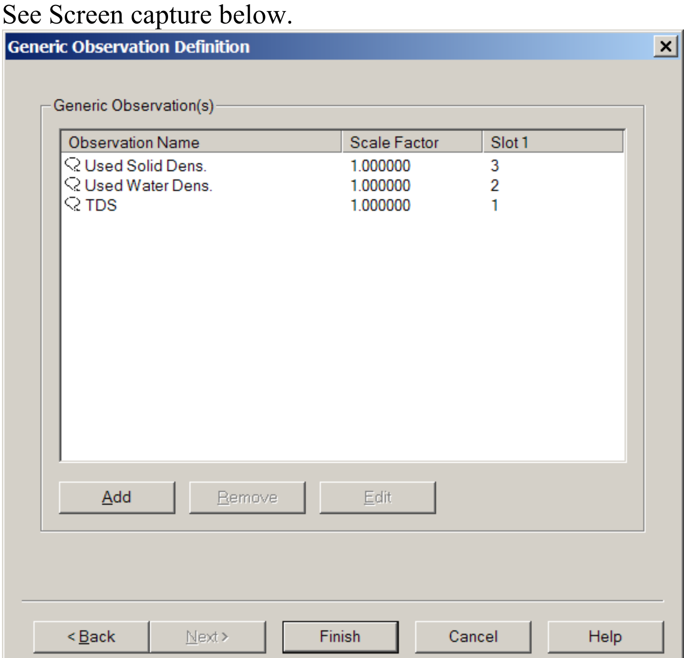
It is important that if the TDS calculation is required that the "Miscellaneous System" :
"IHC Dredge Monitoring TDS ($PIHC)" is selected with the same port parameters as the USBL system.

For correct decoding you should select the following slot numbers:

Slot Nr:	***Observation***
1	*TDS*
2	*Water Density*
3	*Solid Density*

[Keep all scale factors to 1.0]

See Screen capture below.



If slot numbers are not assigned correctly then observations are not decoded and hence are not stored in the database correctly.

Drivers.io Options

NV When this command line parameter is used, no validation will be done on the decoded data, otherwise a check will be performed whether the decoded data is within the given min/max range.

IX When this command line parameter is used, the sign of the decoded X-value will be inverted.

IY When this command line parameter is used, the sign of the decoded Y-value will be inverted. Might be useful, because *QINSy* expects an XYZ value in the ship's co-ordinate frame, i.e. positive X to starboard and positive Y to bow.

3.5.5 iXSea GAPS ($PTSAX Message)

3.5.6 iXSea GAPS ($PTSAX Message) (With UTC)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvIxseaGaps.exe	*Drivers.io options:*	*PPS*
Last modified:	2004-March-18		

Driver Description

Driver to decode the absolute or relative positioning message from an iXSea GAPS (Global Acoustic Positioning System), a fully integrated (INS and GPS) portable USBL system.
This section will describe how to decode the relative positioning message. To decode the absolute positioning message, see the driver description under chapter POSITION NAVIGATION SYSTEM DRIVERS.

Format Description - GAPS Positioning Messages

<u>Relative Positioning Message</u>

The position indicated in this message is relative to the GAPS antenna.

Message	$PTSAX,#NNNNN, hhmmss.sss,jj,mm,aaaa, T,XXXXX.X, YYYYY.Y,V,DDDD.D,1, DDDD.D *CK	
Wording	Relative coordinates and depth	
Field 0	$PTSAX	
Field 1	Frame number	
Field 2	Hour	hour, minute, second, milliseconds
Field 3	Day	0 to 31
Field 4	Month	1 to 12
Field 5	Year	
Field 6	Transponder #	0 : Ship 1 to 128 : Transponder # -1 to –127 : Unexpected reply
Field 7	X coordinates	In meters
Field 8	Y coordinates	In meters
Field 9	Position validity	F : valid, O : not valid
Field 10	Calculated Depth	In meters
Field 11	Depth validity	1 (always)
Field 12	Sensor depth	In meters

-Position validity: for compatibility with Posidonia systems, "F" stands for "valid".

-Sensor depth: if the Acoustic Transponder has no sensor, the value transmitted is 9999.9.

Format Example

```
$PTSAG,#08191,180814.510,10,10,2003,0,4336.3830,N,00719.2940,E,F,0000,0,0000*2B
$PTSAG,#08192,180814.510,10,10,2003,3,4336.5239,N,00718.7622,E,F,1227.9,1,9999.9*26
$PTSAX,#08193,180814.510,10,10,2003,3,-641.5,416.0,F,1227.9,1,1227.9*2D
$PTSAG,#08194,180819.541,10,10,2003,0,4336.3790,N,00719.2980,E,F,0000,0,0000*2E
$PTSAG,#08195,180819.541,10,10,2003,3,4336.5236,N,00718.7620,E,F,1228.0,1,9999.9*23
$PTSAX,#08196,180819.541,10,10,2003,3,-624.5,452.8,F,1228.0,1,1227.9*2C
$PTSAG,#08197,180824.570,10,10,2003,0,4336.3750,N,00719.3010,E,F,0000,0,0000*C2
$PTSAG,#08198,180824.570,10,10,2003,3,4336.5129,N,00718.7934,E,F,1256.8,1,9999.9*24
```

Decoding Notes

- Date and time from the message may be decoded, but only if you are sure that this is UTC time AND that *QINSy* also uses PPS. In that case you have to select the driver with the “With UTC”-option. Otherwise the data will be timestamped when it is received at the I/O port.
- Data is only accepted when the Position Validity (field 9) indicates a ‘F’.
- The Frame number (field 1), the Depth Validity (field 11) and the Sensor depth (field 12) are not decoded.

Interfacing Notes

No specific interfacing or configuring recommendations. See Chapter 1 for general interfacing remarks. The driver does not send any commands to the GAPS.

Database Setup

See also description under “USBL SYSTEM DRIVERS”.
Add an USBL System in your template and select the driver “iXSea GAPS ($PTSAX Message)”
Important: The slot numbers on the USBL Targets wizard page must be the actual Transponder # (1 to 128).

3.5.7 Nautronics ATS (ASCII)

3.5.8 Nautronics ATS (ASCII) (UTC)

Input / Output:	Input	*Driver class type:*	Terminated <CR>
Executable name:	DrvNautronicsASCII.exe	*Drivers.io options:*	PPS
Last modified:	2002-July-17		

Driver Description

Driver for Nautronics ATS ASCII Format and to be used to decode USBL X, Y and Z data, relative between USBL Transducer and Res/Transponder.

Format Description

The ASCII telegram format is given in the following table. All items are space separated. String is terminated by carriage return only (no linefeed)

```
dd Mmm yyyy hh:mm:ss B:n X:x.x Y:y.y D:d.d P:p.p: R:r.r H: E:e<CR>
```

Dd Mmm yyyy	Date
Hh:mm:ss	Time of reception (May be synchronized with UTC)
B:n	Transponder code (e.g. B:1 or B:12)
X:	X-Co-ordinate
Y:	Y-Co-ordinate
D:	Depth
P:	Pitch
R:	Roll
H:	Heading
E:	Error code

Format Example

```
20 Jun 1999 23:52:14:643 B:1 E:0 X:12.9     Y:0.7      D:2.2    H:0.0   P:2.1   R:1.0
20 Jun 1999 23:52:14:693 B:2 E:-128
20 Jun 1999 23:52:30:075 B:1 E:0 X:13.4     Y:0.6      D:1.3    H:0.0   P:2.1   R:1.1
20 Jun 1999 23:52:36:163 B:1 E:0 X:13.0     Y:0.7      D:1.1    H:0.0   P:2.1   R:1.0

30 Jun 02 14:32:15 B:1 X:0.1 Y:0.0 D:100.0 P:0.0 R:0.0 H:0.0 E:1
30 Jun 02 14:32:17 B:1 X:0.0 Y:0.0 D:100.0 P:0.0 R:0.0 H:0.0 E:1
30 Jun 02 14:32:19 B:1 X:-0.1 Y:-0.0 D:100.0 P:0.0 R:0.0 H:0.0 E:1
```

Database Setup

See description under “USBL SYSTEM DRIVERS”.

Slot numbers depend on the used transponder or responder (beacon). Note that the first two characters of the transponder identifier (‘B:’) must *not* be entered in the slot id, just the number following the ‘B:’.

Drivers.io Options

PPS Instead of using I/O time, use time from datastring (Only when the system is PPS synchronised)

3.5.9 Seatec SmartWire

Input / Output:	Input	*Driver class type:*	Counted
Executable name:	DrvSeatecSmartwire.exe	*Drivers.io options:*	*none*
Last modified:	1998-Jul-01		

3.5.10 Simrad HiPAP (NMEA Format)

Input / Output:	Input	*Driver class type:*	Terminated
Executable name:	DrvSimradHiPAP.exe	*Drivers.io options:*	NMEA | V | PPS |NOCS | 400
Last modified:	2002-May-29		

Driver Description

Driver for Simrad HiPAP (High Performance Accoustic Positioning) NMEA Format and to be used to decode USBL X, Y and Z data, relative between HiPAP Transducer and Transponder.

Format Description

The NMEA Simrad HiPAP transponder telegram format is given in the following table.

```
$PSIMSSB,hhmmss,Btp,qqq,errcode,c,o,f,x.xx,y.yy,z.zz,a.aa,i,,*cc<CRLF>
```

$PSIMSSB	Start character and header
Hhmmss	Time of reception (can be empty) (likely to be that it is not UTC)
Btp	Transponder code (e.g. B01 or B33)
Qqq	Quality (A=ok, or V=not ok)
Errcode	Error code (three characters or empty)
C	Coordinate system (C=Cartesian, P=Polar)
O	Orientation (H=head up (X/Y), N=north (N/E), E=east (E/N))
F	SW filter (M=measured (no filter), F=filter, P=predicted)
x.xx	X-co-ordinate
y.yy	Y-co-ordinate
z.zz	Depth
a.aa	Expected accuracy (some kind of sd) Should be low
I	Additional Info (N=none)
,,	Empty fields, used for add.values, depends on different transponders
*cc	Checksum (not always present)

Format Example

```
$PSIMSSB,060836,B48,A,,C,E,M,-4.12,-3.45,11.62,0.02,N,,*77
$PSIMSSB,060838,B48,A,,C,E,M,-4.11,-3.44,11.61,0.02,N,,*78
```

Database Setup

See description under “USBL SYSTEM DRIVERS”.

Slot numbers depend on the used HiPAP transponder or responder. Note that the first character of the transponder identifier (‘B’ or ‘b’) must *not* be entered in the slot id, just the number following the ‘B’.

Drivers.io Options

NMEA	NMEA Mode (see below)
400	400 Mode (see below)
PPS	Instead of using I/O time, use time from datastring (Hipap is PPS synchronised)
V	Validate HiPap data
NOCS	Ignore Checksum (only for NMEA messages)

3.5.11 Simrad HiPAP (400 Format)

Input / Output:	Input	*Driver class type:*	Terminated 0xAA
Executable name:	DrvSimradHiPAP.exe	*Drivers.io options:*	400
Last modified:	2000-Aug-03		

Driver Description

Driver for Simrad HiPAP (High Performance Acoustic Positioning) 400 Format and to be used to decode USBL X, Y and Z data, relative between HiPAP Transducer and Transponder, and heading information.

Format Description

The binary Simrad HiPAP/HPR general telegram format (length 8+N bytes) is given in the following table.

Byte	*Type*	*Description*
0	BYTE	Start character 0x55 Hex
1-2	WORD_16	Block length N
3	BYTE	Message type
4	BYTE	Destination
5	BYTE * N	Data block
N+5	WORD_16	Sumcheck
N+7	BYTE	Stop character 0xAA Hex

The binary Simrad transponder telegram format (length 58 or 62 bytes) is given in the following table.

Byte	*Type*	*Description*
0-1	WORD_16	Transponder index
2	BYTE	Operation mode
3	BYTE	Sync mode
4	BYTE	Transponder type
5	BYTE	Transponder operation
6	BYTE	Pos data form
7	BYTE	Reply status
8-11	REAL	Filt X pos
12-15	REAL	Filt Y pos
16-19	REAL	Filt Z pos
20-23	REAL	X pos
24-27	REAL	Y pos
28-31	REAL	Z pos
32-35	REAL	Slant range
36-39	REAL	Vessel course
40-43	REAL	Vessel roll
44-47	REAL	Vessel pitch
48	BYTE	Transducer beam
49	BYTE	Transducer type
50-51	WORD_16	Transducer number
52-53	WORD_16	Diagnostic
54-57	REAL	Standard deviation
58-61	REAL	Instrument data

Format Description (continued)

Note 1. The start character and the stop character are not unique and may occur as data within the telegrams.
Note 2. The sumcheck value is the 16 bit sum (byte+byte addition) of all bytes preceding the sumcheck itself.
Note 3. The length of a transponder position telegram is only 62 bytes when the instrument data field is used.

Format Example

```
55 3a 00 01 00 94 00 01 00 00 00 00 00 fc
e4 c9 42 72 46 6e c2 47 cd 80 40 bb ed c9
42 25 85 6e c2 c2 cc 8c 40 80 5b e8 42 00
00 00 00 00 00 00 00 00 00 00 00 01 01 02
00 00 00 58 5c 00 40 b0 11 aa
```

```
The data block of the telegram decoded:

 TpOmSmTtToPfSt    X       Y      Z
148 1 0 0 0 0 0  100.95  -59.57   4.03
                 100.96  -59.63   4.40
Rang Crs Roll Pitc TbTtT#Diag Std
 116 0.0 0.00 0.00  1 1 2  0  2.01
```

Decoding Notes

The *QINSy* driver first checks if the reply status is 0 before it continues decoding the USBL data. The driver decodes the filtered x,y,z position coordinates of the transponder (distance from reference point in meters).

Database Setup

See description under "USBL SYSTEM DRIVERS".

Slot numbers depend on the used HiPAP transponder or responder. Be sure to remove the 'B' and to add 100 to the transponder number. So if the transponder identifier is 'B48' the *QINSy* slot number becomes '148'.

To decode the ***heading***, add a "System" of type "Gyro", select the driver, and define the heading parameters. To decode all four observations (USBL X/Y/Z and gyro heading), add both these system types to the *QINSy* database and make sure to select the same driver name and the same I/O parameters for both systems.

3.5.12 Simrad HPR300 (ASCII)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvSimradHiPAP.exe	*Drivers.io options:*	HPR300
Last modified:	2000-Nov-16		

Driver Description

Driver for Simrad Hydroacoustic Position Reference 300 (HPR300) ASCII Format and to be used to decode USBL horizontal range, bearing and depth data, relative between HPR Transducer and Transponder. Driver can also decode the heading information.

System Configuration

For successful interfacing, the HPR300 system should be setup as follows:

- Turn Print Mode On
- Set Position Coordinates to Polar in the Position, Angle, Print Menu
- Set Orientation to Vessel

Format Description

The HPR300 systems transmits the following ASCII telegram for each measured position:

AA•B••C••DDD•EEEE.E•FFFF.F•GGGG.G•HHHH.H•III.I••JJJ•KKKK.K•LLLL.L<CR/LF>

Description of data:

Field	Description	Range (if applicable)
•	Space (ASCII 20h)	
AA	***Transponder code***	11 - 55, 1 – 9
B	Transducer number	1 or 2
C	Beam used	W = wide beam, M = medium beam, N = narrow beam
DDD	***Reply status***	OK or ok = reply ok, NRY = no reply, MRY = missing reply, REJ = reply rejected
EEEE.E	***Vessel heading***	0-359.9
FFFF.F	***Horizontal Range***	
GGGG.G	***Bearing***	
HHHH.H	***Depth***	
III.I	***Position quality based on the 4 last positions (in meters)***	If NRY or REJ occurs the quality = quality * 3.
JJJ	Riser Angle status	OK = reply ok,NRY = no reply, MRY = missing reply, REJ = reply rejected [optional]
KKKK.K	Riser X-angle or tilt with sign	[optional]
LLLL.L	Riser Y-angle or azimuth with sign	[optional]
<CR/LF>	Termination Characters	

- THE FIELDS ARE FILLED UP WITH SPACES TO ALIGN THE COLUMNS.

- [optional] : Only some limited edition HPR300's do output these fields, these fields have no influence on the position calculation, therefor these fields shall, if present, be ignored by *QINSy*.

Format Example

```
11 1  W  OK   330.0  147.1  247.3  213.0   6.4
22 1  W  REJ  350.0  557.3  156.5  216.7   2.0
33 1  W  OK    45.0    1.8    2.0  299.7  18.0
11 1  W  REJ   70.0  999.1  299.3  999.0   5.4
22 1  W  OK    72.0  148.3  248.5  216.7   6.0  MRY -168.8  -60.0
33 1  W  OK    74.0   21.8    3.0  299.7  27.0  OK   179.2  250.4
```

Decoding Notes

The *QINSy* driver first checks if the reply status is OK before it continues decoding the USBL data. If reply status does not match OK then USBL data will not be decoded. Heading data however will always be decoded (if defined in Database Setup of course).

Fields B, C, JJ, KKKK.K, LLLL.L are not decoded.
.

Database Setup

See description under "USBL SYSTEM DRIVERS".

HPR Transducer Number in message is ignored. In case of switching over transducers, assign another Node to the HPR system.

Slot numbers must match transponder code (e.g. transponder code = 22,   slot number = 22).

To decode the ***heading***, add a "System" of type "Gyro", select the driver, and define the heading parameters. To decode all four observations (USBL range/bearing/depth and gyro heading), add both these system types to the *QINSy* database and make sure to select the same driver name and the same I/O parameters for both systems.

3.5.13 Simrad Binary HPR

Input / Output:	Input	*Driver class type:*	Terminated '@'
Executable name:	DrvSimradHPR.exe	*Drivers.io options:*	*none*
Last modified:	2000-April-19		

Driver Description

Driver for Simrad Hydroacoustic Position Reference (HPR) Format and to be used to decode USBL X, Y and Z data, relative between HPR Transducer and Transponder. Driver can also decode the heading and Pitch/Roll information.

Format Description

The binary Simrad HPR transponder telegram format is given in the following table.

Item	*Bytes*	*Description*	*Values*
1	00	Head	
2	01 – 02	roll (or x-angle)	
3	03 – 04	pitch (or y-angle)	
4	05 – 06	***course (from gyro)***	
5	07	Transponder index	
6	08 – 10	***x-position or range***	
7	11 – 13	***y-position or bearing***	
8	14 – 16	***z-position or depth***	
9	17	Status	1 = no response
10	18	timeout (received pulses)	
11	19 – 21	Transponders in sequence	
12	22 – 23	tracking transponder angle	
13	24	test (diagnostic errors)	
14	25	Transponder type	
15	26	transponder specification	
16	27	transducer information	
17	28	transducer status	
18	29	standard deviation signal	
19	30	checksum for bytes 00 – 29	
20	31	end of telegram character	'@'

Byte format is 7 bits, 1 start bit, 2 stop bits, , 1 (odd) parity bit. Typical interface settings: 2400, 7, 2, ODD.

Database Setup

See description under "USBL SYSTEM DRIVERS".

Slot numbers depend on the used HiPAP transponder or responder, according to the table on the next page.

To decode the heading, add a "System" of type "Gyro", select the driver, and define the parameters. To decode the pitch and roll, add a "System" of type "Pitch, Roll, Heave", select the driver, and define the parameters. To decode the USBL, add a "System" of type "USBL", select the driver, and define the parameters. To decode all observations (USBL X/Y/Z, Pitch and Roll, and gyro heading), add three system types to the *QINSy* database and make sure to select the same driver name and the same I/O parameters for all systems.

Database Setup (continued)

QINSy	**Simrad HPR**		
Slot Id	Channel	Frequencies	
1 … 9	1 ... 9		
10	11 (square)	21.55	27.19
11	22 (circle)	22.78	28.41
12	33 (triangle)	23.98	29.76
13	44 (X)	25.19	31.25
14	55 (Y)	26.46	32.48
15	Emergency A		
16	Emergency B		

3.5.14 Sonardyne USBL (Surveyors Output)

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvSonardyneLUSBLV6.exe	*Drivers.io options:*	PPS
Last modified:	2000-Jun-15		

Driver Description

This driver will decode LUSBL measurements from the Sonardyne LUSBL unit with firmware version 6. The driver decodes transponder position (computed delta Easting / delta Northing / delta Depth relative to vessel), vessel pitch, vessel roll, vessel bearing and transponder depth. For time-tagging purposes the time from the USBL and Depth strings will be used if the driver option '+ UTC' has been chosen. If the driver without the option '+ UTC' has been chosen, local computer time (or PPS if it is connected to *QINSy*) will be used for time-tagging. If you want to decode transponder position, vessel pitch, vessel roll, vessel bearing and transponder depth, make sure to **select the same driver option** in Db Setup when adding systems of these types (see Database Setup section below).

Format Description

The output format depends on the initialization string send to the LUSBL computer on startup, or when resetting the I/O in *QINSy*. The following strings are sent:
Version 6:
Initialization: `select,1,\rselect,6,3,\r`
USBL: `select,1,index,flag,time,pitch,roll,bearing,quality,east,north,depth\r`
Depth: `select,6,3,Node,RxTime,Depth\r`

Decoding Notes

Flag value is zero in case of bad data, otherwise different than zero.

Interfacing Notes

Type of cable wiring (two-way). Cable wiring diagrams:

DB-25	Sensor		DB-9	COM	DB-25	COM
Pin 2	RXD	-----------------	Pin 3	TXD	Pin 2	TXD
Pin 3	TXD	-----------------	Pin 2	RXD	Pin 3	RXD
Pin 7	SG	-----------------	Pin 5	SG	Pin 7	SG

Database Setup

USBL Setup:
To decode the ***delta Easting, delta Northing and delta Depth*** observations, add a variable node for the USBL transponder. Add a “System” of type “USBL System”, and select the ***Sonardyne USBL (Surveyors Output) driver*** if you want to use local computer time or PPS if it is connected to *QINSy* for time-tagging. Select the ***Sonardyne USBL + UTC (Surveyors Output) driver*** if you want to use the time from the data string for time-tagging. There is no need to define the three observations separately, since they are automatically added and connected to the system. A new transponder node can be added by pressing the button; to change its properties, press the button. **The slot number corresponds to the transponder index, which should be unique**.

USBL Gyro Setup:
To decode the vessel's bearing observation, add a system of type "Gyro's and compasses", and select the ***Sonardyne Hdg (Surveyors Output) driver*** if you want to use local computer time or PPS if it is connected to *QINSy* for time-tagging. Select the ***Sonardyne Hdg + UTC (Surveyors Output) driver*** if you want to use the time from the data string for time-tagging.

USBL VRU Setup:
To decode the vessel's pitch and roll observations, add a system of type "Pitch, roll and heave sensor", and select the ***Sonardyne (P-R) (Surveyors Output) driver*** if you want to use local computer time or PPS if it is connected to *QINSy* for time-tagging. Select the ***Sonardyne (P-R) + UTC (Surveyors Output) driver*** if you want to use the time from the data string for time-tagging. There is no need to define the two observations separately, since they are automatically added and connected to the system.

USBL Depth Setup:
To decode the transponder depth, add a system of type "Surface navigation system", and select the ***Sonardyne Depth (Surveyors Output) driver*** if you want to use local computer time or PPS if it is connected to *QINSy* for time-tagging. Select the ***Sonardyne Depth + UTC (Surveyors Output) driver*** if you want to use the time from the data string for time-tagging. Add an “Observation” of type “ROV depth” to the system. A new transponder node can be added by pressing the button; to change its properties, press the button. **The slot number corresponds to the transponder node index, which should be unique**.

3.5.15 TrackPoint II

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvTrackPoint.exe	*Drivers.io options:*	none
Last modified:	2001-May-15		

Driver Description

Driver for ORE Trackpoint II ASCII Formats and to be used to decode USBL X, Y, Z measurements to a target plus additional measurements such as vessel heading, roll, pitch & warning/error code.

Format Description

The Trackpoint II is capable of outputting the following formats:

- STANDARD 68 bytes
- STANDARD-EC 68 bytes
- STD W/PR 80 bytes
- STD-EC W/PR 80 bytes
- NCSC 75 bytes
- NMEA TTM 53 bytes
- NMEA ORE 74 or 80 bytes
- REV4 42 bytes
- REV4-EC 45 bytes
- NUWC 85 bytes
- NUWC-EC

The current version of the driver only supports the STANDARD, STANDARD-EC, NUWC & NUWC-EC formats. Any other format will require software modifications by QPS.

The STANDARD & STANDARD-EC formats are defined as follows:

Byte	*Length*	*Format*	*Description*	*Values, Range, Units*
1	1		Target number	1-9, 0 = simulated data
2	1	Space		
3-4	2	HH	Hours	00-23, hours
5	1	Space		
6-7	2	MM	Minutes	00-59, minutes
8	1	Space		
9-10	2	SS	Seconds	00-59, seconds
11	1	Space		
12-14	3	xxx	Compass heading	0-359, degrees
15	1	Space		
16-20	5	xxx.x	Target bearing	0.0-359.9, degrees
21	1	Space		
22-28	7	xxxxx.x	Slant range	0.0-10000.0, meters/yards/feet
29	1	Space		
30-37	8	-xxxxx.x	USBL X	+/- 10000.0, meters/yards/feet
38	1	Space		
39-46	8	-xxxxx.x	USBL Y	+/- 10000.0, meters/yards/feet

47	1	Space		
48-54	7	xxxxx.x	USBL Z	0.0-10000.0, meters/yards/feet
55	1	Space		
56-63	8	-xxxxx.x	Telemetry	+/- 99999.9
64	1	Space		
65-66	2	xx	Warning/Error code	Null, 1-99
67-68	2	<CR><LF>		

The NUWC & NUWC-EC formats are defined as follows

Byte	*Length*	*Format*	*Description*	*Values, Range, Units*
1	1		Target number	1-9, 0 = simulated data
2	1	Space		
3-4	2	HH	Hours	00-23, hours
5	1	Space		
6-7	2	MM	Minutes	00-59, minutes
8	1	Space		
9-10	2	SS	Seconds	00-59, seconds
11	1	Space		
12-14	3	Xxx	Compass heading	0-359, degrees
15	1	Space		
16-20	5	xxx.x	Target bearing	0.0-359.9, degrees
21	1	Space		
22-25	4	xx.x	Depression angle	0.0-89.9, degrees
26	1	Space		
27-33	7	xxxxx.x	Slant range	0.0-10000.0, meters/yards/feet
34	1	Space		
35-42	8	-xxxxx.x	USBL X	+/- 10000.0, meters/yards/feet
43	1	Space		
44-51	8	-xxxxx.x	USBL Y	+/- 10000.0, meters/yards/feet
52	1	Space		
53-59	7	xxxxx.x	USBL Z	0.0-10000.0, meters/yards/feet
60	1	Space		
61-68	8	-xxxxx.x	Telemetry	+/- 99999.9
69	1	Space		
70-71	2	Xx	Warning/Error code	Null, 1-99
72	1	Space		
73-77	5	-xx.x	Roll	+/- 0.0-45.0, degrees
78	1	Space		
79-83	5	-xx.x	Pitch	+/- 0.0-45.0, degrees
84-85	2	<CR><LF>		

Format Example

STANDARD & STANDARD-EC example

```
1 15:32:40 359 356.3   196.3    -11.1    169.1   100.0      0.0 50
1 15:32:43 359 356.3   196.4    -11.1    169.2   100.0      0.0 50
```

NUWC & NUWC-EC example

```
1 11:13:01   2  21.2 44.8   200.0     54.9    141.8   100.0      0.0 50   0.0   0.0
1 11:13:03   2  21.2 44.6   200.0     54.9    141.8   100.0      0.0 50   0.0   0.0
```

Decoding Notes

If the driver encounters a warning/error code in range 1 to 10 the update is ignored by the driver and therefore also doesn't get stored in the database. Currently the following warning/error codes are know to us:

Error code	*Description*
0	No errors detected
1	Unusable signal received
2	Signal timing error
3	Range cannot be determined
4	Low quality factor
5	Target velocity excessive
6	No recent replies
7	Minimum range error
8	Simultanuous reply error
9	Transmitter inoperative
10	Travel time less than turn around time
14	Maximum slant range exceeded
15	Bearing limits exceeded
22	Telemetry signal timing error
23	Telemetry timing out of range
24	Telemetered depth greater than slant range
26	No recent telemetry replies
50	Target input depth not within normal limits of calculated depth
51	Pinger depression angle < 20 deg (including hydrophone offsets)
52	Pinger depression angle < 20 deg
53	Pinger depression angle 20 – 45. Position approximated
54	Target center mode cancelled
55	Compass not active
56	Transponder or Responder depression angle > 45 deg
57	Depth > slant range
59	No external key received within wait period. Target was internally keyed
60	System ignores phase count depression angle. Using slant range & input depth.
61	Calculated horizontal range > slant range
62	System performing auto offset function
64	Low quality factor

Database Setup

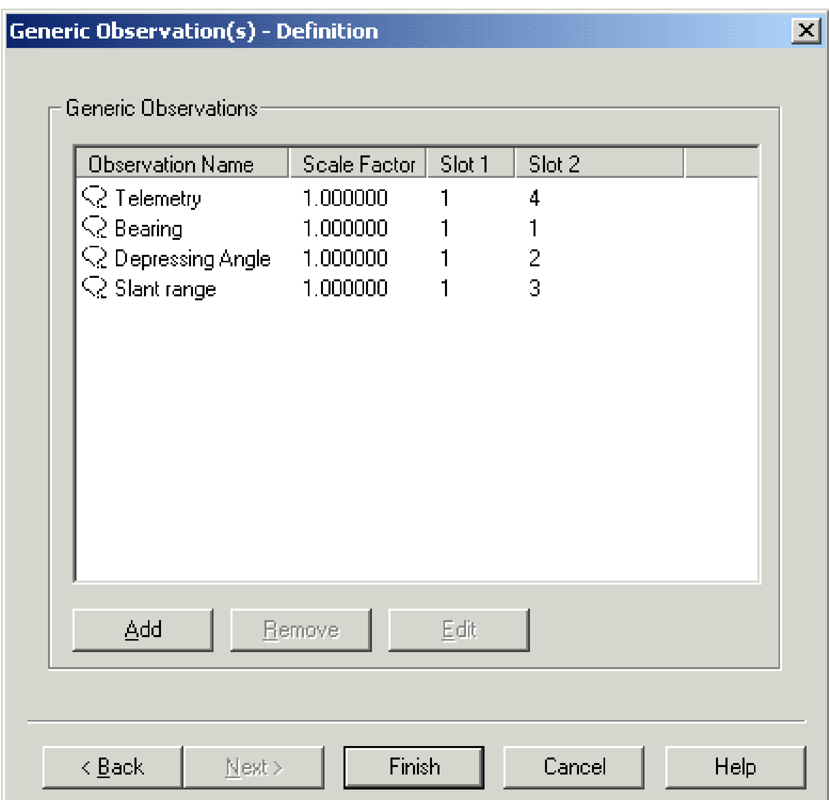
See description under "USBL SYSTEM DRIVERS".

To decode the ***compass heading*** field, add a "System" of type "Gyro", select the driver, and define the heading parameters. To decode all four observations (USBL range/bearing/depth and gyro heading), add both these system types to the *QINSy* database and make sure to select the same driver name and the same I/O parameters for both systems.

To decode the ***target bearing, depression angle, slant range, and telemetry*** fields of the NUWC & NUWC-EC formatted string, add a "System" of type "Miscellaneous", select the driver, and define 4 observation with the Slot 2 set using the following table. In this case the "Slot 1" field is still used to designate the USBL target number for which you want to decode this data.

Observation	**Slot 2**
Target bearing	1
Depression angle	2
Slant range	3
Telemetry	4

Below you find an example for "target 1":



3.6 MANUAL LAYBACK SYSTEM DRIVER

3.6.1 Manual Layback

Input / Output:	Manual Input	*Driver class type:*	
Executable name:	DrvManualLayback.exe	*Drivers.io options:*	*none*
Last modified:	2001-Sept-12		

Driver Description

The Manual Layback driver is used to calculate positions of objects without a positioning system. E.g. the driver calculates the position of a towed fish without using a USBL system. The driver can also be used to calculate the touchdown position of the pipe when laying it. The driver determines the positions relative to a node, using ranges and angles. There are three types of layback:

- Layback: used with towed floating objects
- Rectangular Layback: used with object which are towed underwater
- Touchdown point: used to determine the touchdown point when laying pipes

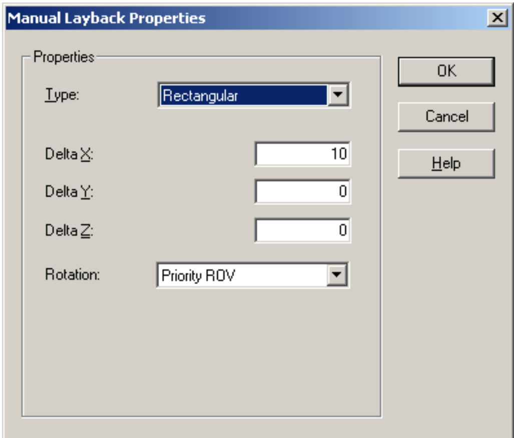
All ranges and angles are to be selected online.

Database Setup Configuration

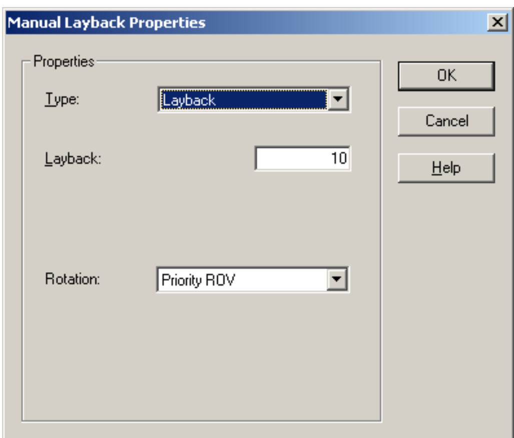
The Manual Layback Driver is added to the database by selecting a new system "Manual Layback System" with the "Manual Layback" driver. No communication parameters have to be set as it is a manual driver. Click "*Next*" to select a location for the layback system. This is usually a tow point on a vessel. Finally the observations calculated from this point have to be added by clicking "*Add*". Make sure to fill in the observation name.

Online Configuration

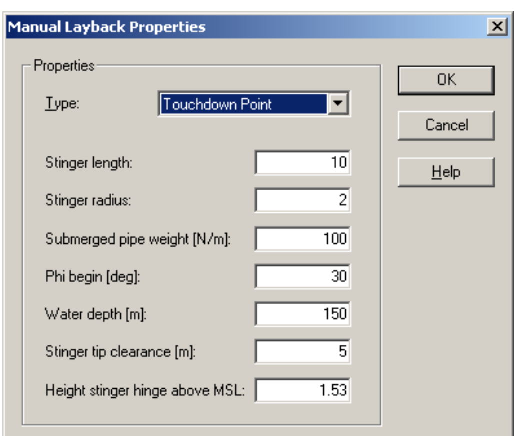
The observations will be selected online in the Manual Layback driver user interface. All drivers and observations are displayed and can be adjusted manually by double clicking on the item or using the "*Properties*" button. In the Manual Layback Properties dialog the layback type can be selected. The corresponding properties will appear. All ranges should be filled in manually. For the Layback and Rectangular Layback the rotation of the ranges should be selected. The rotations listed are: the heading method with the highest priority, the course over ground and all gyro's and compasses defined in the Database Setup.



Suitable for calculating underwater position of towed objects such as sidescan fishes or sound velocity probes. Calculates position using three offsets and a heading.



Used for floating towed objects, such as sparker or boomer frames.

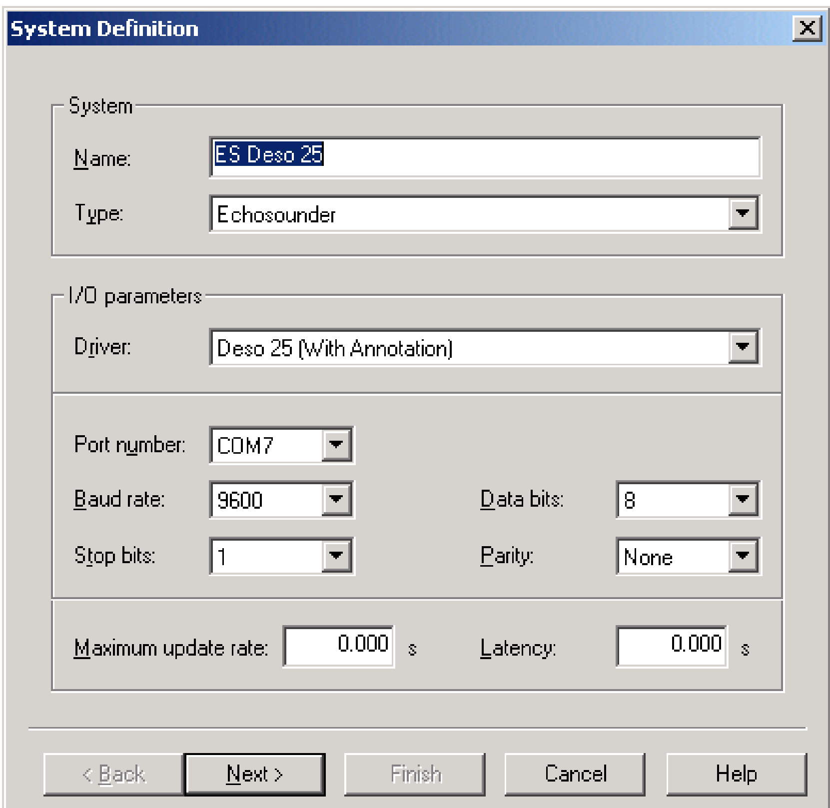


Used for pipe laying purposes.

3.7 SINGLEBEAM ECHOSOUNDER DRIVERS

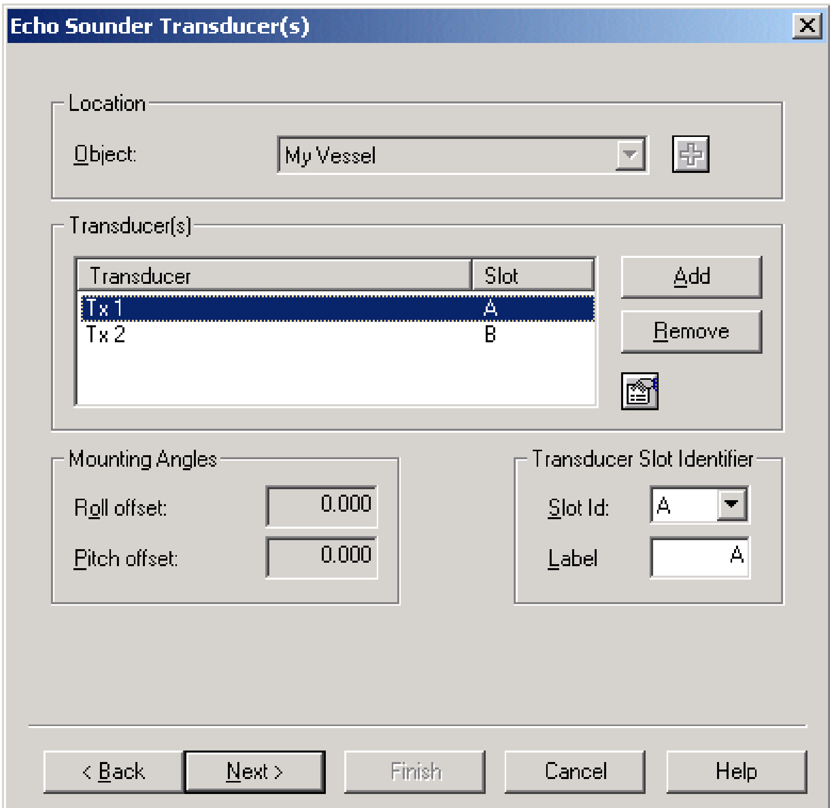
Database Setup

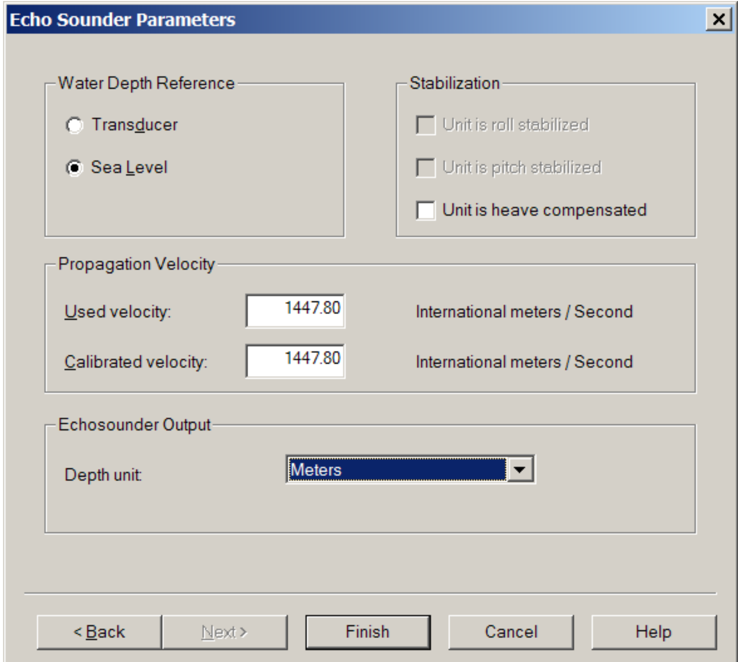
First define and select the "Object" on which the (single beam) echosounder is located. Add a system of type "Echosounder" and select the appropriate driver and interface parameters. Press "Next" button to continue. There is no need to define a separate ***depth*** observation, since it is automatically added to the system. Select or add the transducer node and enter the system parameters. Finally, press "Finish" to save the system.



Database Setup (continued)

A new transducer node can be added by pressing the Add button; to change the node properties, press  button.
If the driver supports slot numbers then more transducers may be added. With older *QINSy* versions it was necessary to define two separate systems for a dual frequency E/S and split the interfacing over 2 serial ports but this is no longer necessary. A dual frequency E/S driver like the Deso 25 will now support slot numbers, hence it is possible to assign 2 transducers.





Water Depth Reference. Important is whether or not transducer depth has been entered into the echosounder instrument, hence depth measured is below transducer or water level (reference point). QPS recommend setting the echosounder up so that depth output is from transducer (i.e. no transducer depth entered in instrument), as draft can change and *QINSy* assumes the vessel reference point at (0,0,0).

Stabilization. Some echosounder are directly interfaced to a motion or attitude measurement system. The depth these echosounders output to *QINSy* are then already compensated for by motion. Select the appropriate options if depth is compensated for by E/S. Uncheck all options if E/S outputs uncorrected depths.

Propagation Velocity. Water velocity is normally entered on the echosounder instrument, hence depth output is always corrected. In this case, set the *QINSy* velocity fields on echosounder parameters page the same, otherwise depth is divided by "Used Velocity" and then multiplied by "Calibrated Velocity".

Depth units. Select the units of the observation as output by the E/S. Most E/S output in meters but some model are known to output in US survey Feet.
Important: Propagation velocities must be entered in the same unit as is selected here. So if units are set to feet, then velocities must also be entered in feet.

See for more information the *QINSy* DB Setup Help Topics or the *QINSy* Knowledge Base.

3.7.1 Annotation Drivers

Input / Output: Input (two-way)
Executable name: DrvAnnotate.exe
Last modified: 2003-March-10

Driver class type: Terminated <CR> | <LF> | "*"
Drivers.io options: ODOM | DESO25 | NMEA | SIMRAD KLEIN2000 | KLEIN595 | TEXTOUT | KNUDSEN HF | KNUDSEN LF

Driver Description

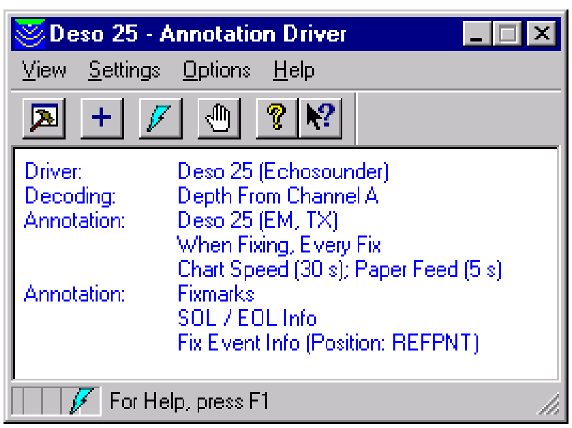
Driver for decoding data messages from echosounders, outputting depth sensor data in Atlas Deso 15/20/25, Odom Echotrac, Simrad ASCII, Knudsen PKEL or NMEA format, or for decoding data messages from side-scan sonars Klein 595 and Klein 2000.
The "Text Out" option of the annotation driver does not expect any input data.

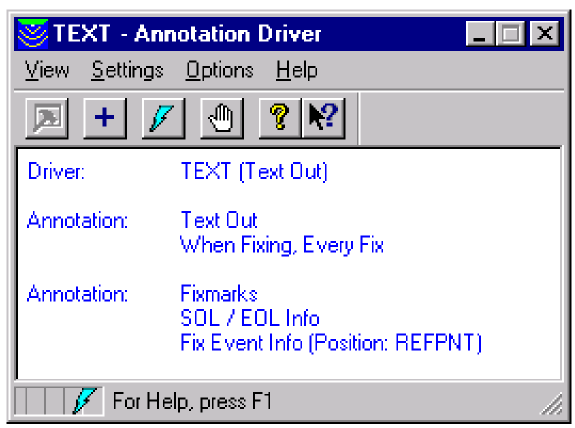
Driver can also send annotation messages (Fix Marks, SOL / EOL Info, Fix Event Info, etc.) to the sensor.

Driver with user-interface, so settings can be changed online, by clicking on system button on taskbar.

The format of the annotation output string can be selected online, under Settings – Annotation. By default, this is the same format as for decoding data. There are also possibilities to send direct annotation messages. All user selections are saved to registry and restored the next time an annotation driver with the same system name (as defined in DB Setup) is started.

The driver window displays the user selections. Notice that decoded values are not shown in the driver's display. Decoded depth and altimeter readings can be seen using a Observation Physics Display.





Format Description

See for the various input data formats, the Format Description paragraph under the appropriate driver.

Interfacing Notes

It is important that the wiring of the cable between the echosounder and the COM port is ***bi-directional***, i.e. allows two-way data transfer, so that the *QINSy* driver can send the annotation telegrams, if selected.

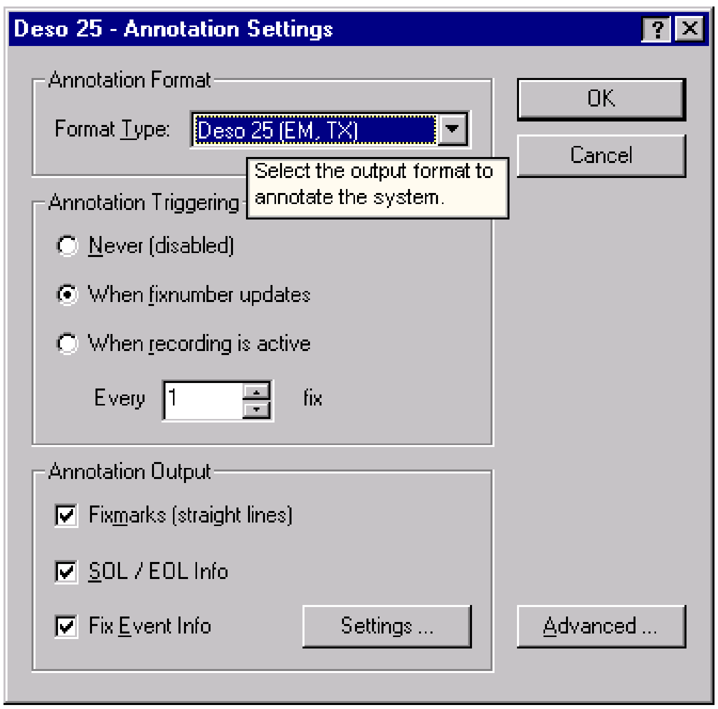
Database Setup

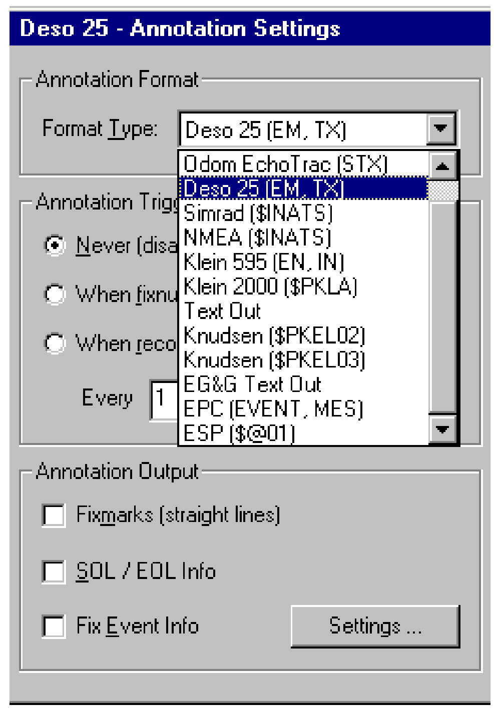
See description under “ECHOSOUNDER SYSTEM DRIVERS”.

Be sure to select the driver according to the input format. The annotation format can be changed online.

Annotation Output

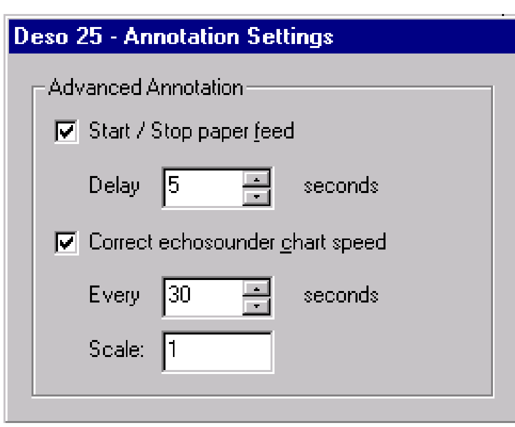
Use Settings – Annotation to select the annotation format and output data content. Use Options – Direct Annotation to send a fix mark and/or annotation comment directly to the echosounder or side-scan sonar. Use Context Sensitive Help in the Annotation Dialog to get more information about each specific item.

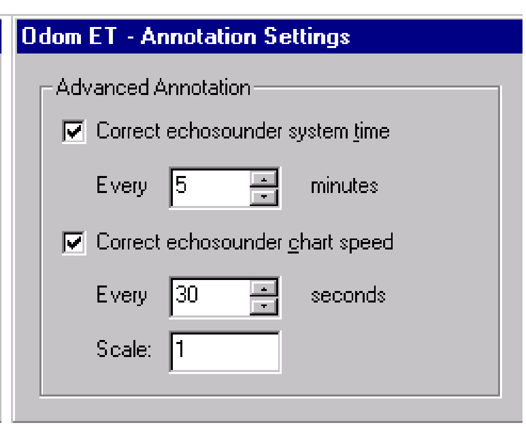




Advanced Annotation

With the Deso 25 and Odom Echotrac annotation formats, some advanced settings are available.





Advanced Annotation (continued)

<u>Deso 25 (EM, TX)</u>

For the Deso 25, this is automatic start and stop of paper feed when starting and stopping a recording session. After EOL, paper feed will continue for some seconds, and after this delay, an additional paper feed is given. The chart speed can also be corrected (when paper is feeding), using the present vessel speed over ground.

<u>Note.</u> Be aware that the Deso will interprete a small speed value as a stop paper feed command. Hence, when the vessel is stationary, testing these advanced annotation options will only result in some paper feed at EOL.

<u>Odom Echotrac (STX | NO STX)</u>

For the Odom Echotrac, advanced annotation options are to correct the echosounder system time, or to set the echosounder chart speed, using the vessel speed over ground. See annotation format descriptions below.

Annotation Output Formats

The annotation formats that are presently available are shown above. See also the appropriate input drivers.

<u>Deso 25 (EM, TX)</u>

Deso 25 annotation strings may contain up to 50 characters. Each message is ended with an **EOB**, End of Block, i.e. a '*' character followed by <CR><LF>.

<u>Event Marker:</u> **EMn<CR><LF>**

Field	*Format*	*Description*	*Values, Range, Units*
1	EM	event marker identifier	"EM"
2	n	event marker line type	0 = no line, 1 = dashed line 2 = dotted-dashed, 3 = solid
3	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

<u>User-Definable Text Message:</u> **TXccc---ccc<CR><LF>**

Field	*Format*	*Description*	*Values, Range, Units*
1	TX	annotation string identifier	"TX"
2	ccc---ccc	user-definable text string	handled as ordinary text
3	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

<u>Vessel Speed:</u> **VS+xx.xx_m/s<CR><LF>**

Field	*Format*	*Description*	*Values, Range, Units*
1	VS	vessel speed identifier	"VS"
2	+xx.xx_m/s	signed speed over ground	meters per second
3	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

<u>Deso 25 Example</u> time and fix number sent to Deso 25, with a solid line as event marker

TXUTC 15:36:55 Fix# 101**<CR><LF>EM3<CR><LF>*<CR><LF>**

Annotation Output Formats (continued)

Odom Echotrac (No STX)
Odom Echotrac (STX)

Odom annotation strings may contain up to 80 characters per line (42 characters for earlier models). With newer Echotrac sounders, it is no longer necessary to wait for the STX response byte before sending new annotation data. In such a case, the “No STX” option can be selected. For earlier models, select “STX”.

Annotation Response:	**STX**	**(Control B)**	**Hex 02**
Event Line (Fix Mark):	**ACK**	**(Control F)**	**Hex 06**
Event Annotation (Start):	**SOH**	**(Control A)**	**Hex 01**
Event Annotation (End):	**EOT**	**(Control D)**	**Hex 04**
Multiple Line Annotation (New Line):	**CR**	**(Control M)**	**Hex 0D**
External Control of Unit Parameters:	**DLE**	**(Control P)**	**Hex 10**

Parameter Transfer Protocol String: **__nn_xxxx<CR><LF>**

Field	*Format*	*Description*	*Values, Range, Units*
1	__	start characters	two spaces “ “ (32 Hex)
2	nn	parameter number	1 - 21
3	_	separation character	one space “ “ (32 Hex)
4	xxxx	new parameter value	0 - 9999
5	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

#	*Parameter*	*Description*	*Range*	*Units*
1	08	velocity	1370 - 1700	m/s
2	09	hours	0 - 23	hours
3	10	minutes	0 - 59	minutes
4	14	chart speed	8 - 1200	0.01 m/s

Simrad ($INATS)
NMEA ($INATS)

Simrad annotation is the same as NMEA annotation. At present, the checksum field is always added.

Annotation Text String **$--ATS,ccc---ccc*hh<CR><LF>**

Field	*Format*	*Description*	*Values, Range, Units*
1	$--ATS	message type identifier	“$INATS”(“--“ can be anything)
2	ccc---ccc	text string	handled as ordinary ASCII string
3	*hh	checksum	standard NMEA checksum field
4	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Annotation Output Formats (continued)

Klein 595 (EN, IN)

Klein annotation strings may contain an annotation field up to 80 ASCII characters. The first N*16 characters in the field are broken down into N 16 character lines and are annotated on the sonar on receipt of the <CR>.

Fix Event Annotation String **<LF>enccc---ccc<CR>**

Field	Format	Description	Values, Range, Units
1	<LF>	start character	<LF> (0A Hex)
2	e	mark line identifier	“E” is mark line, “I” is no mark line
3	n	number of annotation lines	1 - 5
4	ccc---ccc	annotation field text string	broken into N 16 character lines
5	<CR>	termination character	<CR> (0D Hex)

Update Vessel Speed **<LF>S_vv.v<CR>**

Field	Format	Description	Values, Range, Units
1	<LF>	start character	<LF> (0A Hex)
2	S	vessel speed update identifier	“S” (53 Hex)
3	_	space character	“ “ (20 Hex)
4	vv.v	vessel speed value	knots to tenths
5	<CR>	termination character	<CR> (0D Hex)

Klein 2000 ($PKLA)

The *QINSy* driver treats Klein 2000 annotation strings the same way as Klein 595 annotation strings.

Fix Event Annotation String **$PKLA,EV,ccc---ccc*hh<CR><LF>**

Field	Format	Description	Values, Range, Units
1	$PKLA	Klein Associates identifier	“$PKLA”
2	EV	message type identifier	“EV” or “TE”
3	ccc---ccc	text string	handled as ordinary ASCII string
4	*hh	checksum	standard NMEA checksum field
5	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Annotation Output Formats (continued)

Knudsen ($PKEL02)
Knudsen ($PKEL03)

Knudsen 320 echosounder annotation strings may contain annotation field of maximal 68 ASCII characters.

Event Marker with External Annotation Only **$PKEL02,ccc---ccc<CR><LF>**
Event Marker with Internal and External Annotation **$PKEL03,ccc---ccc<CR><LF>**

Field	Format	Description	Values, Range, Units
1	$PKEL	Knudsen Engineering Limited	"$PKEL"
2	nn	message type identifier	"02" or "03" to trigger event mark
3	ccc---ccc	text string	handled as ordinary ASCII string
4	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Set Speed of Sound in Echosounder **$PKEL13,xxxx<CR><LF>**

Field	Format	Description	Values, Range, Units
1	$PKEL	Knudsen Engineering Limited	"$PKEL"
2	nn	message type identifier	"13" for speed of sound update
3	xxxx	speed of sound in water	1300-1700 m/s or 4265-5577 ft/s
4	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Text Out
EG&G Text Out

Text annotation strings do not start with a header field, but are always ended by <CR><LF>. Text Out annotation strings are truncated to 256 characters. EG&G Text Out strings are truncated to 22 characters.

Annotation Text String **ccc---ccc<CR><LF>**

Field	Format	Description	Values, Range, Units
1	ccc---ccc	text string	handled as ordinary ASCII string
2	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Annotation Output Formats (continued)

EPC (EVENT, MES)

EPC GSP-1086 annotation strings are truncated to 35 characters. Commands end with <CR> and/or <LF>.

Event Marker: **EVENT_DASHED<CR><LF>**

Field	Format	Description	Values, Range, Units
1	EVENT	print and set event type	"EVENT" or "EVE"
2	_	space character	" " (20 Hex)
3	DASHED	line type	"DASHED"
4	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Annotation Text Message: **MES_ccc---ccc<CR><LF>**

Field	Format	Description	Values, Range, Units
1	MES	print annotation message	"MES" or "MESSAGE"
2	_	space character	" " (20 Hex)
3	ccc---ccc	text string	should not begin with number
4	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

ESP ($@01)

There is a separate ESP annotation driver which outputs quite long annotation strings. This driver's ESP annotation strings are always truncated to 35 characters. Strings always start with the sequence "$@01".

Annotation Text String **$@01ccc---ccc <CR><LF>**

Field	Format	Description	Values, Range, Units
1	$	start character	"$" (24 Hex)
2	@	annotation channel	A, B, C or @ (all channels)
3	0	start position	0 - 255
4	1	paper direction	0 = right to left, 1 = guess what
5	ccc---ccc	text string	handled as ordinary ASCII string
6	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

3.7.2 Deso 15 / 20 / 25 Echosounder

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvAtlasDeso.exe	*Drivers.io options:*	
Last modified:	*6 June 2003*		

Driver Description

Driver for decoding a depth sensor message (D# and BC-message) from an Atlas Deso 15 / 20 or 25 echosounder. The driver will decode the depth reading (in meters) and the bottom condition (as quality indicator) when available.
The D#-message contains data for transducer A or B.
The user can specify which transducer(s) will be used, by selecting the appropriate slot in DB Setup.

The driver will detect how the data string is terminated (<*> or <CR><LF>). The driver will also detect which Deso format needs to be decoded.

Format Description

The Atlas Deso 15 data message consists of four lines of fixed length, which are separated by <CR><LF>. When “Auto Output” has been selected, a data string is output upon completion of each sounding. “DA/DB” depth presented is in metres, 00000.00 - 00650.00 m, or feet, 00000.00 - 02130.00 ft. “BC” bottom condition is a parameteric strength signal, NOT identical to the Atlas Deso 25 values. (1) The extension 'dB' is kept for compatibility reasons, although the value itself is NOT measured in dB. Range of the value is 00.0 - 99.9.

DAxxxxx.x_m<CR><LF> (where ‘_’ is a space)
DBxxxxx.x_m<CR><LF> (where ‘_’ is a space)
BCxx.xdB<CR><LF> (no space before unit)
*<CR><LF>

The Atlas Deso 20 data message consists of one line per transducer, separated by <CR><LF>

DAxxxxx.x_m<CR><LF> (where ‘_’ is a space)
DBxxxxx.x_m<CR><LF> (where ‘_’ is a space)

Item	*Format*	*Description*	*Values or Units*
1	D#	depth channel	"DA" for 1 or "DB" for 2
2	Xxxxx.x_m	echosounder depth reading	m
3	BC	bottom condition	
4	Xx.xdB	parametric strength signal	(1)
5	*	end of block	*
6	<CR><LF>	line termination characters	carriage return | line feed

(continued on next page)

The following message was also encountered as output from Deso 20. (The driver will detect this format when it is encountered).

000000ssDDDD<CR><LF>

Where ss is the channel/slot number, and DDDD is the depth reading in cm's.

The depth reading will be ignored when DDDD data is zero.

Format Example data of this rare format:

000000010289	(will be decoded as 2.89m depth, for Slot A)
000000110259	(will be decoded as 2.59m depth, for Slot B)
000000010289	
000000110260	
000000010293	
000000110261	

Database Setup

See description under "ECHOSOUNDER SYSTEM DRIVERS".

Select in Db Setup driver "`Deso 15/20/25`" and select which channel ('A' or 'B') needs to be decoded. To decode the data with channel '01' use slot 'A', to decode the data with 'channel' 11 use 'B'.

3.7.3 Deso 25 (With Annotation)

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <LF> | "*"
Executable name:	DrvAnnotate.exe	Drivers.io options:	DESO25
Last modified:	2000-Dec-01		

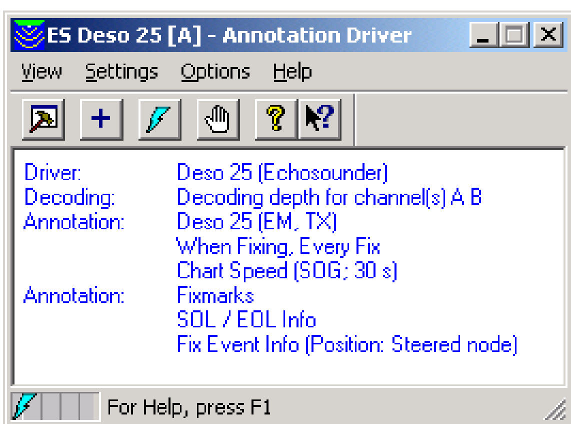
Driver Description

Driver for decoding depth sensor messages (D# and BC-message) from Atlas Deso 15 / 20/ 25 echosounders. The driver will decode the depth reading (in meters), as well as the bottom condition (as quality indicator), if present. The D#-message contains depth readings for transducer A or B, corresponding to channel 1 or 2. Driver can also send annotation messages (Fix Marks, SOL / EOL Info, Fix Event Info) to the echosounder.

Driver with user-interface, so settings can be changed online, by clicking on system button on taskbar.

The format of the annotation output string can be selected online, under Settings – Annotation. By default, this is the same format as for decoding data. There is also a possibility to send a direct annotation string. All user selections are saved to Windows registry and restored the next time an annotation driver with the same system name (as defined in DB Setup) is started.

The driver window displays the user selections. Notice that decoded values are not shown in the driver's display. Decoded depth and bottom condition readings can be seen using a Observation Physics Display.



Format Description

See the Format Description of the "Atlas Deso 15 / 25 (Depth Channel A or B) Echosounder.
Driver will automatically determine the type of input data format, Deso 15 / 25 or Deso 20.

Annotation Output

See the Annotation Output paragraph for the "Annotation Drivers".

Database Setup

See description under "ECHOSOUNDER SYSTEM DRIVERS".

3.7.4 Bathy UK94 Pressure Sensor (Depth)

3.7.5 Bathy UK94 Pressure Sensor (Altitude)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvBathyUK94.exe	*Drivers.io options:*	OI
Last modified:	1997-Oct-20		

Driver Description

Driver for decoding depth sensor message from a Bathy UK94 bathymetric system. The BathyUK94 driver can decode the depth reading or the altitude reading (both of them in meters). The BathyUK driver handles automatically the Standard UK90 format, the Alternate UK90 format or the MB1000/HB200 format.

Format Description

The **Alternate UK90 Format** is given by

```
Dxxxx.xx Axx.xx Txx Pxxxx Vxxxxx dxxxxx Hxx<CR><LF>
```

The **Standard UK90 Format** (twice the Altitude field) is given by

```
Dxxxx.xx Axx.xx Axx.xx Txx Pxxxx Vxxxxx dxxxxx Hxx<CR><LF>
```

Item	*Format*	*Description*	*Values or Units*
1	Dxxxx.xx	depth	meters
2	Axx.xx	altitude	meters
3	Txx	temperature	degrees centigrade
4	Pxxxx	atmospheric pressure	**OR** entered by the system operator, **OR** measured by surface barometer
5	Vxxxxx	velocity of sound in water	
6	Dxxxxx	relative density of seawater	
7	Hxx	height of unit above seawater	
8	<CR><LF>	termination characters	carriage return + line feed

Some example Standard UK90 format data strings are given by

```
D 000.48 A00.37 A00.37 T12       P1010 V14849 d10274 H02
D 000.48 A00.38 A00.38 T12       P1010 V14849 d10274 H02
D 000.47 A00.37 A00.37 T12       P1010 V14849 d10274 H02
D 000.47 A00.38 A00.38 T12       P1010 V14849 d10274 H02
```

Where, in last message, depth is 0.47 m and altitude is 0.38 m.

Notes.
(1) Fields have fixed widths, all fields separated by spaces; string ends with <CR><LF>
(2) The **MB1000/HB200 Format** is similar, except for depth to 999.99 m, so Dxxx.xx
(3) Typical system output interface parameters are 4800,8,2,N (9600 baud is optional)

Database Setup

See description under “ECHOSOUNDER SYSTEM DRIVERS”.

3.7.6 EG&G Sonar System (Depth)

Input / Output:	Input	*Driver class type:*	Terminated <CR>
Executable name:	DrvEchoSounder.exe	*Drivers.io options:*	*none*
Last modified:	1999-Nov-03		

Driver Description

Driver for decoding depth from a EG&G side scan sonar system. The driver will automatically determine the format of the input data string. The depth output from an EG&G sonar is just the first return of a sonar ping.

Format Description

Each EG&G depth message has a fixed length of 11 bytes, including termination characters <CR><LF>.

```
RRR DDD.D<CR><LF>
12345678901
```

where RRR is range in meters and DDD.D is depth in meters. The two values are separated by a space.

Format Example

```
100 025.0<CR><LF>
```

Decoding Notes

The range is copied to the quality indicator of the depth observation. Use “Observation Physics Display”.

Database Setup

See description under “ECHOSOUNDER SYSTEM DRIVERS”.

3.7.7 Elac LAZ 4400 Echosounder

Input / Output:	Input	*Driver class type:*	Terminated <CR>
Executable name:	DrvElacLAZ4400.exe	*Drivers.io options:*	N/A
Last modified:	1999-Nov-23		

Driver Description

Driver for decoding depth from an Elac LAZ 4400 echosounder. The driver will decode the depth reading in meters. The feet and fathoms fields are ignored.

Format Description

Each data message has a fixed length of 34 bytes. The datastring is terminated by <CR><LF>.

Item	*Format*	*Description*	*Values or Units*
1	$SDDBK	header	-
2	xxxx.x	feet value	feet
3	f	feet indicator	-
4	yyyy.y	meter value	meter
5	M	meter indicator	-
6	zzzz.z	fathom value	fathom
7	F	fathom indicator	-
8	<CRLF>	termination characters	carriage return + line feed

Format Example

```
$SDDBK,0027.2,f,0008.3,M,004.5,F<CRLF>
```

Database Setup

See description under “ECHOSOUNDER SYSTEM DRIVERS”.

3.7.8 Elac STG 721 Echosounder

Input / Output:	Input	*Driver class type:*	Terminated <CR>
Executable name:	DrvElacSTG721.exe	*Drivers.io options:*	LOW | HIGH
Last modified:	1999-Oct-27		

Driver Description

Driver for decoding depth from an Elac STG 721 echosounder. The driver will decode the depth reading (if not in meters – so feet or fathoms - it will be always converted to meters), as well as the status (as the quality indicator) in both LOW and HIGH frequency mode.

Format Description

Each data message has a fixed length of 11 bytes. The datastring is terminated by <CR><LF>.

Value	*Unit*	*Frequency*	*Overflow*
A	m	Low	no
B	ft	Low	no
C	ftm	Low	no
E	m	High	no
F	ft	High	no
G	ftm	High	no
I	m	Low	yes
J	ft	Low	yes
K	ftm	Low	yes
M	m	High	yes
N	ft	High	yes
O	ftm	High	yes

Format Examples

```
<LF>E000308@<CR><LF>
<LF>A000321O<CR><LF>
<LF>E000311@<CR><LF>
<LF>A000321O<CR><LF>
```

Decoding Notes

The quality indicator of the depth observation will be 0 if no error occurred. In case of an error, the quality indicator of the depth observation will be 1.

Database Setup

See description under “ECHOSOUNDER SYSTEM DRIVERS”.

3.7.9 Kaijo Denki PS20R Echosounder

Input / Output:	Input	*Driver class type:*	Counted
Executable name:	DrvKaijoDenkiPS20R.exe	*Drivers.io options:*	*none*
Last modified:	1997-Oct-06		

Driver Description

Driver for decoding depth sensor message from the echosounder. The driver will decode the depth reading (value in centimetres converted meters), as well as the status (as the quality indicator).

Format Description

Each message is fixed in length. The message is NOT terminated by <CR><LF>. Format example:

D1	Record mark	**:**
D2	Data byte length (2 bytes)	**0**
D3		**A**
D4	Counter data (4 bytes) repetition "0000" to "FFFF"	**0**
D5		**0**
D6		**D**
D7		**9**
D8	Record type (2 bytes)	**0**
D9		**0**
D10	Depth data in cm (6 bytes)	**0**
D11		**0**
D12		**0**
D13		**2**
D14		**4**
D15		**8**
D16	moving average frequency (2 bytes)	**0**
D17		**4**
D18	Status	**0**
D19		**2**
D20	Checksum (Suplementary number of 2 from D2 to D18)	**C**
D21		**D**

Interfacing Notes

The default fequency for data is 10Hz at 9600 Baud, 2 stop bits, 8 data bits and no handshaking.

Database Setup

See description under “ECHOSOUNDER SYSTEM DRIVERS”.

3.7.10 Knudsen 320M (PKEL HF) (With Annotation)

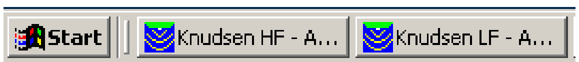
3.7.11 Knudsen 320M (PKEL LF) (With Annotation)

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvAnnotate.exe	*Drivers.io options:*	KNUDSEN | HF | LF
Last modified:	2003-March-10		

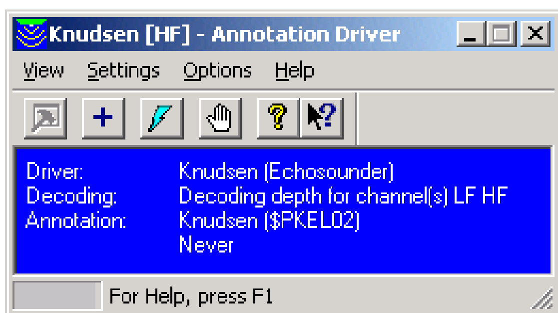
Driver Description

Driver for decoding water depths from a Knudsen 320M echosounder, providing a $PKEL telegram.
The driver will decode the water depth reading (in meters). The driver can also output a NMEA annotation telegram.

Driver with user-interface, so settings can be changed online, by clicking on system button on taskbar:



The driver window displays the user selections. Notice that decoded values are not shown in the display.



Format Description

$PKEL,nnn,hhmmss,LF,ll.ll,HF,hh.hh*hh<CR><LF>

Field	*Format*	*Description*	*Values, Range, Units*
01	'$PKEL'	message type identifier	Header
02	nnn		Not used
03	hhmmss	time	Not used
04	'LF'	Low Frequency identifier	
05	ll.ll	Low Frequency water depth	Meters
06	'HF'	High Frequency identifier	
07	hh.hh	High Frequency water depth	Meters
04	*hh	optional checksum	XOR from "$" to "*" exclusive
05	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Example:

```
$PKEL,007,165809,LF,00.00,HF,02.55*20<CR><LF>
$PKEL,007,165810,LF,00.00,HF,02.55*28<CR><LF>
$PKEL,007,165811,LF,00.00,HF,02.55*29<CR><LF>
```

Interfacing Notes

It is important that the wiring of the cable between the echosounder and the COM port is ***bi-directional***, i.e. allows two-way data transfer, so that the *QINSy* driver can send the annotation telegrams, if selected.

Annotation Output

See the Annotation Output paragraph for the “Annotation Drivers”.

Drivers.io Options

Command line parameter “KNUDSEN” will decode any $PKEL telegram. Parameter “HF” will decode the high frequency value, parameter “LF” will decode the low frequency.

Database Setup

See description under “ECHOSOUNDER SYSTEM DRIVERS”.

Select the “Knudsen 320M (PKEL HF/LF) (With Annotation)” driver to decode any incoming $PKEL telegrams.

Note. Presently only one frequency is allowed in the *QINSy* driver. Split input to decode multiple frequency.

3.7.12 Marimatech E-Sea Sound Echosounder

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvESeaSound.exe	*Drivers.io options:*	LOW | HIGH
Last modified:	2000-Jul-07		

Driver Description

Driver for decoding depth from a Marimatech E-Sea Sound echosounder. The driver will decode the depth reading (if not in meters – so feet or fathoms - it will always be converted to meters) in both LOW and HIGH frequency mode. Whether or not the LOW or the HIGH frequency value comes first in the data message is not important for decoding the right value.

Format Description

Two types of data messages exist, which have a fixed length. The 1 Channel data message contains 22 characters. The 2 Channel data message takes 40 characters. Each message is terminated by <CR><LF>.

1 Channel data message: ERSF####,##UU,DDD,BB<CRLF>
2 Channel data message: ERSF####,##UU,DDD,BB,F####,##UU,DDD,BB<CRLF>

Item	*Format*	*Description*	*Values or Units*
1	E	Identifier for Echo Format	"E"
2	R	Identifier for heave compensation	"R" = Raw depth "C" = Corrected depth
3	S	Identifier for status	"S" = Standby : Paper stop "R" = Running : Paper on "M" = Marked depth "E" = Error (No depth)
4	F	Identifier for frequency	"H" = High frequency "L" = Low frequency
5	####,##	Depth in 0.01 units (2 decimals accuracy)	0043.60
6	UU	Unit	" m" = meter "ft" = foot " F" = fathom
7	DDD	Delay in milliseconds from Echosounder time to first character	546
8	BB	Bottom amplitude strength	0-99
9	<CR><LF>	termination characters	carriage return | line feed

Format Example

1 Channel data message: `ERSL0043.60 m,546,56<CR><LF>`
2 Channel data message: `ERSH0019.60 m,516,86,L0019.60 m,517,86<CR><LF>`

Decoding Notes

The system update time will be corrected for the delay in milliseconds, which is present in the data messages.

Database Setup

See description under “ECHOSOUNDER SYSTEM DRIVERS”.

3.7.13 Odom Echotrac/Digitrace (High Freq | Low Freq | Single Freq)

3.7.14 Odom Echotrac (With Annotation and STX | no STX)

3.7.15 Raytheon (Single Frequency)

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <CR>
Executable name:	DrvAnnotate.exe	Drivers.io options:	ODOM | S | H | L | U | STX
Last modified:	2003-Jul-29		

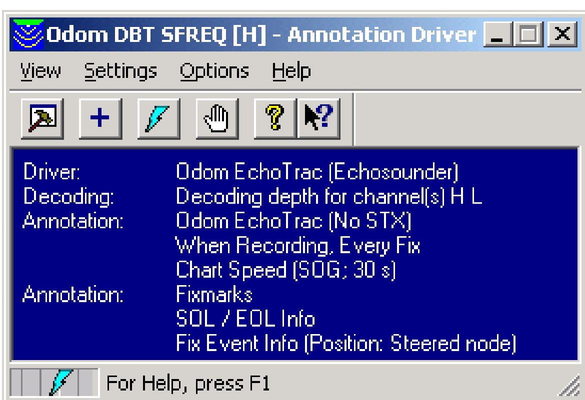
Driver Description

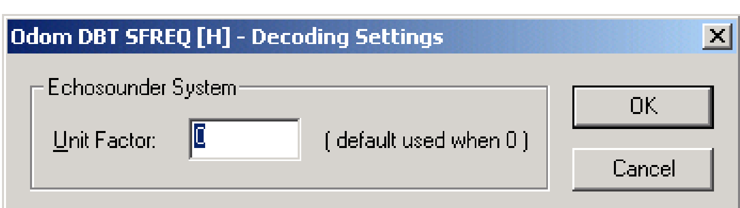
Driver for decoding depth sensor messages in Odom Echotrac/Digitrace formats. Both the standard output format and the dual bottom tracking output formats (single frequency and dual frequency) are supported. The driver will apply the default scale factors according to the resolution, or 0.01 for the Raytheon, but this scale factor can be changed online. Driver can also send annotation messages to the Odom echosounder.

Driver with user-interface, so settings can be changed online, by clicking on system button on taskbar:

The format of the annotation output string can be selected online, under Settings – Annotation. By default, this is the same format as for decoding data. There is also a possibility to send a direct annotation string. All user selections are saved to Windows registry and restored the next time an annotation driver with the same system name (as defined in DB Setup) is started.

The driver window displays the user selections. Notice that decoded values are not shown in the display.





Format Description

Standard Output **FETECddddd<CR>**

Field	Format	Description	Values, Range, Units
01	space or “F”	“F” indicates fix mark	ignored
02	“ET” or “et”	EchoTrac and resolution	“ET” 1/10 feet, “et” 1/100 metres
03	space or “E”	“E” indicates an error	not decoded in case of “E” error
04	space or “C”	“C” indicates heave compensated	ignored
05	ddddd	depth data	0 – 99999
06	<CR>	termination character	<CR> (0D Hex)

Dual Bottom Tracking Output – Single Frequency **FETEH_ddddd<CR>**

Field	Format	Description	Values, Range, Units
01	space or “F”	“F” indicates fix mark	ignored
02	“ET” or “et”	EchoTrac and resolution	“ET” 1/10 feet, “et” 1/100 metres
03	space or “E”	“E” indicates an error	not decoded in case of “E” error
04	“H” or “L”	frequency indicator	“H” high, “L” low frequency
05	space	always space (“C”?)	ignored
06	ddddd	depth data	0 – 99999
07	<CR>	termination character	<CR> (0D Hex)

Dual Bottom Tracking Output – Dual Frequency **FETEB_ddddd<CR>**

Field	Format	Description	Values, Range, Units
01	space or “F”	“F” indicates fix mark	ignored
02	“ET” or “et”	EchoTrac and resolution	“ET” 1/10 feet, “et” 1/100 metres
03	space or “E”	“E” indicates an error	not decoded in case of “E” error
04	“B”	frequency indicator	“B” for dual frequency
05	space	always space (“C”?)	ignored
06	ddddd	high frequency depth data	0 – 99999
07	space	always space (“C”?)	ignored
08	ddddd	low frequency depth data	0 – 99999
09	<CR>	termination character	<CR> (0D Hex)

Note. The Digitrace formats only differ from the Echotrac formats in usage of “DT” instead of “ET”.
ET -> units on echosounder are set to US Survey feet, et -> units to metres.

Annotation Output

See the Annotation Output paragraph for the “Annotation” drivers.

Drivers.io Options

Command line parameter “U” followed by a number will set a default scale factor.

Database Setup

See description under “ECHOSOUNDER SYSTEM DRIVERS”.
Make sure that the output units are set correctly in DbSetup.

3.7.16 NMEA (DPT,DBT,DBS) (With Annotation)

3.7.17 Simrad EA-Series ASCII Telegram (With Annotation)

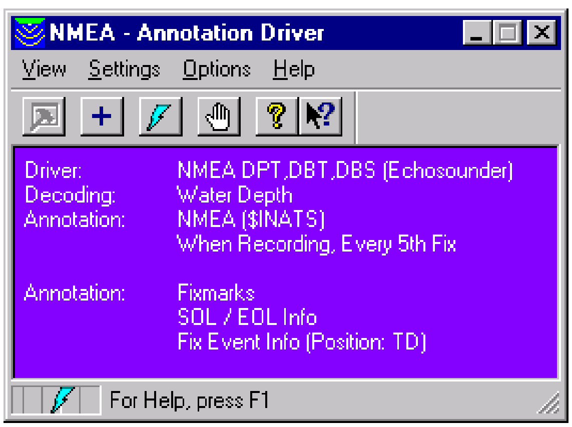
Input / Output:	Input (two-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvAnnotate.exe	*Drivers.io options:*	NMEA | SIMRAD
Last modified:	2000-Oct-02		

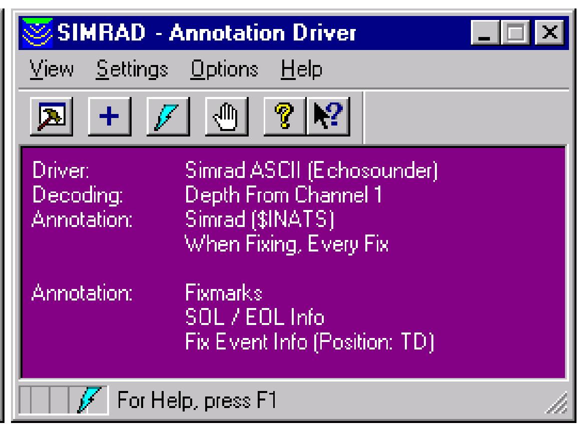
Driver Description

Driver for decoding water depths from an echosounder providing a NMEA DPT, DBT or DBS telegram, or from an echosouder outputtting a Simrad ping based ASCII telegram, such as a Simrad EA 400 system. The driver will decode the water depth reading (in meters) and the bottom condition (as quality indicator), if available in case of a Simrad ASCII telegram. The driver can also output a NMEA annotation telegram.

Driver with user-interface, so settings can be changed online, by clicking on system button on taskbar:

The driver window displays the user selections. Notice that decoded values are not shown in the display.





Format Description

<u>NMEA DPT (Depth)</u> **$--DPT,x.x,y.y*hh<CR><LF>**

Field	*Format*	*Description*	*Values, Range, Units*
01	$--DPT	message type identifier	-- can be anything
02	x.x	water depth relative to transducer	meters
03	y.y	offset of the measuring transducer	meters
04	*hh	optional checksum	XOR from “$” to “*” exclusive
05	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Format Description (continued)

NMEA DBT (Depth Below Transducer) **$--DBT,x.x,f,y.y,M,z.z,F*hh<CR><LF>**

Field	*Format*	*Description*	*Values, Range, Units*
01	$--DPT	message type identifier	-- can be anything
02	x.x, f	water depth relative to transducer	feet
03	y.y, M	water depth relative to transducer	meters
04	z.z, F	water depth relative to transducer	fathoms
05	*hh	optional checksum	XOR from "$" to "*" exclusive
06	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

NMEA DBT (Depth Below Surface) **$--DBS,x.x,f,y.y,M,z.z,F*hh<CR><LF>**

Field	*Format*	*Description*	*Values, Range, Units*
01	$--DPT	message type identifier	-- can be anything
02	x.x, f	depth referenced to water surface	feet
03	y.y, M	depth referenced to water surface	meters
04	z.z, F	depth referenced to water surface	fathoms
05	*hh	optional checksum	XOR from "$" to "*" exclusive
06	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Simrad Ping Based ASCII Telegram **D#,hhmmss.ss,xxxx.xx,zzz,TDN,ABS<CR><LF>**

Field	*Format*	*Description*	*Values, Range, Units*
01	D	header (always)	"D"
02	#	channel number	1, 2, 3
03	hhmmss.ss	time of transmission	computer's present time
04	xxxx.xx	depth from transducer incl. draft	meters
05	zzz	bottom surface backscattering	dB
06	TDN	transducer number	(never used in EA 400)
07	ABS	athwarthship bottom slope	degrees (not used in EA 400)
08	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Annotation Output Telegram **$--ATS,ccc---ccc<CR><LF>**

Field	*Format*	*Description*	*Values, Range, Units*
01	$--ATS	message type identifier	-- can be anything ("IN")
02	ccc---ccc	text string	handled as ordinary text
03	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Decoding Notes

Driver will decode the **x.x** field from a NMEA DPT telegram or the **y.y** field from a NMEA DBT or DBS telegram. Signal quality indicator is always 1 for a water depth decoded from a valid NMEA telegram. Driver will decode the **xxxx.xx** field from the Simrad ASCII telegrams. The **zzz** field is decoded as signal quality indicator. The time field in the Simrad ASCII telegram is disregarded by the *QINSy* driver.

System Configuration

The NMEA telegrams can only provide depth information from one channel. With the ***Simrad EA 400*** echosounder system, which channel is used, is selected in the depth output dialog box, whereas the telegram type to be transmitted (DPT, DBT, DBS, Simrad, Atlas Deso 25) is selected in the same dialog box. For the Simrad ASCII output telegram, one telegram is exported from each echosounder channel (limited to 3).

Interfacing Notes

It is important that the wiring of the cable between the echosounder and the COM port is ***bi-directional***, i.e. allows two-way data transfer, so that the *QINSy* driver can send the annotation telegrams, if selected.

Annotation Output

See the Annotation Output paragraph for the “Annotation Drivers”.

Drivers.io Options

Command line parameter “NMEA” will decode any DPT, DBT and/or DBS telegram. Parameter “SIMRAD” will decode the Simrad ASCII telegram that starts with the “D#” combination for the selected channel.

Database Setup

See description under “ECHOSOUNDER SYSTEM DRIVERS”.

Select the “NMEA (DPT,DBT,DBS) (With Annotation)” driver to decode any incoming NMEA DPT, DBT and/or DBS telegrams. Select the “Simrad ASCII (With Annotation)” to decode a so-called Simrad ping based ASCII telegram for a certain channel.

3.7.18 Simrad EA-Series ASCII Telegram

3.7.19 Simrad EA-Series ASCII Telegram (With UTC)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvSimradEA50x.exe	*Drivers.io options:*	PPS
Last modified:	*23* December 2003		

Driver Description

Driver for decoding the Simrad ASCII telegram. This (depth) telegram is used by a number of Simrad EA series echosounder systems – e.g. EA400, EA500, EA501P, EA600.
The driver will decode the depth reading (in meters), as well as the bottom surface backscattering strength (as quality indicator). The D#-message contains data for transducer 1, 2 or 3. The user can specify which transducer will be used ('1', '2', 3''), or ignore the transducer number by selecting the appropriate slot ('Any') in DB Setup.
The Simrad (EA500, EA501P) device can also output a motion sensor message (MS-message), containing roll, pitch and heave. This driver can decode this message.
The Simrad EA501P device can also output a NMEA Depth message ($SDDBS). This driver will not decode this message.

Format Description

Each Simrad EA500 / EA501P message is variable in length; but fields are separated by a comma delimiter. The datastring is terminated by <CR><CR><LF>.

Item	*Format*	*Description*	*Values or Units*
1	D#	Header	"D1" or "D2" or "D3"
2	HHMMSSss	time of depth reading	ss = hundredth of second
3	x.x	echosounder depth reading	m
4	x	bottom surface backscattering strength	dB
5	n	transducer number	
6	x	athwartships bottom slope	°
7	<CR><CR><LF>	termination characters	2 × carriage return | 1 × line feed

Format Examples

```
D1,12275838, 10.60, -5,  1,  0<CR><CR><LF>
D1,12280010, 10.80, -8,  1,  0<CR><CR><LF>
D1,12280181, 10.60, -6,  1,  0<CR><CR><LF>
```

Decoding Notes

The quality indicator of the depth observation will be the bottom surface backscattering strength value. Notice that time, transducer number and athwartships bottom slope are not used by *QINSy*.
For time-tagging purposes the time from the Depth message will be used if the driver "Simrad EA-Series ASCII Telegram (With UTC)" has been chosen. If the other driver (without the UTC) has been chosen, local computer time (or PPS if it is connected to *QINSy*) will be used for time-tagging.

Database Setup

See description under "ECHOSOUNDER SYSTEM DRIVERS".

3.7.20 Simrad EA-Series (Socket)

3.7.21 Simrad EA-Series (Socket) (With UTC)

Input / Output:	Input	*Driver class type:*	UDP/IP Client
Executable name:	DrvSimradEAxxxSocket.exe	*Drivers.io options:*	PPS
Last modified:	2003-May-16		

Driver Description

Driver for decoding the Simrad Ping Based Binary Datagram from a Simrad EA400, EA500 or EA600 echosounder via a network connection. The driver is also capable of decoding the Sidescan Echogram (binary) datagram. Refer to Sidescan Systems chapter for more details.

Format Description – Simrad Ping Based Binary Datagram

The driver will decode the depth reading (in meters), as well as the reflectivity (as quality indicator). The D#-message contains data for channel #. The user may specify which channel will be decoded, by setting up the channel parameters DB Setup.

The datagram has a fixed length of 28 bytes, the first part is ASCII, the second part is binary.

`D#,HHMMSShh,Depth,Reflectivity,Transducer no,Athwartships angle`

`Where:`

```
D#                     2 chars header, # indicates the channel number  <ASCII>
,                      1 char separator                                <ASCII>
HHMMSShh               8 bytes -- time when ping is transmitted        <ASCII>
,                      1 char separator                                <ASCII>
Depth                  4 bytes floating point number                   <Binary>
Reflectivity           4 bytes floating point number                   <Binary>
Transducer no          4 bytes integral number                         <Binary>
Athwartships angle     4 bytes floating point number                   <Binary>
```

Format Examples

```
D1,08143838,...Aq...........D2,08143838,..%?"f..........
D1,08143861,...AQ.l.........D2,08143861,..%?.G..........
D1,08143885,.r.A............D2,08143885,..%?............
D1,08143914,.O.AK...........D2,08143914,..%?............
D1,08143936,.G.A............D2,08143936,..%?............
D1,08143959,...A./..........D2,08143959,..%?|...........
D1,08143981,A>.A.3..........D2,08143981,.A ?............
```

Decoding Notes

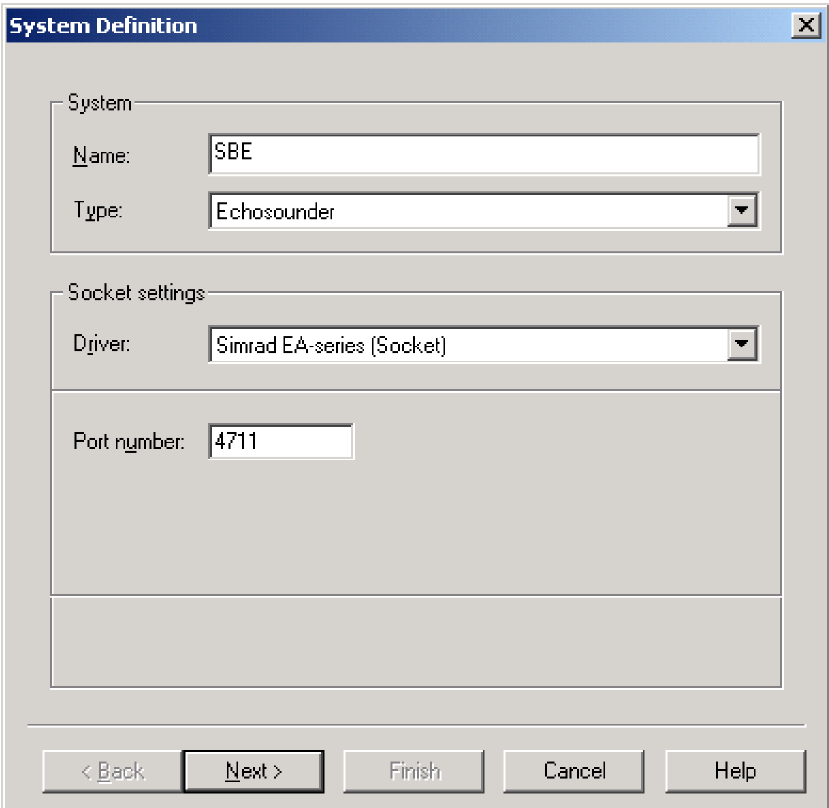
The quality indicator of the depth observation will be the reflectivity value (in case of D#-message) which can be monitored with an Observation Physics Display.

For time-tagging purposes the time from the Depth message will be used if the driver “Simrad EA-Series (Socket) Channel # (With UTC)” has been chosen. If the other drivers (without the UTC) have been chosen, local computer time (or PPS if it is connected to *QINSy*) will be used for time-tagging.
Notice that all other fields (like transducer number, athwart ships angle) are not used by *QINSy*.

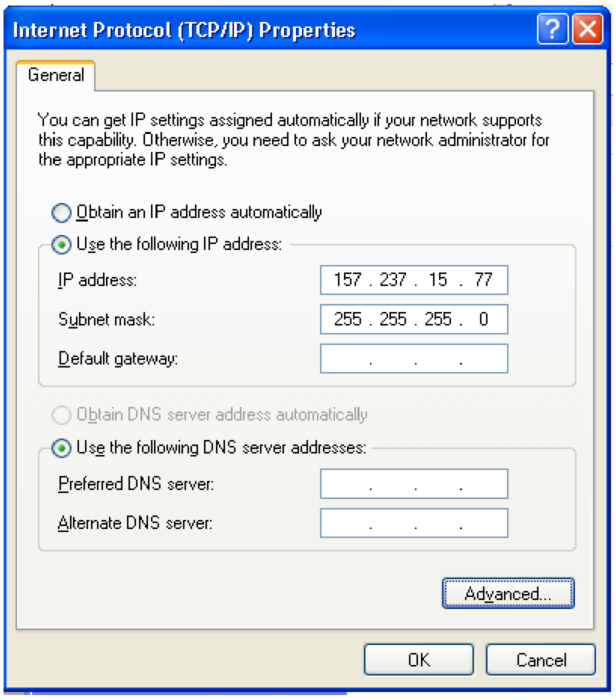
Database Setup

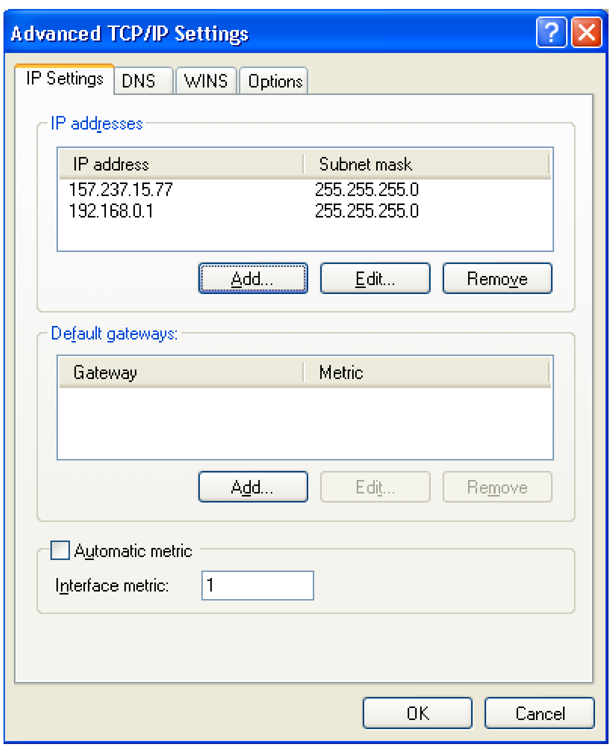
See description under "ECHOSOUNDER SYSTEM DRIVERS".

Further, the (Network UDP) Port number must be the same as the Remote Computer Port number, where the Simrad Echosounder is sending the data onto the network.

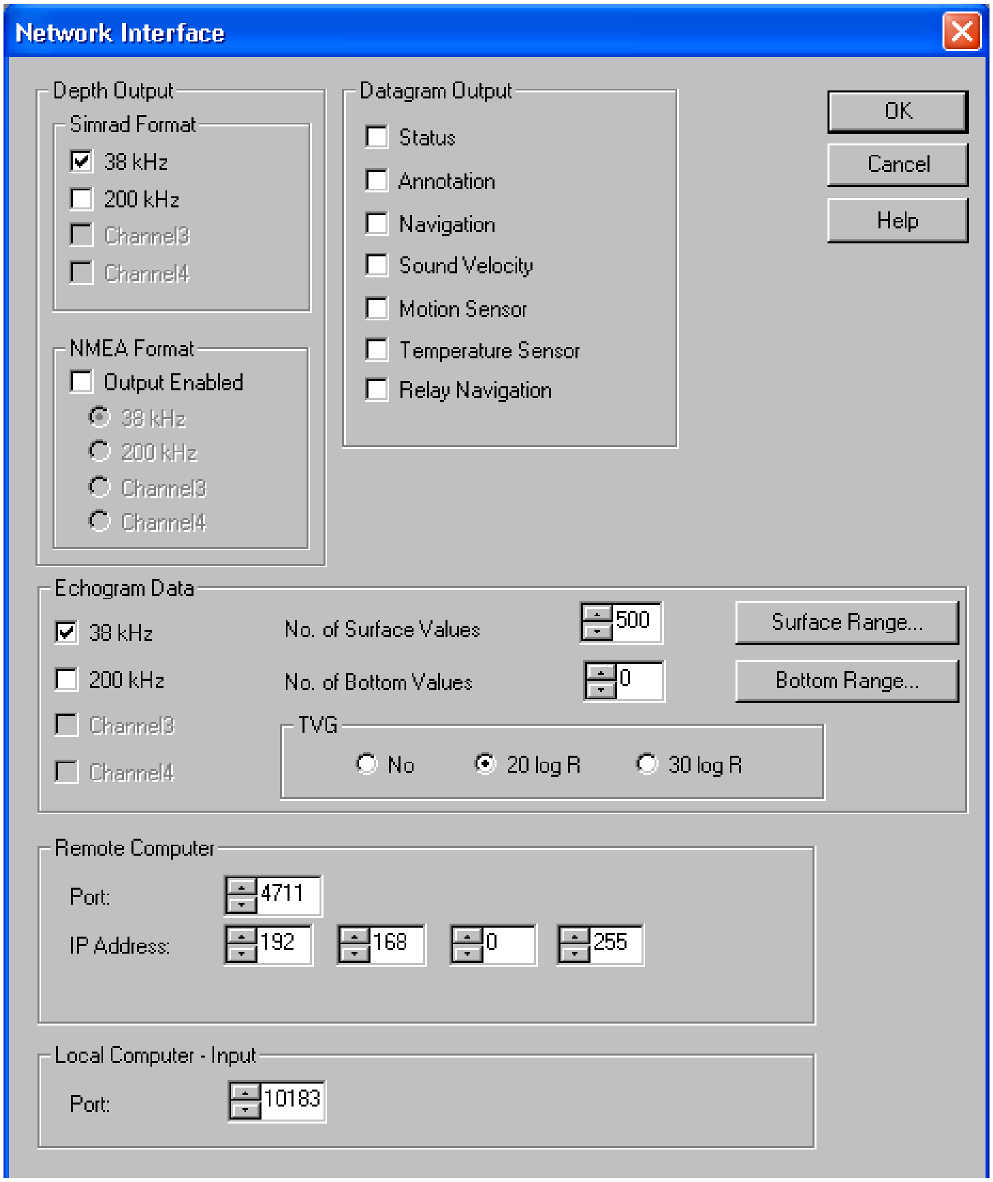


During testing the following settings have been used for the network interface of the *QINSy* PC.





On the Simrad Echosounder you must also define, besides the Port number, the IP Address of the Remote Computer. It is recommended to use a mask for the last field of the address.



3.7.22 Sweep Depth (Imtech DMS 3500)

Input / Output:	Input	*Driver class type:*	UDP/IP Client
Executable name:	DrvDraughtSocket.exe	*Drivers.io options:*	none
Last modified:	2003-Dec-10		

Driver Description

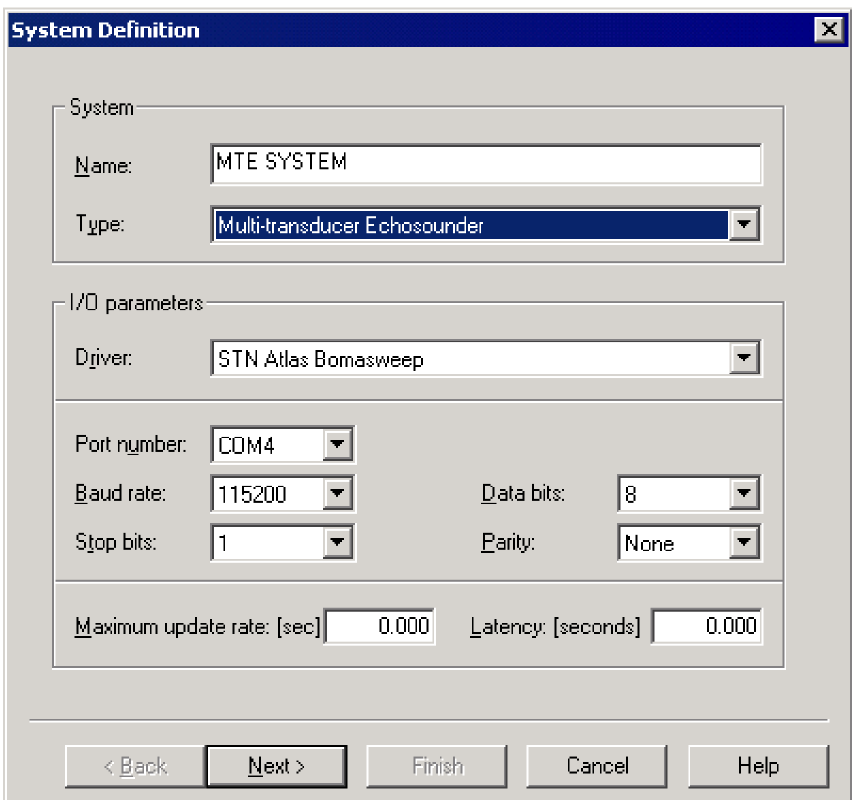
Driver for decoding the depth from a sweep system.

See for more information Miscellaneous driver ‘Draught Measurement System (Imtech DMS 3500).

3.8 MULTI-TRANSDUCER ECHOSOUNDER DRIVERS

Database Setup

First define and select the “Object” on which the multi-transducer system is located. Select item “Systems” and define a new “Multi-transducer Echosounder”. Select the appropriate driver and interface parameters. Be sure to select a baud rate that is high enough to transfer all the data. Press the “Next” button to complete the setup. Select the object on which the transducers are located. Enter multi-transducer parameters. Press the “Next” button to add the tranducer nodes and their slot numbers. Press “Finish” to save the system.



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3.8.1 Navitronic (DPP 2000)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvNavitronic.exe	*Drivers.io options:*	*none*
Last modified:	2002-06-14		

Driver Description

Driver to decode the Navitronic Multi-channel Echosounder.

The system consist of a DPP 2000 Controller, which handles up to ten MCS 2000 Units.
Each unit can have 6 channels (read: transducer).
The DPP 2000 outputs for each channel the range measurement from the transducer head to the riverbed or
from water level to the riverbed.
This is a setting on the DPP Controller!

The DPP Controller may operate in Full Sync or
in Group Sync mode. The driver will autodetect the mode.

Format Description

Full sync.mode (all channels transmit at the same time) = 203 Characters

`$F11112222------nnnnq---qllllcl`

Where:	`$F`	2 characters, Start sign indicating Full sync. mode
	`1111`	4 characters, depth in cm for channel #1
	`2222`	4 characters, depth in cm for channel #2
	`---`	etc…
	`nnnn`	4 characters, depth in cm for channel #39
	`q---q`	39 times 1 character, Quality number for each channel
	`llll`	4 characters, Latency in msec
	`cl`	2 characters, Carriage Return and Linefeed

Group sync.mode (all channels #1 for each group, then all channels #2, and so on) = 223 Characters

`$G11112222------nnnnq---qllll---llllcl`

Where:	`$G`	2 characters, Start sign indicating Group sync. mode
	`1111`	4 characters, depth in cm for channel #1
	`2222`	4 characters, depth in cm for channel #2
	`---`	etc…
	`nnnn`	4 characters, depth in cm for channel #39
	`q---q`	39 times 1 character, Quality number for each channel
	`llll---llll`	6 times 4 characters, Latency in msec for each group
	`cl`	2 characters, Carriage Return and Linefeed

Format Example Full Sync Mode

```
$F 182 173 165 321 376 173 153 185   0    0    0    0999989980000 212
$F 182 173 165 321 365 173 153 185   0    0    0    0899889980000 212
$F 182 173 167 321 365 173 153 185   0    0    0    0999999980000 207
$F 182 173 165 321 371 173 153 185   0    0    0    0989899980000 203
```

Format Example Group Sync Mode

```
$G 562 547 547 532 532 532 517 503 489 489 476 476999999999999 180 181 182 183 184 479
$G 542 557 547 532 532 522 517 503 489 489 476 476999999999999 180 181 182 183 184 479
$G 522 537 547 532 532 512 517 503 489 489 476 476999999999999 180 181 182 183 184 479
$G 512 547 547 532 532 522 507 503 489 489 576 476999999999999 180 181 181 181 184 479
```

Decoding Notes

At this moment only 12 channels (hard-coded) are decoded.
The Qaulity Indicator can be interpreted as a figure between o and 9, 9 stands for best quality, 0 for poorest.

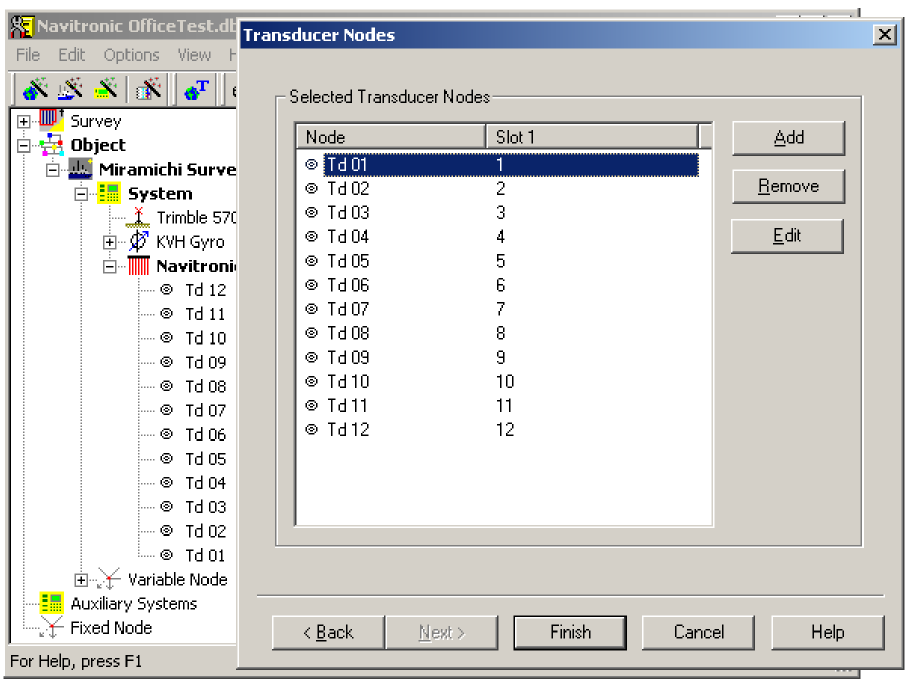
Interfacing Notes

Only a one-way interfacing cable is required for this driver.

Database Setup

See description under MULTI-TRANSDUCER ECHOSOUNDER SYSTEM DRIVERS.

Additionally all the transducer nodes must be defined as variable nodes on the vessel. These can be assigned to the system on the last page of the multi-transducer system wizard. The slot numbers are the locations of the depth soundings in the string. Normally the portside most transducer is number 1.



Drivers.io Options

None.

3.8.2 STN Atlas Bomasweep

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvAtlasBomasweep.exe	*Drivers.io options:*	*none*
Last modified:	2001-05-08		

Driver Description

Driver for the Atlas Bomasweep. This sensor consists of a number (49) of separate sensors, each giving a range measurement from the transducer to the riverbed.

Format Description

The composite system sends a number of strings. The first six characters denote the type of string. The most important is the **SZ7202** string, which contains the raw depth measurements. The depths are decoded up to 5 decimal places, units are centimeters. A depth quality is also included (1 = valid, 0 = invalid). Some other data strings are: **ST0015**: number of transducers; **PA0020**: start and end depth; **SZ0014**: sound velocity.

Format Example

```
SZ7202 18205767 00000000000 000000000 000000 000000 000520 0000 0001 001
00 00000 034 000 02472 1 02450 1 02427 1 02401 1 02373 1 02344 1 02311 1
02278 1 02243 1 02207 1 02170 1 00554 1 00555 1 00556 1 00557 1 01980 1
01942 1 01904 1 01868 1 01834 1 01801 1 01769 1 01738 1 01710 1 01685 1
01661 1 01640 1 01621 1 01606 1 01593 1 01584 1 01577 1 01572 1 01572 1
01574 1 01580 1 01589 1 01600 1 01614 1 01631 1 01651 1 01674 1 01700 1
01726 1 01756 1 01788 1 01822 1 01857 1 01892 1
```

Decoding Notes

Only the 4 above mentioned data strings (SZ7202, ST0015, PA0020, SZ0014) are decoded.
A quality indicator is decoded from the incoming data. It can be interpreted as a “Brightness Test” flag, 1 stands for a valid beam, 0 for an invalid beam.

Interfacing Notes

A two-way interfacing cable is required for this driver. At startup, the driver sends the last used start/end depth and sound velocity to the unit. The user may enter the required depths and speed of sound in the GUI and send them to the unit.

Database Setup

See description under MULTI-TRANSDUCER ECHOSOUNDER SYSTEM DRIVERS.

Additionally all the transducer nodes must be defined as variable nodes on the vessel. These can be assigned to the system on the last page of the multi-transducer system wizard. The slot numbers are the locations of the depth soundings in the string. Normally the portside most transducer is number 1.

Drivers.io Options

None.

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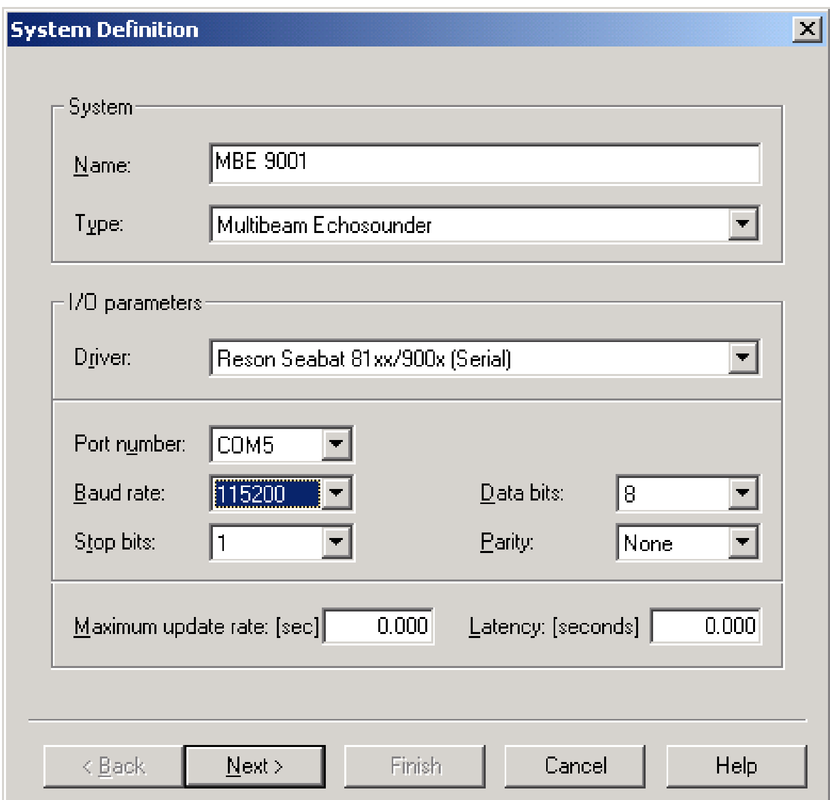
3.9 MULTIBEAM ECHOSOUNDER DRIVERS

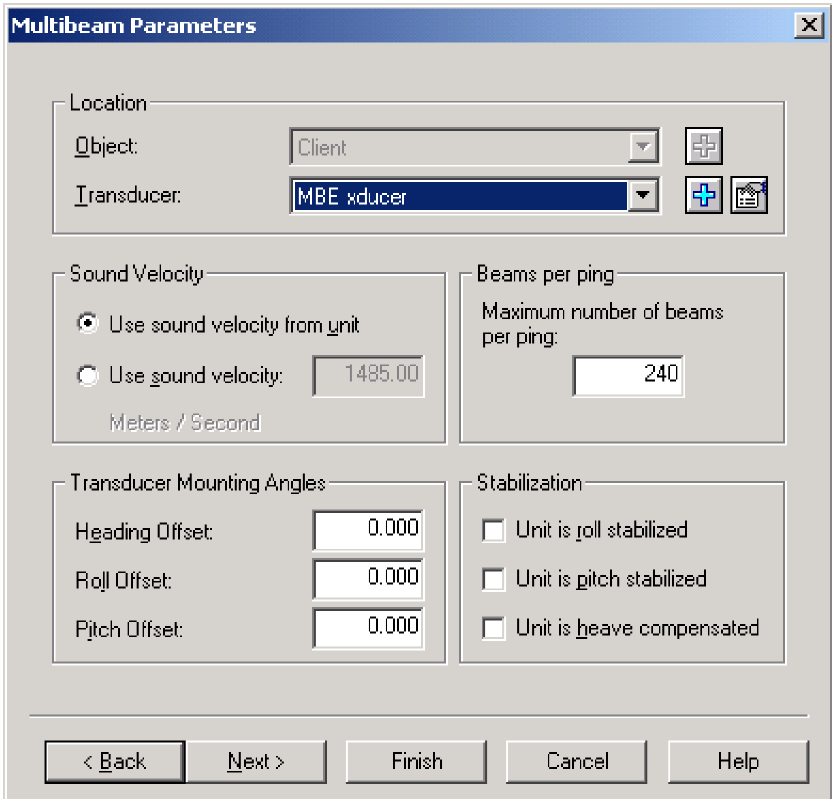
Database Setup

First define and select the “Object” on which the multibeam transducer is located. Select item “Systems” and define a new “Multibeam echosounder”. Select the appropriate driver and interface parameters. Be sure to select a baud rate that is high enough to transfer all the data. Press the “Next” button to complete the setup. Select object and node for the transducer. Enter multibeam parameters. Press “Finish” to save the system.



Database Setup (continued)

A new transducer node can be added by pressing the  button; to change its properties, press  button.



Note 1. Dual head multibeam echosounders are treated by *QINSy* as **two** separate MBE systems, each with its own transducer node, node offsets and mounting angles. Roll offset values usually will have opposite signs.

Note 2. In case of Reson Seabat network drivers, the Seabat UTC synchroniser driver has to be defined too.

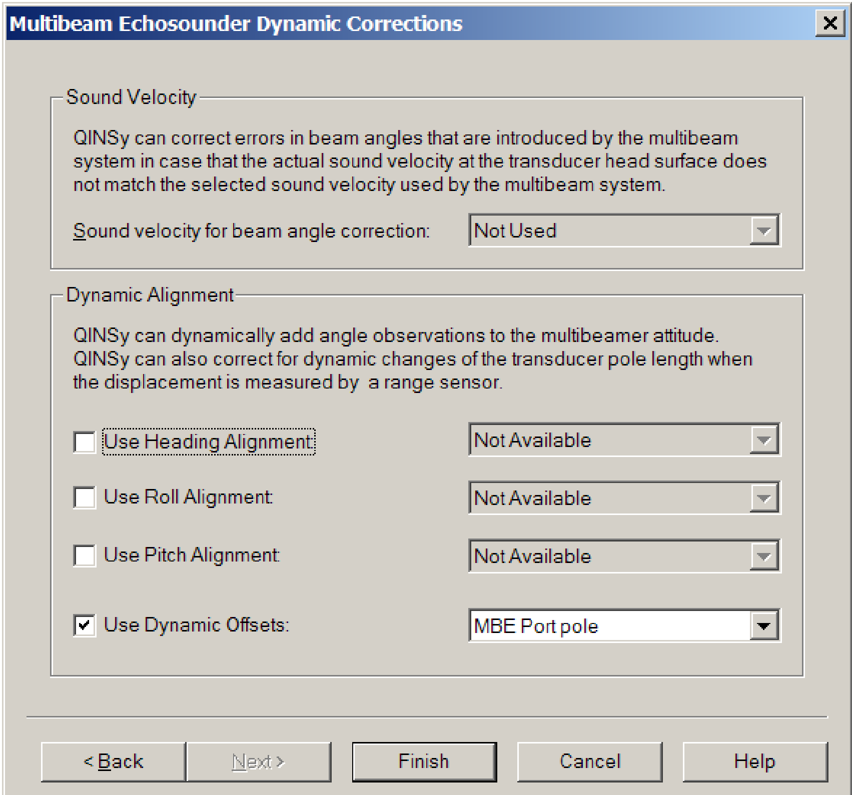
Note 3. The number of beams is very important. Be sure that it corresponds to the output of the MBE unit.

Note 4. A sound velocity profile can be entered in DB Setup under "Edit – New – Velocity Profile". When online in the Controller, select "Settings – Echosounders – Refraction" to determine which profile to use.

Note 5. Mounting angles result of calibration. Those from the Patch Test utility or Validator can be entered directly.

Press the next button to go to the Dynamic Correction pages.

Database Setup (continued)



Sound Velocity
Here you can select if you want to correct for wrong sound velocity. This is only applicable to Kongsberg Simrad Multibeam systems, primarily EM3000, For any other brand this correction is not used.
The multibeamer can apply a correction to the beam- and tilt angles if the sound velocity differs between what was entered as fixed value inside the multibeam system and what is actually measured with a sound velocity probe at the head. Selected can be ‘none’, in that case no correction are required. In order to activate this option you should define an Underwater Sensor - Sound Velocity observation first. To define an underwater sensor system refer to respective chapter.

Dynamic Alignment – Heading/Pitch/Roll
The Heading/Roll/Pitch options can be used if the multibeam transducer is mounted on a rotating frame. If the multibeam transducer has a fixed mounting, as with most survey vessels , this is not relevant and you should leave these options unchecked. If the transducer is mounted on a turning or tilting frame, check the required rotation axis/axes and assign the angle observation of that particular angle. Note that the angle observation must be defined first in order to select it here. Only observations of type “Angle” and with the “At Node” corresponding to the Multibeam Transducer Node are displayed here.

Database Setup (continued)

Dynamic Alignment – Dynamic Offsets
Sometimes a multibeam transducer is placed on a retractable frame or pole. This is often the case with hull-mounted sonar's. If the range of the transducer displacement is interfaced into *QINSy* then the multibeam results can be compensated for the fact that the transducer offsets change.
QINSy supports a transducer displacement in only one direction, by default the vertical direction. It is however possible to define the direction in which the pole moves, this is useful when the pole is not mounted exactly vertical into the reference frame of the vessel. If this is the case then a transducer displacement not only causes the Z local coordinate to change but it also effects the transducers' X and Y local coordinates.
The system that measures the length of the transducer pole must be interfaced with a Surface Navigation system driver to *QINSy*. Generally this is a custom made driver, for example the WAGO driver. It is also possible to select a manual driver; you can then enter the length of the transducer pole yourself.

About setting up the Surface Navigation System:
First select the correct system, then an observation with type "Range" must be defined. Make sure to select the correct unit / C-O and / or scale factor.

-Define the Location/At Node identical to the node that was selected for the multibeam system. If the node is not identical to that of the multibeam system then the range observation can never be selected in the multibeam system settings!

-Define the To Node as the local offset of the transducer when it is fully lowered. If the pole is mounted straight down in the vessel frame then make the X/Y coordinates identical for both nodes and the To Node's Z coordinate smaller than the At Node. With these setting *QINSy* will apply the shift as purely vertical.

If the At- and To Nodes have different X/Y coordinates then the shift is considered to be in a non-vertical direction. The transducer will move on a straight line that intersects with the two nodes.

Important. *QINSy* will assume that the transducer is located in the at-node if the observed range observation is zero. If the range equals the distance between the at- and to-node then *QINSy* assumes that the transducer is located in the to-node.

For more information on how to setup a range observation refer to the chapter "Surface Navigation Systems". See for more information the *QINSy* DB Setup Help Topics or the *QINSy* Knowledge Base.

Mechanical Profiler Systems

QINSy considers profiler systems as multibeam echosounder systems with different ping times for each beam (data point), instead of one ping time for all beams. Processing of the data points is therefore similar.

Important note. It is important to realize that a profiler scan contains data points which have been collected during some period of time that can last seconds. In addition, the data strings are quite long and take some time to be transferred to the *QINSy* computer. Add some time for pre/post scans and calculations in the profiler system, and it will take seconds after the start of a scan, before the *QINSy* driver will receive and decode the data string and the MultiBeamer module can start processing a profiler scan. Before September 2004, there was a limitation to the number of positions (10, registry setting, see remark *) and the number of attitude values (200, fixed) that are available in the MultiBeamer for interpolation. From September 2004 on, these values have been changed to 20 and 500, respectively.

For fast updating positioning systems or gyro and/or MRU systems, the number of positions or attitude values can possibly be not enough to cover the time period needed to compute and correct all the scan data points. It is therefore recommended to use update rates of 1 Hz for positioning systems and maximal 10-20 Hz for attitude systems. This will also improve positioning by the Adjustment/PositionFilter modules.

*) [HKEY_CURRENT_USER\Software\QPS\QINSy\7.0\Core\MultiBeamer\Settings] "MaxPosUpdates"
The number of positions must be enough to be able to compute the oldest data point in a profiler data string. For example, if the triggering system for the computation updates 2 times a second and the profiler data string contains 6 seconds of data points (calculated by the driver) and is sent 1 second after it has been compiled by the profiler (system latency), interpolation will require $2 \cdot (6+1) + 1 = 15$ positions.

Pipe and Cable Tracker Systems

QINSy considers pipe- or cable-tracker systems as multibeam echosounder systems with just one beam (data point) in dX-dY-dZ format, where dY is often 0. Processing of the data points is therefore similar.

3.9.1 Aran Rut Bar

Input / Output:	Input	*Driver class type:*	Counted
Executable name:	DrvAranRutBar.exe	*Drivers.io options:*	*none*
Last modified:	2000-10-30		

Driver Description

Driver for the Aran Rutbar sensor. This sensor is used on the Automatic Road Analyzer (ARAN) for profile measurements of roads. The sensor uses a proprietary format that may not be reproduced here.
The driver is configured as a multibeam system and creates XYZ multibeam observations. The number of beams is taken from the calibration data.

Decoding Notes

The observations are checked for too short to long values, and corrected for the measurement window base. Optionally the value from the calibration sensor can be used as a scale-factor to correct the observations.

The decoded Quality Indicator (QI) can be interpreted as a figure with a range between 0 and 3:

QI	Beam Status	
1	*Interpolated*	*(=best quality)*
2	*Invalid*	
3	*Bad Observation*	

System Configuration

The Rutbar is connected to a Central Data Acquisition Computer (CDAC) which configures the Rutbar. The commands from the CDAC and the replies from the Rutbar are both available to *QINSy* on the same pin.

Database Setup

See description under MULTIBEAM ECHOSOUNDER SYSTEM DRIVERS. The maximum number of beams received from the Rutbar is 39.

Drivers.io Options

None

3.9.2 L3 Communications Seabeam 1180 / 1885

Input / Output:	Input (Network)	*Driver class type:*	TCP Client
Executable name:	DrvSeabeamSocket.exe	*Drivers.io options:*	None
Last modified:	2000-Jul-07		

Driver Description

Driver for L3 Communication 1180 en 1885 multibeam echosounders using a network connection to the L3 Communications supplied HydroStar software. The driver will decode the data and present it to rest of the system as mechanical profiler data. The reason for this is the timing mechanism that is being used to transmit the acoustic energy. Acoustic energy is being transmitted for small groups of beams (i.e. 3 beams) which causes different ping times for each group of beams. The driver uses a network connection with the L3 supplied HydroStar software to obtain the multibeam data. The system time on the computer running the HydroStar software needs to be synchronized to the system time of the computer running *QINSy.* This may be accomplished by synchronizing both computers to the same time frame (i.e. a PPS interface on both computers) or by running the *QINSy* and the HydroStar software on the same computer.

Format Description

See the L3 issued document with the title *"Data Exchange Format (XSE)"*.
The driver was developed using revision 1.6 of this document.

Decoding Notes

The timetag from the data packets is used. Therefore it is required to synchronize the times of the *QINSy* and the HydroStar system to UTC using an external timeframe (i.e. PPS interface from a GPS receiver).

The packets that are being decoded are:
- Multibeam General Group
- Multibeam Traveltime Group
- Multibeam Delay Group
- Multibeam Angle Group

The decoded Quality Indicator (QI) can be interpreted as a figure with a value between 1 and 8, 1 stands for best quality, 8 for worst quality.

System Configuration

See description below.

Database Setup

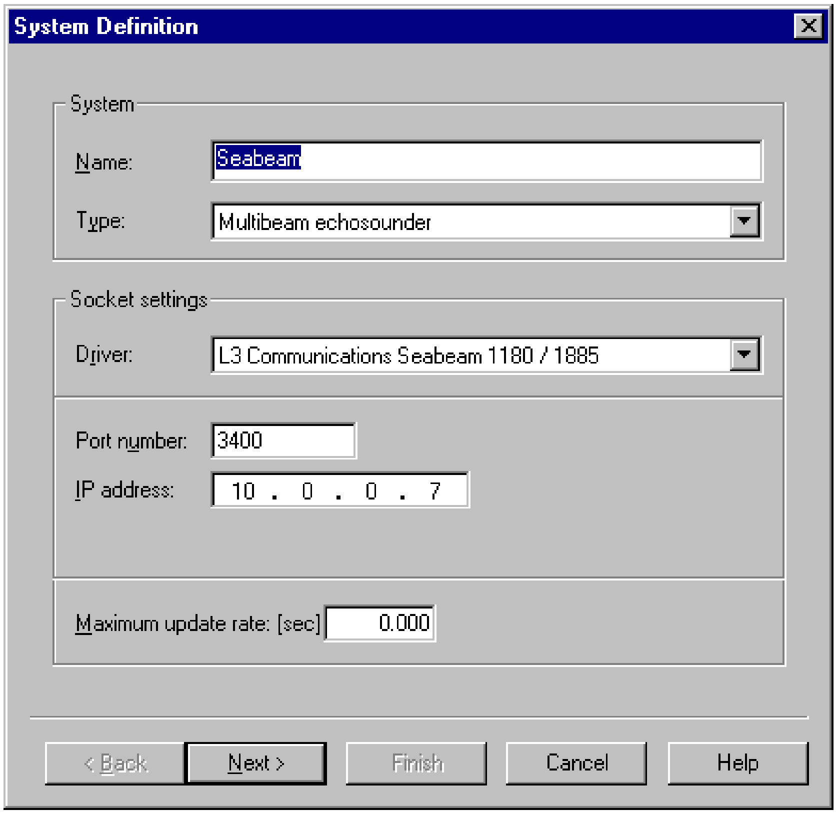
See description on next page and under "MULTIBEAM ECHOSOUNDER SYSTEM DRIVERS".

Controller Setup

When online, select the "Echosounder ..." option from the "Settings" menu to define the positioning of the echosounder transducer node, as well as the online blocking and filtering of the multibeam echosounder data. Use a Raw Multibeam Display to show raw data and a Swath System Display to show the corrected scans.

Seabeam IP Number & Port Number Configuration

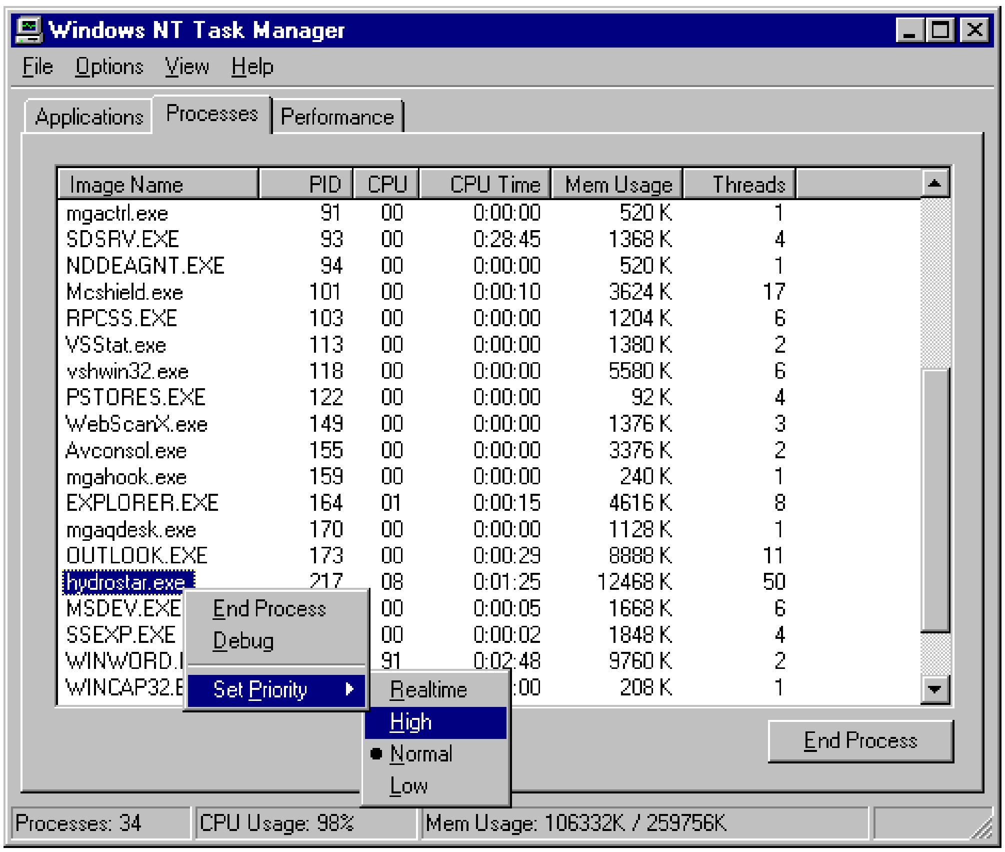
From the HydroStar software the data packets are send over a network link. This requires all computers involved to run the TCP/IP protocol on their network cards. As with any network configuration, the IP numbers for all computers involved should be unique. The following screen capture shows an installation on which the HydroStar software is running on the computer with IP address 10.0.0.7 and is listening on port 3400 (= default HydroStar port).



Changing the Hydrostar Software priority setting

To allow accurate time tagging of the sensors in *QINSy* the priority of certain drivers is elevated above the normal priority setting. Since the HydroStar software functions as an intermediate driver between the L3 Seabeam unit and *QINSy* its priority also needs to be increased. Because *QINSy* only increases the priority of its own drivers the user has to manually increase the priority of the HydroStar software. This has to be repeated every time the user starts the HydroStar software. However <u>this procedure only needs to be executed when the HydroStar software and *QINSy* are running on the same computer</u>. If the HydroStar software is running on a separate computer (which needs to be synchronised to the computer running *QINSy*) this procedure is not required.

To increase the priority the user has to start the Task Manager by right clicking in the taskbar. After the Task Manager has started the second tab sheet called 'Processes' shows all the running processes. The user should search for a process called "hydrostar.exe". Once found, he/she should right click on the process to change its priority setting to "High" (see also screen capture below). This makes sure that Hydrostar software receives enough CPU time to perform accurate time tagging.



3.9.3 Marimatech E-Sea Swath 501 (5 Channel echosounder)

Input / Output:	Input (two-way)	*Driver class type:*	Terminated
Executable name:	DrvESeaSwath501.exe	*Drivers.io options:*	
Last modified:	2000-Mar-31		

Driver Description

Driver for Marimatech E-Sea Swath 501 5 channel echosounder. The echosounder is seen as a mechanic profiler because of the delays for each of the five channels. The echosounder unit is interrogated for the sound velocity (CS<CRLF>) at startup and when resetting the I/O.

Format Description

<F1><F2><F3><F4>111111,ddd,ss,222222,ddd,ss,333333,ddd,ss,444444,ddd,ss,555555,ddd,ss<CRLF>

Field	Format	Description	Example
1	<F1>	See below (*1)	N/A
2	<F2>	See below (*2)	N/A
3	<F3>	See below (*3)	N/A
4	<F4>	Reserved	x
5	111111	Distance to bottom in us	79452
6	ddd	Delay in msec (*4)	88
7	ss	Bottom ampl.strength (*5)	65
8-19		4 more channels (2-5)	
20	<CRLF>	Carriage return linefeed	

*1 Can be C (Corrected for roll / pitch and heave) or R (Raw data)
*2 Can be M (Request marker info from computer) or x (No marker info)
*3 Can be 1-5 (Printer on, channel selected for continuous printout) or x (Printer off)
*4 Delay in msec between sending the first byte of the depth string and transmitting by the corresponding channel
*5 Bottom amplitude strength (relative units in the range of 0-99)

Example data:
`Rxxx72120,88,65,79452,169,56,76640,255,56,79026,337,59,82720,422,43`

Sound velocity data, as returned on interrogation, is according to the following format:

CSVVVV<units><CRLF>, for example `CS1485m/s`

where CS is a header, VVVV is the sound velocity, and <units> can be "m/s", "ft/s", "f/s".

Decoding Notes

No Quality Indicators (QI) are available. QI will always be set to 3.

Database Setup

See description under “MULTIBEAM ECHOSOUNDER SYSTEM DRIVERS”.

3.9.4 Odom Echoscan

3.9.5 Odom Echoscan XTF

Input / Output:	Input	*Driver class type:*	Counted
Executable name:	DrvOdomechoscan.exe	*Drivers.io options:*	RAW | NOCS
Last modified:	2003-Aug-12		

Driver Description

Driver for Odom Echoscan Multibeam Echosounders using a serial cable connection. The Odom Echoscan is a 30 beam Echosounder which uses so-called physical beamforming. In fact it can be seen as a multi transducer echosounder with all it's transducers integrated in a single hull.

The XTF version will store the raw XTF data records in the *QINSy* database. Such a database can afterwards be used to export the XTF records to a separate file. However, using this option will create much larger db's.

Format Description

Serial Output Strings
Serial output data rate from the ECHOSCAN SPU is 19.2 KBaud, updating
as fast as 16 times / second (depending upon the Range selected).
Output strings are ASCII binary and described as follows:
Data Description
Sync Header Four, 8-bit bytes (FFh, FFh, 00h, 00h) identifying the beginning of the output string
Packet Type (10 or 01) Two 8-bit bytes (00h, 01h) identify the ECHOSCAN binary output *1
Year (0-99), Month (1-12),
Day (1-31), Hour (0-23),
Minute (0-59), Second (0-59)
Six, 8-bit bytes - Year (00h-63h), Month (01h-0Ch), Day (01h-1Fh), Hour (00h-17h), Minute (00h-3Bh), Second (00h-3Bh)
Sound Velocity (1200-1700 m/s)
One 16-bit word (Example: 04h B0h - 06h A4h) as set by the operator on the LCDU
Latency (0-1000 ms) One 16-bit word (Example: 00h 00h - 03h E8h) indicating the time lapsed between the sonar ping to the start of the fourth byte in the output string
Sampling Rate (HZ) One 16-bit word representing the digitizing frequency
Range Samples / Beam Quality
Individual range readings (in No. of samples)*1
Range = Range Samples (Sound Velocity) / Sample Rate 2
Checksum One 16-bit word, unsigned sum of all 8-bit bytes excluding the sync byte.

*1 The ECHOSCAN string contains 30, 16-bit ranges for a total of 80 bytes and a transmission time of 42 ms. Beam directions are in 3° increments, across Port (Beam 1) to Starboard (Beam 30). Beams 15 and 16 are each 1.5° off nadir. The most significant 14 bits of each range represent the round trip travel time in samples. The 15th and 16th bits (least significant) indicate beam quality, i.e., 00b = bad, 01b = low signal strength, 10b = out of sequence, and 11b = good.

[source Odom echoscan manual]

Decoding Notes

- Timetag from data packets is not used, instead the time of arrival of the first string is used in combination with the latency provided in the output message. The latency is typically identical to the ping interval.

- Decoded ranges are considered to be from one common acoustic centre in the middle of the transducer hull.

- The decoded Quality Indicator (QI) can be interpreted as a figure with the following possible values:

QI	Beam Status	
0	*Bad*	*(= worst)*
1	*Low Signal Strength*	
2	*Out of Sequence*	
3	*Good*	*(=best)*

Database Setup

See description under “MULTIBEAM ECHOSOUNDER SYSTEM DRIVERS”.

Refer to Odom documentation for information about the acoustic centre of the transducer.

Controller Setup

When online, select the "Echosounder..." option from the "Settings” menu to define the positioning of the echosounder transducer node, as well as the online blocking and filtering of the multibeam echosounder data. Use a Raw Multibeam Display to show raw data and a Swath System Display to show the corrected scans.

To exclude invalid beam data from the result dtm’s you can flag the beam based on the beam quality indicator value. Set for example the Echosounder settings “Exclude Data when – Quality outside” range from 3 to 3 to block beams that do not have a Quality of “Good”.

Drivers.io Options

Command line parameter “NOCS” can be used to skip checksum test. “RAW” will store the XTF records.

3.9.6 Reson Seabat 81xx/900x (Serial) [XTF]

Input / Output:	Input	*Driver class type:*	Counted
Executable name:	DrvSeabatSerial.exe	*Drivers.io options:*	RAW | NOCS
Last modified:	1999-Dec-10		

Driver Description

Driver for Reson Seabat 81xx & 900x series Multibeam Echosounders using a serial cable connection. Driver will automatically detect the input format, but will only decode R_THETA or RI_THETA packets.
The XTF version will store the raw XTF data records in the *QINSy* database. Such a database can afterwards be used to export the XTF records to a separate file. However, using this option will create much larger db's.

Format Description

See Reson Seabat manuals.

Decoding Notes

The timetag from the data packets is <u>not</u> used, instead the time of arrival of the first string is used in combination with the latency provided in the output message.

The decoded Quality Indicator (QI) can be interpreted as two flags:
- Brightness Flag (0 = invalid, 1 = valid)
- Colinearity flag (0 = invalid, 1 = valid)

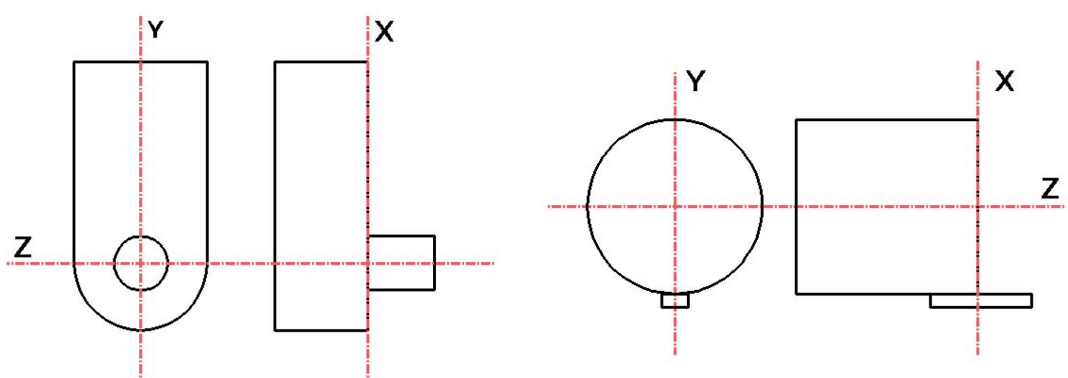
Database Setup

See description under "MULTIBEAM ECHOSOUNDER SYSTEM DRIVERS".

Drivers.io Options

Command line parameter "NOCS" can be used to skip checksum test. "RAW" will store the XTF records.

Seabat 81xx/900x Offsets



Drawings that show the acoustic centres for the SeaBat 900x series (left) and SeaBat 8101 (right) systems

Source: Reson Inc website (http://www.reson.com)

3.9.7 Reson Seabat 81xx/900x (Network) [XTF]

Input / Output:	Input (Network)	*Driver class type:*	UDP/IP Client
Executable name:	DrvSeabatSocket.exe	*Drivers.io options:*	RAW | NOCS
Last modified:	1999-Dec-10		

Driver Description

Driver for Reson Seabat 81xx & 900x series Multibeam Echosounders using a network connection. The driver will automatically detect the input format, but will only decode R_THETA or RI_THETA packets. The XTF version will store the raw XTF data records in the *QINSy* database. Such a database can afterwards be used to export the XTF records to a separate file. However, using this option will create much larger db's.

Format Description

See Reson Seabat manuals.

Decoding Notes

The timetag from the data packets is used (if it is not zero) if the Reson Seabat driver is a network driver. Therefore it is highly recommended to synchronize the times of the *QINSy* and Seabat systems by adding the output driver "Seabat 8000 Series UTC Synchroniser" to the database. If the *QINSy* online setup includes a PPS system, then the timetag will be truly UTC. See description under "OUTPUT SYSTEM DRIVERS".

The decoded Quality Indicator (QI) can be interpreted as two flags:
-Brightness Flag (0 = invalid, 1 = valid)
-Colinearity flag (0 = invalid, 1 = valid)

System Configuration

See description below.

Database Setup

See description on next page and under "MULTIBEAM ECHOSOUNDER SYSTEM DRIVERS".

Controller Setup

When online, select the "Echosounder..." option from the "Settings" menu to define the positioning of the echosounder transducer node, as well as the online blocking and filtering of the multibeam echosounder data. Use a Raw Multibeam Display to show raw data and a Swath System Display to show the corrected scans.

Drivers.io Options

Command line parameter "NOCS" can be used to skip checksum test. "RAW" will store the XTF records.

Seabat IP Number Configuration

From the Reson Seabat units some, or all, data types can be sent over a network link. These data are of a broadcast type and require the receiving computers to run the TCP/IP protocol on their network cards. As with any network configuration, the IP numbers of both the computer and the Seabat unit should be unique.

(continued on next page)

Seabat IP Number Configuration (continued)

The 9000 series sonar will send its bathymetry data over the serial ports only. If the sidescan option is enabled, this data will be made available over the network connection only. QPS has not yet encountered a 9000 series sonar with sidescan option, so unit is assumed to work identical to the 8100 series sonar.

The description above applies for the 8101 series sonar. Bathymetry is available on the serial port only and sidescan data is only available on the network port. The later models of the 8100 series, like the 8125 and 8111, have the option to send the bathymetry data over the network connection too. This is necessary, as the huge amount of data cannot be processed over the serial connection, even at 115200 baud.

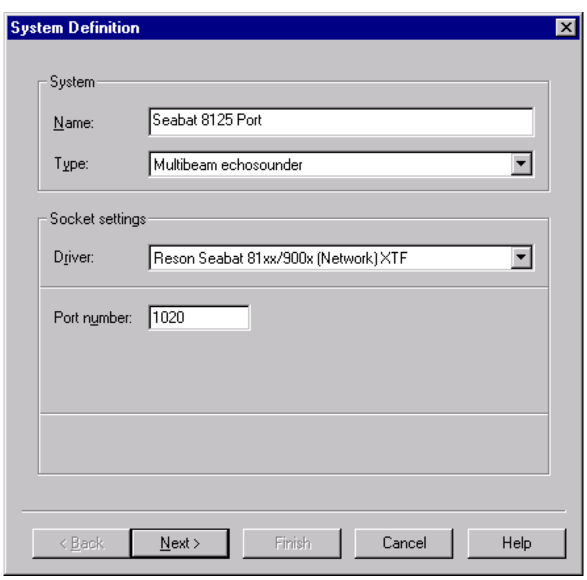
For the network connection the following IP addresses have been used successfully. (1) On a ***dual head 8125*** installation, the two sonar processors had IP addresses 010.000.001.001 and 010.000.001.002. The computer was set to IP address 010.000.001.003. Although many more combination will operate, this is a proven combination. (2) On a ***8101*** installation using sidescan the settings for local can be 010.000.001.001 and extern 010.000.001.003 and the port set to 1028. Be sure to set the sidescan option working in Menu 6 , recommended is to use the RMS option. However, many more combinations might be working as well.

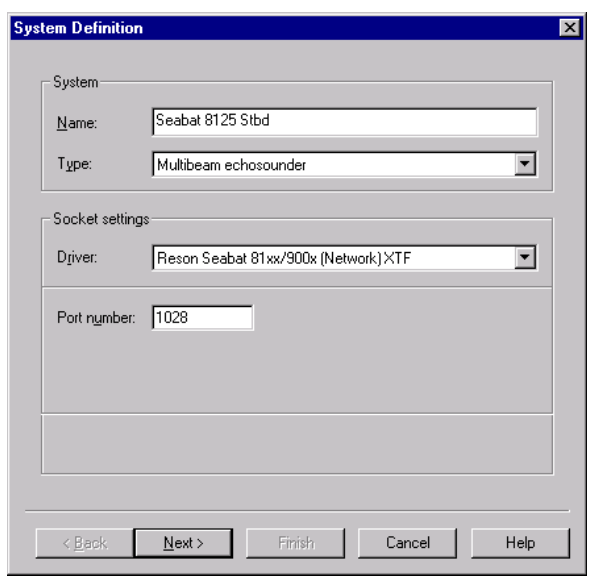
In the 'byte' screen of the Seabat unit the IP addresses can be set. To enter the 'byte' screen click on the green square in the top left corner of the display. This square can be red if there is an error in the setup.

Set the IP address for 'local' to the IP address of the Seabat unit. The 'extern' IP address can be set to the address of the computer you want to receive the data on. This setting seems to be ignored, as there is a 'subnet' mask to be set. This defines which range of IP numbers will receive the data. In our example setting above we could set a subnet mask of 255.255.255.0. This will only allow computers in the IP range of 10.0.1.0 to 10.0.1.255 to receive the data.

The port number needs to be defined and has to be unique on the network as well. This is what can be compared as the serial port number in serial communications. Port numbering is related to IP numbering and workable values in our example are 1028 and 1020. The difference in port numbers has to be 8 or more.

In Db Setup one only has define the port number at which the unit broadcasts as driver parameter. The IP numbering is obsolete and not visible anymore. Older versions of *QINSy* will get prompted to enter an IP address. This address should be the address of the Seabat processor.





3.9.8 Reson Seabat 7K (Network)

Input / Output:	Input (Network)	*Driver class type:*	TCP Client
Executable name:	DrvSeabat7K.exe	*Drivers.io options:*	*none*
Last modified:	2003-Dec-31		

Driver Description

Driver that decodes bathymetry, sidescan and snippet data (snippet not supported yet) from a Reson Seabat 7K series Multibeam Echosounder using a network connection.
The driver will automatically connect to the multibeam system over the network interface. The driver will request only the records that it needs in order to fulfil its interfacing task; this keeps the network traffic as low as possible.
The driver can also be used to send commands (e.g. start pinging/stop pinging) to the Seabat 7K. Commands are initiated from another driver (to be implemented).

The Seabat 7K processor can process data from multiple sonar and /or bathymetry Seabat systems. This driver will always select the first available multibeam system that is reported by the processor.

XTF is not yet supported.

Format Description

The Driver requests various record types from the Seabat 7K. This depends on what type of data must be decoded:

Data type:	Required 7K records
Bathymetry	7000 (Ping Header), 7004 (Beam Angles), 7006 (Ranges)
Sidescan	7000 (Ping Header), 7007 (Sidescan Image)
Snippets	7000 (Ping Header), 7004 (Beam Angles), 7006 (Ranges), 7008 (Beam Data)

Note: snippet decoding is not supported yet

The driver uses the 7500 (Remote Command) record to send commands to the Seabat 7K.

For more details on these records please refer to the Reson Seabat 7K Interface Control Document.

Decoding Notes

The time tag from the 7000 record's RECORD_FRAME is used as the ping observation time. Therefore it is **crucial** for proper operation that both Seabat 7K unit and *QINSy* are UTC synchronised (PPS).
Currently it is not possible to synchronise the Seabat 7K with the "Seabat 8000 Series UTC Synchroniser" driver and therefore should it be synchronised to UTC (PPS) autonomously.

-The decoded Quality Indicator (QI) can be interpreted as a figure with a range between 0 and 15. Zero depicts bad quality while 15 stands for best quality.

System Configuration

See description below.

Database Setup

See description on next page and under "MULTIBEAM ECHOSOUNDER SYSTEM DRIVERS".

Controller Setup

When online, select the "Echosounder..." option from the "Settings" menu to define the positioning of the echosounder transducer node, as well as the online blocking and filtering of the multibeam echosounder data. Use a Raw Multibeam Display to show raw data and a Swath System Display to show the corrected scans.

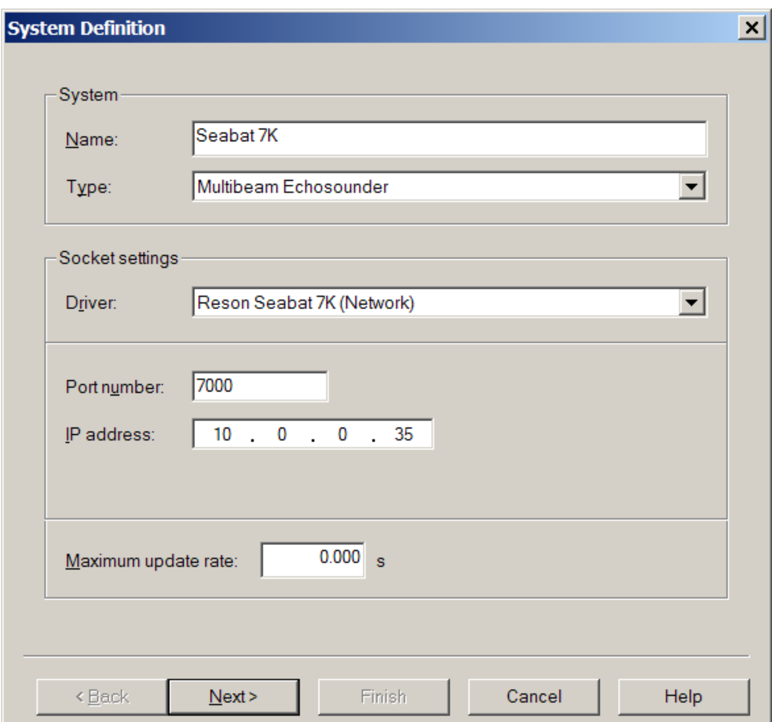
Drivers.io Options

None.

Seabat IP Number Configuration

As with any network configuration, the IP numbers of both the computer and the Seabat unit should be unique. Since the connection type is TCP it obligatory to enter the port number and the IP address of the Seabat 7K processor.

DbSetup:
-Port number must always be 7000. The Seabat 7K processor will always listen to connection requests on this port number.
-IP address is the address of the Seabat 7K processor.



3.9.9 Simrad EM1000 (X-Y-Z Format)

3.9.10 Simrad EM1000 (X-Y-Z Format) (No UTC)

Input / Output:	Input (Network)	*Driver class type:*	UDP/IP Client
Executable name:	DrvSimradEM1000.exe	*Drivers.io options:*	IO
Last modified:	2000-Feb-18		

Driver Description

Driver for Simrad EM1000 Multibeam Echosounder datagrams broadcasted over a network. Driver to be used to decode the MBE profile scans in X-Y-Z format. The Simrad EM1000 outputs either 60 or 48 beams, depending on the operational mode (13 modes for EM1000). Driver can use either the UTC timetags from the EM1000 profile scans, or the timetag for the first byte of a datagram that is received over the network.

Format Description

Binary EM1000 datagrams start with STX and message type, and end with ETX and a checksum. The total length of the datagram is 692 bytes. The checksum is the arithmetic sum of all "n" data bytes (from and excluding message type to and excluding ETX. The MBE clock time stamp resolution is 10 milliseconds.

EM1000 depth output datagram starts with the following bytes:

Byte	*Format*	*Description*	*Valid Range*	*Resolution*	*Remark, Units*
01	1U	start identifier (STX)	02h		always 02h
02	1U	type of datagram	97h		always 97h
03	6U	data (day month year)	010100 – 311299	1 day	DDMMYY
09	8U	time since midnight	0 – 23595999	0.01 s	HHMMSShh
17	2U	ping number	0 – 65535	1	
19	1U	operational mode	1 – 13	1	see below
20	1S	ping quality factor	-60 – 60	1	OK if positive
21	2U	depth below keel	0 – 65535	0.02	meters
23	2U	heading	0 – 3599	0.1	degrees
25	2S	roll angle	-2100 – 2100	0.01	degrees
27	2S	pitch angle	-2100 – 2100	0.01	degrees
29	2S	transducer pitch angle	-2100 – 2100	0.01	degrees
31	2S	heave (ping time)	-1000 – 1000	0.01	degrees
33	2U	sound velocity	14000 – 17000	0.1	M / s

EM1000 depth output datagram continues with 60 beam entries:

Byte	*Format*	*Description*	*Valid Range*	*Resolution*	*Remark, Units*
01	2U	depth from transducer (z)	0 – 65535	0.02	meters
03	2S	across-track distance (y)	-32768 – 32766	0.1	meters
05	2S	along-track distance (x)	-32768 – 32766	0.1	meters
07	2S	range (two-way travel time)	-32768 – 32766	0.0000	seconds
09	1S	reflectivity (BS)	-128 –0	5	dB
10	1U	quality factor	0 – 255	0.5	
11	1S	heave (reception time)	-100 – 100	0.1	meters

EM1000 depth output datagram ends with the following bytes:

Byte	*Format*	*Description*	*Valid Range*	*Resolution*	*Remark, Units*
01	1U	end identifier (ETX)	03h		always 03h
02	1U	checksum (LSB)			
03	1U	checksum (MSB)			

The operational modes are 1 = 60°, 2 = 120°, 3 = 150°, 4 = channel, 5 = 150°, 6 = 140°, 7 = 128°, 8 = 120°, 9 = 104°, 10 = 88°, 11 = 70°, 12 = port bank, 13 = starboard bank. Modes 1-3 have equiangle beam spacing, the rest equidistant. Mode 1 and 11 have a pulse length of 2 ms and 48 beams per ping, mode 2 and modes 8-10 0.7 ms and 48 beams per ping with interlacing, the other modes 0.2 ms and 60 beams with interlacing.

See for more information on how these values can differ for the various EM1000 modes and how these values should be interpreted, the *Kongsberg Simrad – Simrad EM Series P2317 – Datagram Formats.*

Decoding Notes

Only time, depth, across-track distance, along-track distance, reflectivity and quality factor are decoded.

-The decoded Quality Indicator (QI) is actually the number of beams that is used for bottom tracking within a range of 0 and 60. It is unknown which value is worst or which is best.

System Configuration

The unix workstation with Simrad software running on it, must send the data to *QINSy* through one of its Ethernet LAN ports. The workstation contains four LAN interfaces, LAN2, LAN3, LAN4 and LAN5. From these four interfaces, LAN4 is used to communicate with the X terminal(s) so this port can't be used to output data. Any other available port can be used. The workstation starts a so-called "data distribution" program for every LAN port; these programs handle the internal and external Ethernet communication of the workstation. The "data distribution" programs read an ASCII configuration that contains which type of datagrams are to be sent and where to send them; the files are stored in the rt user's home directory. A config file has a user definable file name; therefore an environment variable must be set for each "data distribution" program.

The following steps must be taken to add an output:

1) Determine which Ethernet LAN interface can be used.
   Either use a free port (in this case a config file should be added) or select a used port (in this case a config file must be modified and a HUB should be used to split the cables) If a used port is selected go to 3)
2) Add a MODULE_ADDRESESS environment variable to the start-up script named "start_data_distrib" (location unknown).
   for example: LAN3.addresses
3) Change or add a data distribution config file for the selected port
   The config file name should consist of the environmental var. with the host name added, for example LAN3.addresses.EM121A. File must be placed in rt user's home directory. Look at the other config files for info regarding the structure of these files. A line must be added at the bottom of the config file according the following format:

   <module name> <IP Address> <IP port nr> [<datagram1> <datagram2> …]
   for example:
   QINSy 128.160.50.130 2010 0x97

Notes:
-This will enable the sending of a depth(0x97) telegram to the *QINSy* PC which has an IP number of 128.160.50.130 and multibeam driver listens on port 2010.
-Use only spaces , no TABS allowed!!
-This chapter is provided for background information, QPS recommends that only qualified Kongsberg Simrad Engineers modify the workstation set-up.
-For more information contact your local Kongsberg Simrad Agent

Database Setup

See description under “MULTIBEAM ECHOSOUNDER SYSTEM DRIVERS”, except that the driver can only be used on a network, so instead of entering serial port parameters, the port number has to be entered.

Controller Setup

When online, select the "Echosounder ..." option from the "Settings” menu to define the positioning of the echosounder transducer node, as well as the online blocking and filtering of the multibeam echosounder data. Use a Raw Multibeam Display to show raw data and a Swath System Display to show the corrected scans.

Drivers.io Options

Command line parameter “IO” means that the first byte is time stamped, so that the *QINSy* time is used.

3.9.11 Simrad EM300x (R-Theta Format)

3.9.12 Simrad EM3000 (X-Y-Z Format)

3.9.13 Simrad EM3000D Head II (X-Y-Z Format)

3.9.14 Simrad EM3000D Head II (R-Theta Format)

3.9.15 Simrad EM3000 (R-Theta Format / D)

3.9.16 Simrad EM3000D Head II (R-Theta Fmt / D)

3.9.17 Simrad EM300x XTF (R-Theta Format)

3.9.18 Simrad EM300x XTF (X-Y-Z Format)

3.9.19 Simrad EM1002 (R-Theta Format)

Input / Output:	Input (Network)	*Driver class type:*	UDP/UP Client
Executable name:	DrvSimradEM3000.exe	*Drivers.io options:*	0 | 1 | 2 | DII | RAW EM1002
Last modified:	2004-Feb-24		

Driver Description

Driver for Simrad EM3002 / EM3000(D) / EM1002 Multibeam Echosounder datagrams broadcasted over a network. Driver to be used to decode either the XYZ position of the footprints (X-Y-Z Format) or the raw range and angle (R-Theta Format) from either D,F or f datagram. The Simrad EM3000(D) has 127 (2 x 127) beams, but only valid beams will be broadcasted. The EM3002 (an improved EM3000) will have maximum 254 beams. The *QINSy* driver will restore invalid beams, by resetting all values to 0, except for quality factor and intensity, which are set to the invalid values according to the EM3000 manual, i.e. FF Hex and 7F Hex, respectively.
Driver only uses the UTC time tags from the EM3000 datagrams so make sure that the EM3000 System is synchronized by GPS PPS and clock telegrams are transmitted from the EM3000.
The XTF version will store, the raw F or D telegrams in the *QINSy* database. Such a database can afterwards be used to export to XTF. However, using this option will create much larger db's.
Important note: The driver will also store the Seabed S datagrams inside of the *QINSy* Database. Therefor it is important to disable the sending of S datagrams inside the EM3000 if you do not need this datagram for XTF export.

The EM3000 must send the following datagrams for correct decoding:

Rho-Theta mode:
F datagram for raw ranges and angles
D datagram for sampling frequency (not included in F datagram)
C datagram to determine internal EM3000 clock drift and offset
Recommended Mode

X-Y-Z mode:
D datagram for position of footprints
C datagram to determine internal EM3000 clock drift and offset

Rho-Theta mode / from D datagram
"Raw-Data" D datagram for raw ranges, angles and sampling frequency
C datagram to determine internal EM3000 clock drift and offset

The EM3002 must send the following datagrams for correct decoding:

Rho-Theta mode:	f datagram for raw ranges and angles (new f telegram includes sample rate) C datagram to determine internal EM3002 clock drift and offset **Recommended Mode**
X-Y-Z mode:	D datagram for position of footprints C datagram to determine internal EM3002 clock drift and offset

Note 1: "Raw-Data" D datagram is identical to ordinary D datagram except that some variables like for example the beam depression angle are now attitude-uncompensated launching angles. The EM3000 must be setup to output this special type of D datagrams if Rho-Theta from D mode is used. Only use this mode if F datagrams are not available in the EM3000 software version (earlier versions).
Note 2: Backscatter, or raw seabed image intensity values are stored in the S datagram.
If you want to decode the backscatter, see the Simrad EM3000 paragraph under the SIDESCAN SONAR SYSTEM DRIVERS chapter, for more details.

Important: Driver will stop updating if no C (clock) datagrams are received for more than 30 seconds. This is done to prevent latency related errors. This limitation is activated as soon as the first clock datagram arrives. So for test purposes it is possible to use this driver without receiving the clock telegram but never use it like this operationally.

Format Description

This driver can decode these 3 types of datagrams:
- D (depth) XYZ of footprints
- F (range-angle) Raw angles and ranges
- C (clock) Time message containing the EM3000 internal clock offset

General
Binary EM3000 datagrams start with STX, datagram type and timetag, and end with ETX and a checksum. The total length of the datagram (excluding length field) will precede the STX byte, except for datagrams that are sent out on an external Ethernet network as the length is then automatically given by the Ethernet protocol upon datagram reception. The time stamp resolution is 1 millisecond and includes the century.

An EM3000D (Dual Head) transmits the same datagrams as a single EM3000 but these datagrams contain 254 beams instead of the 127.

D (depth)
The EM3000 depth output diagram contains maximal 4096 bytes when 254 beams are broadcasted.
EM3000 depth output datagram starts with the following bytes:

Byte	***Format***	***Description***	***Valid Range***	***Invalid***	***Remark, Units***
01	4U	number of bytes	48 – 4092	0FFFFh	
05	1U	start identifier (STX)	02h		always 02h
06	1U	type of datagram (“D”)	044h		always 044h
07	2U	EM model number	3000	FFFFh	
09	4U	data (year month day)		FFFFFFFFh	yyyymmdd
13	4U	time since midnight	0 – 86399999	FFFFFFFFh	milliseconds
17	2U	ping counter	0 – 65535		sequential
19	2U	system 1 or 2 serial number	100 –	FFFFh	
21	2U	heading of vessel	0 – 35999	FFFFh	0.01 degrees
23	2U	sound speed at transducer	14000 – 16000	FFFFh	dm / s
25	2U	transmit transducer depth	0 – 65535		
27	1U	Maximum number of beams	48 –	FFh	127 single head
28	1U	number of valid beams (N)	1 – 254	FFh	254 dual head
29	1U	z resolution	1 – 254	FFh	cm
30	1U	x and y resolution	1 – 254	FFh	cm
31	2U	Sampling rate	300 – 30000	FFFFh	Hz

EM3000 depth output datagram continues with N beam entries:

Byte	***Format***	***Description***	***Valid Range***	***Invalid***	***Remark, Units***
01	2S	depth from transducer (z)	-32768 – 32766	7FFFh	
03	2S	across-track distance (y)	-32768 – 32766	7FFFh	
05	2S	along-track distance (x)	-32768 – 32766	7FFFh	
07	2S	beam depression angle	-9000 – 9000	7FFFh	0.01 degrees
09	2U	beam azimuth angle	0 – 719.99	FFFFh	0.01 degrees
11	2U	range (one-way travel time)	0 – 65534	FFFFh	
13	1U	quality factor	0 – 254	FFh	
14	1U	length of detection window	1 – 254	FFh	samples / 4
15	1S	reflectivity (BS)	-180 – 126	7Fh	0.5 dB resolution
16	1U	beam number	1 – 254	FFh	1-127, 128-254

EM3000 depth output datagram ends with the following bytes:

Byte	***Format***	***Description***	***Valid Range***	***Invalid***	***Remark, Units***
01	1U	transducer depth offset factor	-1 – 17		
02	1U	end identifier (ETX)	03h		always 03h
04	2U	Checksum			

*) In case of a 3000D systems (model number 3002-3008) this value is replaced with the difference in depth between transducer 1 and 2. In this case, the driver derives the sampling rate from a table as derived form the Simrad manual (see below):

Em model number	***Sampling Rate Head 1 [Hz]***	***Sampling Rate Head 2 [Hz]***
3002	13956	14621
3003	13956	14621
3004	14293	14621
3005	13956	14293
3006	14621	14293
3007	14293	13956
3008	14621	13956

Important: Note that if a new 3000D model (>3008) comes out, this driver will need to be updated since *QINSy* can not calculate any depth data without knowing the sampling rate!

F (range-angle)
EM3000 F output datagram starts with the following bytes:

Byte	***Format***	***Description***	***Valid Range***	***Invalid***	***Remark, Units***
01	4U	number of bytes	48 – 4092	FFFFh	
05	1U	start identifier (STX)	02h		always 02h
06	1U	type of datagram (“F”)	046h		always 046h
07	2U	EM model number	3000	FFFFh	
09	4U	data (year month day)		FFFFFFFFh	yyyymmdd
13	4U	time since midnight	0 – 86399999	FFFFFFFFh	milliseconds
17	2U	ping counter	0 – 65535		sequential
19	2U	system serial number	100 –	FFFFh	
21	1U	maximum number of beams	48 –	FFh	127 single head
22	1U	number of valid beams (N)	1 – 254	FFh	254 dual head
23	2U	sound speed at transducer	14000 – 16000	FFFFh	dm / s

EM3000 F output datagram continues with N beam entries:

Byte	***Format***	***Description***	***Valid Range***	***Invalid***	***Remark, Units***
01	2S	Beam pointing angle	-11000 – 11000	7FFFh	0.01 degrees
03	2U	Transmit tilt angle	-2999 – 2999	FFFFh	0.01 degrees
05	2U	Range (two-way travel time)	0 – 65534	FFFFh	1/sampling rate
07	1S	Reflectivity (BS)	-128 – 126	7Fh	0.5 dB
08	1U	beam number	1 – 254	FFh	1-127, 128-254

EM3000 F output datagram ends with the following bytes:

Byte	***Format***	***Description***	***Valid Range***	***Invalid***	***Remark, Units***
01	1U	Spare (Always 0)	–		
02	1U	end identifier (ETX)	03h		always 03h
04	2U	checksum			

C (clock):

Byte	*Format*	*Description*	*Valid Range*	*Invalid*	*Remark, Units*
01	4U	number of bytes	48 – 4092	FFFFh	
05	1U	start identifier (STX)	02h	FFh	always 02h
06	1U	type of datagram (“C”)	043h		always 043h
08	2U	EM model number	3000	FFFFh	
10	4U	date (yr mon day) EM clock		FFFFFFFFh	yyyymmdd
14	4U	time since midnight EM clock	0 – 86399999	FFFFFFFFh	milliseconds
18	2U	clock counter	0 – 65535		sequential
20	2U	system serial number	100 –	FFFFh	
22	4U	date (y/m/d) from ext. clock		FFFFFFFFh	yyyymmdd
26	4U	time since midnight ext. clock	0 – 86399999	FFFFFFFFh	milliseconds
30	1U	1 PPS use active or not	–	FFh	1 active / 0 not
33	1U	end identifier (ETX)	03h		always 03h
34	2U	checksum			

For the new ‘f’ datagram as send by the EM3002 will not be described here. Please refer to Simrad EM manuals.

See for more information on how these values can differ for the various EM3000 models and how these values should be interpreted, the *Kongsberg Simrad – EM Technical Note – Input and Output Diagrams.*

Decoding Notes

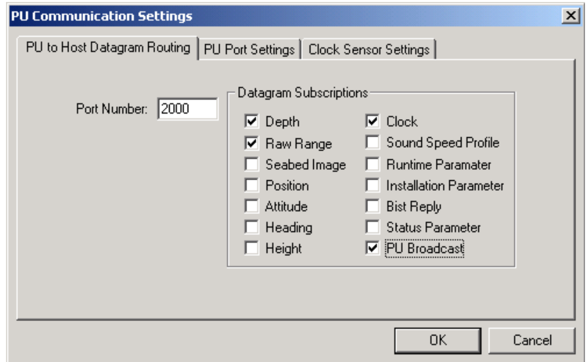
-Driver will always output the decoded maximum number of beams (with a maximum of 127). Invalid beams are restored to the MBE data buffer, with all values set to 0, except quality factor (FFh) and intensity (7Fh).
-No Beam Quality flag is decoded in *Rho-Theta mode*, this is because F datagram does not contain any.
-Beam Intensity values (backscatter) that are stored in the datagram have a range from –128 to 126 (0.5 dB steps). These values are converted to *QINSy* Intensity range that runs from 0-255.

-The decoded Quality Indicator (QI) can be considered a figure with a range between 0 and 64, where 0 stands for best quality.
Actually the value from the EM3000 is a combination of flags and values but inside the driver this is interpreted to a range between 0 (= best quality) and 64 (= worst quality) for valid beams and 127 for the invalid beams. For amplitude bottom tracked beams this value stands for the used number of samples while for phase bottom tracked beams this value stands for the “fit”.

Rho-Theta Only:
The Beam angles that are reported in the F telegrams are valid in the receive array and not in the acoustic centre. *QINSy* assumes the beam angle and the range to be valid at the acoustic centre. This non-conformity will result in small depth independent depth errors at the outer beams. The driver will correct the reported beam angles so they are valid for the acoustic centre. By default this options is enabled but it can be disabled if necessary through the registry key: “Use beam angle wrt acoustic centre correction”, 0 = disabled, 1= enabled. QPS advises however to keep this enabled.

System Configuration

EM3000Compact:
The Simrad PU has the capability to send data to three user-definable UDP ports. Please setup as many ports as required by the interfacing to *QINSy* (see Database Setup below).



EM3000 Compact controller software, Com. Settings

EM3000:
The workstation with Simrad's Merlin software running on it, sends the data to *QINSy*. In order to activate the transmission, one should do the following:

In the file $HOME/DPC.addresses.`hostname`, just below the line "#user_start" add a line using the following format:

	NAME	IPADDR	PORTNO	TELEGRAMS
For example:	*QINSy*	192.1.1.2	2101	C D F

The IP-address and port number is for the machine to which these datagrams are to be send. The letters following the port number is an indication of the datagrams, which are to be output on this port.

In order to be able to test the network connection it is advised to add a line to the 'hosts' file using the following format:

	IPADDR	HOSTNAME
For example:	192.1.1.2	qps

This allows the user to use the 'ping qps' command to test the network connection.

EM3000D:
The workstation with Simrad's Merlin software running on it, sends the data to *QINSy*. In order to activate the transmission, one should do the following:

In the file $HOME/DPC.addresses.`hostname`, just below the line "#user_start" add two lines using the following format:

	NAME	IPADDR	PORTNO	TELEGRAMS
For example:	*QINSy*1	192.1.1.2	2101	C D F
	*QINSy*2	192.1.1.2	2102	C D F

The IP-address and port number is for the machine to which these datagrams are to be send. The letters following the port number is an indication of the datagrams, which are to be output on this port.

In order to be able to test the network connection it is advised to add a line to the ‘hosts’ file using:

	IPADDR	HOSTNAME
For example:	192.1.1.2	qps

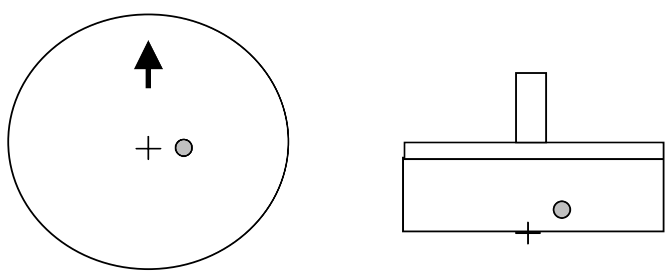
This allows the user to use the ‘ping qps’ command to test the network connection.

Important: In all these examples the IPADDR and PORTNO fields are examples and might require different values based on the actual network configuration.

Acoustic Centre of EM3000/EM3002

The Acoustic centre is the point for which the node position must be entered into the *QINSy* database. The EM3000 manuals will mention the acoustic centre to be in the geometric centre of the transducer face but this is not exactly true, it is slightly offset. The drawing below shows a schematic overview of the acoustic centre.

Schematic overview of location of Acoustic centre



top view aft view

note: arrow points to bow of ship

Acoustic Centre - Node position of MBE

Geometric centre of the transducer face

Placement of acoustic centre EM3000 transducer w.r.t. geometric centre
1 centimetre above face in vertical direction
2.3 centimetres to starboard in horizontal direction

For a dual head system with 40° roll, 0° pitch and 0° heading mounting angles the corrections are:
Port Head: Acoustic centre is 2.4 centimetre starboard and 0.7 centimetres below Geometric Centre.
Starboard Head: Acoustic Centre is 1.1 centimetre starboard and 2.2 centimetres above Geometric Centre.

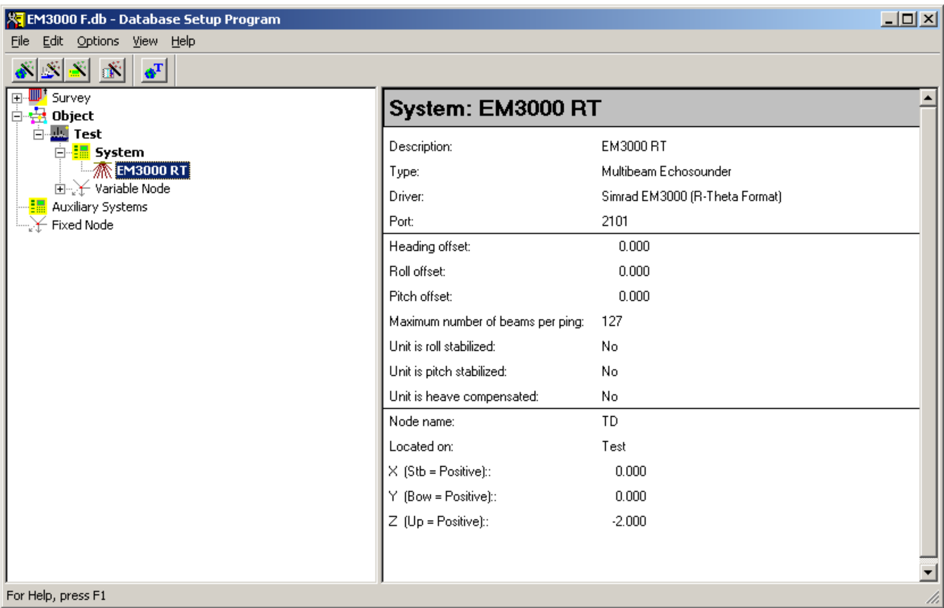
Database Setup

For every EM3000 related multibeam or sidescan system, *QINSy* requires the data to be sent to a unique port Number:

EM3000 Setup:	Required ports to interface to *QINSy*
Single head multibeam	1
Single head multibeam + sidescan	2
Dual head multibeam	2
Dual head multibeam + sidescan	3

EM 300x (one Transducer)

See description under “MULTIBEAM ECHOSOUNDER SYSTEM DRIVERS”, except that the present *QINSy* driver is only meant for datagrams broadcasted over a network, so instead of entering serial port parameters, the port number has to be entered.

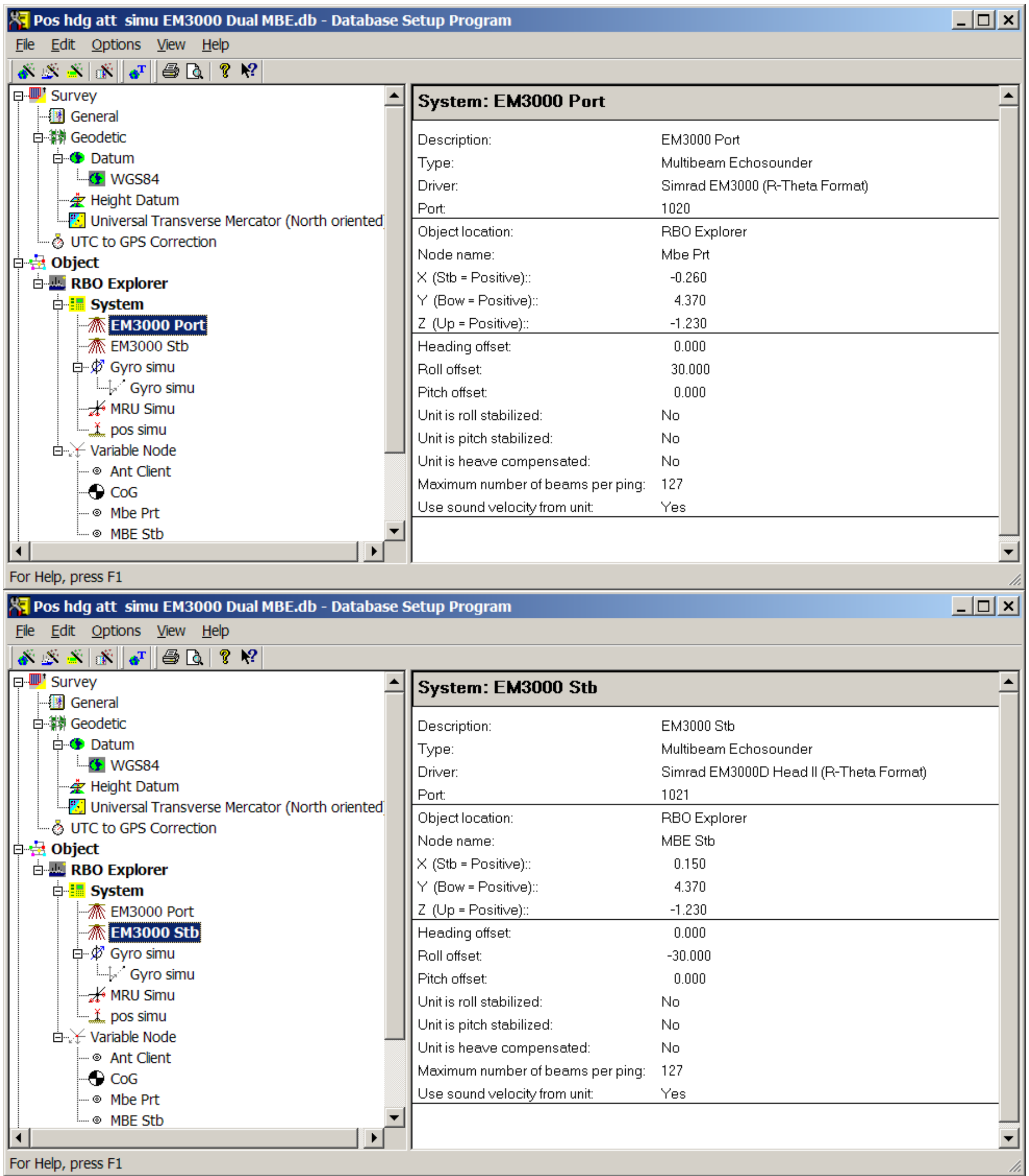


DbSetup example for Simrad 3000Compact system.

EM3000D Dual Head (two transducers)

An EM3000D system must be configured in DBSetup as two single EM3000 Multibeam systems that have a node position and unique mounting angles per transducer . Choose one of the “Head II” systems to decode the beam data from the second transducer. In normal mode, the driver decodes the first 127 beams (1-127) from the telegrams, while with Head II option enabled, it decodes the second 127 beams (128-254). In a normal configuration, the first 127 beams are located on the PORT transducer, the second 127 beams on the STARBOARD transducer. The Port transducer will have a positve mounting roll offset (+30 to +40°). Starboard transducer must have a negative roll offset (-30° to –40°)

It is advised to assign different portnumbers for port and starboard head.



DbSetup example for Simrad 3000D Dual Head system.

Controller Setup

When online, select the "Echosounder ..." option from the "Settings" menu to define the positioning of the echosounder transducer node, as well as the online blocking and filtering of the multibeam echosounder data. Use a Raw Multibeam Display to show raw data and a Swath System Display to show the corrected scans.

Drivers.io Options

Command line parameter "0" denotes the R-Theta format from F datagram, "1" denotes the X-Z format and "2" the R-Theta Format from D datsgram. "DII" means that the instead of decoding beam 1-127, the driver decodes beam 128-254. RAW will not only decode data but also store the raw data in the Db in order to export it to XTF. "EM1002" indicates that the driver has to deal with a EM1002 echo sounder.

3.9.20 Simrad Mesotech MS 971 / MS 990

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvSimradMesotech.exe	*Drivers.io options:*	971 | 990 | OI
Last modified:	1998-Jul-23		

Driver Description

Driver for SIMRAD Mesotech Model 971 or 990 Sonar and to be used to decode the profile scans from the high frequency sector scanning sonar. There is no quality field included in the data.

Format Description

The driver can decode two different formats, the old Format 971 and the newer Format 990. The data can be preceeded with an OiSTAR header, containing a Time structure. The driver detects automatically whether an OiSTAR header is present or not. However, if the Time of the OiSTAR Header has to be used, the user must select the appropriate OiSTAR Mesotech driver in DB Setup.

FORMAT 971

```
Laaaarrrrzz<CR><LF> or
Raaaarrrrzz<CR><LF>
```

where

L	Transducer head is left rotating
R	Transducer head is right rotating (clockwise)
aaaa	4 decimal digits representing transducer angle in steps of 0.225 degrees from 0000 to 1599. 0° = 0000 90° = 0400 180° = 0800 270° = 1200
rrrr	Range in units of 15.38 uSec (0.00001538 sec). Variable length from 1 to 5 digits Leading zero's are suppressed

Typical interface settings: baud rate: 4800 baud,s 8 data bits, ODD parity and 1 stop bit.

Format Example

Sample MS971 data strings supplied by Kongsberg Simrad:

```
R08006180
R08086252
L08006211
L07925890
L07846074
```

(continued on next page)

FORMAT 990

```
Rc,az,a,r1,r2,r3,....<CR><LF> or
Lc,az,a,r1,r2,r3,....<CR><LF>
```

where:

R or L: indicating rotation or the transducer (R is clockwise)
c: is a digit from 0..3, representing the active channel
az: is four digit decimal number, representing the azimuth angle in steps of 0.225°.
(This az number is only present in systems with Dual Axis heads,
AND NOT VALID FOR THIS DRIVER!!!)
a: is four digit decimal number, representing the scan angle of the transducer in steps of 0.225°.
r1, r2, ... Range value for the first return, second return and so on.
Unit is in microseconds, describing the one-way travel to target.
Multiply with the speed of sound to convert it to spatial units.
THE DRIVER WILL ONLY DECODE THE FIRST RETURN (r1).

Decoding Notes

The decoded Quality Indicator (QI) can be interpreted as one flag, the brightness flag. The flag is set to 1 is the beam has got a valid travel time, it is set to 0 if the traveltime is zero.

- Brightness Flag (0 = invalid, 1 = valid)

Database Setup

See description under “MECHANICAL PROFILER SYSTEM DRIVERS”.

Note. If an OiSTAR header preceeds the profiler data and the user wants to use the OiSTAR header timetag, select the driver "OISTAR Simrad Mesotech MS 971" or "OISTAR Simrad Mesotech MS 990".

Controller Setup

First time online, use “Settings – Echosounder” to select the computation to enable the MBE computations. Use next page in the MBE settings wizard to disable/enable beam 1 (target) and/or beam 2 (sea bottom).

3.9.21 Simrad Mesotech SM2000

Input / Output:	Input (serial)	*Driver class type:*	Counted
Executable name:	DrvSimradSM2000.exe	*Drivers.io options:*	none
Last modified:	2001-Nov-02		

Driver Description

Driver for Simrad – Mesotech SM 2000 Sonar System. Driver to be used to decode the binary raw range and angle serial datagram (R-Theta Format), the so-called MPB format. The Simrad SM2000 has up to 128 beams but only valid beams will be broadcasted. Driver ignores the time in the datagram; the time of arrival combined with latency value within the datagram is used for time stamping of the data.

Format Description

This driver can decode only the MPB (Multibeam Profile Binary) format; make sure this datagram is output by the SM2000. A description of the MPB format follows below.

[Byte Alignment: Intel-like, no byte swapping required]

Header Section:

Byte	*Format*	*Description*	*Valid Range*	*Invalid*	*Remark, Units*
01	4U	Packet Sync Header	FF00h		Start of package
05	1U	Packet Type	10h		always 10h
06	1U	Packet Sub Type	01h		always 01h
07	1U	Date:Year	0 - 99		
08	1U	Time: Hour	0 -23		Local time
09	1U	Time: Minutes	0 – 59		
10	1U	Time: Seconds	0 – 59		
11	2U	Ping Number			
13	2U	AGC Level			
15	1U	Date: Month	1 – 12		
16	4U	Ping Time, sec after midnight			50 microsec
20	1U	Date: Day	1 – 31		
21	2U	Sound Velocity			m/s
23	2U	Latency			milliseconds
25	2U	Sampling rate			Hz
27	1U	Scan width	60,90,120,150,180		Degrees
28	1U	Total number of beams	Upto 128		
29	1U	Start beam number (SB)	1 – 128		
30	1U	Number of beams used (NB)	1 – 128		
31	1U	Number of returns (NR)	1 – 4		
32	1U	Along track beam width			1/10 of degrees
33	4U	System range			centimeters

SM2000 MPB datagram continues with a data section of NR blocks with beam entries: (first block: return 1, second return 2 etc).

Byte	Format	Description	Valid Range	Invalid	Remark, Units
01	2U	Range Data for beam SB			Nr. Of samples
03	2U	Range Data for beam SB+1			Use sam.rate
…	…	……			To convert to 2
…	2U	Range Data for beam SB+NB			Way trav. time

Each field in the Data Section consists of a two byte Return Value representing one qualifying return or echo. Data values of zero are used to indicate an excluded or missing point. The 2 most significant bits of a Return Value word represent a quality flag ranging between 0-3.

F1 F2 Quality Meaning (F1 is most significant bit)
0 0 Best This point is in line with its neighbors
0 1 Good This point varies by more than 10% from its neighbors
1 0 Fair This point varies by more than 20% from its neighbors
1 1 Poor This point varies by more than 50% from its neighbors
note: The Quality flags are inverted by the driver, 0 becomes 1 while 1 becomes zero (see decoding notes).

The angle of each return must be calculated from its position in the Data Section and from other information given in the Header Section.
The Beam Spacing in degrees can be calculated from the Header Data as:
Beam Spacing = Transducer Scan Width / (Total Number of Beams-1)
If the Transducer Scan Width is 180 degrees, the angle for the return at the first location in the Data Section will be:
Angle = Beam Spacing * (Start Beam Number - 1)
If the Transducer Scan Width is 120 degrees, the angle for the return at the first location in the Data Section will be:
Angle = 30 degrees + Beam Spacing * (Start Beam Number - 1).

See for more information on how these values should be interpreted, the *Kongsberg Simrad Mesotech– SM 2000 Product Specifications.*

Decoding Notes

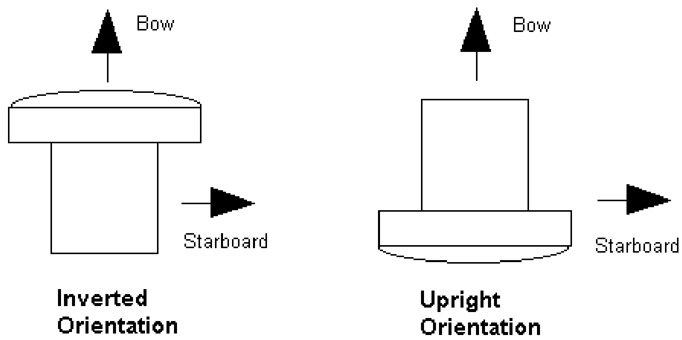
Driver will always output the decoded maximum number of beams (with a maximum of 128). Invalid beams are restored to the MBE data buffer, with all values set to 0. Intensity values cannot be decoded from a MPB telegram.

-The decoded Quality Indicator (QI) can be considered a figure with a range between 0 and 4, where 4 stands for best quality. Note that the original values as delivered by the SM2000 are inverted inside the driver.

QI Value	Meaning
3	Best This point is in line with its neighbors
2	Good This point varies by more than 10% from its neighbors
1	Fair This point varies by more than 20% from its neighbors
0	Poor This point varies by more than 50% from its neighbors

System Configuration

The sonar transducer can be mounted in various orientations depending on the application. For bathymetric operations the aperture of transducer points towards the sea floor, see drawing below. In this case either the transducer side of the transducer unit can point to the bow (left drawing, “Upright” orientation) or the electronics pod of the unit can point to the bow (right drawing, “Inverted” orientation. This orientation must be correctly set in the “Options|Setup|Head Configuration” menu of the SM2000 control software otherwise the beams port/starboard will be mirrored.



Simrad Mesotech SM2000 Transducer orientation

Database Setup

For higher ping rates, we advise to set the baud rate between the SM2000 (usually port 2) and *QINSy* computer as high as possible. See also description under “MULTIBEAM ECHOSOUNDER SYSTEM DRIVERS”.

Controller Options

Beams can be excluded from the result DTM file based on their quality flags. Refer to Echo sounder Settings “Exclude when… options” to enable blocking on quality. If you want to keep only the best beams then set Quality range from 3 to 3.

Drivers.io Options

No Options.

3.9.22 SMD ROV Cable Tracker, Gyro Heading, Depth & Altitude, Cable Data

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvSMDROV.exe	*Drivers.io options:*	*none*
Last modified:	1999-Jul-01		

Driver Description

Driver to decode cable tracker data, gyro heading, depth and altitude, and/or (generic) cable data from SMD ROV output strings. Soil Machine Dynamics (SMD) is a Newcastle (UK) based company that builds ROVs, incorporating powerful cable burial tools, that are designed for operation to at least 2500m water depth.

To compute a cable position from the cable tracker offsets, the *QINSy* Multibeam support must be enabled. The cable tracker offsets can also be decoded as "generic observations", which can be stored in a database.

Format Description

The following format will be decoded by the *QINSy* SMD ROV driver. Data must be ASCII and each line is terminated with a carriage return (CR) and line feed (LF). Each data field must be separated by a comma. Data fields can be of variable length with any number of decimals. The SMD ROV format is given as:

```
$ROV,aa.a,bbbb.b,+cc.c,+dd.d,+ee.e,+fff,+ggg,hhh.h,iiii<CR><LF>
```

Note. The cable tracker data is output in centimetres, but is converted to metres by the driver.

Item	*Format*	*Description*	*Values, Units*
0	$ROV	Header	"$ROV"
1	aa.a	Echosounder altitude above seabed	metres
2	bbbb.b	Pressure transducer depth below sea level	metres
3	+cc.c	Cable tracker horizontal offset from cable	centimetres
4	+dd.d	Cable tracker vertical offset from cable	centimetres
5	+ee.e	Cable tracker altitude above seabed	centimetres
6	+fff	Burial depth	centimetres
7	+ggg	Trench depth	centimetres
8	hhh.h	Gyro heading	degrees
9	iiii	Umbilical length	metres
10	<CR><LF>	record termination	<CR><LF>

Database Setup

See description under "PIPE AND CABLE TRACKER SYSTEM DRIVERS".

To decode the (horizontal and vertical) cable tracker offsets as (one) multibeam observation, from which the cable position can be computed, add a system of type "Multibeam echosounder" to the ROV object, select the "SMD ROV (CableTracker)" driver and add the appropriate interfacing and MBE system parameters.

In order to decode also other data fields from the same input string, be sure to select the same "SMD ROV" driver with the same serial interfacing parameters. In this case, *QINSy* will start up only one driver module. Slot numbers for the observations should correspond to the field sequence number in the SMD ROV string. The driver for the SMD ROV output data that was tested OK onboard the MV Ocean Commander (CTC) on 990630, was using the same slot numbers (data sequence) as given in the table above in the "Item" column.

To decode the ROV gyro heading, add a “Gyro” system to the database and select the “SMD ROV (Gyro Heading)”driver with interfacing and gyro observation parameters. To decode the echosounder observation, add a “Surface navigation system”, select the “SMD ROV (Depth & Altitude)” driver with appropriate interfacing parameters, and add a “ROV altitude” observation to this system. To decode the cable tracker altitude, add a “Surface navigation system”, select “SMD ROV (Depth & Altitude)” driver with appropriate interfacing parameters, and add another “ROV altitude” observation to this system. To decode the pressure transducer depth observation, add a “Surface navigation system”, select the “SMD ROV (Depth & Altitude)” driver with appropriate interfacing parameters, and add a “ROV depth” observation to s system.

Cable tracker offsets, burial and trench depth and umbilical length can be decoded as “generic observations”. To decode one or more of these data fields, add a system of type “Miscellaneous” to the database and select driver “SMD ROV (Cable Data)” with the appropriate serial interfacing parameters. Add an observation (of type “Generic”) with its proper slot number for each of the additional data fields that must be decoded.

Note: This system does not deliver a Quality indicator.

Controller Setup

First time online, use “Settings – Echosounder” to select the computation to enable the MBE computations. Use next page in the MBE settings wizard to disable/enable beam 1 (target) and/or beam 2 (sea bottom).

3.9.23 STN Atlas Fansweep

Input / Output:	Input	*Driver class type:*	Network
Executable name:	DrvAtlasFansweep.exe	*Drivers.io options:*	None
Last modified:	2001-Feb-02		

Driver Description

Driver to intercept and decode the UDP/IP network communications between the PC running the ATLAS HYDROMAP ONLINE software and the ATLAS FANSWEEP 20 Interface Processor. The driver decodes telegrams types 10, 11 and 16. The decoded data is presented to the system as a Multibeam system of the R-Theta type.

Format Description

The following tables show the fields that are being decoded from each telegram. Each ping of the ATLAS FANSWEEP 20 results in one 'Beam Transmission Data' telegram (type 10) and one or more 'Beam Travel Times' telegrams (type 11). Each set of beam travel times of one ping refers to a set of beam angles, distributed via the 'Angle Table' telegrams (type 16).

Telegram Type 10 (Beam Transmission Data)

Field	*Description*
lead_no	Ping number
transmit_time	Ping time
cmean	Mean sound velocity (Source is selectable via ATLAS HYDROMAP ONLINE, selectable sources are manual values or a measured sound velocity profile)

Telegram Type 11 (Beam Travel Times)

Field	*Description*
lead_no	Ping number. Needs to match ping number from Type 10 telegram.
transmit_time	Ping time. Needs to match ping time from Type 10 telegram.
beam_table_index	Beam table index. Needs to match beam table index from Type 16 telegram.
max_tele_no	Maximum telegram sequence number (in this ping)
act_tele_no	Actual telegram sequence number (in this telegram)
max_lead_cnt	Maximum number of beams (in this ping)
act_lead_cnt	Actual number of beams (in this telegram)
lruntime[]	Two-way travel time per beam (in seconds)
lamplitude[]	Amplitude value per beam
lstatus[]	Status information per beam

Telegram Type 16 (Angle Table)

Field	*Description*
max_tele_no	Maximum telegram sequence number (in this table)
act_tele_no	Actual telegram sequence number (in this table)
beam_table_index	Beam table index (Unique identifier of this table).
max_angle_cnt	Maximum number of beam angles (in this table)
act_angle_cnt	Actual number of beam angles (in this telegram)
max_angle_cnt	Total number of beam angle (in this table).
setangle[]	Beam angle per beam ()

Decoding Notes

All three telegrams may contain other fields that are currently not being decoded by the driver. The driver converts the two-way travel time in the type 11 telegram to one-way travel time. The driver converts the beam angle in the type 16 telegram from radians to degrees. A quality indication flag is extracted from the status field (Bit position 2 of the type 11 telegram and placed in the least significant bit position of the beams' quality indicator. The flag is set to 1 if the beam is valid and to 0 if the beam is invalid.

The Quality indicator can be interpreted as a brightness test flag, if the beam is valid then we can consider it to have passed the brightness test.

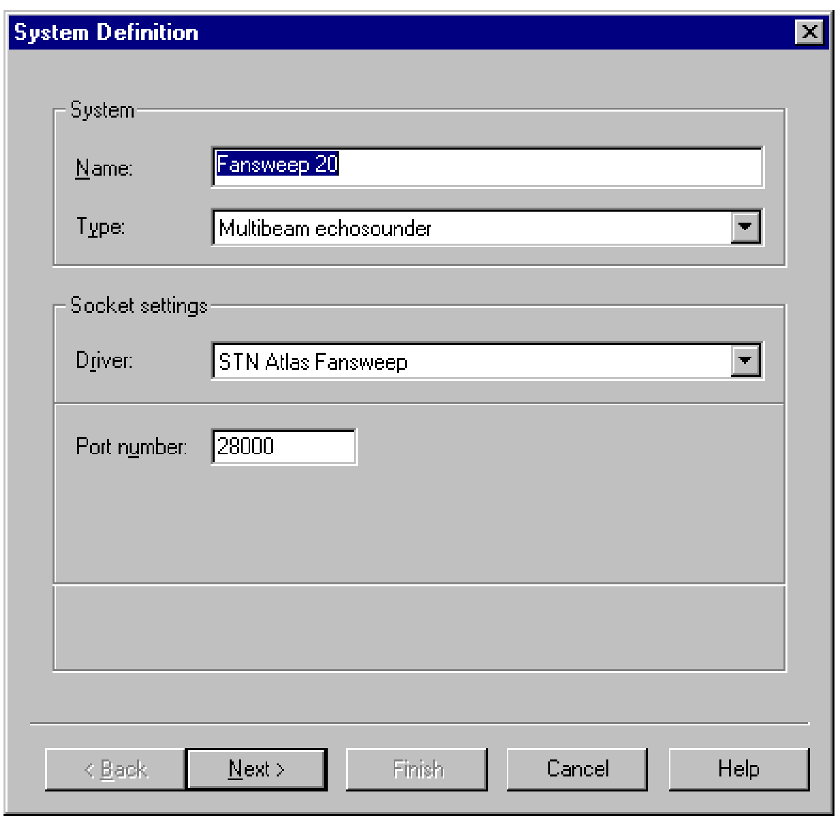
Interfacing Notes

This driver requires an IP network connection that is capable of receiving the UDP telegrams as they are being broadcast from the ATLAS FANSWEEP 20 Interface Processor to the ATLAS HYDROMAP ONLINE system. All three devices (Interface Processor, ATLAS HYDROMAP ONLINE workstation and the PC running *QINSy*) should have IP numbers that belong to the same IP subnet.

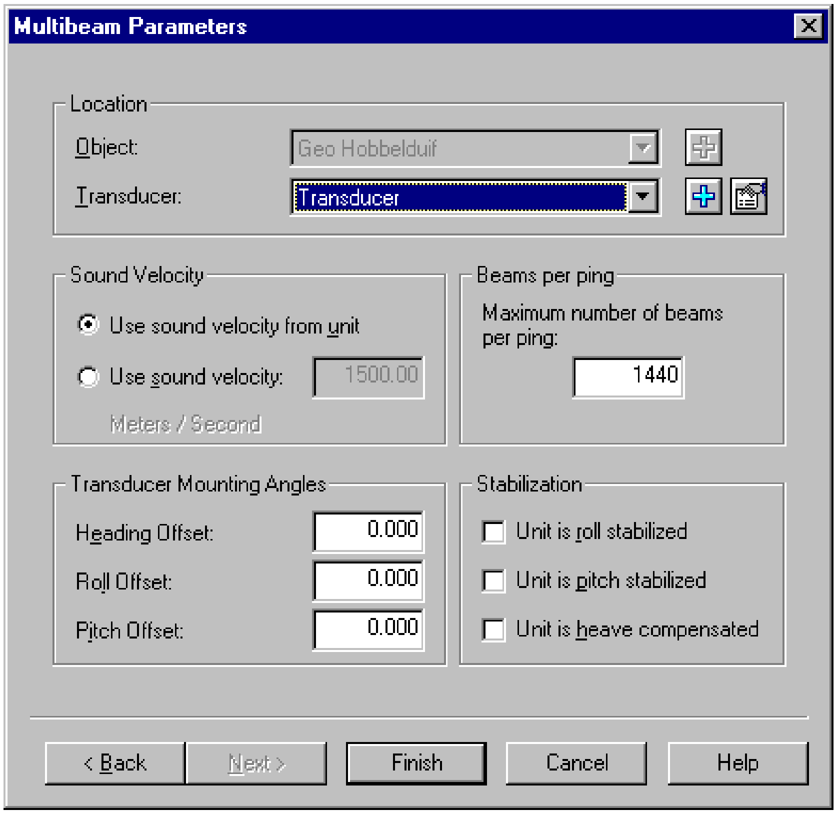
Database Setup

See description under "MULTIBEAM SYSTEM DRIVERS".

The following screen dump shows the settings when the so-called "lanport" offset is set to 25000. This number is normally detemined by system configuration of the Interface Processor/ATLAS HYDROMAP ONLINE combination. Please notice the offset of 3000 between the "lanport" offset and the port number entered in the system definition.



The following screen dump shows the multibeam parameters. The number of beams should be set to 1440 because the driver will automatically adjust when there are less than 1440 beams made active using the ATLAS HYDROMAP ONLINE system.



Controller Setup

When online, select the "Echosounder ..." option from the "Settings" menu to define the positioning of the echosounder transducer node, as well as the online blocking and filtering of the multibeam echosounder data. Use a Raw Multibeam Display to show raw data and a Swath System Display to show the corrected scans.

Enable the "Exclude when brightness Test Failed" option in the Echosounder settings if you want to flag the invalid beam data.

3.9.24 TSS 340 PipeTracker, ROV Altitude, Depth of Cover, Signal Strength

3.9.25 TSS 350 CableTracker, ROV Altitude, Depth of Cover, Signal Strength

3.9.26 TSS 340/350 Tracker (Ignore Offset Quality)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvTSS350.exe	*Drivers.io options:*	OI | NOQUAL
Last modified:	2004-Jun-14		

Driver Description

Driver to decode pipe tracker or cable tracker data, depth of, ROV altitude (or depth) and Signal Strength data from a TSS 340 or 350 output string. The driver automatically recognizes the “T”, “I” and “S” records. When option “OI” (“OISTAR”) has been selected, the driver will use the timetags from any preceding OiSTAR headers. To compute a cable position, the *QINSy* Multibeam support must be enabled.

Format Description

The following data packets will be decoded by the *QINSy* driver. Bad data is denoted by question marks.

TSS 340 Coordinates and Signals Data Packet (T record)
48 bytes, terminated by <Carriage Return><Line Feed>

```
:TQ+aaa_bbb_ccc+ddd+11111+22222+33333+44444_XX<CR><LF>
```

_	Space character
:	Start character
T	Record identifier
Q	Quality indicator (' ' = good and '?' = bad)
+aaa	Lateral offset ('+' = stbd and '-' = port)
_bbb	Vertical offset (search coils to top of target)
_ccc	Altitude or depth reading (optional input)
+ddd	Cover thickness ('+' = buried and '-' = exposed)
+11111	Signal strength channel 1 in microvolts
+22222	Signal strength channel 2 in microvolts
+33333	Signal strength channel 3 in microvolts
+44444	Signal strength channel 4 in microvolts
_XX	Check code (00 = good; see manual for details)

TSS 340 Coordinates Data Packet (I record)
20 bytes, terminated by <Carriage Return><Line Feed>

```
:I+aaa_bbb_ccc+ddd<CR><LF>
```

_	Space character
:	Start character
I	Record identifier
+aaa	Lateral offset ('+' = stbd and '-' = port)
_bbb	Vertical offset (search coils to top of target)
_ccc	Altitude or depth reading (optional input)
+ddd	Cover thickness ('+' = buried and '-' = exposed)

TSS 350 Run Display Mode Format (S record)
62 bytes, terminated by <Carriage Return><Line Feed>

```
:SQ+LLLL_VVVV_AAAA+CCCC+SSS+1111+2222+3333+4444+5555+6666_qq<CR><LF>
```

_	Space character
:	Start character
S	Record identifier
Q	Quality indicator (' ' = good and '?' = bad)
+LLLL	Lateral offset ('+' = stbd and '-' = port)
_VVVV	Vertical offset (search coils to top of target)
_AAAA	Altitude or depth reading (optional input)
+CCCC	Cover thickness ('+' = buried and '-' = exposed)
+SSS	Skew angle in degrees ('+' = clockwise and '-' = anti-clockwise)
+1111	Signal strength channel SL in microvolts
+2222	Signal strength channel SV in microvolts
+3333	Signal strength channel PL in microvolts
+4444	Signal strength channel PV in microvolts
+5555	Signal strength channel SF in microvolts
+6666	Signal strength channel PF in microvolts
_qq	Check code (00 = good; see manual for details)

TSS 350 Forward Search Mode Format (F record)
48 bytes, terminated by <Carriage Return><Line Feed>

```
:FQ_FFFF_AAAA+1111+2222+3333+4444+5555+6666_qq<CR><LF>
```

_	Space character
:	Start character
F	Record identifier
Q	Quality indicator (' ' = good and '?' = bad)
_FFFF	Forward search range ('????' = target out of range)
_AAAA	Altitude or depth reading (optional input)
+1111	Signal strength channel SL in microvolts
+2222	Signal strength channel SV in microvolts
+3333	Signal strength channel PL in microvolts
+4444	Signal strength channel PV in microvolts
+5555	Signal strength channel SF in microvolts
+6666	Signal strength channel PF in microvolts
_qq	Check code (00 = good; see manual for details)

The F telegram is currently not decoded.

Decoding Notes

The TSS tracker distances are output in centimetres, but are converted to metres by the TSS driver.

The driver decodes the TSS tracker offsets as (two) multibeam echosounder beams.
Beam 1 represents the actual pipe target, it contains the vertical distance between the tracker reference point (reference line of the coil array) and the target.
Beam 2 represents the seafloor above or below the detected pipe or cable, it contains the vertical distance between the tracker reference point and the sea bottom. The Z value of beam 2 is obtained by subtracting the Depth of Cover value from the Z value of beam 1 (+ value means buried), The X (across) value is taken from beam 1.

- If lateral or vertical offset field(s) contains '???' then the multibeam data will not be decoded.

<u>Exception: *Drivers.io options: If* NOQUAL option is used then the multibeam data will be decoded anyway even though offset fields contain question marks (???) instead of figures. The X and Z value of beam 1 will be set to 0.</u>

- If Cover Thickness field contains '???' then the last valid decoded cover thickness is used to calculate the beam 2 Z value and the Quality indicator of the this beam is forced to 99 to indicate it is not valid.

The Quality field 'Q' is ignored, instead the Check code field is used as the beam's quality indicator. A value of 0 is best quality, 99 worst quality.

Database Setup

See description under "PIPE AND CABLE TRACKER SYSTEM DRIVERS".

To decode the (horizontal and vertical) cable tracker offsets as multibeam observations, from which the cable position can be computed, add a system of type "Multibeam echosounder" to the (ROV) object, select the "TSS 340"or "TSS 350" driver and add the appropriate interfacing and system parameters.

In order to decode the ROV attitude (or depth) from the same input string, connect a new "Surface navigation system" to the ROV object and select the "TSS 340 (ROV Altitude)" or "TSS 350 (ROV Altitude)" driver with the same I/O parameters as before. Select the ROV object and add a new observation of type "ROV altitude" (or "ROV depth"). Do not forget to set the "Observation Properties", i.e. the unit to meters.

The "Depth of Cover" and "Signal Strength" fields can be decoded (and displayed) as a "generic observation". Add an auxiliary system of type "Miscellaneous system" to the database, select the "TSS 340/350 Depth of Cover / Signal Strength" driver; use the same I/O parameters as with the MBE driver (if it was defined).
Add one or more "Generic Observation(s)" to the new system and assign the appropriate slot number. The slot number will define what value is decoded from the various strings:

Value:	**Slot Number:**	
"Depth of Cover"	0	
"Signal Strength 1"	1	
"Signal Strength 2"	2	
"Signal Strength 3"	3	
"Signal Strength 4"	4	
"Signal Strength 5"	5	(TSS350 Only)
"Signal Strength 6"	6	(TSS350 Only)

In case more than one system is defined for the TSS tracker, *QINSy* will start up only one driver module.

Controller Setup

To exclude invalid beam data from the result dtm's you can flag the data based on the beam quality indicator value. Note that for beam 2 the Quality indicator is set to 99 if the decoded "Depth of Cover" is invalid.

3.9.27 Tritech SeaKing SCU Master (Slot 2)

3.9.28 Tritech SeaKing SCU Slave (Slot 3)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvTritechSKV4.exe	*Drivers.io options:*	N | ACT | PAS
Last modified:	2004-Jul-09		NOREV | OI

Driver Description

Driver to decode profile data (up to 799 beams) from a Tritech SeaKing mechanical profiler system (model SKV4). The actual data connection with *QINSy* is through a Tritech SeaKing SCU3 network.
The driver will only decode a data record if Generic Device Type (source type) is either Hexadecimal 25 (SeaKing) or Hexadecimal 02 (WINSON), and Data Reply Mode is equal to 0 (ASCII).

The driver can be used in ***passive*** or ***active*** mode. When in passive mode, the timetag of the first profiler beam will be the time of arrival of the first byte at the COM port, corrected for scan duration and the latency value as entered in the Database Setup Program. When in active mode, the timetag of the first profiler beam is obtained from the "Time at Start of Scan" data field. See more information below.
The profiler system is supposed to output "raw data" (not corrected for offsets) and run in "continuous data output" mode. In case the output is "processed data", the range is converted back to milliseconds using the sound velocity value from the data record (XYZ offsets are not applied). When in active mode, a command is sent upon driver start (and reset) to activate the "continous data output". Furthermore, the "Set Button Bar" command is used to set the *QINSy* UTC time as clock time, which effectively synchronises the profilers internal clock to the *QINSy* time frame. See more information under "Online Setup".

Format Description

Please refer to the Tritech SeaKing SCU manual for more details on the message format specifications.

There have been different SeaKing manual descriptions for the Profile System Reply Data Structure with different units for various data fields. However, Tritech International Ltd has confirmed QPS that these differences were typing errors and that all SeaKing formats are equal. WINSON units can be different.

When the SCU3 is in continuous data output mode, the system will reply the following data message:
Prefix (2 chars) – SlotReplyHdr (10 chars) - Profiler System Reply Data (?? Chars) - <CR><LF>

Prefix & Header

The header data is binary but each byte is converted to ASCII Hexadecimal. Every character stands for one byte. Fields are made up of one or multiple bytes, byte order is little-endian (Intel order).

#	*Bytes*	*Reply Prefix*	*Values, Range, Units*
1	[1,2]	Identifier	"%D"
#	*Bytes*	*SlotReplyHdr Data Structure*	*Values, Range, Units*
1	[1,4]	Total Number of Bytes in Message	N
2	[5,6]	Slot Number	"01" to "0C"
3	[7,8]	Generic Device Type (Source Type)	0x25 [SeaKing] or 0x02 [WINSON]
4	[9,9]	Data Reply Mode	0=ASCII, 1=Hex, 2=Binary, 3=CSV
5	[10,10]	Data Flag	1=Raw data, 0=Processed data

Profiler Data

The profiler data is always normal ASCII. The end of each data record contains 'N' profile data points.

#	*Bytes*	*Profiler System Reply Data Structure*	*Values, Range, Units*
1	[1,6]	Head Installation X Position	millimetres [NOT USED]
2	[7,12]	Head Installation Y Position	millimetres [NOT USED]
3	[13,18]	Head Installation Z Position	millimetres [NOT USED]
4	[19,24]	Rotational R Position	0x25, SeaKing: 1/10 gradians 0x02, WINSON: 1/10 gradians
5	[25,30]	EchoRanging Time Correction	µs (microseconds)
6	[31,35]	Number of Profile Samples	number of beams
7	[36,40]	Scan Start Angle	0x25, SeaKing: 1/16 gradians 0x02, WINSON: gradians
8	[41,44]	Step Size and Direction	0x25, SeaKing: 1/16 gradians 0x02, WINSON: gradians
9	[45,49]	Velocity Of Sound	0x25, SeaKing: dm/s (or m/s) 0x02, WINSON: dm/s (or m/s)
10	[50,57]	Time at Start of Scan	HHMMSSss [ACTIVE MODE]
12	[58,62]	Duration of Scan	0x25, SeaKing: 1 ms (milliseconds) 0x02, WINSON: 10.6667 ms
13	[63,65]	Profiler Head Operating Mode	*see information below*
N	[+1,+5]	Raw Data: Two-Way Travel Time Processed: Slant Range	Raw Data: µs or 10 µs Processed: mm or cm

#	*Bit*	*Profiler Head Operation Mode*	*Values, Range, Units*
1	[0]	Head Orientation	0: upright, 1: reversed
2	[1]	Profiler Data Units	Raw Data: 0: µs, 1: 10µs Processed: 0: mm, 1: cm
3	[2]	Profiler Clock Units	WINSON: 0: 1.953125 µs WINSON: 1: 20.833 µs
4	[3]	unknown	always 0
5	[4]	Ping Times	0: excluding, 1: including

Seaking Remote Commands

The *QINSy* Tritech SeaKing driver will send the following commands when running in active mode.

CONTINUOUS_ON:	activates serial output
Format:	S+N<LF> [N= Slot number]
Example:	`S+3`
CONTINUOUS_OFF:	Stop serial output
Format:	S-N<LF> [N= Slot number]
Example:	`S-3`
BUTTONBAR_SET:	Set Time in Profiler
Format:	:SB~~~~~~~~~HHMMSSss~DDMMYY<LF>
Example:	`:SB~~~~~~~~~14592299~281104`

Format Examples

```
12345678901234567890123456789012345678901234567890123456789012345678901234567
```

SeaKing format – source type 0x25 – 101 beams – master head (slot 02) and slave head (slot 03)

```
%D0248022501-00850+00000+00000+00014+000000010102000+024147500320117802073001
05299051270476704765044080427304035039380384703694036470345103358032720318703
16603041030170291302896000000273902789026950262302579025190250002459024570243
50240102349023640229102272023010224802223022120219702184021830217402171021660
21660216602163021670217002177021970218802209022080221602266022360224102258022
70022880231402343023630243702435024650247902497025600257602611026730270702727
02796028560285500000030380303803169031790331203310035050351703655037520394104
0390416304426045020491905001054660557806044
%D0248032501+00850+00003+00000-00050+000000010104400-024147500320117902074001
04702044010419204058039480381003643035800347703358033140318903092030190296702
89302829027900273200000026260265602542025080245302426023840238002368023600228
40228002315022300221202188021770216102160021490214902048020130212902136021450
21330212602122021240213602140021390213602147021700218702189022570225002275023
04023150233702354023760241002437025010253602540025800263100000000000281902791
02861029310000003132031280000003310033180345003560036510377703966042160423504
4900470204890051450537405854059920650407066
```

WINSON format – source type 0x02 – 179 beams – single head (slot 01)

```
%D03CE010201+00643-00506+00100-00009+000000017900110+001014751144238400010000
00000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000190261920817845176571704416880163621600
11559115524151531481514694143621384313755136121340913266129681280412606124851
23291225112022119361187011729115731136611097110871083110432103231021410159098
02097200966709503092780922509155090420901308950088410882308768087570876108675
08649086590861808569085460853408548084850849508475084560847208409083700837408
30408315083090833508317082700826608263082550827408296084170841508401084250849
10856108614086670878008866089500902409079092820943109472097960987610173103911
05401083110870109581127811382115051169011870119011198912143124151247712626126
81129401303013270133111367113725140071403014077141881428014462145931469414913
15075151841528813577163311888800000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000
```

Decoding Notes

The Observation Time is calculated as follows. In active mode, the timetag of the first profiler beam is just the “Time at Start of Scan” data field. In passive mode, the timetag of the first profiler beam will be the time of arrival of the first byte at the COM port, corrected for scan duration and the latency value as entered in the Database Setup Program. The Beam Delay is calculated as follows. The first beam delay is obviously zero. Each following beam gets a beam delay by adding the Scan Duration divided by (Number of Beams – 1).

The Beam Angle is calculated as follows. The first beam angle will equal the Rotation Offset plus the Start Angle. Each following beam will be incremented by the Angle Interval. Note: If the Head Orientation is reversed then the beam angles are inverted (multiplied by –1), except with Drivers.io option ‘NOREV’.

The decoded Quality Indicator (QI) can be interpreted as one flag: the brightness flag. The flag is set to 1 if the beam has got a valid traveltime, 0 if the traveltime is zero or invalid.

Drivers.io Options

Command line parameter "N", where N should be replaced by a number, is interpreted by the driver as a slot number. Only profiler system reply data records for this particular slot are decoded.

Command line parameter "ACT" will start the driver in active mode, i.e. the driver will send the *QINSy* time to the SeaKing SCU system every minute. The driver will also send a command to the SCU system to set it to "continuous data output" mode. Command line parameter "PAS" will start the driver in passive mode, i.e. the driver will not send time messages for synchronisation purposes.

Command line parameter "OI" indicates that timetags are obtained from preceding "OiSTAR" headers, if available. Timetags are corrected for scan duration if driver runs in passive mode.

Command line parameter "NOREV" will ***not*** invert the beam angles (***not*** multiply them by –1) if the head orientation is reversed, as indicated by bit 0 of the Profiler Head Orientation Mode data field.

Example. "DrvTritechSKV4.exe 4 ACT" will start driver in active mode, using profile data from slot 4 only.

Note. By default (no Drivers.io options), driver will start in passive mode, listening to master slot number 2.

Important. Since 2004-Jul-09, the Drivers.io option "NOREV" is added to all Tritech SeaKing drivers. According to Tritech International Ltd, the the invert flag does actually change the data in the scan, so there is no need to invert the beam angles (supposedly, the rotation offset and scan start angle are also adapted).

Database Setup

See description under "MULTIBEAM ECHOSOUNDERS".

Important. Since *QINSy* expects the nadir beam to be 0 degrees and positive to starboard, the beam angle values in the SeaKing profiler data need to be corrected by entering appropriate transducer mounting angle offsets, apart from the mounting offsets as found during the profiler system calibration. In the most common case, this means a 180° roll offset and a 180° heading offset (which is equal to a 180° pitch offset).

Online Setup

In most cases, two SeaKing profiler drivers are being used online, one for the master profiler head and one for the slave profiler head. Often there is also a Tritech SCU-3 Bathy driver interfaced to the same SCU3 system. It is important that only one of these drivers is sending UTC time commands, i.e. is started in active mode with a ***two-way cable*** connection. Make sure that this cable is not splitted to any other COM port, otherwise the UTC time command will probably not reach the Tritech SCU system.

The other driver(s) can also be used in active mode, so that the timetag from the data records is decoded, but one must make sure to use ***one-way cables*** for these other connections, so that the UTC time commands will not reach the SCU. Also make sure that the SCU is in "continuous data output" mode.

3.9.29 Ulvertech Profiler (Head 1)

3.9.30 Ulvertech Profiler (Head 2)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvUlvertechProfiler.exe	*Drivers.io options:*	SC1 | SD1 | SD2
Last modified:	2004-Sep-28		S1 | P2 | N | 200 | 180 | REV | ROLL | PAS | ACT

Driver Description

Driver to decode profiler beam data points, from an Ulvertech SC1 Profiler Data Telegram or an Ulvertech SD Profiler Data Telegram. Defaulty, the driver automatically determines the type of data output.

Currently, the driver only works in *passive* mode, i.e. it will not decode the timetags from the data strings. Therefore, determining a time latency might be important. This latency can be considered to be the time between the actual scan being ready and when de first data is available on the COM port. The driver itself corrects for data transfer (using port settings) and the scan duration (using number of steps and step time).

Development of an *active* driver is on hold, since during tests it was obvious that sending (TT) commands while the Ulvertech is scanning (a scan can take considerable time), can hang up the Ulvertech system.

Note. In passive mode, the Ulvertech system must be set up for Continuous Output Profiler Data.

Note. QPS strongly recommends using the ***SC1 Profiler Data*** format since this format contains a flag for scan direction, which is required to get accurate timetags for pitch-roll-heave corrections. Data output is always port to starboard (except for even heads in mirror mode), but every other scan will be scanned from starboard to port. The SD Profiler Data Output (2) format including roll compensation angles also contains the scan direction flag, but this format has not been tested real-time. The SD Profiler Data Output (2) format with just the O.S.P. data does not contain a scan direction flag. See decoding notes for more information. The O.S.P. data (depth, temperature, water density, speed of sound) can also be decoded from a Bathy Plus (O.S.P.) telegram. See “Ulvertech Bathy (Depth & Altitude)” driver under the underwater sensor drivers.

Format Description

The format description is obtained from Ulvertech’s *Document: Z05104, Issue: B, Date: April 2000.* Driver can decode all data strings in software version 2.11g, but data strings are backwards compatible.

SC1 Profiler Data Telegram

```
SSSSS...PPPPP...000000DDMMYYHHmmssXXXXXX00000000HHHVVVSTAsto0Mhl0RPS
ssssssEEEEEE0000000TTTTTTtttZG<terminator>
```

Telegrams from the profiler system in SC1 format are always fixed length of 2092 bytes (+ terminator).

Caution. It is possible for the Ulvertech system to output only 1892 bytes (+ terminator), if it has been inadvertently switched to the old 180 step mode (1 deg steps rather than 0.9 deg steps). This setting is only there to support the old harmonic heads. The harmonic heads will not achieve the current scan rates of the new Ulvertech fast scan profiler heads, so this setting should be avoided unless speed is not an issue.

There are 201 data points (i.e. 201 sets of 5 bytes) providing the system is set for Fast Scan Heads (Scan Mode of 200). If the system is set for harmonic heads (Scan Mode of 180) there will be 181 data points. SC1 format will always contain all data points giving zeros for points not scanned.

SC1 Profiler Data Telegram (continued)

SSSSS...	data from starboard head (5 bytes per reading, being the time to target in microseconds)
PPPPP...	data from the port head (5 bytes per reading, being the time to target in microseconds)
000000	always 6 zeros
DD	day of the month
MM	month (01 = Jan ... 12 = Dec)
YY	year (last 2 digits, i.e. 00 = 2000)
HH	hour of the day (00 ... 23)
mm	minutes (00 ... 59)
SS	seconds (00 ... 59)
XXXXXX	speed of sound in cm/sec
00000000	always 8 zeros
HHH	horizontal head separation in cm
VVV	vertical head separation in cm
STA	start angle in degrees
sto	stop angle in degrees
0	always 0
M	operation mode (1 = paused, 2 = running)
h	highest head (0 = same or port, 1 = starboard)
l	step size (0 = 1.0 deg, 1 = 0.9 deg, 2 = 1.8 deg)
0	always 0
R	range setting in metres divided by 5 (rounded down)
P	port head state (0 = disabled, 1 = enabled)
S	starboard head state (0 = disabled, 1 = enabled)
ssssss	start time of scan in HHMMSS format
EEEEEE	end time of scan in HHMMSS format
0000000	always 7 zeros
TTTTTT	time tag at start of scan in hex 20 ms ticks
ttt	time per step in hex 256 microsecond ticks
Z	scan direction (1 = port to starboard, 0 = starboard to port) – *see note*
G	group number (only used for automatic scan output)

Note. Ulvertech Engineering has confirmed that the scan direction flag in the SC1 profiler data string is wrong and that it outputs a '0' when going from port to starboard and a '1' in case of starboard to port. The current Drivers.io file contains a flag 'REV' to correct this. See Drivers.io options for details.

Note. QPS recommends that the double step size (option 2) is ***not*** used, since it is not clear what the timetags of the individual data points must be. The sample data logfiles that QPS has received from various sources, do not seem to correspond with the manual and the correspondence with Ulvertech Engineering Ltd.

SD Profiler Data Telegrams

Output (1): Profilers Only or Profilers with Bathy Plus but not using OSP data

```
[G]SRR,STA,STO,ffffff,vvvvvv,BB:BB:BB,EE:EE:EESHH,ddd...SHH,ddd...T
```

Output (2): Profiler with Bathy Plus (O.S.P.) set to use OSP data or compensation enabled

```
[G]SRR,STA,STO,ffffff,vvvvvv,BB:BB:BB,EE:EE:EE,DDDDDD,TTTTT,SSSSSS,VVVVVV,
tttttt,Z,s,PPPnAAAAA...SHH,ddd...SHH,ddd...T
```

(continued on next page)

SD Profiler Data Output (1) Telegram (continued)

[G]	group number
S	separator (1 or 2 bytes)
RR	range setting in metres
STA	start angle setting in degrees
STO	stop angle setting in degrees
ffffff	correction factor setting for each slot (average error between actual and required heading)
vvvvvv	head flag for each slot (0 = no head or head faulty, 1,2,3,4 = valid head, various modes)
BB:BB:BB	start time of scan in hour:minute:second
EE:EE:EE	end time of scan in hour:minute:second
S	separator (1 or 2 bytes)
HH	slot number of the first head
ddd...	data from the first head (3 bytes per reading, being the time to target in hex 16uS units)
S	separator (1 or 2 bytes)
HH	slot number of the next head
ddd...	data from the next head (3 bytes per reading, being the time to target in hex 16uS units)
T	terminator (1 or 2 bytes)

SHH,ddd... will be repeated for all other heads in group. Whole string will be repeated for other groups.

Note. QPS recommends that this format is ***not*** used, since it does not contain timing information.

SD Profiler Data Output (2) Telegram

[G]	group number
S	separator (1 or 2 bytes)
RR	range setting in metres
STA	start angle setting in degrees
STO	stop angle setting in degrees
ffffff	correction factor setting for each slot (average error between actual and required heading)
vvvvvv	head flag for each slot (0 = no head or head faulty, 1,2,3,4 = valid head, various modes)
BB:BB:BB	start time of scan in hour:minute:second
EE:EE:EE	end time of scan in hour:minute:second
DDDDDD	OSP depth reading (cm)
TTTTT	OSP temperature reading (hundredths of a degree)
SSSSSS	OSP water density reading (gm/100L)
VVVVVV	OSP speed of sound reading (cm/sec)
tttttt	time tag at the start of the scan (in hex 20 ms ticks)
Z	scan direction (0 = starboard to port, 1 = port to starboard)
s	step mode (0 = 1 deg steps / 181 data points, 1 = 0.9 deg steps / 201 data points)
PPP	step time (in hex 256 µs ticks)
n	null character
AAAAA...	roll angle from the head (correction to be applied to expected angle during scan)
S	separator (1 or 2 bytes)
HH	slot number of the first head
ddd...	data from the first head (3 bytes per reading, being the time to target in hex 16 µs units)
S	separator (1 or 2 bytes)
HH	slot number of the next head
ddd...	data from the next head (3 bytes per reading, being the time to target in hex 16 µs units)
T	terminator (1 or 2 bytes)

SHH,ddd... will be repeated for all other heads in group. Whole string will be repeated for other groups.

Decoding Notes

SD telegrams contain separator bytes that can be identical to the terminator byte(s). The termination byte is assumed to be a <LF> (line feed) byte, but this can be altered in the registry settings. The *QINSy* driver needs to be able to distinguish the various parts of the SD telegram. For this purpose, it is looking for '[' and ',' (comma) characters in the data string. It is therefore important that the separator byte is ***not*** ',' (comma). The header fields in a SC1 output telegram are separated by using the occurences of zeros in the data string.

The default mode is that the driver automatically determines the type of data output. However, SC1 Profiler Data and SD Profiler Data Output (1) telegrams do not contain information on the scan step mode, so the driver will skip decoding the first input string since this is needed to determine the number of beams.

Ulvertech data is always port to starboard regardless of scan direction, with port 0 degrees and starboard 180 degrees, except for even numbered heads in mirror mode. Since *QINSy* expects the nadir beam to be 0 degrees and beam angles positive to starboard, the beam angle values in the profiler data are corrected by subtracting 90 degrees. The *QINSy* driver, however, will always store the data points in the direction from port to starboard, so that fixed beam number can be used in the echosounder settings to exclude beams.

Note. As there are two transducers in each profiler head (at 90 degrees to each other), there is one timetag for two data points from each head. If the selected scan sector is more than 90 degrees, the transducer heads will be doing the full 0 degrees to 180 degrees sweep. However, if the scan sector is less than 90 degrees, only one transducer is used depending on which one is appropriate. Start of scan time (t_0) is when the head starts to do its scan, so it would apply to to 0 degrees or 180 degrees if in opposite direction. If less than 90 degrees then the start of scan timetag must apply to the angle at start of scan depending on direction again.

Note. The center beam (i.e. beam 101 if 201 data points are scanned) is always considered to be observed by the port transducer in a head. It will have the minimum (0.0) or maximum (scan duration) time delay with respect to start of scan time (t_0), depending on whether the scan direction is port to starboard of vice versa.

SC1 Profiler Data Telegrams will always contain all data points giving zeros for points not scanned. In this case the driver corrects the timetag of the first data point only if the scan sector is less than 90 degrees.

SD Profiler Data Telegrams only contain the data pionts for the scan sector selected by the operator to save sending null data. If the scan sector is more than 90 degrees, the head is actually scanning 180 degrees, so the driver calculates where the head actually started scanning and corrects the timetag of the first data point.

In passive mode, the start of scan timetags from the profiler data telegrams are not used to timetag the data points (beams). Instead the first byte of the telegram is timetagged (corrected for the time needed to transfer the data bytes) and the duration of the scan is calculated to determine the timetag of the first data point (t_0). In both passive and active mode, a correction is made for added or skipped points if the start of scan timetag does not correspond to the timetag of the first datapoint in the profiler telegram, as explained above.

See also the "Ulvertech Bathy" and "Ulvertech Profiler" drivers under the underwater sensor drivers.

Drivers.io Options

Command line option "PAS" will start the driver in passive mode, "ACT" will start driver in active mode. The latter option is not supported yet, since QPS has encountered some problems when testing this option.

Command line option "REV" (presently enabled) will reverse the scan direction as decoded from the profiler telegrams. Ulvertech Engineering has confirmed that the scan direction flag in the SC1 profiler data string is wrong and that it outputs a '0' when going from port to starboard and a '1' in case of starboard to port.

Drivers.io Options (continued)

Command line option “SC1” will only decode telegrams in SC1 format, whereas “SD1” and “SD2” will only decode telegrams in SD format. By default, the driver automatically determines the Ulvertech format.

Command line option “S1” or just “1” will decode the first head in a Profiler Data telegram, i.e. the data from the head with slot number 1 in case of the SD format, and the data from the starboard head in case of the SC1 format. Option “P2” or just “2” will decode the second head in a Profiler Data telegram, i.e. the data from the head with slot number 2 in case of the SD format, and the data from the port head in case of the SC1 format.

These two options are predefined in Drivers.io. The driver also supports slot numbers 3 to 6 which can be used in case of the SD format. To use another head, find all entries for DrvUlvertechProfiler in Drivers.io, and replace “DrvUlvertechProfiler.exe 1” by “DrvUlvertechProfiler.exe N”, where “N” is the slot to decode.

Command line option “200” will tell the driver to expect data in scan mode of 200 (201 data points), and “180” will prepare the driver for scan mode of 180 (181 data points). By default, the driver will use the step mode from the input string (SD Output (2) format) or automatically determine the number of data points.

Drivers.io Options (advanced)

Command line option “PREV” will tell the driver to use the timetag of the first byte in a new Ulvertech telegram for the update time (start time of scan) of the following telegram. Correspondingly, the timetag for the current telegram (start time of scan) is obtained from the update time of the previous telegram. System latency is still applied, but no scan duration correction is applied to the start time of scan. This option assumes that the Ulvertech profiler system starts a new scan immediately after an output telegram has been sent. Remember, the Ulvertech system must be set up for Continuous Output Profiler Data. To use this option, find all entries for DrvUlvertechProfiler in Drivers.io, and add “PREV” to the command lines.

Option “ROLL” will decode the roll angle values from the SD Output (2) telegrams, and add them to the beam angles. By default, this option is not enabled, since it has not been tested. The correction angle values are only valid if the Bathy Plus (O.S.P.) Head is the Enhanced type with Motion Sensors, otherwise they are meaningless. To use this option, add “ROLL” to all DrvUlvertechProfiler entries in Drivers.io.

Database Setup

See description under “MULTIBEAM ECHOSOUNDERS”.

Select driver “Ulvertech Profiler (Head 1)” to decode the data from the head with slot number 1 in case of the SD format, and the data from the starboard head in case of the SC1 format. Select driver “Ulvertech Profiler (Head 2)” to decode the data from the head with slot number 2 in case of the SD format, and the data from the port head in case of the SC1 format. The same driver (and COM port) can be used to decode the OSP readings from the SD Output (2) telegram or the sound velocity value from a SC1 data telegram.

See also the description of the “Ulvertech Profiler” under the underwater sensor drivers.

Online Setup

Since *QINSy* does not yet support dual heads for multibeam echosounders, the input cable from the Ulvertech system has to be splitted to two separate COM ports, if data from both heads are to be decoded.

If the active version of the Ulvertech driver becomes available, it is important that only one of the COM ports has got a ***two-way*** cable connection, otherwise the *QINSy* commands will not reach the Ulvertech.

Important note. See remark on Mechanical Profiler Systems under “MULTIBEAM ECHOSOUNDERS”.

3.9.31 Ulvertech Pipe / Cable Tracker

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvUlvertechTracker.exe	*Drivers.io options:*	0..100, 0..100
Last modified:	2002-May-08		

Driver Description

Driver can decode: depth of contact, burial depth, Attitude, Heading and Cable Deviation from the Ulvertech TD400 Pipe and Cable Tracker – Ulvertech Enhanced Format. To compute a cable position from the cable tracker offsets, the *QINSy* Multibeam support must be enabled.

Format Description

The following data packet will be decoded by the *QINSy* driver:

Ulvertech Enhanced Format
Length variable, 11 comma-separated fields, terminated by <Carriage Return><Line Feed>

```
..XXX.XX,YYY.YY,RRR.R,PPP.P,HHH,S.SS,B.BB,A.AA,DDD,M,
```

The format of the normal data string is as follows:

X	Distance Across (+ = pipe detected on starboard side) P-R COMPENSATED
Y	Vertical distance from skid to pipe top (positive down) P-R COMPENSATED
R	Roll
P	Pitch
H	Heading
S	Signal Strength (0- 1)
B	Burial Depth
A	Altitude
D	Deviation from pipe or cable heading
M	Mode (not used in driver)
T	Time (not used in driver)

Note. Leading zeros are suppressed and there are two hex 01 character's at the start.

Format Example

```
  0.89,1.28, 3.5, 0.8,112, 0.44,0.75,0.53,  8,0,162304
```

Where X is 0.89 mtrs, Y is 1.28 mtrs, roll is plus 3.5 deg, pitch is 0.8 degrees, heading is 112 degrees, confidence level or average signal strength is 0.44 or 44%, burial depth from ROV skids to pipe/cable top is 0.75 mtrs, altitude is 0.53 mtrs, deviation from pipe or cable heading is 8 degrees, mode is passive (i.e. no injected tone), and the time is sixteen twenty three and four seconds.
When the sensors have too low a signal or too high then it sets both the X and Y values to 0.00. If the confidence level is low then there is insufficient signal and when it is high then it is reaching saturation.
If there is no input to the system of altitude then the burial is set to 00.00 and the altitude is the same as Y.

(continued on next page)

Decoding Notes

The relative X, Z position of the detected pipe is decoded as beam 1 of the multibeam system.
The relative X, Z position of the seafloor is decoded as beam 2 of the multibeam system.

If the Ulvertech unit has no altitude input then height of seafloor can't be calculated. The driver detects this and beam 2 is no longer being decoded.

The driver decodes the TSS tracker offsets as (two) multibeam echosounder beams. ***Beam 1*** contains the vertical and horizontal distance between the tracker reference point (reference line of the coil array) and the target. ***Beam 2*** contains the vertical distance between the tracker reference point and the sea bottom and the same horizontal distance as beam1. The Z value of beam 2 is obtained by subtracting the fields "Burial Depth" from "dY".

Quality indicators of beam1 and 2 are set to valid (3) when:

a) X and Y values are not equal to zero AND
b) Decoded Signal Strength is higher than a user-defined Threshold-Low AND
c) Decoded Signal Strength is lower than a user-defined Threshold-High

If requirements a) to c) are not met then data is still decoded ok but the Indicators are set to 0.

Quality indicator can be interpreted as a single "Brightness Test Flag".

Drivers.io Options

The user can define 2 threshold values (a minimum and a maximum) as command line parameter in Drivers.io. These values are used to set the quality indicators. The values that are entered in drivers.io are integer values in the range of 0 to 100. This will be interpreted as a Signal Strength Threshold between 0.0 and 1.0. If only one argument is entered, this is interpreted as the low threshold. If no thresholds are entered in drivers.io then Quality indicators will remain untouched.

Important note. In order to add user-defined thresholds, one should add the same parameters to all the lines in drivers.io that contain the name DrvUlvertech.exe. Make them syntax-technically the same so watch out for spaces and upper/lower case. If the syntax is not the same, Controller will start multiple driver modules and complain about port conflicts.

Example:

DrvUlvertech.exe 20 90	-> Low Threshold = 0.2, High Threshold 0.9
DrvUlvertech.exe 20	-> Low Threshold = 0.2, High Threshold 1.0
DrvUlvertech.exe	-> (default) Low Threshold = 0.0, High = 1.0 [All accepted]

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Database Setup

See description under “PIPE AND CABLE TRACKER SYSTEM DRIVERS”.

To decode the (horizontal and vertical) cable tracker offsets as multibeam observations, from which the cable position can be computed, add a system of type “Multibeam echosounder” to the (ROV) object, select the “Ulvertech Pipe/Cable Tracker” driver and add the appropriate interfacing and system parameters. Make sure to select options “Unit is roll stabilized” and “Unit is pitch stabilized”.

In order to decode the ROV attitude from the same input string, connect a new “Pitch, Roll an Heave system” to the ROV object and select the “Ulvertech Pipe/Cable Tracker R-P” driver with the same I/O parameters as before.

In order to decode the ROV heading from the same input string, connect a new “Gyro’s and Compasses system” to the ROV object and select the “Ulvertech Pipe/Cable Tracker Heading” driver with the same I/O parameters as before.

The “Deviation” can be decoded (and displayed) as a “generic observation”. Add an auxiliary system of type “Miscellaneous system” to the database, select the “Ulvertech Pipe/Cable Tracker Deviation” driver; use the same I/O parameters as with the MBE driver (if it was defined). Add a “Generic Observation” to the new system.

Controller Setup

First time online, use “Settings – Echosounder” to select the computation to enable the MBE computations. Use next page in the MBE settings wizard to disable/enable beam 1 (target) and/or beam 2 (sea bottom). Also make sure to enable “Settings- Filtering” and enable options “Brightness Test” and “Linearity Test” if you want Multibeam data to be flagged when Quality indicators are “not valid (0)”.

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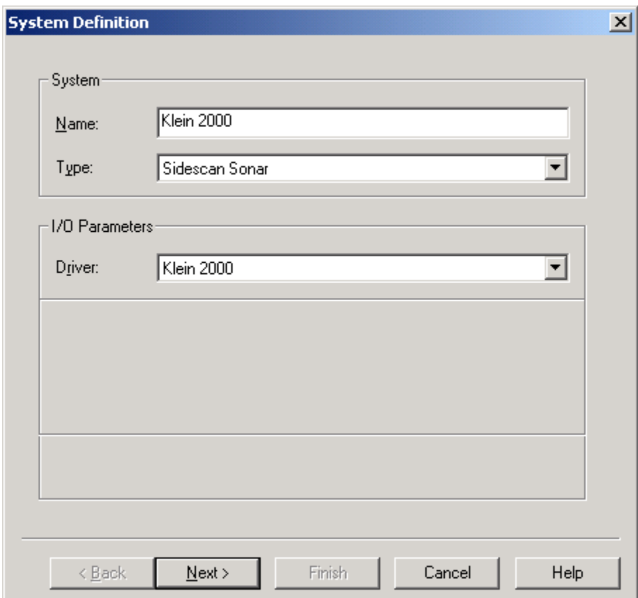
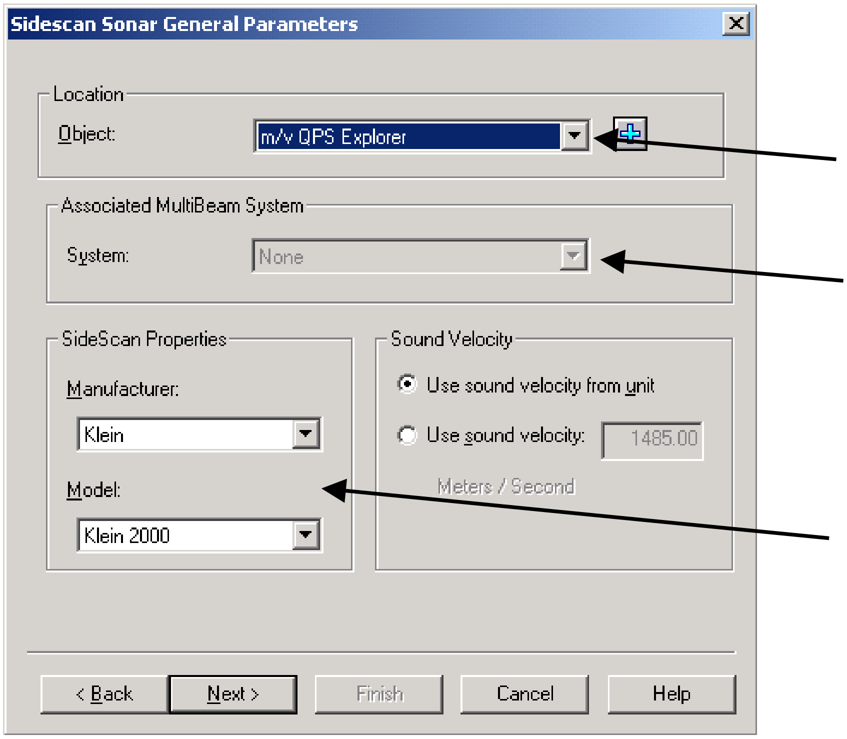
3.10 SIDESCAN SONAR DRIVERS

Database Setup

Select system type 'Sidescan Sonar'. The category 'sidescan Sonar (old)' is no longer used but left for backwards compatibility.



Pressing "Next" will show the "Sidescan Sonar General Parameters" Page:



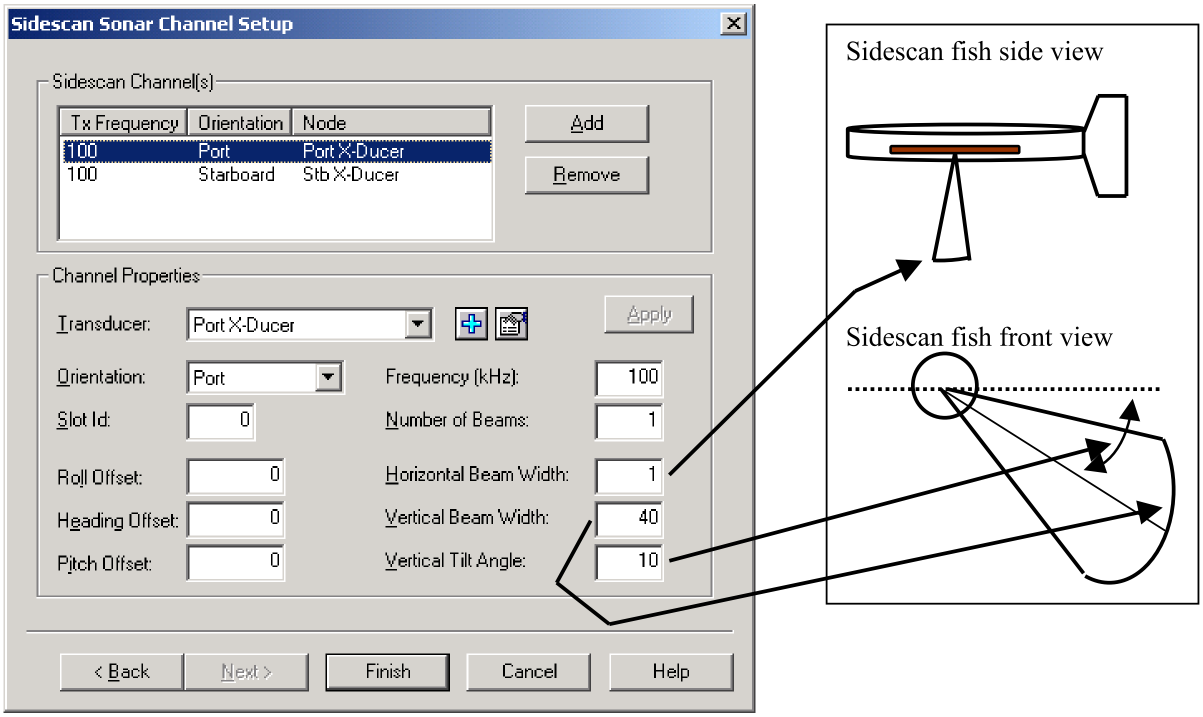
Select Object on which system is located.

Select in case of an Add-on sidecan system, the originating Multibeam system.

Fill out the system Model and Manufacturer here, this is for informal use only (used for example by 6041 software to set model specific settings)

Pressing “Next” shows the “Sidescan Sonar Channel Setup” Page.

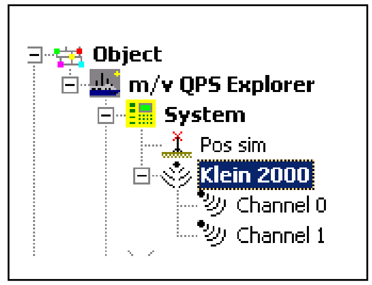
Press the “Add” button to add a new channel, then select the inserted channel in the list and modify it’s Channel properties. Pressing “Finish” or selecting another channel will save the changes.



Description of Channel Properties

Transducer	Node on which transducer of channel is located. For a Multibeam Add-On Sidescan both channels usually share the same node as the originating multibeam system
Orientation	Direction to which the transducer is transmitting/receiving
Slot Id	ID to identify Channel (IMPORTANT FOR A/D and Digital Input Cards!!, see respective driver description)
Roll, Hdg, Pitch Offsets	Mounting angles of transducers (same as with Multibeam systems)
Frequency (kHz)	Nominal Transmitting frequency
Number of beams	Always set this to 1 except when using a Multibeam Sidescan sonar system like Klein 5000 Series. Note in case of a Multibeam Add-On Sidescan like the Sidescan option of a 8125 or 8101 always set this to 1 and not the number of beams of the Multibeam transducer!!
Hor. Beam Width	Opening angle of transducer in horizontal direction (usually 1-2°)
Vert. Beam Width	Opening angle of transducer in vertical direction (usually 40-60 °)
Vert. Tilt Angle	Angle between horizontal axis and centre beam limits (see figure above)

Pressing “Finish” will close the setup of the “System” and save the changes. A new sidescan system appears in the treeview below the object, see figure on the right. A glossary of the properties of either system or individual can be viewed in the right pane of DbSetup when tree item is selected.



Notes:
-XTF Export: as of august 2003 it is no longer possible nor necessary to select a driver with the option ‘XTF’. Every Sidescan system can now be exported to XTF without requiring the storage of any additional raw data. All users that currently use a driver that uses the XTF option must select their respective system in DbSetup but without the ‘XTF’ option. The biggest advantage of this development is that database sizes will be dramatically reduced (up to 50 %!) because of the absence of raw XTF sidescan blocks in the *QINSy* database. Exception: for exporting ‘Snippets’ from a Reson seabat, the recording of raw packets is still required.

-Beam Widths and Angles are currently not used within *QINSy* but is only used to Export to Reson 6041 software.

3.10.1 Analog Sidescan [PCI card] (0-5V. Pos. Trigger)

3.10.2 Analog Sidescan [PCI card] (0-5V. Neg. Trigger)

Input / Output:	Input	*Driver class type:*	*Digital I/O*
Executable name:	DrvSidescanAnalog.exe	*Drivers.io options:*	U1|U2|U5
Last modified:	2003-Jun-30		U10|NTRG

Driver Description

Driver to read image data from any sidescan sonar system that can deliver a TTL/CMOS Trigger pulse and an analogue voltage sweep per channel. For example: Klein 595, ODom Echoscan. The driver works only in combination with an ADLink/Nudaq PCI 9118DG Analogue to Digital conversion PCI card. The driver requires the correctly installed Windows driver for the 9118DG card, refer to Chapter 2 for an installation description.
Up to four analogue channels can be acquired simultaneously and continuously at a rate of 22.2 KHz samples per channel per second. This approaches the internal sample rate of the Klein 2000 Sidescan system. The resolution of the acquisition process is 12 bits, at 0-5 volts input range this translate to a resolution of 5/4096 milli volts.
The driver will support sweep times between circa 0.025 and 1.0 second. This corresponds with a range between 20 and 750 meters slant range.

Input requirement

The signals from the sidescan sonar must be compatible with the following characteristics:

Trigger Requirement:
- TTL or CMOS compatible signal.
- Flank rise time better then 50 µs.
- Pulse duration minimum 100 µs.
- Rising or falling active flank [software selectable].

Input Signal:
- Up to 4 Channels.
- Input range software selectable 0-1.25, 0-2.5, 0-5 or 0-10 Volt.

Note: If trigger requirements are not met then driver will not work properly, resulting in intermittent or completely failing decoding.

Interfacing Notes

It is essential to use coaxial cable(s) for every sidescan signal that is to be transported to the card. Not using coax cables will increasing the noise level badly!

The following cable must be created for the interfacing of the signals:

50 p Male HD Delta	BNC's	
34	→ Shield of BNCs	Analogue GND
26	→ BNC+	Trigger {channel 0 is always trigger}
27	→ BNC+	Channel 1 Input
28	→ BNC+	Channel 2 Input
29	→ BNC+	Channel 3 Input
30	→ BNC+	Channel 4 Input

The connector is of a very special type. It is a high density 50 pins delta connector, normally used for a SCSI cable, see picture below.

Drivers.io Options

Command line parameters determine the input voltage range of the card. By default this will be 0 to 5 Volts maximum. With this range, the input voltage will be converted inside the driver to a digital value beween 0 (0 volt) and 65535 (max. voltage). If required the input voltage range can be modified to a different range with a command line option in Driver.io.

Option:	Input range [Volt]:
U1	0 to 1.25
U2	0 to 2.50
U5	0 to 5.00
U10	0 to 10.0
NTRG	Trigger on Negative flank of trigger signal, by default the driver will use the positive flank.

Registry Options

Swath Rejector FiFo Size

The driver will validate an acquired swath before it is accepted and forwarded to the rest of the *QINSy* system. The driver will do this by comparing the sample count of the swath with a variable number of preceding swaths. If the sample count is 5% smaller or 5% larger then the average sample count of the last "Swath Rejector FiFo Size" swaths then it is rejected. This is implemented to prevent any wrongly acquired swaths. If this value is set to 0 then it will be disabled, all data passes the rejector successfully.

Default value: 5.

Swath Length Averager FiFo Size

The driver contains a mechanism to keep the number of samples per ping at a steady number. Due to small drifts in the triggering source of a sidescan system, it is possible that the sample count drifts a little bit (up to +/- 5 samples). This can be annoying because one expects a fixed number of samples per range. If this value is set to zero then averaging is disabled.

Default value : 5.

Database Setup

See description under SIDESCAN SONAR SYSTEM DRIVERS.

Select a Sidescan sonar system and add at least one channel and maximum four channels. Enter the acquired channel number as slot number. Slot ID 1 refers to channel 1, ID 2 to channel 2, etc. Channel 0 will always be connected to the triggering signal, but for debugging purposes one can assign slot ID 0 to view the characteristic of the trigger pulse.

3.10.3 Klein 2000

3.10.4 Klein 2000 QPS Simulator

Input / Output:	Input	*Driver class type:*	*Digital I/O*
Executable name:	DrvKlein2000.exe	*Drivers.io options:*	TST366 | TST46
Last modified:	2001-Jul-18		OLD_HF | OLD_LF

Driver Description

Driver to read image data from a Klein 2000 or Klein 2100 Sidescan Sonar System. Driver reads buffered digital input, which is continuously output by the Klein system. In order for the *QINSy* PC to read this data a NuDaq PCI-7200 Digital I/O card must have been installed (see description under Interface Cards).

Format Description

Data sent from the Klein 2000 is a continuous raw data stream of 179K samples per second. It contains the digitized multiplexed data for 8 analogue input channels as acquired in the fish. Usually only two to maximal four channels are used for the sidescan image data.

The digital output port of the Klein 2000 is a 12 bit parallel digital output that provides a buffered version of the digital signals that are applied to the digital processing circuits in the system 2000. The signal comes straight from the sidescan fish after TVG has been applied. The port supplies all 8 channels as acquired in time division multiplexed format. The port contains 12 data lines, 3 channel select lines and a strobe.

The digital output port has the following characteristics:

Output Level:	CMOS/TTL compatible 5 V	
Output Impedance:	Series Terminated in 100 ohms to allow driving ribbon cable.	
Data Rate:	179KHz	
Word Size:	12 bits	
Data:	Channel 0: Port 100 KHz	<=USED
	Channel 1: Starboard 100 KHz	<=USED
	Channel 2: Port 500 KHz	<= USED
	Channel 3: Starboard 500 KHz	<= USED
	Channel 4: Instrumentation Telemetry	
	Channel 5: Reserved	
	Channel 6: Sub-Bottom Profiler	
	Channel 7: Aux. Input	
Format:	12 data lines, 3 channel select lines, strobe trigger and ground.	

Decoding Notes

Which channel is decoded is determined by the channel setup of the Sidescan System in DbSetup. For every channel it is required to input a “Slot Id”. This must be set to a unique number which identifies the Channel in the digital data coming form the Klein 2000 system.

Klein 2000 channel Id’s:
Channel 0: Port Transducer 100 KHz
Channel 1: Starboard Transducer 100 KHz
Channel 2: Port Transducer 500 KHz
Channel 3: Starboard Transducer 500 KHz

So If you want to decode Port channel 100 KHz, make sure to enter Slot Id: 0.
Note: Theoretically you could decode max. 8 sidescan channels but a Klein 2000 will have max 4 Channels which contain sonar data.

Interfacing Notes

This driver requires a special, tailor made I/F cable that connects the PCI-7200 DIO Card port CN2 female 37 p Delta with the Klein 2000 Digital Output Port (also 37 p female Delta).

The cable has the following layout:

	to Klein 2000 Digital o/p port Male 37p Delta			to PCI 7200 dio card Male 37p Delta
(LSB)	Data Select 0	6	1	DI 0
	Data Select 1	5	2	DI 1
(MSB)	Data Select 2	4	3	DI 2
	Trigger	1	4	DI 3
(LSB)	D0	19	5	DI 4
	D1	18	6	DI 5
	D2	17	7	DI 6
	D3	16	8	DI 7
	D4	15	9	DI 8
	D5	14	10	DI 9
	D6	13	11	DI 10
	D7	12	12	DI 11
	D8	11	13	DI 12
	D9	10	14	DI 13
	D10	9	15	DI 14
(MSB)	D11	8	16	DI 15
	Strobe	2	19	I_REQ
		3	18	I_ACK
		3	37	I_TRG
	Ground	3	36	GND

Try to keep the cable length as short as possible, maximum length 6 metres but preferably shorter. Be careful with how you connect the cable, since both ends have the same connector. To prevent accidental swapping, mark the connectors clearly, failing to correctly connect the cable may result in damage to either system!

Drivers.io Options

Command line parameter “TST46” or TST366 indicates that instead of a “real” klein 2000 system, the QPS Klein 2000 Simulator has been attached. Difference between the two is that in the TST46 mode the swathlength of incoming swathlength is set to 46 milliseconds instead of 366 ms.Make sure that the simulator is connected by the attached ribbon cable and NOT the official Klein 2000 I/F cable.
Command line parameter OLD_HF means driver will work in “old” mode and only decodes the 2 high frequency channels. OLD_LF means : low frequency channels, “old” mode.

Database Setup

See description under SIDESCAN SONAR SYSTEM DRIVERS.

No options are available in for “old” mode. A sidescan sonar will always be defined as an auxiliary system.

3.10.5 Reson Seabat 81xx/900x (ß) (Network)

3.10.6 Reson Seabat 81xx/900x (ß) (Network) XTF-Snippets

Input / Output:	Input (Network)	*Driver class type:*	UDP/IP Client
Executable name:	DrvSeabatSocket.exe	*Drivers.io options:*	RAW | NOCS | OLD
Last modified:	2002-Jun-24		

Driver Description

Driver for Reson Seabat 81xx & 900x series Multibeam Echosounders with Sidescan or Snippet Option, using a network connection. The driver decodes SIDESCAN_IMAGE (0x48) or Snippet (SNP0/1) packets. This driver is also used to decode Multibeam data records, refer to MULTIBEAM ECHOSOUNDER SYSTEM DRIVERS section for more information.
The XTF version will store, besides the decoded Sidescan or Snippet image data, the raw XTF Sidescan/Snippet data records in the *QINSy* database. Such a database can afterwards be used to export the XTF records to a separate file. However, using this option will create much larger db's since you store Sidescan image data twice.
Note: For exporting ordinary sidescan to XTF it is no longer necessary to use the XTF option. Ther XTF export utility will export straight from the QPS Sidescan records in the database nd does not need raw data anymore. Hoewever if you want to Export snippets then the XTF Option is still required.

This driver supports the new Reson Snippet technology. This technology measures the backscatter data per beam, adding an additional angular resolution that results in enhanced seafloor images. A Snippet is the series of amplitude values in the signal reflected from a beam's footprint on the seafloor. One Snippet will be produced for each beam. For more information on Snippets refer to Reson documentation.

Current versions of *QINSy* Seabat Socket driver downgrades the Snippet data to an ordinary sidescan time series of amplitude values and handles it that way accordingly. By downgrading it, it looses the advantage of the angular resolution. However the Snippet data can be stored as XTf blocks and exported to an XTF file for further external processing.
Note: The OLD version does not support snippet technology.

Format Description

See Reson Seabat manuals.

Decoding Notes

The timetag from the data packets is used (if it is not zero) if the Reson Seabat driver is a network driver. Therefore it is highly recommended to synchronize the times of the *QINSy* and Seabat systems by adding the output driver "Seabat 8000 Series UTC Synchroniser" to the database. If the *QINSy* online setup includes a PPS system, then the timetag will be truly UTC. See description under "OUTPUT SYSTEM DRIVERS".

System Configuration

See description below.

Database Setup

It is important to select 2 channels for this System, a Port and a Starboard channel. Select the correct node for both channels, the nodes are identical to the one(s) as used by the Multibeam system. Select the "Associated Multibeam System". Refer to section "SIDESCAN SONAR SYSTEM DRIVERS" for more information.

Drivers.io Options

Command line parameter “NOCS” can be used to skip checksum test. “RAW” will store the XTF records. The OLD version will support the “Sidescan sonar (old)” [auxiliary] system types.

Seabat IP Number Configuration

Refer to section “Reson Seabat 81xx/900x (Network) [XTF]” in chapter MULTIBEAM ECHOSOUNDER SYSTEM DRIVERS for more information on IP setup.
The processor outputs snippet data via UDP/IP (base port + 6). Each ping generates a burst of Ethernet packets containing one SNP0 header followed by BeamCnt snippets (one snippet per beam).

.

3.10.7 Reson Seabat 7K (Network)

Input / Output:	Input (Network)	*Driver class type:*	TCP Client
Executable name:	DrvSeabat7K.exe	*Drivers.io options:*	*none*
Last modified:	2003-Dec-31		

Refer to section "Reson Seabat 7K (Network)" in chapter MULTIBEAM ECHOSOUNDER SYSTEM DRIVERS for more information.

Database Setup

It is important to select 2 channels for this System, a Port and a Starboard channel. Select the correct node for both channels, the nodes are identical to the one(s) as used by the Multibeam system. Select the "Associated Multibeam System". Refer to section "SIDESCAN SONAR SYSTEM DRIVERS" for more information.

3.10.8 Simrad EM3000 Seabed Image

Input / Output:	Input (Network)	*Driver class type:*	UDP/IP Client
Executable name:	DrvSimradEM3000.exe	*Drivers.io options:*	0 | 1 | 2 | DII | RAW
Last modified:	2001-Nov-11		

Driver Description

Driver for Simrad EM3000 EM3000Compact and EM3000D Multibeam Echosounders, using a network connection. The driver decodes S (seabed Image) type datagrams from either a single or dual head EM3000. This driver is also used to decode Multibeam data records, refer to MULTIBEAM ECHOSOUNDER SYSTEM DRIVERS section for more information. Driver only uses the UTC time tags from the EM3000 datagrams so make sure that the EM3000 System is synchronized by GPS PPS and clock telegrams are transmitted from the EM3000. The driver needs, besides the S datagrams, also bathymetry packets to correctly re-construct the sidescan data from the seabed image datagram.

The EM3000 must send the following datagrams for correct decoding of sidescan data:

-S datagram that contains the intensity data
-C datagram to determine internal EM3000 clock drift and offset
-F datagram for raw ranges and angles and D datagram for sampling frequency (not included in F datagram)
-or-
-D “raw-data” datagram

Important: Driver will stop updating if no C (clock) datagrams are received for more than 30 seconds. This is done to prevent latency related errors. This limitation is activated as soon as the first clock datagram arrives. So for test purposes it is possible to use this driver without receiving the clock telegram but never use it like this operationally.

Format Description

Binary EM3000 datagrams start with STX, datagram type and timetag, and end with ETX and a checksum. The total length of the datagram (excluding length field) will precede the STX byte, except for datagrams that are sent out on an external Ethernet network as the length is then automatically given by the Ethernet protocol upon datagram reception. The time stamp resolution is 1 millisecond and includes the century.

An EM3000D (Dual Head) transmits the same datagrams as a single EM3000 but these datagrams contain 254 beams instead of the 127.

See for more information on how these values can differ for the various EM3000 models and how these values should be interpreted, the *Kongsberg Simrad – EM Technical Note – Input and Output Diagrams.*

Decoding Notes

Seabed Image Intensity values that are stored in the S datagram have a range from –128 to 126 (0.5 dB steps). These values are converted to *QINSy* 2 bytes range 0-65535 by adding 128 and multiply with 256.

Drivers.io Options

With the RAW option enabled the driver not only decodes the Side scan data but also stores the raw data in the Db. The raw data can be exported to XTF later.

3.10.9 Simrad EA-Series Sidescan

3.10.10 Simrad EA-Series Sidescan (With UTC)

Input / Output:	Input	*Driver class type:*	UDP/IP Client
Executable name:	DrvSimradEAxxxSocket.exe	*Drivers.io options:*	Channel# | PPS
Last modified:	*2003*-Jan-13		

Driver Description

Driver for decoding sidescan samples from EA400 Echosounder. Driver can decode two types of datagrams: Echogram (binary) datagram and the classification ‘RAW0’ raw telegram. The same driver is also used for decoding depth data. The EAXXX series Echosounders can also be extended with a sidescan sonar setup. Usually a configuration of multiple side looking 120 KHz Transducers is used for this.

Format Description – Echogram Datagram

The driver will decode the sidescan samples form the Q# message.
The Q#-message contains data for channel 1 [Q1] (120 KHz Port SSS), or channel 2 [Q2] (120 KHz Starboard SSS). Q1 is always decoded as data from the port channel, Q2 form the starboard channel.

The datagram has a variable length, the first part is ASCII (fixed length), the second part is binary.

Q#,HHMMSShh,TVG type,Depth,Pelagic Upper,Pelagic Lower,Pelagic Count,Bottom Upper,Bottom Lower,Bottom Count,Data

Where:

Q#	2 chars header, # indicates the channel number	<ASCII>
,	1 char separator	<ASCII>
HHMMSShh	8 bytes -- time when ping is transmitted	<ASCII>
,	1 char separator	<ASCII>
TVG type	4 bytes integral number, 0=No TVG, 3=20logR, 4=30logR	<Binary>
Depth	4 bytes floating point number	<Binary>
Pelagic Upper	4 bytes floating point number	<Binary>
Pelagic Lower	4 bytes floating point number	<Binary>
Pelagic Count	4 bytes integral number	<Binary>
Bottom Upper	4 bytes floating point number	<Binary>
Bottom Lower	4 bytes floating point number	<Binary>
Bottom Count	4 bytes integral number	<Binary>
Data	(Pelagic Count + Bottom Count) * 2 bytes signed	<Binary>

Notes:
-Due to protocol limitations the number of output samples is limited to 700.
-The 'Data' is x in the following formula: $y = x\ 10 \log(2)/256$
-'Data': Weakest signal is –20000 (-235 dB) maximum signal is 0 (0 dB).

-Sidescan data is only stored in pelagic (surface) samples
-Bottom samples are always zero

-Start of samples does not have to be at pingtime but can have an offset
depending on Pelagic Upper Value, range of samples is from Pelagic lower - Pelagic upper

Example:
pelagic upper : 10
pelagic lower : 60
pelagic count : 200
bottom values are all set to zero

Range is then 50 metres, Max. slant Range is 60 metres.
sample count = 200, sample rate can in that case be calculated with SV

Format Examples

```
Q1,08222740,....\.yA......zC......A............$.z.V......^...<...\.A...........Z.#.5...d.M.........
;.S.......8.................D.h.1...*..........  etc... etc…
Q2,08222740,....v.yA......zC......A............9...q.%.......................b.....2...........
etc… etc…
```

Format Description – RAW0 Datagram

```
// Power and angle sample data
struct Sample {
      long  TelegramType;         // "RAW0"
      struct {
            long LowDateTime;
            long HighDateTime;
      } DateTime;                 // 100-ns ticks since 1601
      short Channel;              // Channel number
      short Mode;                 // Power and angle data?
      float TransducerDepth;      // [m]
      float Frequency;            // [Hz]
      float TransmitPower;        // [W]
      float PulseLength;          // [s]
      float BandWidth;            // [Hz]
      float SampleInterval;       // [s]
      float SoundVelocity;        // [m/s]
      float AbsorptionCoefficient;// [dB/m]
      float Heave;                // Best guess [m]
      float Roll;                 // Future use
      float Pitch;                // Future use
      float Temperature;          // [C°]
      short TrawlUpperDepthValid; // None=0, expired=1, valid=2
      short TrawlOpeningValid;    // None=0, expired=1, valid=2
      float TrawlUpperDepth;      // [m]
      float TrawlOpening;         // [m]
      long  Offset;               // First sample
      long  Count;                // Number of samples
      short Power[];   // EK500 dB-format
      short Angle[];   // Step size: 360/256 = 1.4 degree
      };
```

This telegram contains sample data from just one transducer channel. It can contain power sample data .(Mode = 0), or it can contain both power and angle sample data (Mode = 1). The sample data telegram can contain more than 32 768 sample points.

Decoding Notes

For time-tagging purposes the time from the message will be used if the driver "(With UTC)" has been chosen. If the other drivers (without the UTC) have been chosen, local computer time (or PPS if it is connected to *QINSy*) will be used for time-tagging.

Echogram
-Only the Pelagic Data is used.
-If Selected pelagic (surface) range is larger then there is actual data then zero's are decoded.
-Sound Velocity is not available in message.
-Samples are compressed by the EA400.

RAW0
-Sound Velocity is decoded from this message
-All the samples are decoded, if operation is in deep water there will be a lot of samples (many thousands).
-Angle data is never decoded.

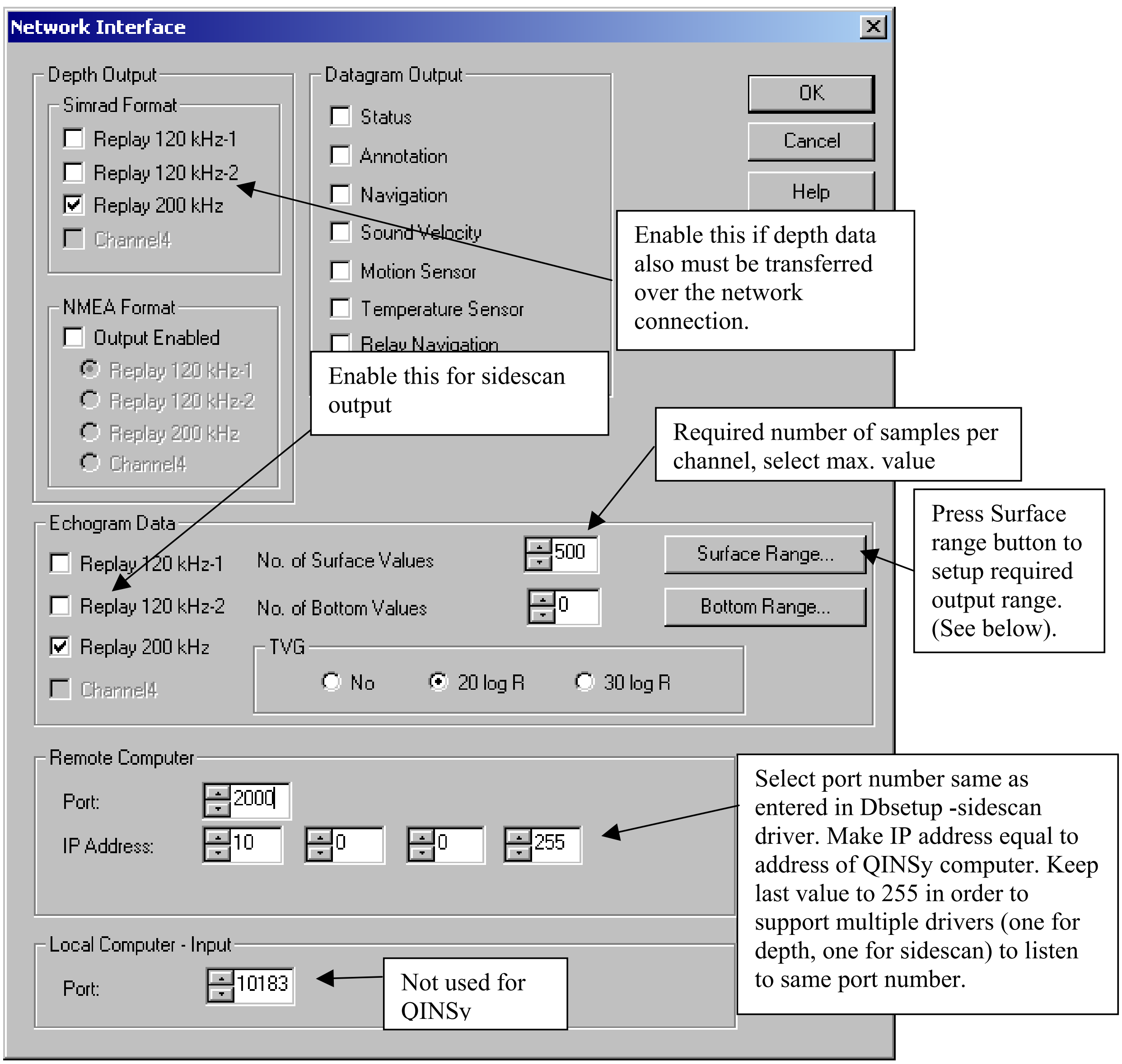
System Configuration

As mentioned above, there are two ways to transfer sidescan samples from EA400 to *QINSy*.
The first is through the Echogram message. The echogram will contain (extra) amplified and compressed sidescan samples. The number of samples that are to be transferred is user selectable and hence independent of the operating range of the EA400.
The second is through the RAW0 classification message. This message contains all the samples that are acquired during the sweep, no additional amplification is applied.

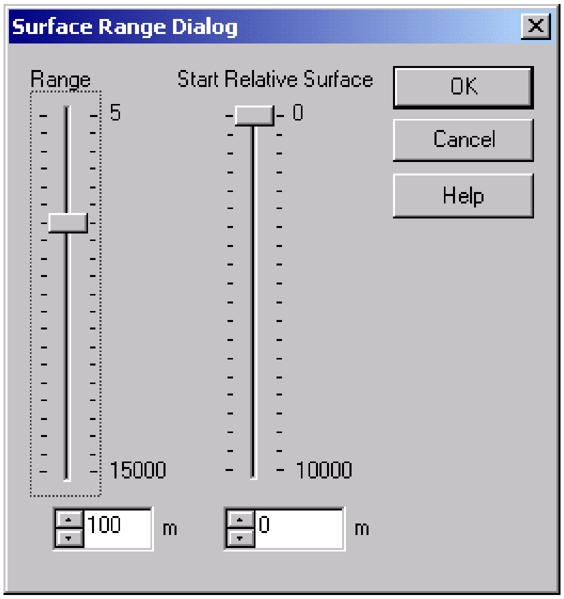
Do not output Echogram messages and RAW0 on the same port!

Echogram Datagram

The EAXXX Setup program must be configured correctly in order to output echogram sidescan data. Network setup can be accessed through the menu Interfaces|Network Interface.



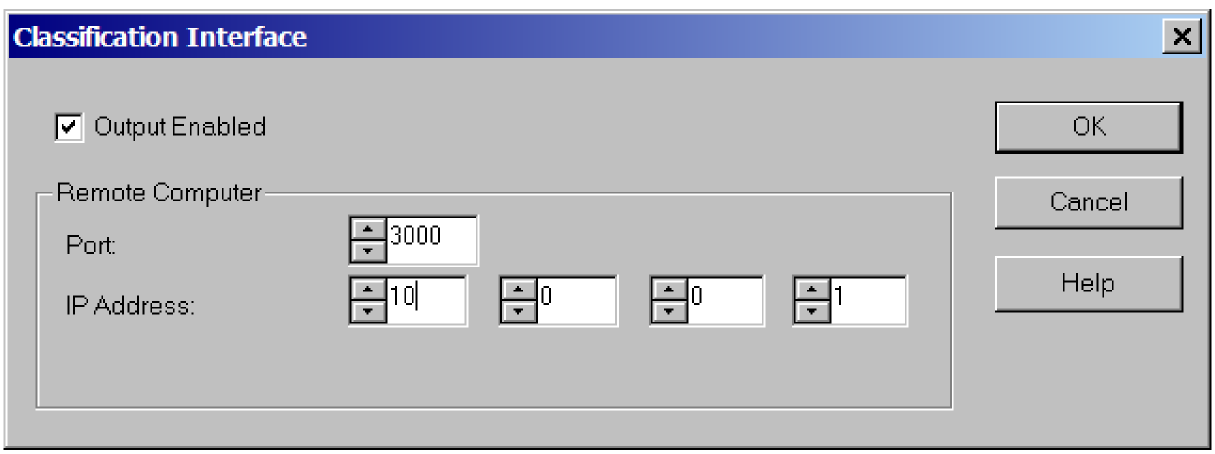
Setup of Surface Range:



Left slider sets up the range of the samples, the right slider sets up the start of the range. To contain a complete sidescan picture including water column, it is advised to keep the start at zero. Note that sidescan slant range will be equal to start range + range! So if one enters a start range of 20 metres and a range of 100 then effectively the sidescan range will be a 120 metres with a blank the first 20 metres.

RAW0 classification Datagram

The EAXXX Setup program must be configured correctly in order to output RAW0 sidescan data. Output can be enabled through the menu Interfaces|Classification.



-Enable checkbox “Output enabled
-Enter port and IP address of *QINSy* computer.

No more settings are required when using this message

Database Setup

See description under “SIDESCAN SYSTEM DRIVERS”.

Further, the (Network UDP) Port number must be the same as the Remote Computer Port number, where the Simrad Echosounder is sending the data onto the network.

On the Simrad Echosounder you must also define, besides the Port number, the IP Address of the Remote Computer. It is recommended to use a mask for the last field of the address. I.e. if your IP address is e.g. 10.0.0.30 (you can determine your address using the IPCONFIG command on a DOS command line, Select Start Menu, Programs, Accessories, Command Prompt), then set the Remote computer IP address to 10.0.0.255. (It is recommended not to use loopback address 127.0.0.1)

If you use the Echogram datagram then make sure to enter the correct sound velocity into *QINSy* since this can not be decoded by the driver. The setting ‘Sound Velocity’ for a sidescan sonar system must be set to manual.

If you use the RAW0 Datagram then the soundvelocity as entered in EA400 Controller program is used.

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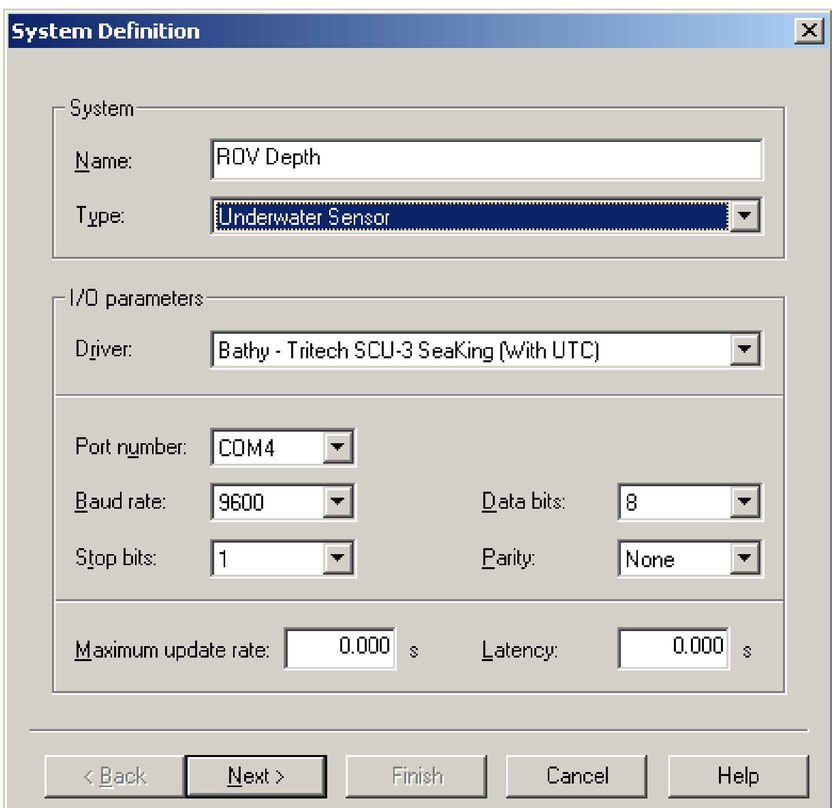
3.11 UNDERWATER SENSOR DRIVERS

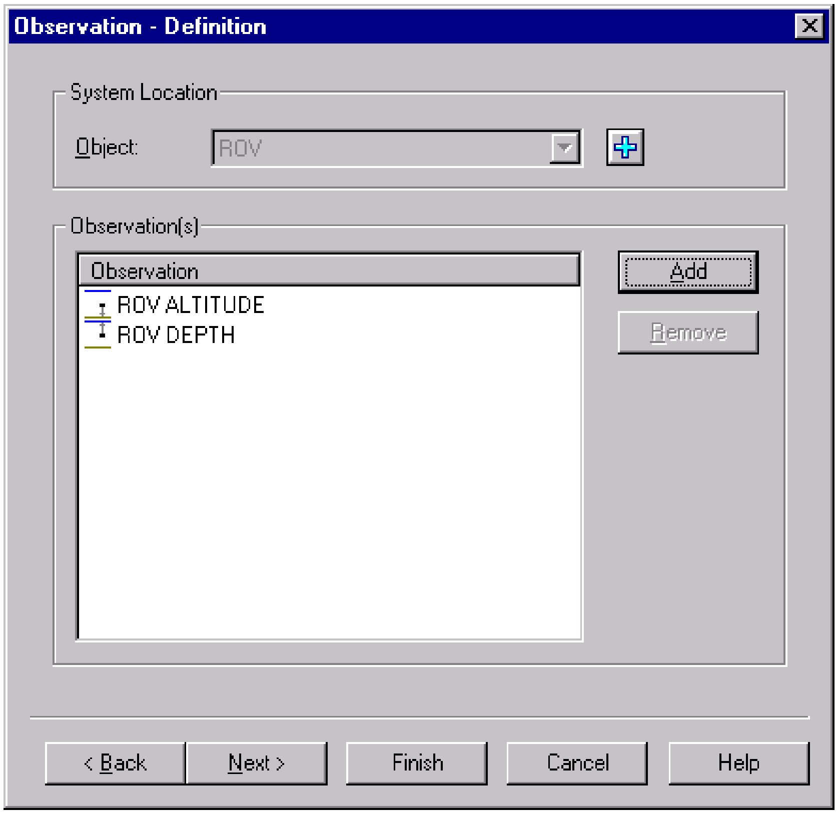
Database Setup

In Db Setup, underwater sensors can be bathymetry, revolution or soundvelocity systems. All drivers are listed as “Underwater Sensor”. Notice that some other underwater sensor, like speedlogs, have their own system type category in Db Setup.

To decode the ***depth***, add an “Observation” of type “ROV depth” to the system.
To decode the ***altitude***, add an “Observation” of type “ROV altitude” to the system.
To decode the ***revolution***, add an “Observation” of type “Revolution” to the system.
To decode the ***sound velocity***, add an “Observation” of type “Sound Velocity” to the system.
Be sure to define the observation(s) at the right node.



Database Setup (continued)



See for more information the *QINSy* DB Setup Help Topics or the *QINSy* Knowledge Base.

3.11.1 DeepC AUV (Depth & Altitude)

Input / Output:	Bi-Directional (Network)	*Driver class type:*	TCP Client
Executable name:	DrvDeepCAFS.exe	*Drivers.io options:*	*none*
Last modified:	2004-Feb-13		

Please refer to Miscellaneous system “DeepC AUV AFS Control” for more information.

3.11.2 DSSI ROV Depth (NMEA $--DPT)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DSSIROVDepth(NMEA$--DPT).ini	*Drivers.io options:*	*none*
Last modified:	2002-Jan-28		

Driver Description

Driver to decode depth from "NMEA-look-a-like" $-DPT Message, as outputted by ROV Depth sensor on a DSSI ROV. The driver uses the generic serial input driver with the above-mentioned filename.

Format Description

Data will be ASCII and each line is terminated with a carriage return (CR) and line feed (LF). Each data field is separated by a comma.

#	*Format*	*Description*	*Values, Range, Units*
01	$--DPT	NMEA Identifier	
02	";"	field delimiter	";"
03	xx.xx	Depth of ROV	metres
04	","	field delimiter	","
05	xx.xx	Unknown field	(not used)
06	","	field delimiter	","
07	xxxx.x	Unknown field	(not used)
08	*HH	Checksum	(not used)
09	<CR><LF>	record termination	

Format Example

$--DPT,21.3,0.0,10000.0*73<CR><LF>
$--DPT,21.3,0.0,10000.0*73<CR><LF>
$--DPT,21.3,0.0,10000.0*73<CR><LF>
$--DPT,21.3,0.0,10000.0*73<CR><LF>
$--DPT,21.4,0.0,10000.0*74<CR><LF>
$--DPT,21.4,0.0,10000.0*74<CR><LF>

Database Setup

See description under "UNDERWATER SENSOR DRIVERS"

3.11.3 Eurosense Realtime Draught

3.11.4 Eurosense Realtime Draught (UTC)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvDraughtSerial.exe	*Drivers.io options:*	UTC | PASS
Last modified:	2003-Jan-14		

Driver Description

Driver to decode draught measurement from Eurosense Realtime draught system.

Format Description

The output data is an ASCII format.
The drivers expects the data to be comma, space or tab separated and Carriage Return/Linefeed terminated.

The first fields is a prefix (text string, e.g. "$Draught01"), the second field the time of the data (hhmmss.sss).
Each observation is outputted as a separate line of data.

`$Draught01,hhmmss.sss, d.ddd[, d.ddd][, d.ddd]<CR><LF>`

#	*Identifier*	*Description*
1	`$Draught01`	Prefix
2	Hhmmss.sss	Time (from the draught computer) of the draughtvalue (Only used when the driver with UTC is selected
3	d.ddd	Draught (Slot 1)
4	d.ddd	Draught (Optional, when this is draught value to decode (Slot 2)
5	d.ddd	Draught (Optional, when this is draught value to decode (Slot 3)
6	<CR><LF>	Carriage Return + Linefeed

Format Examples

```
$Draught01,132923.938, 1.252<CR><LF>
$Draught01,132924.939, 1.236<CR><LF>
```

Database Setup

See also description under “UNDERWATER SENSOR DRIVERS”

The user has to select in Db Setup a system of type Underwater sensor, and add an observation of type ROV Depth. The name of the driver must be "Depth - Eurosense Realtime Draught"

The slotnumber of the observation represents the value to decode as draught measurement (1 means the first field after the timefield, 2 means the second field (if available) and 3 means the third field after the timefield will be decoded (if available).

The user may select between two driver entries in Db Setup: one with UTC and one without.
The one with UTC will use the time of the datastring, the other one will timestamp the received datastring when it comes in at the I/O port..

3.11.5 Hyspec OSP Bathy (ROV Depth or Altitude)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvHyspecOSP.exe	*Drivers.io options:*	*format* | OI
Last modified:	1998-Jul-01		

Driver Description

Driver to decode depth and/or altitude data from Hyspec Systems Ltd. (HSL) Oceanographic Sensor Package (OSP). The Hyspec OSP can be integrated with a Ulvertech Modular Scanner MK2 and mounted on a ROV. Environmental data like sound velocity, temperature, salinity and density not yet implemented in *QINSy*.

Format Description

Data will be ASCII and each line is terminated with a carriage return (CR) and line feed (LF). Each data field has a fixed length and is separated by a comma. Only full format data will include environmental parameters.

#	*Format*	*Description*	*Values, Range, Units*
01	xxxx.xx	depth of ROV	metres
02	“,”	field delimiter	“,”
03	xx.xx	altitude of ROV	metres
04	“,”	field delimiter	“,”
05	xx.xx	Temperature	
06	“,”	field delimiter	“,”
07	xxxx.x	density	
08	“,”	field delimiter	“,”
09	xxxx.xx	sound velocity	
10	“,”	field delimiter	“,”
11	xx.xx	salinity	
12	<CR><LF>	record termination	

Format Example

Example full format (42 bytes): `234.98, 3.30,`
`7.12,1026.0,1483.70,35.59<CR><LF>`
Example short format (15 bytes): `236.49, 2.51<CR><LF>`

Database Setup

See description under “UNDERWATER SENSOR DRIVERS”

Note. It is possible to use this driver to define a system of type “Echosounder”, using the same interface parameters. The depth and altitude fields are then added to give the depth with respect to the bathy unit node. One can use the Observation Physics Display or the Echosounder Display to display this depth value.

3.11.6 ISIS (ROV Depth and Altitude) (ROV Gyro) (Cable Out)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvIsis.exe	*Drivers.io options:*	*none*
Last modified:	1998-Oct-27		

Driver Description

Driver to decode ROV depth, altitude, gyro and cable out data from ISIS. ISIS has to be set up to output the desired output format to *QINSy*.

Format Description

The following format will be decoded by the ISIS driver.
Data will be ASCII and each line is terminated with a carriage return (CR) and line feed (LF). Each data field is separated by a comma. Data fields can be any length with any number of decimals.

Item	*Format*	*Description*	*Values, Range, Units*
01	AAAA.AA	depth of ROV	metres
02	“,”	field delimiter	“;”
03	BBBB.BB	altitude of ROV	metres
04	“,”	field delimiter	“,”
05	CCCC.CC	gyro of ROV	degrees
06	“,”	field delimiter	“,”
07	DDDD.DD	cable out	metres
08	<CR><LF>	record termination	

Format Example

```
AAAA.AA,BBBB.BB,CCCC.CC,DDDD.DD<CR><LF>
```

Database Setup

See description under “UNDERWATER SENSOR DRIVERS”

For the ***Cable Out*** a range observation should be defined. Select the previously defined “Surface navigation system” (or add a new one) with the ISIS (ROV Depth, Altitude & Cable Out) driver and enter the serial I/O interfacing parameters. Add an “Observation” of type “Range” to the system and define its properties.

For the ***ROV gyro*** a gyro observation should be defined. First, add a “Gyro’s and compasses” system to the database and select the ISIS (ROV Gyro) driver, using the same I/O interfacing parameters as with the ROV Depth and Altitude driver. Press “Next” button to define the properties of the true bearing observation.

3.11.7 Klein2000 SSS Info (With Annotation)

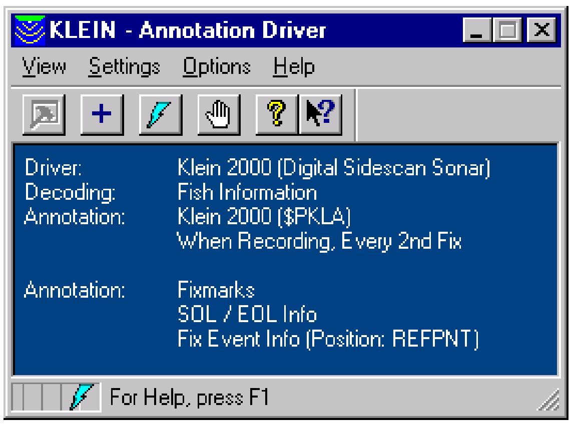
Input / Output:	Input (two-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvAnnotate.exe	*Drivers.io options:*	KLEIN2000
Last modified:	2000-Dec-01		

Driver Description

Driver with user-interface to decode information from a Klein 2000 Side Scan Sonar fish. Driver can also send annotation messages (Fix Marks, SOL / EOL Info, Fix Event Info, etc.) to the side-scan sonar sensor.

Driver with user-interface, so settings can be changed online, by clicking on system button on taskbar.

The driver window displays the user selections. Notice that decoded values are not shown in the display.



Format Description

<u>Message received from Klein 2000</u>

```
$PKLA,SD,3.6,15.1,80.0,45.4,-12.5,7.9,150*hh<CR><LF>
( a   b   c    d    e    f     g   h   i   j    k)
```

a:	NMEA Record Identifier	
b:	System Data	
c:	Temperature (°C)	Decoded as “Generic” observation
d:	Altitude (m)	Decoded as “ROV altitude” observation
e:	Depth (m)	Decoded as “ROV depth” observation
f:	Towfish Heading (°)	Decoded as “Heading” observation
g:	Towfish Pitch (°)	Decoded as “VRU” observation
h:	Towfish Roll (°)	Decoded as “VRU” observation
i:	Sonar Range Setting (meters)	Decoded as “Generic” observation
j:	Checksum	
k:	Carriage Return and Linefeed character	

Format Description (continued)

In order to receive a System Data message from the Klein 2000, the system needs a position of the fish. Therefore the driver will always send a NMEA 0183 $INRMC Message, containing Latitude / Longitude, Speed and Heading of the Fish.

Message sent to Klein 2000

```
$INRMC,112545,A,2637.9681,N,05009.4071,E,00.0,182.3,240500,,*38<CR><LF>
(  a     b  c    d     e     f     g   h    i    j    k  l   m )
```

a: NMEA Record Identifier ($--RMC)
b: UTC Time (hhmmss) of the position
c: Status of Position, ‘A’ ,means Valid, ‘V’ means Receiver Warning
d: Latitude (DDMM.MMMM)
e: ‘N’orth or ‘S’outh
f: Longitude (DDDMM.MMMM)
g: ‘E’ast or ‘W’est
h: Speed (knots)
i: Heading (°)
j: Date (ddmmyy)
k: unknown
l: Checksum
m: Carriage Return and Linefeed character

Annotation Output

See the Annotation Output paragraph for the “Annotation Drivers”.

Interfacing Notes

The RS-232 cable must have two-way direction, both receiving (Rx) and transmitting (Tx) data. Driver will send annotation commands to the unit (and fish position for Klein 2000) and will receive the altitude data.

Database Setup

See description under “UNDERWATER SENSOR DRIVERS”.

For the ***Towfish Heading*** field a heading observation should be defined. First, add a “Gyro’s and compasses” system to the database and select the “Klein2000 SSS Heading (With Annotation)” driver, using the same I/O interfacing parameters as with the ROV Depth and Altitude driver. Press “Next” button to define the properties of the true bearing observation.

For the ***Temperature*** and ***Sonar Range Setting*** fields generic observations should be defined. First, add a “Miscellaneous system” system to the database and select the “Klein2000 SSS Info (With Annotation)” driver, using the same I/O interfacing parameters as with the ROV Depth and Altitude driver. Press “Next” button to define the properties of the generic observations. The slot number should be 1 for the ***Sonar Range Setting*** and 2 for the ***Temperature*** field.

For the ***Towfish Pitch*** and ***Towfish Roll*** fields a “Pitch, roll and heave sensor” system should be defined. Add a “Pitch, roll and heave sensor” system to the database and select the “Klein2000 SSS VRU R-P (With Annotation)” driver, using the same I/O interfacing parameters as with the ROV Depth and Altitude driver. Press “Next” button to define the properties of the pitch & roll observations.

3.11.8 Klein595 SSS (Altitude) (With Annotation)

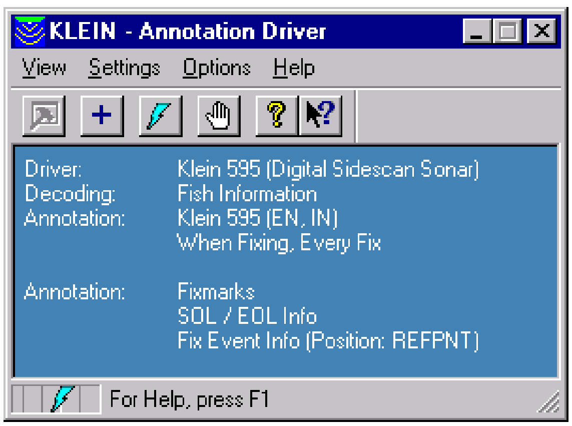
Input / Output:	Input (two-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvAnnotate.exe	*Drivers.io options:*	KLEIN595
Last modified:	2000-Dec-01		

Driver Description

Driver with user-interface to decode information from a Klein 2000 Side Scan Sonar fish. Driver can also send annotation messages (Fix Marks, SOL / EOL Info, Fix Event Info, etc.) to the side-scan sonar sensor.

Driver with user-interface, so settings can be changed online, by clicking on system button on taskbar.

The driver window displays the user selections. Notice that decoded values are not shown in the display.



Format Description

Message received from Klein 595

KRRR_HHH.H_F_M<CR><LF>

K	Record Identifier (Always 'K')
RRR	Range scale setting in meters
HHH.H	Altitude of the Towfish, in meters
F	Frequency of the sonar channel (1 means 100 KHz, 5 means 500 KHz, 3 means both)
M	Mapping Mode Status ('M' means Mapping On, 'N' means Mapping off)
_	Space character
<CR><LF>	Carriage Return and Linefeed character

Length of each message is 16 characters (inclusive carriage return and linefeed).

Format Example

```
K050 025.0 3 N
K050 025.1 3 N
```

Annotation Output

See the Annotation Output paragraph for the “Annotation Drivers”.

Interfacing Notes

The RS-232 cable must have two-way direction, both receiving (Rx) and transmitting (Tx) data.
The driver will send annotation commands to the unit and will receive the altitude data replies.

Database Setup

See description under “UNDERWATER SENSOR DRIVERS”.

3.11.9 Magnetometer (Geometrics G880)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvGeometricsMagneto.exe	*Drivers.io options:*	None
Last modified:	2003-Jan-14		

Driver Description

Driver to decode depth, altitude and/or magnetometer observations, such as field strength and field signal from a Geometrics G880 Magnetometer system.

Format Description

The output data is an ASCII format. Each observation is outputted as a separate line of data. Each line starts with an identifier that designates the type of data present in the line. The identifier is followed by the actual value for the observation. Three empty lines follow each set of observations. A <CR> <LF> pair terminates each line.

The following identifiers are used:

#	*Identifier*	*Description*
1	F	Magnetometer Field observation
2	S	Magnetometer Signal observation
3	D	Fish Depth observation
4	A	Fish Altitude observation

Format Examples

```
F 26775.9  <CR>LF>
S 1243.0  <CR><LF>
D 4.0      <CR><LF>
A 14.9     <CR><LF>
<CR><LF>
<CR><LF>
<CR><LF>
```

Database Setup

See also description under “UNDERWATER SENSOR DRIVERS”

To decode the fish depth and altitude observation a Bathy system needs to be defined. After the system has been added the users needs to define the fish depth and altitude observations.

For information on how to decode the magnetometer observations see the entry for “Magnetometer (Geometrics G880)” driver in the “MAGNETOMETER DRIVERS” section of this document.

3.11.10 Smart SV (AML, ASCII) (Active)

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvSoundVelocity.exe	*Drivers.io options:*	ACT
Last modified:	2003-Dec-09		

Driver Description

Driver to decode single sound velocity values from a Smart SV Sensor (Applied Microsystems Ltd.). Such a sensor is normally mounted close to a multibeam transducer head and the values can be used to correct for beamsteering. Typically installation is seen together with a Simrad EM3000 multibeam configuration.

Driver will detect automatically whether the data is comma separated (ASCII format) or space separated (AML format). Driver will also detect automatically whether the sound velocity value in the datastring is preceeded with a pressure value.

If the interfacing is only a one-way, the sensor must already output data continuously, in the so-called Real-mode. In case of two-way cabling, the driver will sent certain commands in order to receive data in Real-mode: At startup, or when I/O is resetted, a wake-up command in order to activate the sensor. Then the command ‘REAL’ is sent, followed by the ‘MON’ command. This latter command will set the sensor to output data continuously. These commands are repeated until data is actually received in Real-mode.

Format Description Real-mode

<u>AML (Space separated)</u>

`Pressure(decibars) Sound Velocity(m/s)<CR><LF>`

Example: `+010.34 1500.03`

<u>ASCII (Comma separated)</u>

`Pressure(decibars),Sound Velocity(m/s)<CR><LF>`

Example: `+010.34, 1500.03`

Notice that data must be received in Real-mode. (Data in Raw-mode can not be decoded. In raw-mode the datastring contains 5 or 6 values, instead of one or two values)

Decoding Notes

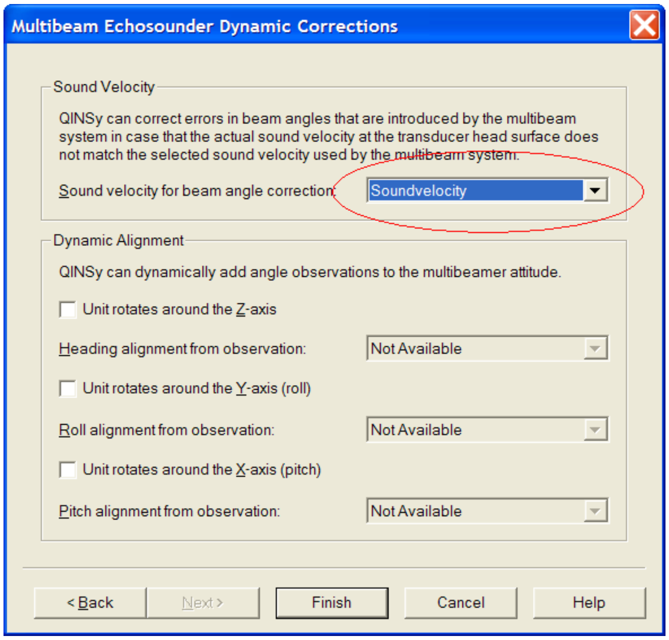
Do *<u>NOT</u>* use this system to obtain sound velocity’s to create profiles, which should be used by single or multibeam echosounders. In order to do that, see chapter about Sound Velocity Profile System Drivers.

Use this system to monitor the value coming a sound velocity sensor, e.g. by using a Observation Physics or Timeplot display, ***or*** use this system to correct the beam angles for some multibeam systems, who do not take a sound velocity directly in their system.

Database Setup

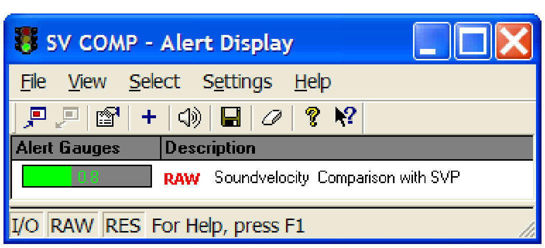
First define a system of type “Underwater Sensor”, and select the driver “Sound Velocity – Smart SV (AML, ASCII) (Active)”. Set the maximum update rate to 1 seconds.
On the next tab-page, add an observation of type “Sound Velocity”.

When the values from the sensor are used to correct for beam angle steering at the multibeam head(s), go to the multibeam system properties and select on the last tab-page this new observation:



Online

The soundvelocity value can be monitored using a Observation Physics or Timeplot display.
One may also compare the sound velocity with the value from the currently used sound velocity profile:
Select an Alert display and add a ‘Raw Data’ Alert and select type ‘Comparison with SVP’.
Set the upper limit to define the maximum allowed difference between the two values.
This is e.g. useful to decide to take a new SVP before continuing with your survey.



3.11.11 Sweep (Imtech DMS 3500)

Input / Output:	Input	*Driver class type:*	UDP/IP Client
Executable name:	DrvDraughtSocket.exe	*Drivers.io options:*	none
Last modified:	2003-Dec-10		

Driver Description

Driver for decoding the depth from a sweep system as a ‘ROV Depth’ observation.
See for more information Miscellaneous driver ‘Draught Measurement System (Imtech DMS 3500).

3.11.12 Tritech SCU-3 SeaKing (Passive | UTC)

3.11.13 Tritech SCU-3 Winson V4 (Passive | UTC)

3.11.14 Tritech SCU-3 Environmetal Data (Passive | UTC)

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvTritechSCU3.exe	*Drivers.io options:*	ACT | PAS | OI
Last modified:	2000-Jun-17		

Driver Description

Driver to decode depth, altitude and/or environmental observations, such as mean velocity of sound, used velocity and mean density, from a Tritech SCU-3 Unit Version 4 bathymetric or velocity reply data structure. The passive type of driver will not synchronize the SCU-3 unit to *QINSy* UTC time. When the active driver is started or reset, the SCU-3 is set to continuous output, using the “Set Continuous Mode (S+)” command. When the active driver is running, the SCU-3 time and date are set to *QINSy* UTC time every 60 seconds, using a “Set Button Bar Data (SB)” command. When PPS support is used, the timing can be very accurate.

Format Description

Tritech SCU-3 must be programmed to output data from bathymetric system (Generic Device Type Hex 27), as ASCII text (Data Reply Mode 0) and raw or processed data (Send Raw Data 1, Send Processed Data 0), or SeaKing long or short format data (Send SeaKing Long = 2, Send SeaKing Short = 3). Old Series-2 bathy strings (Generic Device Type Hex 14) are also supported. A so-called Mean Velocity Reply Data Structure is requested and decoded, when a certain type of generic velocity observation is added to the *QINSy* setup, only valid when SK704 (with CT probe) bathy sensor is deployed and with V1.50 (and later) surface software.

When the SCU-3 is in continuous output mode, it will output bathymetric reply strings consisting of 4 data structures; the length of such a reply, including termination characters, is given in the Slot Reply Header:

1. Prefix : 2 characters, “%D”or “%V”
2. Slot Reply Header : 10 characters, always Hex
3. Bathymetric Data : N characters, ASCII text
4. Termination : 2 characters, <CR><LF>

Winson type bathymetric data strings contain 102 bytes, SeaKing Long 98 bytes, SeaKing Short 56 bytes. Series-2 type bathymetric data strings (Generic Device Type Hex 14) are decoded as Winson type strings.

#	*Bytes*	*Slot Reply Header Description*	*Values, Range, Units*
1	[0,4]	Number of Bytes in Message	0000 – FFFF Hex
2	[5,6]	Slot Number	00 – 0C Hex (04 Hex SeaKing Bathy)
3	[7,8]	Generic Device Type	27 Hex (Winson), 14 Hex (Series-2)
4	[9]	Data Reply Mode	0 = ASCII Text, 1 = Hex, 2 = Binary, 3 = CSV (Comma Separated Values)
5	[10]	Send Format Data	1 = Raw Data, 0 = Processed Data, 2 = SeaKing Long, 3 = SeaKing Short

(continued on next page)

#	Bytes	Winson Type Bathymetric Data Description	Values, Range, Units
1	[0,5]	Internal Temperature	0.1 degree centigrade
2	[6,15]	Digiquartz Pressure	0.00001 Psla
3	[16,21]	Digiquartz Temperature	0.01 degree centigrade
4	[22,31]	Raw Digiquartz Pressure Reading	8 MHz counts for 10 000 pulses
5	[32,41]	Raw Digiquartz Temperature Reading	8 MHz counts for 40 000 pulses
6	[42,47]	Local Oscillator Calibration Coefficient	Hz
7	[48,52]	Conductivity	Mmhos
8	[53,58]	Conductivity Probe Temperature	0.01 degree centigrade
9	[59,63]	Salinity	parts per 100 000
10	[64,68]	Velocity of Sound	0.1 metres per second
11	[69,79]	Altimeter Reading	clicks of 200 ns or 0.001 metres (mm)
12	[80,82]	Bathymetric System Devices	bit # =1 = valid, bit # =0 = not valid; bit 0 : digiquartz, bit 1 : conductivity, bit 2 : altimeter, bit 3 : internal temp., bit 4 : sound velocity, bit 5 : salinity;
13	[83,93]	Depth Reading	0.001 metres (millimetres)
14	[94,101]	Time at Start of Scan	HHMMSSCC = HH:MM:SS.CC

#	Bytes	SeaKing Long Bathymetric Data Description	Values, Range, Units
1	[0,7]	Time at Start of Scan	HHMMSSCC = HH:MM:SS.CC
2	[8,18]	Vehicle Datum Depth (incl. Position Offsets)	0.001 metres (millimetres)
3	[19,29]	Vehicle Datum Altitude (incl. Position Offsets)	0.001 metres (millimetres)
4	[30,34]	Velocity of Sound used for Altitude	0.1 metres per second
5	[35,44]	Mean Density used for Depth Calculation	0.01 grams per litre
6	[45,49]	Barometric Pressure used for Depth	Mbar
7	[50,59]	Digiquartz Pressure	0.00001 Psla
8	[60,70]	Altimeter Reading	clicks of 200 ns
9	[71,76]	System Temperature	0.01 degree centigrade
10	[77,81]	Conductivity	Mmhos
11	[82,91]	Local Density	0.01 grams per litre
12	[92,94]	Bathymetric System Devices	bit # =1 = valid, bit # =0 = not valid; bit 0 : digiquartz, bit 1 : conductivity, bit 2 : altimeter, bit 3 : internal temp., bit 4 : sound velocity, bit 5 : salinity;
13	[95,97]	Parameters for Depth and Altitude Calculation	0 = user supplied, 1 = measured speed of sound, 2 = measured mean specific gravity, 3 = measured baro pressure

#	Bytes	SeaKing Short Bathymetric Data Description	Values, Range, Units
1	[0,7]	Time at Start of Scan	HHMMSSCC = HH:MM:SS.CC
2	[8,18]	Vehicle Datum Depth (incl. Position Offsets)	0.001 metres (millimetres)
3	[19,29]	Vehicle Datum Altitude (incl. Position Offsets)	0.001 metres (millimetres)
4	[30,34]	Velocity of Sound used for Altitude	0.1 metres per second
5	[35,44]	Mean Density used for Depth Calculation	0.01 grams per litre
6	[45,49]	Barometric Pressure used for Depth	Mbar
12	[50,52]	Bathymetric System Devices	see SeaKing Long format
13	[53,55]	Parameters for Depth and Altitude Calculation	see SeaKing Long format

(continued on next page)

#	*Bytes*	*Mean Velocity Reply Data Description*	*Values, Range, Units*
1	[0,10]	Vehicle Datum Depth (incl. Position Offsets)	0.001 metres (millimetres)
2	[11,15]	Velocity of Sound from Local Column Data	0.1 metres per second

Altimeter Units
Altimeter readings are in clicks of 200 nanoseconds for Winson ‘raw’ data format and Series-2 data format. These values do NOT include altimeter position offsets. All other formats output altimeter readings in mm.

Position Offsets
Winson ‘processed’ data format and both SeaKing formats output altimeter readings including the vertical altimeter position (entered in the Tritech SCU-3 setup). The also output depth readings including the vertical bathy position and the vertical bathy installation zero offset. *QINSy* does NOT take these values into account. To retreive these bathy and altimeter position offsets and the bathy zero offset, use the “:GP” command.

Format Examples

```
%D0074041401+001310003864261+014360002435317000186481 1+0034500000+00000000000000
0+0000035896013+000001639309034300
%D0074042701+000000000000000+000000003011527000235410 7+0000000001+01713000091473
2+0000008267055-000000003514034147
%V001E042700+000005841814720
```

Command Description

The “Set Continuous Mode” command is “:S+” + SlotNumber + LineFeed. For example “:S+06<LF>”.
The “Turn Off Continuous Mode” command is “:S–” + SlotNumber + LineFeed. Example “:S-06<LF>”.

The “Set Button Bar Data” command is used by *QINSy* to transfer the UTC time to the SCU-3 system. The format is “:SB~~~~~~~~~HHMMSSCC~DDMMYY<LF>”, where the “~” is a placeholder for a string being sent (no space means no change). An example string is “:SB~~~~~~~~~23595999~311299<LF>”.

The “Request Current Mean Velocity of Sound” command is send when a so-called Mean Velocity Reply Data Structure is needed. The format is “:GV” + SlotNumber + LineFeed. For example “:GV04<LF>”.

Decoding Notes

The quality indicator of the observation(s) is used to show the format of the bathymetric data strings, see the description of the Set Format Data in the Slot Reply Header. See value in the Observation Physics display.

Interfacing Notes

The RS-232 cable must have two-way direction, both receiving (Rx) and transmitting (Tx) data. The driver will send command to the unit to enable the Continuous Data Output Mode and will receive the Bathymetric Data replies. Furthermore, the driver will update time and date of the unit with UTC time every 60 seconds.

Database Setup

See description under “UNDERWATER SENSOR DRIVERS”

(continued on next page)

Database Setup

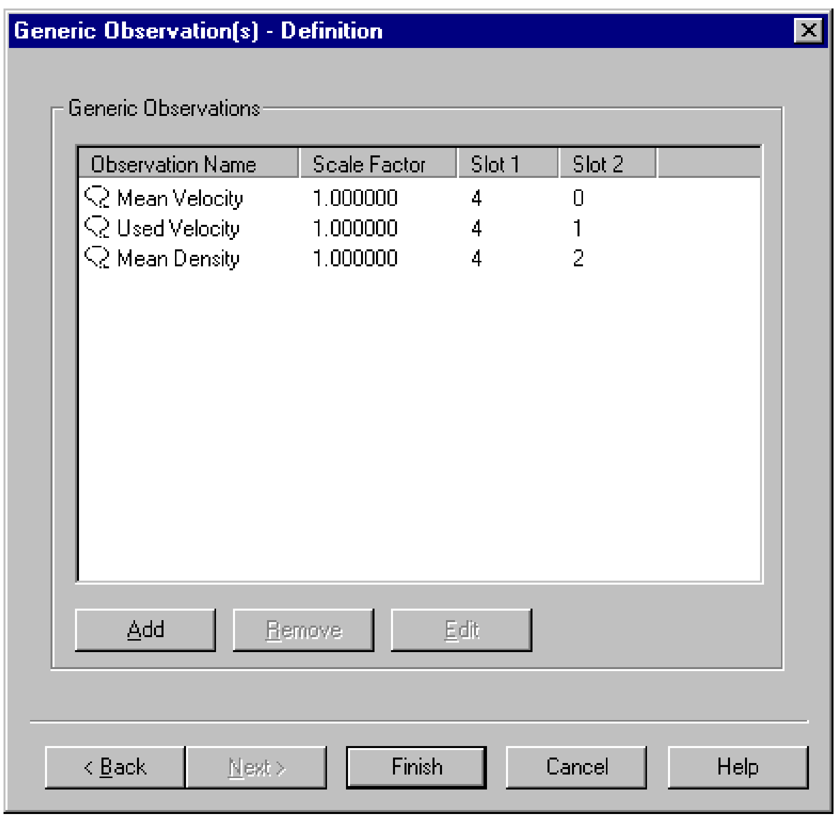
The "ROV Depth" and "ROV Altitude" observations can be defined at different "At" nodes. However, be sure to enter the (same) slot number for this observation(s). Enter the number that corresponds to the slot number in the bathymetric data from the right source device. In SeaKing, the slot number of the first bathy unit is always 04 Hex. *QINSy* uses a slot number to check the input data and to compose output commands. The *QINSy* driver decodes data from one bathy unit only. In order to use more units, split the input cable.

Environmental data such as mean velocity and mean density can be decoded (and displayed) as a "generic observation". Add an auxiliary system of type "Miscellaneous system" to the database, select the "Tritech SCU-3 Bathy Environmental Data" driver of the same type (Passive or UTC) and the same I/O parameters as the bathymetry system (if it was defined). In case these two systems are defined for one SCU-3 unit (slot), *QINSy* will start up only one driver module. The "Generic Observations" that can be added are given in the following table. Slot number 1 must again correspond to the slot number of the bathymetric source device.

Generic Observation Type	***Slot Number 1***	***Slot Number 2***
Mean Velocity of Sound	4 *(SCU-3)*	0 *(QINSy)*
Used Velocity of Sound	4 *(SCU-3)*	1 *(QINSy)*
Mean Density for Depth	4 *(SCU-3)*	2 *(QINSy)*

Note 1. The Mean Velocity of Sound is obtained from a Mean Velocity Reply Data Structure , which is only valid when a SK704 (with CT probe) bathy sensor is deployed and with surface software V1.50 (and later). *QINSy* sends a request for this type of structure (once a second), so a two-way interface cable must be used.

Note 2. Mean Density is only present in a SeaKing type data format and with software V1.27 (and later).



3.11.15 Ulvertech Bathy (Depth & Altitude)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvUlvertechBathy.exe	*Drivers.io options:*	ACT | PAS | OI
Last modified:	2004-Aug-31		

Driver Description

Driver to decode depth, altitude, sound velocity and/or environmental observations, such as temperature, density, salinity and/or pressure, from an Ulvertech Bathy Plus/OSP Sensor or an Ulvertech Profiler, if the output data is in the format of the Bathy Plus (O.S.P.) telegram. See also the “Ulvertech Profiler” entry.

Currently, the driver only works in passive mode, i.e. it will not decode the timetags from the data strings. Therefore, determining a time latency might be important. Enter such a latency value in the database.

Note. In passive mode, the Ulvertech must be set up for Continuous Output Bathy Plus (O.S.P.) Data.

Format Description

The format description is obtained from Ulvertech’s *Document: Z05104, Issue: B, Date: April 2000.*

Bathy Plus (O.S.P.) Telegram

The format of the telegram will be as detailed in a setup table with each enabled parameter being output in the order of the list, separated by commas (or spaces) and the whole telegram terminated with <CR><LF>.

```
Measurement         Format      Unit

depth               dddd.dd     metres
altitude            dd.dd       metres
temperature         dd.dd       degrees
density             dddd.d      Kg/cubic metre
sound velocity      dddd.dd     m/sec
air pressure        dddd        m Bar
salinity            dd.dd       parts per thousand
pressure            dd.ddd      Bar
pitch               dddd.dd     degrees
roll                dddd.dd     degrees
time tag            dddddd      hex 20mS ticks since power on (modulo ffffff)
```

Note. The pitch and roll parameters are only available with the Enhanced Bathy Plus (O.S.P.) Unit.

Format Examples

Full O.S.P. output plus timetag:

```
0.44, 0.74,22.74, 997.9,1490.82, 999, 0.34, 1.044,000e1e
```

Custom output format which just gives depth and altitude:

```
00044 0074
```

(continued on next page)

Decoding Notes

The slot number of each observation is used to determine which field in the telegram must be decoded.

The driver does ***not*** apply any factors to decoded values, so be sure to enter scale factors in DbSetup, if the format is a custom output format. The full O.S.P. output format already has got meters (m/s) as units.

Database Setup

See description under "UNDERWATER SENSOR DRIVERS".

To decode depth, altitude and/or sound velocity from the telegram, add a system of type "Underwater Sensor" and select driver "Ulvertech Bathy (Depth & Altitude)". Add observations of type "ROV Depth", "ROV Altitude" and/or "Sound Velocity". Enter slot numbers that correspond to the field index in the data telegram (1,2,...). Make sure to select proper units and enter appropriate scale factors, e.g. 0.01 to convert decoded values from cm to m, such as in the format example for the custom output format with depth and altitude. The "ROV Depth" and "ROV Altitude" observations can be defined at different "At" nodes.

To decode the other parameters from the telegram, add a system of type "Miscellaneous Systems" and select driver "Ulvertech Bathy Environmental Data". Add a generic observation for each parameter that is to be decoded. Enter slot numbers that correspond to the field index in the telegram (1,2,...). These parameters can be monitored in an "Observation Physics Display" and exported from a recorded database, using for example the "Analyze" module in the "Raw Database Manager", accessable through "Replay" in the Console.

The driver also supports an echosounder observation that is obtained by adding the depth and altitude observations, plus the relative Z offset between their respective "At" nodes (not corrected for pitch and roll). However, this option will only work if both the "ROV Depth" and "ROV Altitude" observations have been defined too. Their units and scale factors are used to compute a depth in meters. In order to define such a echosounder depth observation, add a system of type "Singlebeam Echsounder" and select driver "Ulvertech Bathy (Depth + Altitude)". Depth reference should of course be "Sea Level"; stabilizations all enabled.

Make sure to select the same COM port number and I/O parameters for each of these systems.

3.11.16 Ulvertech Profiler (OSP Data)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvUlvertechProfiler.exe	*Drivers.io options:*	SC1 | SD1 | SD2
Last modified:	2004-Sep-28		S1 | P2 | N | 200 | 180 | REV | ROLL | PAS | ACT

Driver Description

Driver to decode depth, sound velocity and/or environmental observations, such as temperature and density, from an Ulvertech SD Profiler Data Telegram, Output (2): Profiler with Bathy Plus (O.S.P.) set to use OSP data or compensation enabled, or to decode sound velocity from an Ulvertech SC1 Profiler Data Telegram. This driver can be used on the same COM port as an “Ulvertech Profiler” multibeam system driver.

Currently, the driver only works in passive mode, i.e. it will not decode the timetags from the data strings. Therefore, determining a time latency might be important. Enter such a latency value in the database.

Note. In passive mode, the Ulvertech system must be set up for Continuous Output Profiler Data.

Format Description

The format description is obtained from Ulvertech’s *Document: Z05104, Issue: B, Date: April 2000.* Driver can decode all data strings in software version 2.11g, but data strings are backwards compatible.

SC1 Profiler Data Telegram

```
SSSSS...PPPPP...000000DDMMYYHHmmssXXXXXX00000000HHHVVVSTAsto0Mhl0RPS
ssssssEEEEEE0000000TTTTTTtttZG<terminator>
```

XXXXXX speed of sound in cm/sec (ie. 150000 = 1500m/S)

SD Profiler Data Output (2) Telegram

```
[G]SRR,STA,STO,ffffff,vvvvvv,BB:BB:BB,EE:EE:EE,DDDDDD,TTTTT,SSSSSS,VVVVVV,
tttttt,Z,s,PPPnAAAAA...SHH,ddd...SHH,ddd...T
```

DDDDDD	OSP depth reading (cm)
TTTTT	OSP temperature reading (hundredths of a degree)
SSSSSS	OSP water density reading (gm/100L)
VVVVVV	OSP speed of sound reading (cm/sec)

Note. SD Data Telegrams will only contain OSP data fields if an OSP is connected to the profiler system.

Format Examples

SC1 Profiler Data Telegram (edit)

```
0000000000000000000000000000000000...022240120003600009440051200400000512...
00000016080411232914825900000000013000101516501010011112328112329000000003b06702a00
```

SD Profiler Data Output (2) Telegram (edit)

```
[1]
 2, 15,165,IIIIII,100000,14:51:28,14:51:29,    45, 2276,  9977,148259
01,01d01d01d01e01e01e01e01f01f02002002001601702102102102102302302302 2...
```

Decoding Notes

The driver does apply a scale factor of 0.01 to all of the decoded values, to convert depth readings in cm to meters, temperature readings in hundreths of a degree to degrees, water density readings in gm/100L to gm/L, and speed of sound readings in cm/sec to m/s. Make sure to select the proper units in DbSetup, i.e. meters for depths and meters/second for sound velocity values. Scale factors can be left at 1.

SC1 Telegrams. The SC1 output only contains a speed of sound value, no depth or environmental readings. The driver automatically finds the field to decode the sound velocity, so no slot number is needed.

SD Telegrams. The slot numbers of the generic observations are used to determine which telegram field must be decoded for each observation. Enter slot number 8 for temperature, slot number 9 for water density.
The driver automatically uses slot number 7 for ROV depth and slot number 10 for sound velocity.

See also the description of the “Ulvertech Profiler” under the multibeam echosounder drivers.

Drivers.io Options

See the description of the “Ulvertech Profiler” systems under the multibeam echosounder drivers.

Database Setup

See description under “UNDERWATER SENSOR DRIVERS”.

To decode depth and/or sound velocity from the telegram, add a system of type “Underwater Sensor” and select driver “Ulvertech Profiler (OSP Data)”. Add observations of type “ROV Depth” and/or “Sound Velocity”. No slot numbers need to be entered. Make sure to select metres (m/s) as observation units.

To decode the temperature and water density from the SD telegrams, add a system of type “Miscellaneous Systems” and select driver “Ulvertech Profiler (OSP Data)”. Add a generic observation for each parameter that is to be decoded. Enter slot number 8 to decode the temperature reading and slot number 9 to decode the water density reading. These readings can be monitored in an “Observation Physics Display” and exported from a recorded database, using for example the “Analyze” module in the “Raw Database Manager”.

Make sure to select the same COM port number and I/O parameters for this bathy system and (one of) the profiler system(s), if a profiler system (to decode the profiler data points) also has been defined.

See also the description of the “Ulvertech Profiler” under the multibeam echosounder drivers.

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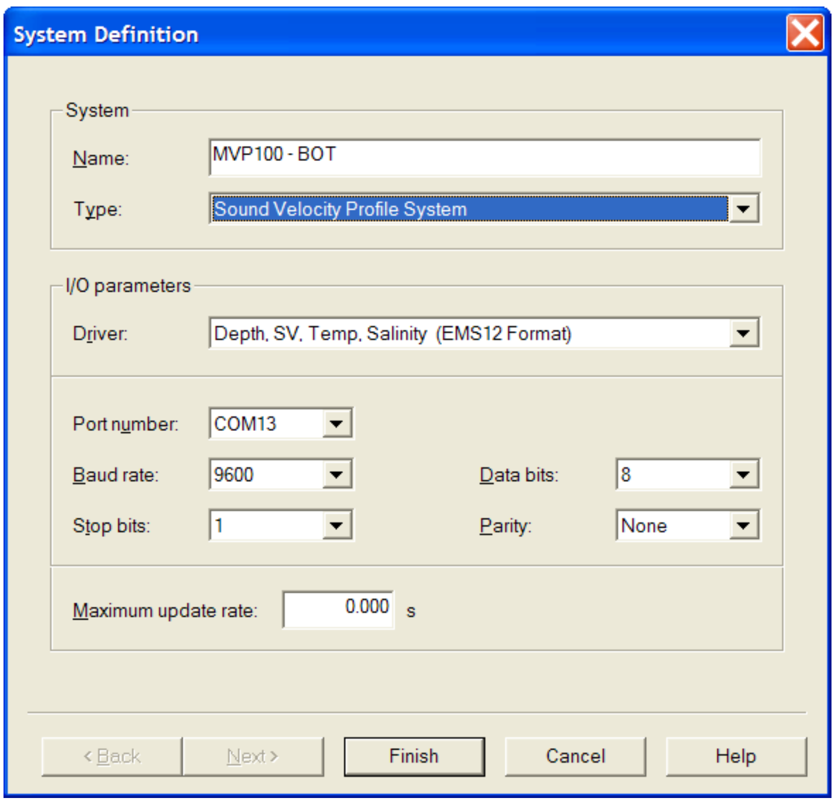
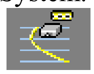
3.12 SOUND VELOCITY PROFILE SYSTEM DRIVERS

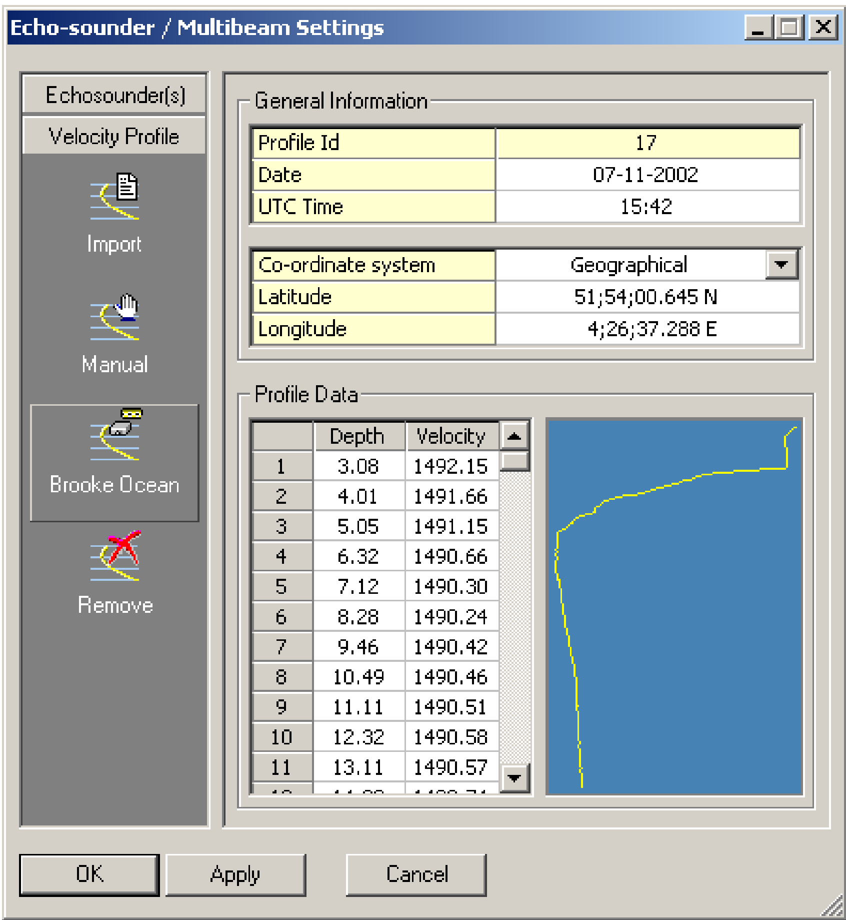
Database Setup

In DB Setup, the system drivers are listed as “Sound Velocity Profile System”.
The only properties the user has to select are the I/O parameters.



Controller Setup

When being on-line, the user will see under Settings, Echosounder Settings, Velocity Profile, a new icon, for the each defined Sound Velocity Profile System.
As soon as the user selects the icon,  the latest received profile will be imported and displayed in the right pane. If satisfied with the results, press the Apply or OK button and *QINSy* will use the new received profile.



3.12.1 Depth SV (ASCII Format)

3.12.2 Depth SV (EMS00 Format)

3.12.3 Depth SV Temp Cond (HIPAP or EM3000 Format)

3.12.4 Depth SV Temp Salinity (EMS12 Format)

3.12.5 Depth SV Temp (AML or EM1000 Format)

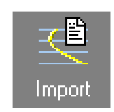
Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvBrookeOcean.exe	*Drivers.io options:*	ASCII | HIPAP | EM12 | EMS00 | EM1000
Last modified:	*2004*-May-17		

Driver Description

Driver to decode during an on-line session sound velocity profile data received from a Brooke Ocean Moving SVP. The MVP100 Controller software is capable of outputting profile data in several formats. The user must select the correct format, i.e. the ASCII or EMS12 format, prior sending data to *QINSy*.

Decoding Notes

When the driver receives new profile data from the Sound Velocity Profile System, two files will be created in the project logfiles folder, both with extension *.SVP.
The first one is named "<System Name>.SVP" and
the second one is named "<System Name> JDxxx HHMMSS.SVP".
Where <System Name> means the name of the system, entered in Db Setup,
xxx the julian day of the year and
HHMMSS the UTC time.
The first file will be overwritten when new profile data is received, so i.e. that this file will always contain the latest up-to-date profile.
A user can always import a previous received profile by using the file import option, use icon



and select a previously created *.SVP file. File type must be "ASCII, AML (Depth speed)".

3.12.6 Depth SV (DeepC AUV)

Input / Output:	Bi-Directional (Network)	*Driver class type:*	TCP Client
Executable name:	DrvDeepCAFS.exe	*Drivers.io options:*	*none*
Last modified:	2004-Feb-13		

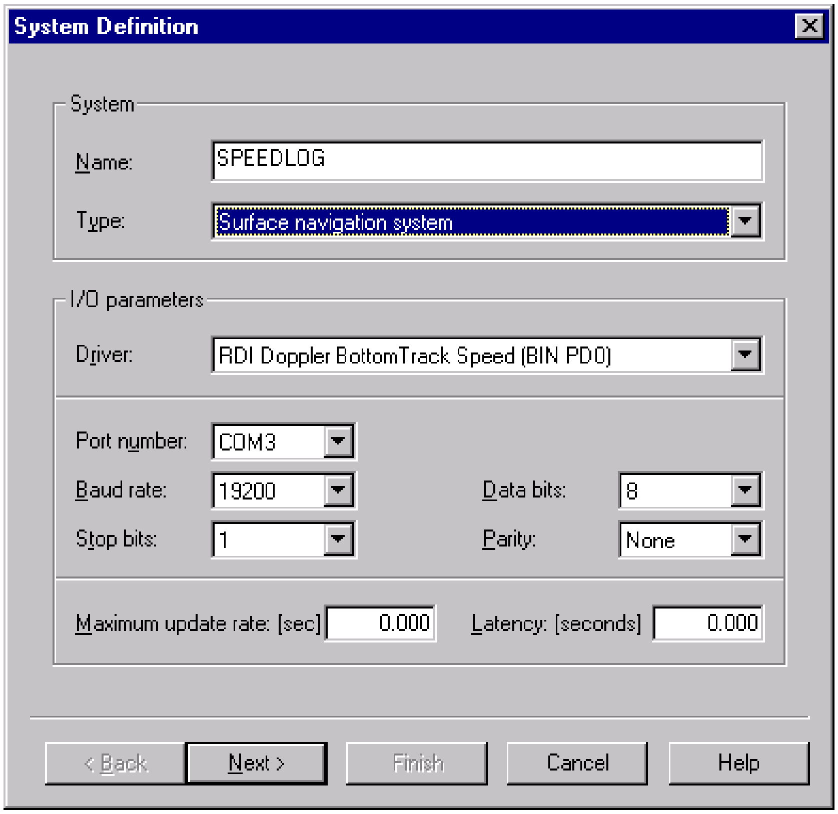
Please refer to Miscellaneous system “DeepC AUV AFS Control” for more information

3.13 SPEED LOG DRIVERS

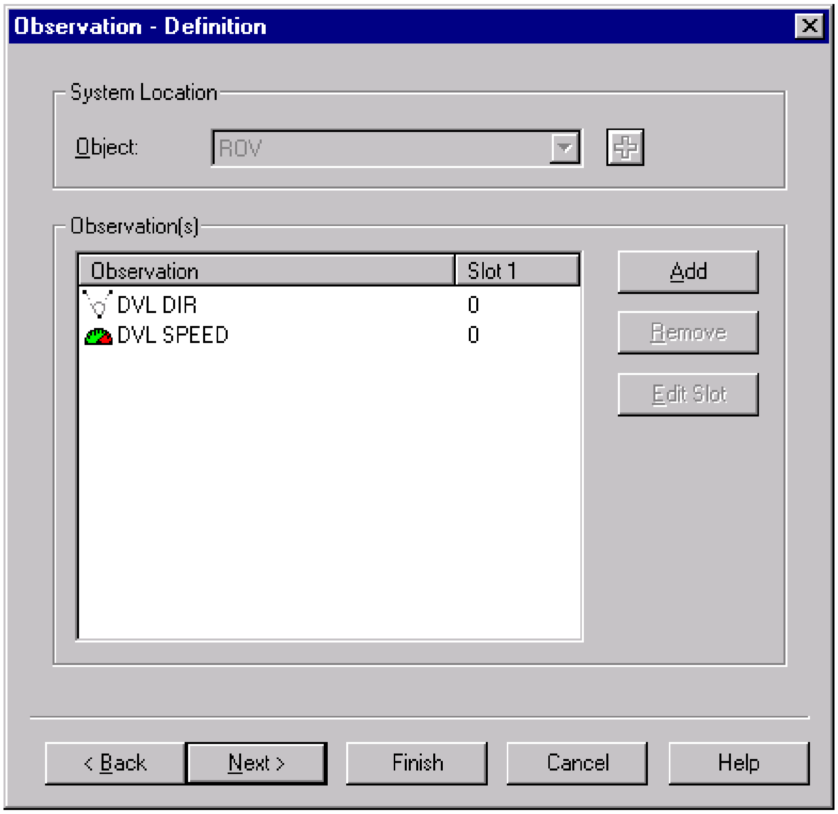
Database Setup

In DB Setup, speedlog system drivers are listed as "Surface navigation system".
See general description under "SURFACE NAVIGATION SYSTEM DRIVERS".

To decode a ***velocity vector value***, add an "Observation" of type "Speed" to the speedlog system. To decode a ***velocity vector direction*** (with respect to the coordinate frame of the object) add an "Observation" of type "Angle" to the system. To decode a ***velocity vector heading***, add an "Observation" of type "Bearing, true".



Database Setup (continued)



Note 1. Be sure to define appropriate a priori SD values for each of the possible (very different) observations.

Note 2. In case of a downward looking speedlog system, e.g. a Doppler unit in bottomtrack mode, it might be necessary to apply a 180 degree offset to the angle observation. Such an offset should be entered as (C-O).

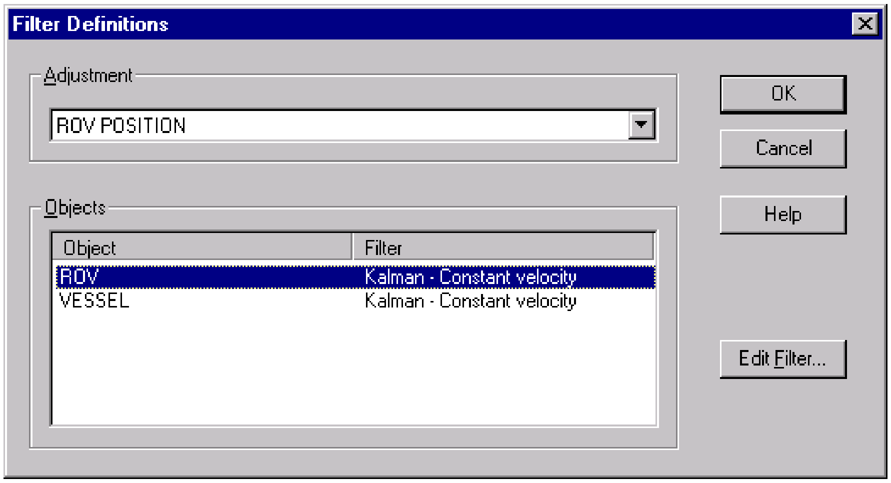
Note 3. In case of an angle observation, a rotation is applied online or during replay to compute the velocity vector heading. This rotation is defined in the Controller, under "Settings – Objects – Horizontal Rotation".

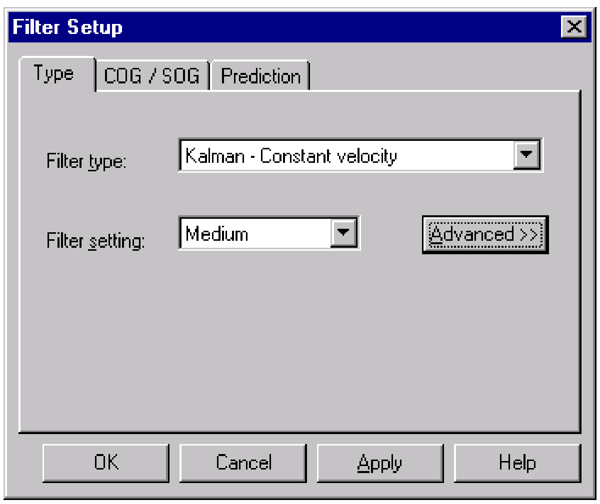
Note 4. The speedlog observations can be used online or during replay as input values for the Kalman filters, as defined in the Controller under "Settings – Position Filters". Select the appropriate computation and object, and press button "Edit Filter". Select filter type "Kalman – Constant Velocity", press button "Advanced" and enable check box "Use object speed". Disable check boxes "Use object heading" and "Use crab angle" if the object can freely move backwards and sidewards, such as an ROV. Press "OK" (twice) to save the selections. Further, select tab "COG / SOG", enable both check boxes for use of external values and select the speedlog observations. Press "OK" to save the position filter definition(s). See next page for an example.

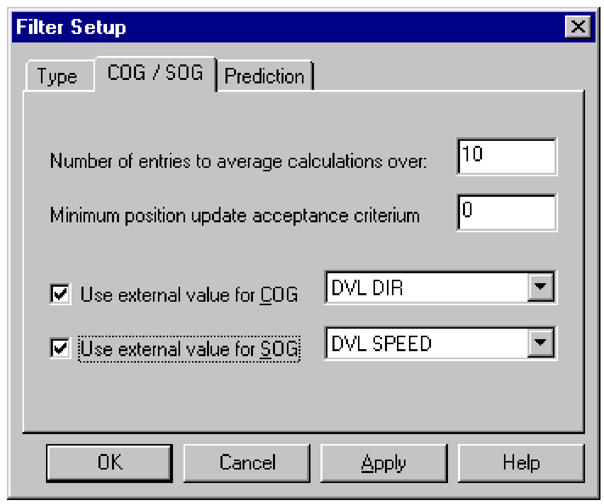
Important. Only use the position filter option if the speedlog data is of constant good quality.

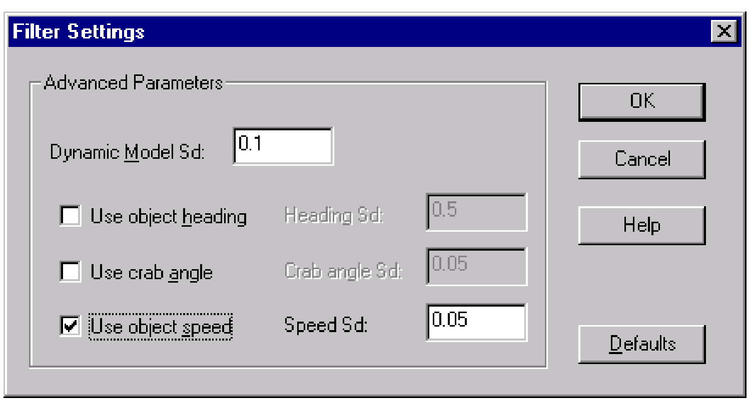
See for more information the *QINSy* DB Setup Help Topics or the *QINSy* Knowledge Base.

Controller Setup (example)









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3.13.1 EDO 3050 Dopplerlog

3.13.2 EDO 3050 Dopplerlog (Tideway)

Input / Output:	Input	*Driver class type:*	Counted
Executable name:	DrvEDO3050Doppler.exe	*Drivers.io options:*	*none*
Last modified:	1999-May-06		

Driver Description

Driver to decode bottom track velocity from DVL data block. The driver can also be used to decode the depth range and/or the heading angle from the output string.

Format Description

The output data is in binary format. The DVL data block has a fixed length of 56 bytes. Onboard the Tideway Rolling Stone the SOH and ETX characters are not send with the DVL data block.

Bytes	*Prefix Description*	*Values, Range, Units*
1	Header start (not for Tideway)	ASCII 01 (SOH)
2	Block length	Integer
3	Block ID	Char ‘a’ for DVL data block
4	F/A Bottom velocity (Fwd +)	Knots
6	P/S Bottom velocity (Stbd +)	Knots
8	F/A Water velocity (Fwd +)	Knots
10	P/S Water velocity (Stbd +)	Knots
12	Vertical Bottom velocity	Knots
14	Vertical Water velocity	Knots
16,19	Beam quality bottom track, beam 1-4 (1 byte each)	Integer
21,23	Beam quality water track, beam 1-4 (1 byte each)	Integer
24,27	Distance (North +)	nm
28,31	Distance (East +)	nm
32,35	Total Distance	nm
36,37	Time (relative)	seconds
39,48	Beam depth, beam 1-4 (2 bytes each)	meters
49	Depth age	seconds
50,51	Temperature	degrees Celsius
52,53	Bit status	
54	Search mode	Integer
55	Tracking mode	Integer
56,57	Block check	
58	End of text (not for Tideway)	ETX (ASCII 03)

Database Setup

See description under “SPEEDLOG SYSTEM DRIVERS”.

To decode the ***depth*** of the ADCP from bottom track ranges, add an “Observation” of type “ROV depth” to the database, and connect this observation to the system. For an up looking doppler, a zero value is returned.

3.13.3 NAVIKNOT III / EM200 Speed Log

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvEM200Speed.exe	*Drivers.io options:*	x.x (max. speed)
Last modified:	2002-Aug-30		

Driver Description

Driver to decode speed from NAVIKNOT III / EM200 electromagnetic speedlog from Litton Marine Systems.

Format Description

```
$VMVHW,,,,,XX.XX,N,XX.XX,K*CS<CR><LF>
```

Where XX.XX,N means the speed in knots and XX.XX,K means the speed in KM/Hr.

Format Example

Decoding Notes

The driver only decodes the KM/Hr field and converts it internally to m/s. That means that the unit the user has to define in the Db Setup program for the speed observation must be m/s!

Interfacing Notes

No special two-way RS-232 cable connection is required. The driver does not send any command to the doppler, so the unit should already be in continuous data output mode.

Database Setup

See description under “SPEEDLOG SYSTEM DRIVERS”. Only a speed observation is required.

The unit for the Speed observation should be meters/second, the recommended a priori sd 0.1.

Drivers.io Options

The speed driver has the possibility to validate the speed data that is being decoded. To use this feature the user has to manually edit the “DRIVERS.IO” file. Locate the DrvEM200Speed.exe driver. Any number that is present as command line argument will used as the maximum speed to be accepted by the driver.

3.13.4 iXSea /Photonetics Octans MRU ($PHSPD)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvPhotoneticsOctans.exe	*Drivers.io options:*	NOCS
Last modified:	2002-May-07		

Driver Description

Driver for iXSea (previously Photonetics) Octans solid state VRU $PHSPD, referred to in the Octans Interface Library (vn2.8 July 2000 manual) as GYROCOMPAS 2. Output type.
Driver to be used to decode the linear speed of the Octans unit.

Format Description

The $PHSPD message is a proprietary NMEA0183 sentence,

```
$PHSPD – linear speed along X1, X2 and X3
$PHSPD,x.xxx,y.yyy,z.zzz[*hh]<CR><LF>
```

Field	*Format*	*Description*	*Values, Range, Units*
01	$	Start character	24 HEX
02	PHSPD	Identifier	
03	x.xxx	X1 speed (along centerline unit)	M/s
04	y.yyy	X2 speed (across centerline unit)	M/s
05	z.zzz	X3 speed (along vertical axis unit)	M/s
06	*hh	Checksum	XOR
06	<CR><LF>	Termination characters	0D 0A HEX

Format Example

```
$PHSPD,-0.157,0.002,-1.255*25<CR><LF>
$PHSPD,-0.281,0.004,-1.380*25<CR><LF>
```

Decoding Notes

Format fields 03 and 04 are decoded. They result in a speed on the horizontal plane and an angle. Field 05 is not decoded.

Database Setup

See description under “SURFACE NAVIGATION SYSTEM DRIVERS”.

The observations that are added in order to decode the speed vectors are:

- Speed
- Angle
- Vertical Speed

3.13.5 RDI Doppler BottomTrack Speed (BIN PD0)

Input / Output:	Input	*Driver class type:*	Counted
Executable name:	DrvRDIDoppler.exe	*Drivers.io options:*	x.x (max. speed) | OI
Last modified:	*2004*-Jun-10		

Driver Description

Driver to decode bottom track velocity or (mean) relative water velocity from a binary output data ensemble from a RD Instruments (RDI) Acoustic Doppler Current Profiler (ADCP) or Doppler Velocity Log (DVL). The driver returns either one specific beam velocity (i.e. the velocity in relation to the sea bottom in case of a down looking doppler with bottom track or the (mean) water velocity for all valid depth cell readings in case of an up looking doppler) or the horizontal velocity along with its direction (heading) if no beam is selected. The driver can also be used to decode the depth range and/or the heading angle from the ADCP output string. When the driver is started or reset, *QINSy* sends the command “CS” to the ADCP, in order to start pinging.

Format Description

The output data must be in the binary PD0 format. The total length of the output ensemble depends on the selected optional data outputs and the number of depth cells. However, each data field has a fixed length.

The ADCP command used to start pinging is “SC<CR>”, two ASCII characters ended with a carriage return.

When the ADCP is pinging, it will sent a data ensemble consisting of required and optional output structures:

1. Header : 6 bytes + number of data types × 2 bytes
2. Fixed Leader Data : 42 bytes
3. Variable Leader Data : 42 bytes
4. Water Velocity Data : 2 bytes + number of depth cells × 8 bytes
5. Correlation Magnitudes : 2 bytes + number of depth cells × 4 bytes
6. Echo Intensity Data : 2 bytes + number of depth cells × 4 bytes
7. Percent Good Data : 2 bytes + number of depth cells × 4 bytes
8. Depth Cell Status Data : 2 bytes + number of depth cells × 4 bytes
9. Bottom Track Data : 72 bytes
10. CheckSum : 2 bytes

QINSy only decodes data from the Header, Fixed Leader, Variable Leader and Bottom Track structures.
See the RD Instruments ADCP Technical Manual for a detailed description of the fields in each structure.

The setting of the “EX” command (Coordinate Transformation) determines how velocity data is referenced. Depth cell water velocities are relative based on a stationary instrument, i.e. they are not absolute velocities.

Coordinate System	***Velocity 1***	***Velocity 2***	***Velocity 3***	***Velocity 4***
Slot Nr	***1***	***2***	***3***	***4***
	positive values indicate water movement :			
BEAM	to beam 1	to beam 2	to beam 3	to beam 4
ADCP	beam 1 to beam 2	beam 4 to beam 3	to transducer	error velocity
SHIP	port to starboard	aft to forward	to surface	error velocity
GRID	to grid east	to grid north	to surface	error velocity

(continued on next page)

Decoding Notes

Default behaviour for the RDI driver are to decode the horizontal bottom track velocity for a down looking doppler, when a speed observation is connected, to return the (true) heading of the velocity vector, when a bearing observation is connected, and to perform the checksum. If the coordinate transformation system is a "BEAM" system, the driver just returns the mean value of the four beams, so this setting is not to be used.

If a specific beam has been selected in DbEdit, the driver just returns the velocity value of this beam and the heading angle from the Variable Leader Data., otherwise the length and direction of the horizontal velocity vector is used. For a down looking doppler with bottom track, this is the observed velocity with respect to the sea bottom; for an up looking doppler, this is the mean value of all the observed velocities for all depth cells.

To change the default behaviour of the driver, change command line parameters in the "DRIVERS.IO" file.

Interfacing Notes

The RS-232 cable connection must have two-way direction, both receiving (Rx) and transmitting (Tx) data, since the *QINSy* RDI driver will send a command to the unit to start pinging and will receive data ensembles.

Database Setup

See description under "SPEEDLOG SYSTEM DRIVERS".

Do not enter a slot number (or enter slot number 0) if the horizontal velocity is to be computed. Enter a slot number (1 to 4) if just the velocity value for a specific beam or direction (1 to 4) is to be returned. See the coordinate system table above for possible beam or direction slots. Be sure to enter identical slot numbers.

To decode the ***altitude*** of the ADCP from bottom track ranges, add an "Observation" of type "ROV altitude" to the database, and connect this observation to the doppler system. For an up looking doppler, a zero value is returned. For a down looking doppler, a mean or specific altitude is returned, depending on the slot as above.

To decode the ***heading*** of the doppler sensor ,add a "System" of type "Gyro's and Compasses" to the database. See description under "GYRO SYSTEM DRIVERS". Select the driver "RDI Doppler Bottom Track (Heading)" and fill in the appropriate port settings (note that the port settings can be the same as the RDI Doppler Speedlog system). For the gyro observation use the slotnumber "HDG" for slot 1.

To decode ***roll and pitch*** for the doppler sensor, add a "System" of type "Pitch, Roll and Heave Sensor" to the database. See description under "PITCH, ROLL AND HEAVE SENSOR DRIVERS". Select the driver "RDI Doppler Bottomtrack P-R" and fill in the appropriate port settings (note that the port settings can be the same as the RDI Doppler Speedlog system).

To decode the ***environmental data*** (temperature, speed, depth, salinity and pressure) from the doppler sensor, add a "System" of type "Miscellaneous" to the database. Select the driver "RDI Doppler Bottom Track (Generic)" and add the new generic observations you want to decode. Fill in the appropriate port settings (note that the port settings can be the same as the RDI Doppler Speedlog system). Use the following slot ids for the observations:

Temperature: "TMP".
Speed: "SND"
Salinity: "SAL"
Depth: "DPT"
Pressure: "PRS"

Drivers.io Options

The *QINSy* RDI driver has the possibility to validate the speed data that is being decoded. To use this feature the user has to manually edit the “DRIVERS.IO” file. Any number that is present as command line argument will used as the maximum speed to be accepted by the driver.

3.13.6 RDI Doppler BottomTrack Speed (PD6)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvRDIDopplerPD6.exe	*Drivers.io options:*	x.x (max. speed)
Last modified:	1999-Jul-13		

Driver Description

Driver to decode bottom track velocity and direction from an ASCII output data ensemble from a RD Instruments (RDI) Acoustic Doppler Current Profiler (ADCP) or Doppler Velocity Log (DVL).
The driver returns the horizontal velocity along with its direction (heading).

Format Description

The output data must be in the ASCII PD6 format.
Each output message is terminated by a CR and LF, all fields in each message are separated by comma's and located at fixed columns. The number of messages in every data ensemble depends on the selected PD6 commands. This driver expects Bottom-track velocity data, it does not decode the water-mass velocity data.

1) System Attitude Data (":SA"-message)
   Pitch, Roll and Heading (All not used)
2) Timing and Scaling Data (":TS"-message)
   Date and Time, Salinity, Temperature, Depth, Speed of sound, BIT result code (All not used)
3) Water-mass Instrument/Ship/Earth-referenced Velocity Data (":WI", ":WS", ":WE"-messages)
   Three velocity components and a status flag (All not used)
4) Bottom-track Ship-referenced Velocity Data (":BS"-message)
   Transverse velocity data in mm/s (+ = port to starboard movement),
   Longitudinal velocity data in mm/s (+ = aft to forward movement),
   Normal velocity data in mm/s (+ = bottom to surface movement),
   Status of velocity data ("A" = Good, "V" = Bad)
   Format: ":BS, □TTTTT,□LLLLL,□NNNNN,S<CR><LF>"
5) Bottom-track, Earth-referenced Velocity Data (":BE"-message)
   East velocity data in mm/s (+ = east movement),
   North velocity data in mm/s (+ = north movement),
   Upward velocity data in mm/s (+ = bottom to surface movement),
   Status of velocity data ("A" = Good, "V" = Bad)
   Format: ":BE, □EEEEE,□NNNNN,□UUUUU,S<CR><LF>"

All other messages are not used.

(continued on next page)

Format Example

```
:SA,  +2.68,  +1.45,223.35
:TS,99070613295148,35.0, +8.5,   0.0,1484.0,  0
:BI,-32768,-32768,-32768,-32768,V
:BS,-32768,-32768,-32768,V
:BE,-32768,-32768,-32768,V
:BD,     +123.98,     +250.44,     +111.70,   0.00,  3.55
:SA,  +2.81,  +1.29,223.58
:TS,99070613295172,35.0, +8.4,   0.0,1484.0,  0
:BI,-32768,-32768,-32768,-32768,V
:BS,-32768,-32768,-32768,V
:BE,-32768,-32768,-32768,V
:BD,     +124.07,     +250.47,     +111.71,   3.47,  3.79
:SA,  +2.73,  +1.43,223.45
:TS,99070613295196,35.0, +8.4,   0.0,1484.0,  0
:BI,  +322,  -256,  +171,  -228,A
:BS,   +47,  -409,  +171,A
:BE,  +248,  +329,  +171,A
:BD,     +124.15,     +250.53,     +111.73,   3.31,  0.24
```

Decoding Notes

The Bottom-track, Ships referenced Velocity data message (":BS") will be used automatically when the direction observation is of Type "Angle", and the Bottom-track, Earth referenced Velocity data message (":BE") is used when the direction observation is Type "Bearing, True".

Interfacing Notes

No special two-way RS-232 cable connection is required. The driver does not send any command to the doppler, so the unit should already be in continuous data output mode.

Database Setup

See description under "SPEEDLOG SYSTEM DRIVERS".

The unit for the Speed observation should be meters/second, the recommended a priori sd 0.1.
The unit for the Angle observation should be degrees, the recommended a priori sd 5.0.

Drivers.io Options

The *QINSy* RDI driver has the possibility to validate the speed data that is being decoded. To use this feature the user has to manually edit the "DRIVERS.IO" file. Locate the DrvRDIDopplerPD6.exe driver. Any number that is present as command line argument will used as the maximum speed to be accepted by the driver. Furthermore, whenever the status of the velocity data is bad ("V"), it is not accepted by the driver and will not be used by *QINSy*.

3.13.7 RDI Doppler BottomTrack (Remote Cherry)

Input / Output:	Input	Driver class type:	Terminated <ESC>
Executable name:	DrvRDIRemoteCherry.exe	Drivers.io options:	x.x (max. speed)
Last modified:	2000-May-10		

Driver Description

Driver to decode bottom track forward and starboard velocity from an ASCII output data ensemble from a RD Instruments (RDI) Acoustic Doppler Current Profiler (ADCP), using the Remote Cherry Display Output Format. The driver returns the horizontal velocity along with its direction (heading).

Format Description

With bottom tracking data available:

```
<ESC>1Affff.f<ESC>2Assss.s<ESC>4Axxxx.x
```

Where: <ESC>: ESC character (1BHex, 27dec)
1A: Identifier for forward velocity
ffff.f Forward Velocity in knots, relative to the bottom
2A: Identifier for starboard velocity
ssss.s Starboard Velocity in knots, relative to the bottom
4A: Identifier for ???
xxxx.x ???

When no bottom tracking data available:

```
<ESC>1Affff.f<ESC>2Assss.s<ESC>4A      <ESC>4A  (WATER VELOCITY)
```

Where: <ESC>: ESC character (1BHex, 27dec)
1A: Identifier for forward velocity
ffff.f Forward Velocity in knots, relative to water
2A: Identifier for starboard velocity
ssss.s Starboard Velocity in knots, relative to water
4A: Identifier for ???
______ Space Characters (20Hex, 32dec)
4A: Identifier for ???
Space Characters ???

Format Example (□ means the ESC character)

□1A 0.0.2A -0.0.4A 8.4□1A 0.0.2A -0.0.4A 8.4□1A 0.0.2A -0.0.4A
8.4□1A 0.0.2A -0.0.4A 8.4□1A 0.0.2A -0.0.4A 8.4□1A 0.0.2A -0.0.4A 8.5

(continued on next page)

Decoding Notes

The driver always wants to receive velocity relative to the bottom (See format A))
The defined Direction observation (Db Setup) should always be of Type "Angle" (not Bearing, True).

Interfacing Notes

No special two-way RS-232 cable connection is required. The driver does not send any command to the doppler, so the unit should already be in continuous data output mode.

Database Setup

See description under "SPEEDLOG SYSTEM DRIVERS".

The unit for the Speed observation should be meters/second, the recommended a priori sd 0.1.
The unit for the Angle observation should be degrees, the recommended a priori sd 5.0.

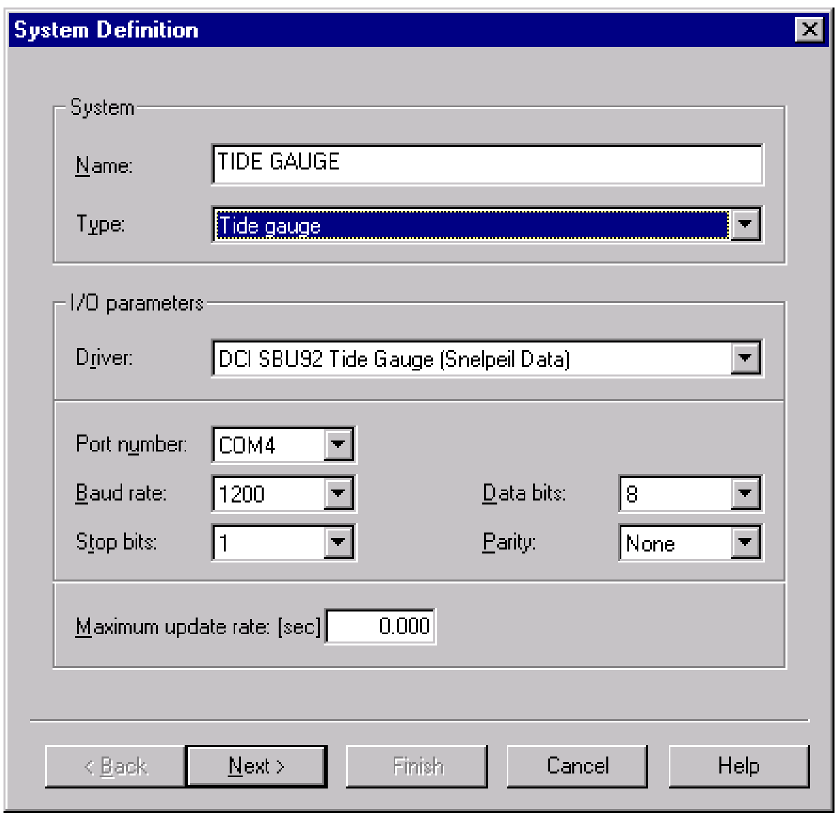
Drivers.io Options

The *QINSy* RDI driver has the possibility to validate the speed data that is being decoded. To use this feature the user has to manually edit the "DRIVERS.IO" file. Locate the DrvRDIRemoteCherry.exe driver. Any number that is present as command line argument will used as the maximum speed to be accepted by the driver.

3.14 TIDE GAUGE DRIVERS

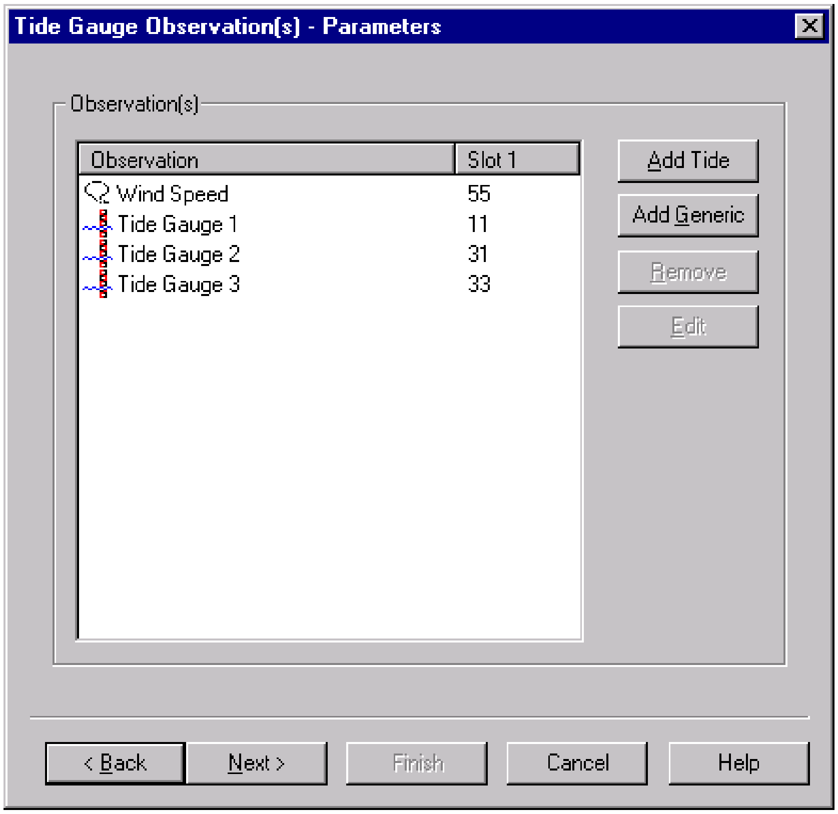
Database Setup

Tide gauge systems are not connected to an “Object”. Select item “Auxiliary Systems” and define a new “Tide gauge”. Select the appropriate driver and interface parameters. Press the “Next” button to continue the setup. Press the “Add Tide” button to add tide height observations to the system. First a (fixed) node for the tide gauge station has to be defined. The actual tide observation is named after this node. Depending on the driver, generic observations can be defined to decode other data from the input data. If needed, enter the slot number(s). Press “Next” to define the observation properties. Select each tide and enter its parameters. Press the “Apply” button before selecting another tide observation. Press “Finish” button to save the system.



Database Setup (continued)

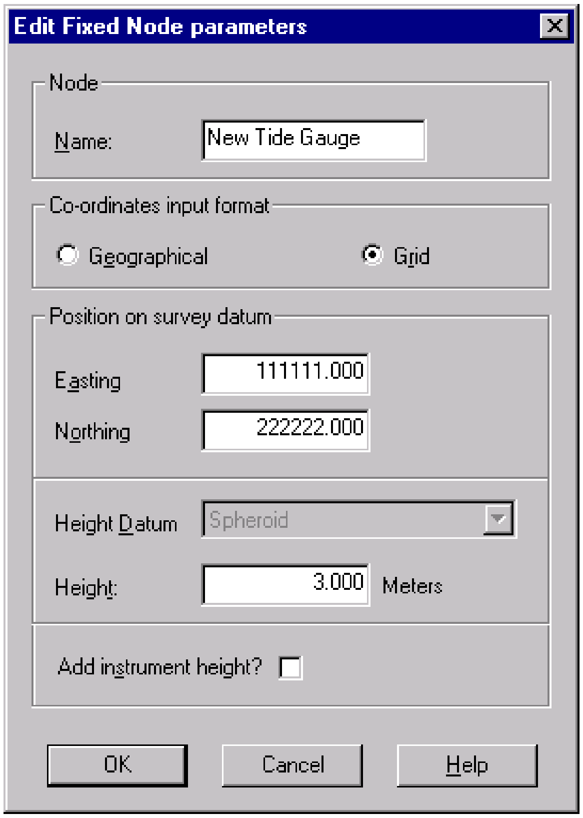
A new observation can be added by pressing the “Add” button; to remove it, select it and press “Remove”.

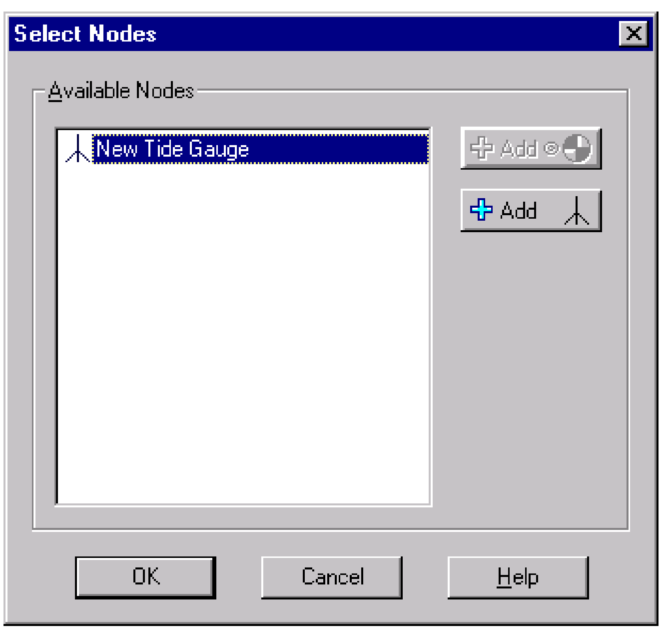


Database Setup (continued)

A new tide gauge can be added by pressing the “Add Tide” and 

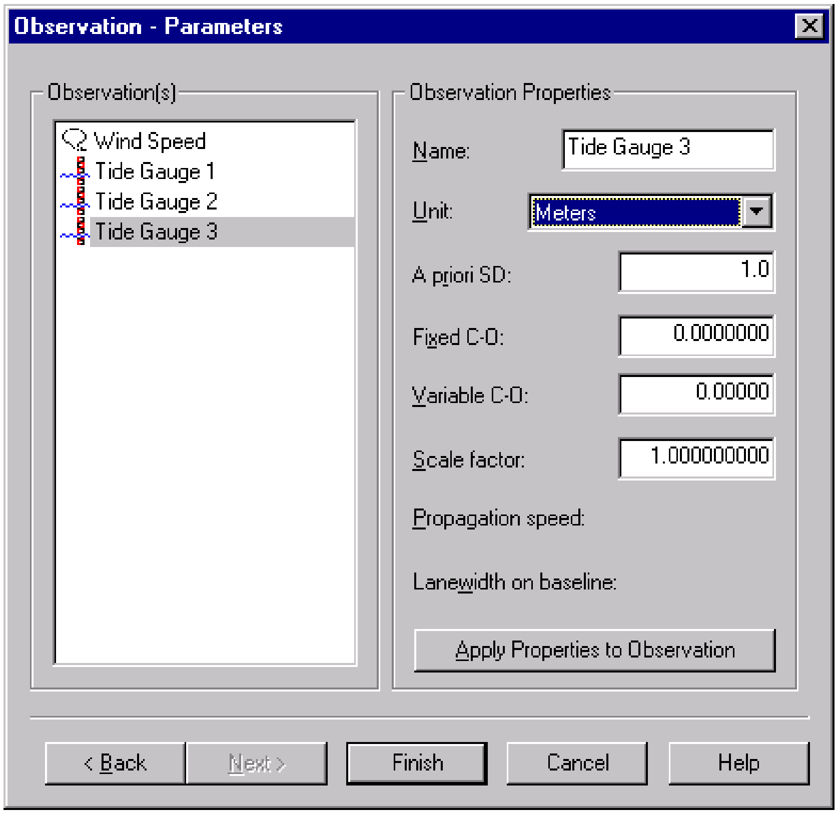
buttons. First, enter all the tidal stations. Then select a tide gauge from the list of available nodes and press “OK” to add a tide observation.





Database Setup (continued)

The properties of each observation, for example unit and calibration values, can be entered after selecting it.



Note 1. In *QINSy*, tide observation heights are assumed to be defined on the survey datum. Therefore, any height difference between the tide gauge datum and the survey datum should be entered as a (C-O) value.

Note 2. Also enter a (C-O) value if the tide datum is different in height from the geoid or mean sea level if the geoid separation option is used in the height settings in the *QINSy* Controller ("Settings – Height").

Note 3. To change tide gauge station properties (name and coordinates) after first definition, expand the fixed node item under the tide gauge system entry in the database setup tree, and select and edit the station.

See for more information the *QINSy* DB Setup Help Topics or the *QINSy* Knowledge Base.

3.14.1 DCI SBU92 Tide Gauge (Selected Data)

3.14.2 DCI SBU92 Tide Gauge (Snelpeil Data)

Input / Output:	Input (one-way)	*Driver class type:*	Counted
Executable name:	DrvDCISBU92.exe	*Drivers.io options:*	RAW | SEL| NOCS
Last modified:	2004-Jul-22		

Driver Description

Driver to decode tide heights as transmitted by a DCI SBU92 Radio Tide Gauge, either in 'Snelpeilbericht' output format or 'Geselecteerde Data' output format. 'Snelpeilbericht' messages contain multiple channels (slots). Some slots contain tide heights, while other slots contain wind speed or direction, or pressure.

Format Description

Data messages are always ASCII. Length of data message depends on the format and the number of slots.

DCI SBU92 Radio Tide Gauges 'Snelpeilbericht' Output Format (793 bytes)

```
[01+nnnC/02+nnnC/03+..../99hhmmC]
```

[	opening bericht
01	kanaalnummer 1 (slot)
nnn	numerieke waarde (ASCII)
C	checksum van het kanaal
/	scheidingsteken kanalen
hhmm	tijdweergave (geen +/-)
]	einde bericht

Two example strings logged onboard ZWAAN 1999-06-14 (line feeds and spaces added)

```
[01+068V/02+113^/03+125Z/04+223Z/05+143X/06-999B/07+220Z/08+204W/09+211X/10+229W/
 11+213]/12+169R/13+090X/14+057T/15+038T/16+082T/17-010Z/18-006T/19-010X/20+010b/
 21+018Y/22-005Z/23+002^/24+045V/25+106W/26+076P/27+197K/28+060U/29+161R/30+083W/
 31+127W/32+213Z/33-008U/34+009U/35-025T/36+237P/37-007R/38+999?/39-999</401338M/
 41+249Q/42+006Y/43+075R/44+347O/45+073R/46+001Z/47+078K/48+341Q/49+080P/50+025Y/
 51+049R/52+350V/53+091S/54+084P/55+103W/56+000Z/57+070R/58+999=/59+999</60+007X/
 61+174R/62+152U/63+164Q/64+169K/65+193M/66+078J/67+178H/68+167I/69+170N/70+164S/
 71+345Q/72+078M/73+186L/74+195K/75+999>/76+999=/77+169G/78+141P/79+178E/80+075Q/
 81+178L/82+171R/83+162Q/84+180P/85+158J/86+158I/87+056K/88+040Q/89+054K/90+999A/
 91+999@/92+051T/93+057M/94+047M/95-999:/96+093J/97+045L/981406D/991338?]
[01+070]/02+116[/03+126Y/04+220]/05+145V/06+171V/07+220Z/08+204W/09+212W/10+230_/
 11+214\/12+173W/13+093U/14+059R/15+040[/16+082T/17-010Z/18-008R/19-011W/20+012`/
 21+019X/22-003\/23+004\/24+047T/25+112Z/26+078N/27+199I/28+061T/29+163P/30+083W/
 31+129U/32+217V/33-008U/34+011\/35-025T/36+240V/37-007R/38+999?/39-999</401339L/
 41+250Y/42+007X/43+080V/44+342T/45+083Q/46+000[/47+070S/48+349I/49+078I/50+025Y/
 51+046U/52+351U/53+084Q/54+084P/55+103W/56+001Y/57+073O/58+999=/59+999</60+007X/
 61+174R/62+152U/63+164Q/64+169K/65+193M/66+078J/67+178H/68+167I/69+170N/70+164S/
 71+347O/72+085O/73+186L/74+195K/75+999>/76+999=/77+169G/78+141P/79+178E/80+075Q/
 81+178L/82+171R/83+162Q/84+180P/85+158J/86+158I/87+056K/88+040Q/89+054K/90+999A/
 91+999@/92+051T/93+057M/94+047M/95-999:/96+092K/97+045L/981406D/991339>]
```

DCI SBU92 Radio Tide Gauges ‘Geselecteerde Data’ Output Format (14 bytes)

```
$1AO+00nnn.00<CR>
```

1 selectieadres (slot)
AO Analoog Output command
nnn numerieke waarde kanaal
<CR> afsluiting bericht

TWO example strings logged onboard ZWAAN 1999-06-14

```
$1AO+00240.00<CR>$1AO+00205.00<CR>
```

Decoding Notes

Data is timetagged when the header of a data message is received, i.e. "[01" for ‘Snelpeilbericht’ format, or "$" for ‘Geselecteerde Data’ format. Tide values are multiplied by 0.01 to convert from cm to meters.

‘Snelpeilbericht’ channel strings include a checksum character: 128 - (sum six chars % 128).
Example. CheckSum "01+068" is 48+49+43+48+54+56 = 298%128 = 42-128 = -86; 86 = 'V'.

Drivers.io Options

Command line parameter “RAW” will decode ‘Snelpeilbericht’ data messages and “SEL” will decode ‘Geselecteerde Data’ messages. “NOCS” will not check the checksum in ‘Snelpeilbericht’ channels.

Database Setup

See description under “TIDE GAUGE SYSTEM DRIVERS”.

3.14.3 Digitrans Radio Tide Gauge (PAH)

Input / Output:	Input (one-way)	*Driver class type:*	Counted
Executable name:	DrvDigitransPAH.exe	*Drivers.io options:*	*format* | NOCS
Last modified:	2000-Feb-16		

Driver Description

Driver to decode tide heights as transmitted by a Digitrans radio link, such as the one used by PAH (Port Autonome du Havre) in France. A complete data message contains 48 sequences (16 channels times 3). Some channels contain tide heights, while other channels contain wind speed or direction, or pressure.

Format Description

Data will be partly ASCII and partly binary (BCD). Each message consists of 5 bytes, including a prefix byte (ASCII "M") and a checksum byte. Data is transmitted according to the CCITT V21 norm (300 bps).

Digitrans format

Byte	*Type*	*Description*	*Values, Units*
01	ASCII	prefix identifier	ASCII "M" (0x4D Hex)
02	ASCII	channel number	"0" to "?" (0x30 to 0x3F)
03	BCD	channel value 1	decameters & meters
04	BCD	channel value 2	decimeters & centimeters
05	Hex	checksum value	AND logic

Decoding Notes

Data is timetagged when a new "M0" sequence is received. Data is updated when the maximum channel, entered in DbSetup, is received. The channel that is decoded corresponds to the slot of a tide observation.

Drivers.io Options

Command line parameters SOL1 and SOL2 can be used to decode a slightly different format. The SOL1 and SOL2 formats consist of 3 sequences per channel, the first one containing BCD digit of meters, the second one decimeters and the third one centimeters. However, these formats have not been tested with real data.

Database Setup

See description under "TIDE GAUGE SYSTEM DRIVERS".

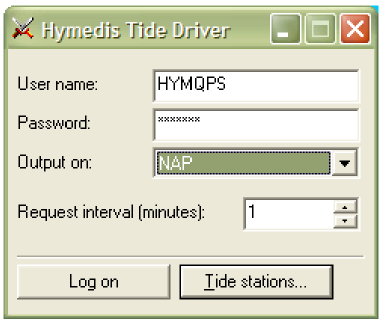
Tide Observation Slot. Enter channel number to be decoded as tide observation slot number. Available slot numbers are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, and :, ;, <, =, >, ?, or 10, 11, 12, 13, 14, 15. (":" equal to "10", etc.).

3.14.4 Hymedis Tide

Input / Output:	Input (one-way)	*Driver class type:*	
Executable name:	DrvHymedisUI.exe	*Drivers.io options:*	*none*
Last modified:	2004-Jun-9		

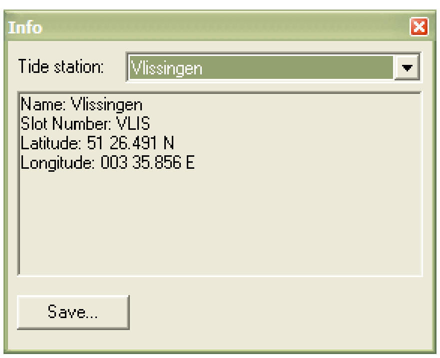
Driver Description

This driver gets tidal information from Hymedis. To use this driver and internet connection (LAN, GPRS, UMTS) is required. The driver has user interface to set a user name and password, for accessing Hymedis data.

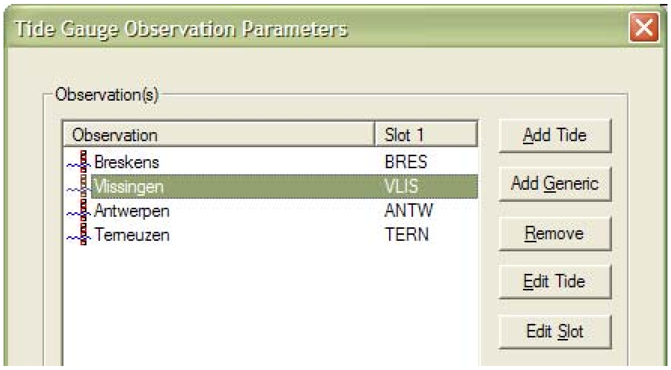


When the correct user name and password are entered, the user can click the *Log on* buton to request data from hymedis. When the driver is re-started the user name and password will be loaded from the registry. The tidal information will be requested every *Request interval*. This value is user definable from 1 to 30 minutes.

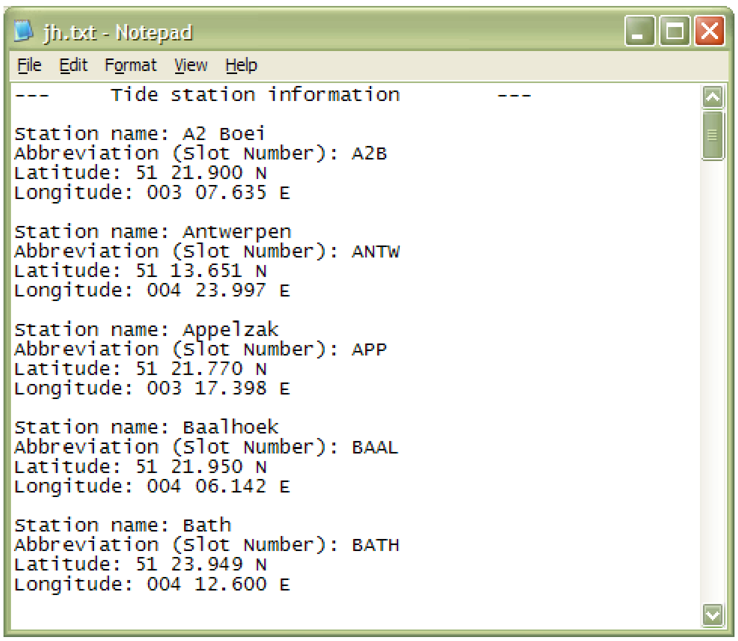
The *Tide stations…* button will open a new dialog which is shown below.



When a tide station is selected the information of that station will be shown. Only stations that transmit a "WH1" will be visible. The *Slot Number* is identical (Case sensitive) to the slot number that is to be entered in the Database Setup program.



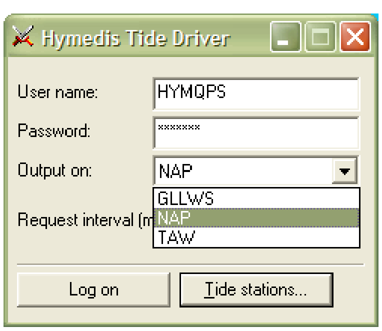
The *Save…* button can be used to save all station information to a text file:




```
---     Tide station information        ---

Station name: A2 Boei
Abbreviation (Slot Number): A2B
Latitude: 51 21.900 N
Longitude: 003 07.635 E

Station name: Antwerpen
Abbreviation (Slot Number): ANTW
Latitude: 51 13.651 N
Longitude: 004 23.997 E

Station name: Appelzak
Abbreviation (Slot Number): APP
Latitude: 51 21.770 N
Longitude: 003 17.398 E

Station name: Baalhoek
Abbreviation (Slot Number): BAAL
Latitude: 51 21.950 N
Longitude: 004 06.142 E

Station name: Bath
Abbreviation (Slot Number): BATH
Latitude: 51 23.949 N
Longitude: 004 12.600 E
```

Decoding Notes

The tidal values can be sent to *QINSy* using three different corrections: NAP, GLLWS and TAW. Which model is to be used can be selected as seen below:



Database Setup

See description under “TIDE GAUGE SYSTEM DRIVERS”.

3.14.5 Kuhnt Pegel Tide Gauge

Input / Output: Input (two-way)
Executable name: DrvKuhntPegel.exe
Last modified: 2004-Feb-13
Driver class type: Interrogated
Drivers.io options: None

Driver Description

Driver to decode tide height observations from a Kuhnt Pegel tide gauge receiver. The *QINSy* driver interrogates the receiver for new data. It can handle multiple tide observations from one transmitter. Tide gauge id's are entered as slots.

Format Description

To be able to obtain new tide information from the receiver the driver first needs to wake up the receiver by sending an ASCII "S" character. The receiver answers with an ASCII "A" character if it is ready.

To obtain the tide information from a single tide gauge the driver send the "Bild 4" command:

"Bild 4" command

Byte	*Description*	*Values, Units*
01	Command identifier	ASCII "J" (0x4A Hex)
02-04	?	not used, always <SPACE> (0x20 Hex)
05	Separator	<SPACE> (0x20 Hex)
06-13	Tide gauge identifier	i.e. "49565621"
14	-	always ":" (0x3A Hex)
15	Separator	<SPACE> (0x20 Hex)
16-19	Measurement identifier	always "0010" for tide observation
20	Terminator	<CR> (0x0D Hex)

Subsequently the receiver answers with a "Bild 9 command which is encoded as follows:

"Bild 9" command

Byte	*Description*	*Values, Units*
01	Command identifier	ASCII "M" (0x4D Hex)
02-09	Tide gauge identifier	i.e. "49565621"
10	-	always ":" (0x3A Hex)
11	Separator	<SPACE> (0x20 Hex)
12-15	Measurement identifier	always "0010" for tide observation
16	Separator	<SPACE> (0x20 Hex)
17	Water level status indicator	"s" = rising, "f" = falling, "D"=constant, "?" = unknown, "T" = old data
18	Separator	<SPACE> (0x20 Hex)
19-23	Height of water level	in centimeters, "#####" = no data.
24	Quality indicator	"!" = data older than 1 minute, "#" = no data.
20	Terminator	<CR> (0x0D Hex)

Example of a valid "Bild4" request: `J 09460040 0010<CR>`
Example of a valid "Bild9" response: `M09460040: 0010 f 0314<CR>`

When the driver receives the "Bild 9" message from the receiver it confirms the reception by sending an ASCII "A" character to indicate succesfull delivery. The whole command response sequence is repeated for each defined tide gauge observation.

Interfacing Notes

Because the *QINSy* driver needs to send commands to the Kuhnt Pegel receiver to get a response, it is important that the cable wiring between the receiver port and the COM port is bi-directional to allow two-way traffic.

Database Setup

See description under "TIDE GAUGE SYSTEM DRIVERS".

Slot 1

Slot 1 of a tide observation must be filled with the tide gauge identifier as mentioned in the "Bild 9" & "Bild 4" message descriptions.

Example Slot Numbers:

Rechtenfieth 04970030
Dwargast 04960020

Note: It is very important that these slotnmubers are valid.
Invalid slot numbers may cause irregular data reception from the tide gauge.

3.14.6 Pacific Crest Tide Gauge

Input / Output:	Input (one-way)	*Driver class type:*	Terminated
Executable name:	PacificCrestTide.ini	*Drivers.io options:*	*none*
Last modified:	2001-May-07		

Driver Description

Driver to decode a tide height observation from a Pacific Crest tide gauge receiver.
The driver uses the generic serial input driver with the “PacificCrestTide.ini” file.

Note. The name of this driver could be somewhat misleading, since the Pacific Crest Corporation makes several types of radio modems that can be used to transfer all kinds of data, not only tide data messages.

Format Description

```
<CR><LF>··a.aaa···b.bbb···c··d.d··ee·fffff<CR><LF>
```

where “·” denotes a space character and “<CR><LF>” is a Carriage Return – Line Feed pair.

#	*Format*	*Description*	*Values, Units*
1	a.aaa	Tide Observation	meters
2	b.bbb	???	
3	c	???	
4	d.d	???	
5	ee	Quality Indicator	99 = good quality
6	fffff	???	

Format Example

```
<CR><LF>  2.112   0.006   0  1.0  99 25581<CR><LF>
<CR><LF>  2.104   0.007   0  1.0  99 25586<CR><LF>
<CR><LF>  2.098   0.006   0  1.0  99 25591<CR><LF>
```

Decoding Notes

See description under generic input driver.

Database Setup

See description under “TIDE GAUGE SYSTEM DRIVERS”.

The tide value in the example above should be subtracted from a local mean sea level value to obtain the real tide height value. Keeping in mind that *QINSy* first adds the (C-O) correction, then applies the (C/O) scale factor, enter the *negative* MSL value as (C-O) correction and enter –1 as scale factor for the tide observation.

```
(MSL – tide) = - (tide + (- MSL))
```

3.14.7 Sonar Research LPM23 Tide Gauge

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvSonarResearchLPM23.exe	*Drivers.io options:*	*none*
Last modified:	1999-Apr-27		

Driver Description

Driver to decode tide heights and system data (datum, gain, noise, voltage status and speed of sound) from the Sonar Research LPM23 Tide Gauge.

Format Description

Data will be ASCII and each line is terminated with a carriage return (CR) and line feed (LF).

#	*Format*	*Description*	*Values, Units*
01	à	start of string	
02-03	nn	unit number	
04	=	header	
05-06	RR	?	
07-08	nn	length	
09	U	?	
10-15	yymmdd	date	year / month / day (tide computer)
16-21	hhmmss	time	hour / min / sec (tide computer)
22-25	nnnn	tide level	Centimeters
26-29	nnnn	datum	
30-31	nn	gain	
32-33	nn	noise	
34-35	nn	voltage status	
36-37	nn	status	00 = OK
38-41	nnnn	speed of sound	meters / sec
42-43	hh	checksum	01 to 41
44-45	<CR><LF>	record termination	

Format Example

```
à01=RR21U99042215282102760000252103001730 8E<CR><LF>
```

Decoding Notes

This driver will decode a tide observation as a tide gauge system and 5 generic observations (datum, gain, noise, voltage status and speed of sound) as a miscellaneous system. You can use the “Quality Indicator” alert (raw data alert) of the Alert display to check the validity of the depth observation.

(continued on next page)

Database Setup

See description under “TIDE GAUGE SYSTEM DRIVERS”.

Default serial interfacing parameters for the Sonar Research LPM23 are 1200 baud, 8 data bits, 2 stop bits and no handshaking. Enter “1” for the slot number for the tide gauge observation (see also table below).

The tide observation is defined at a “Fixed Node”. The driver only decodes tide heights from one tide gauge. If the (local) tide datum at the transmitter unit and the survey datum do not coincide, the separation in height between the two datums should be entered as “Property” of the tide observation, i.e. as “Fixed system C-O”.

The other values contained in the data string can also be decoded and displayed in *QINSy*, for example in the Timeplot and Alphanumerics displays. Such data is also stored in the *QINSy* database if data is logged, and as such can also be examined with the *QINSy* Analyse tool (DbRawInspect). Add five (5) “Observations” of type “Generic” to the tide gauge system (Datum, Gain, Noise, Voltage Status and Speed of Sound) or add these observations to a new “Miscellaneous system” with the same driver name and interface parameters.

Enter the slot number for each generic observation according to the following table:

Slot	***Value***
1	Tide
2	Datum
3	Gain
4	Noise
5	Voltage Status
6	Speed of Sound

3.14.8 Valeport 700 Tide Gauge

Input / Output:	Input (one-way)	*Driver class type:*	Terminated
Executable name:	Valeport700Tide.ini	*Drivers.io options:*	*none*
Last modified:	2000-Apr-18		

Driver Description

Driver to decode a tide height observation from a Valeport 700 tide gauge receiver.
This driver uses the generic input driver with the above mentioned ini-file.

Format Description

`<S>DDDDD<CR>`

#	*Format*	*Description*	*Values, Units*
1	<S>	Sign	+ or –
2	DDDDD	Tide	millimeters
3	<CR>	Carriage Return	

Format Example

`+00732`

Decoding Notes

See description under generic input driver.

Database Setup

See description under “TIDE GAUGE SYSTEM DRIVERS”.

3.14.9 Van Essen RGC920 Tide Gauge

Input / Output:	Input (two-way)	*Driver class type:*	Interrogated
Executable name:	DrvRGC920.exe	*Drivers.io options:*	CM | TCM
Last modified:	1999-Oct-12		

Driver Description

Driver to decode tide height observations and response codes from a Van Essen RGC920 tide gauge receiver. The *QINSy* driver interrogates the receiver for new data. It can handle multiple tide observations from more than one transmitter and more than one channel. Transmitter, channel and tide gauge are entered as slots.

Format Description

The command protocol to request new data from the tide gauge receiver consists of 6 bytes as follows:

```
T n1 C n2 n3 <CR>
```

'T'	1 byte	Transmitter
n1	1 byte	transmitter number 0-9,A-F
'C'	1 byte	Channel
n2	1 byte	channel number 1-6
n3	1 byte	channel Method P,A,D
<CR>	1 byte	ASCII 13

The response can be positive or negative. The data format for a positive response contains 37 bytes:

<#1>	16 bytes	identification
<#2>	10 bytes	observation value
<#3>	6 bytes	observation unit
<CR>	1 byte	ASCII 13
<#1>	3 bytes	response code
<CR>	1 byte	ASCII 13

The format in case of a negative response only contains the error in the form of a code of 4 bytes:

<#1>	3 bytes	response code
<CR>	1 byte	ASCII 13

The most important response codes are given below. See *RGC920-Rx/M Manual Appendix C.*

101	transmitter not updated
102	transmitter not received
2x0	channel 'x' data OK
2x5	channel number wrong
2xn	other channel data error
3xn	battery power low or high

(continued on next page)

Decoding Notes

The response codes are transferred to the quality indicators of the tide observations that are defined for a certain transmitter-channel combination. These quality indicators can be shown in a Observation Physics display. If a response is negative (or positive with a non-valid data code), i.e. in case of an error, the quality indicators will give the negative code and the tide value and time will not be updated. For positive responses, the quality indicator will give the positive code. If an observation did not update, the indicator will be 0.

The driver checks the observation code for "CM" or "DM" and if found, converts the tide value to meters.

Interfacing Notes

Because the *QINSy* driver needs to send commands to the RGC920 receiver to get a response, it is important that the cable wiring between the receiver port and the COM port is bi-directional to allow two-way traffic. ***The cable wiring must follow the full RS-232C protocol, i.e. connect also the Request to Send and Clear to Send wire (see APPENDIX A: RS-232 Connector Pin Assignments).***

According to the RGC920 manual the I/O parameters should be 9600 baud, 8 databits, 1 stopbit, no parity.

Database Setup

See description under "TIDE GAUGE SYSTEM DRIVERS".

Slot 1
Slot 1 of a tide observation must be the first part of the identification field in a response message. Usually this is the **name** of the tide gauge. It is not required to enter a full name, as long as the first characters match exactly. E.g., tide station Dintelhaven identifies itself with DINTELHAVEN, but you can fill in for slot 1 the name DINTEL. Notice that a slot 1 number must be unique for a transmitter-channel-method combination.

Slot 2
Slot 2 of a tide observation must denote the **transmitter** (zender) number for the corresponding tide station.

Drivers.io Options

The channel number (kanaal) will be default "1" and the method is default "P". To change the default values for channel number and method, use different command line parameters in the Drivers.io file, located in the *QINSy* program folder. Search in this file for the driver entry "DrvRGC920.exe 1P". The first parameter (1) is the channel number and the second parameter (P) indicates the method. Do not alter the length of the line.

3.14.10 Vyner Medway Radio Tide Gauge MK I

3.14.11 Vyner Medway Radio Tide Gauge MK II

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvVynerMedway.exe	*Drivers.io options:*	1 | 2
Last modified:	2001-Aug-29		

Driver Description

Driver to decode tide heights as transmitted by a Vyner Medway Radio Tide Gauge Mark I or Mark II.

Format Description

Data will be ASCII and each line is terminated with a carriage return (CR) and line feed (LF).
All the tide heights are measured with respect to the (local) tide datum at the transmitter units.

Examples Vyner MK I format:

```
“:1234<CR><LF>”   or   ”;1234<CR><LF>”
```

#	*Format MK I*	*Description MK I*	*Values, Units*
01	“:” or “;”	start of data	“:” (positive) or “;” (negative)
02	xxxx	tide height	0.01 metres
03	<CR><LF>	record termination	

Examples Vyner MK II format:

```
“07/04/93 12:30:10 A+12.34<CR><LF>”   or   ”A+12.34<CR><LF>”
```

#	*Format MK II*	*Description MK II*	*Values, Units*
01	dd/mm/yy	date of height (optional)	day / month / year
02	“ “	field delimiter (optional)	“ “ (space)
03	hh:mm:ss	time of height (optional)	hours : minutes : seconds
04	“ “	field delimiter (optional)	“ “ (space)
05	c	channel code	“A” to “J”
06	s	tide sign	“+” or “–“
07	xx.xx	tide height	metres
08	<CR><LF>	record termination	

Decoding Notes

Channel code “J” also allows a Medway MK I tide gauge receiver to receive a transmitted tide from a MK II transmitter unit; and code “J” also allows a Medway MK II tide gauge receiver to receive a transmitted tide from a MK I transmitter unit. The channel code that is decoded corresponds to the slot of a tide observation.

(continued on next page)

Database Setup

See description under “TIDE GAUGE SYSTEM DRIVERS”.

If the (local) tide datum at the transmitter unit and the survey datum do not coincide, the separation in height between the two datums should be entered as “Property” of the tide observation, i.e. as “Fixed system C-O”.

The tide observation can be defined at a “Fixed Node”. The present driver can only decode tide heights from one tide gauge, but in the future tide observations from more fixed stations can be decoded (and weighted).

Slot. Enter the channel code as slot number. Always enter slot “J” for Vyner MK I observations.

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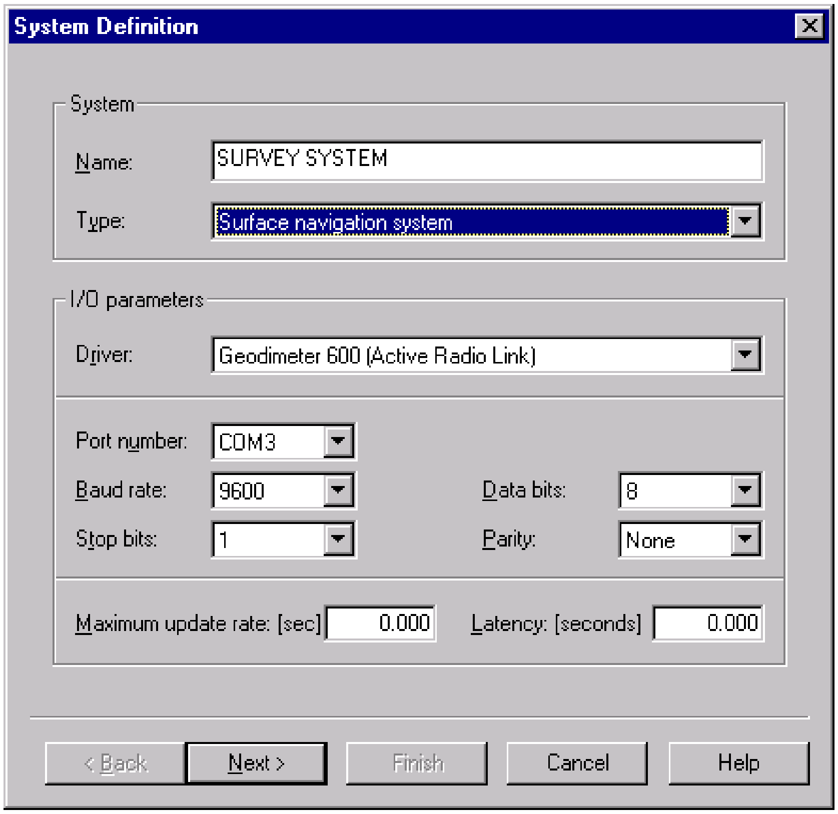
3.15 SURFACE NAVIGATION SYSTEM DRIVERS

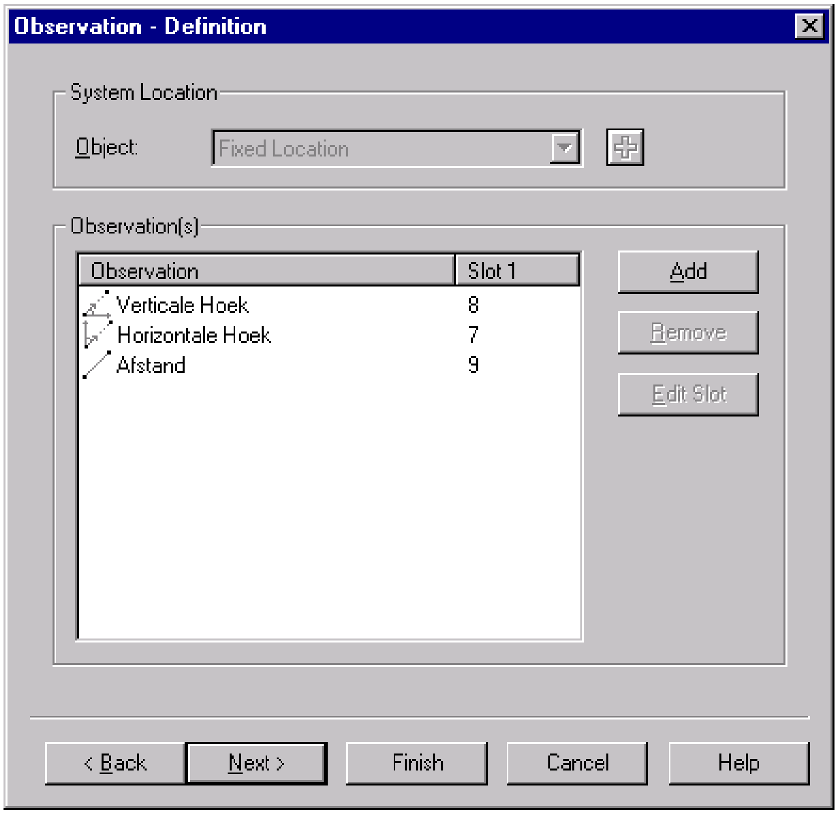
Database Setup

First define and select the “Object” on which the system is located. Select item “Systems” and define a new “Surface navigation system”. Select the appropriate driver and interface parameters. Press the “Next” button to continue the setup. Press the “Add” button to add observations to the system. Depending on the type of observation, define the node(s) at which its value is measured (and to which its value is measured). Press “Next” to define the observation properties. Select each observation and enter the appropriate parameters. Press the “Apply” button before selecting another observation. Press “Finish” button to save the system.



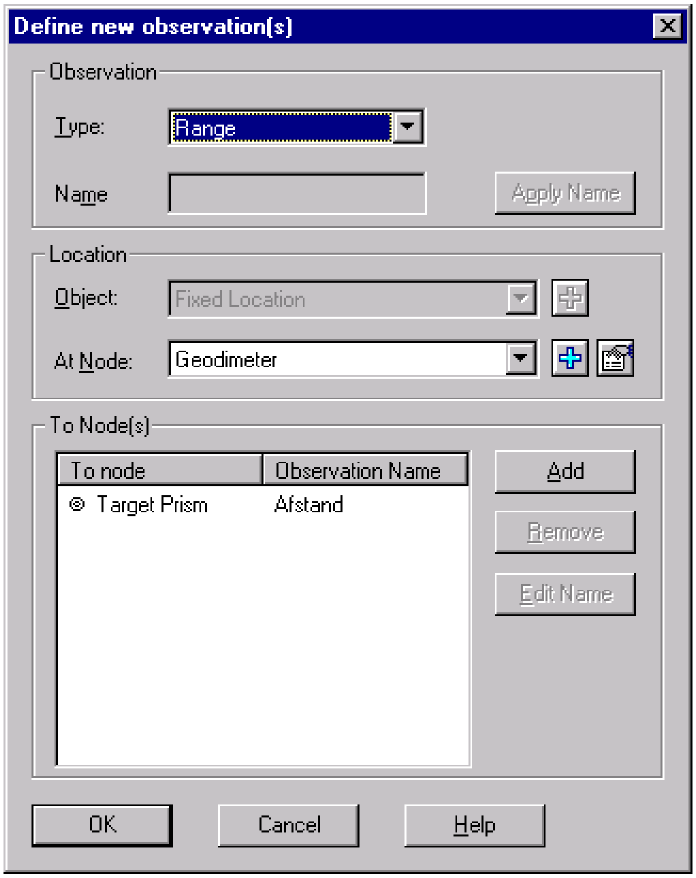
Database Setup (continued)

A new observation can be added by pressing the “Add” button; to remove it, select it and press “Remove”.



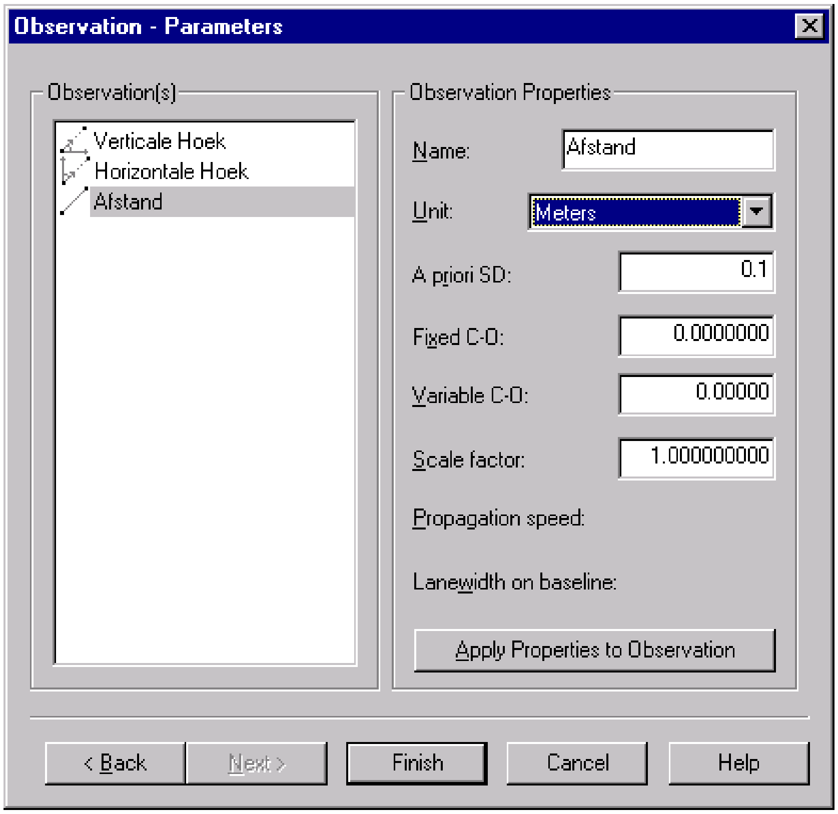
Database Setup (continued)

A new antenna node can be added by pressing the button; to change its properties, press the button.



Database Setup (continued)

The properties of each observation, for example unit and calibration values, can be entered after selecting it.



Note 1. Be sure to define appropriate a priori SD values for each of the possible (very different) observations.

See for more information the *QINSy* DB Setup Help Topics or the *QINSy* Knowledge Base.

3.15.1 Artemis Range & Bearing (ASCII)

3.15.2 Artemis Range & Bearing (KA-BCD (0.1))

3.15.3 Artemis Range & Bearing (KA-BCD (0.01))

Input / Output:	Input	*Driver class type:*	Terminated
Executable name:	DrvPseudoArtemis.exe	*Drivers.io options:*	*none / format*
Last modified:	1999-Sep-02		

Driver Description

Driver to decode both distance and azimuth from Artemis output telegrams in BCD or ASCII format. For the ASCII formats, the Artemis driver automatically determines if an ASCII string contains 16 or 17 characters.

Format Description

The following four peripheral output telegram formats are available for use with the *QINSy* Artemis driver:

1) KA-BCD(0.1) 7 byte BCD telegram, distance resolution of 1.0m, azimuth resolution of 0.01º.
2) KA-BCD(0.01) 7 byte BCD telegram, distance resolution of 1.0m, azimuth resolution of 0.001º.
3) ASCII-16 16 character ASCII string, distance resolution of 0.1m, azimuth resolution of 0.01º.
4) ASCII-17 17 character ASCII string, distance resolution of 0.1m, azimuth resolution of 0.001º.

KA-BCD(0.1)		
Byte	***Description Bit 7-6-5-4***	***Description Bit 3-2-1-0***
1	AZM x 100	AZM x 10
2	AZM x 1	AZM x 0.1
3	0000	AZM x 0.01
4	DIST x 10000	DIST x 1000
5	DIST x 100	DIST x 10
6	0000	DIST x 1
7	1111	1111
KA-BCD(0.1)		
Byte	***Description Bit 7-6-5-4***	***Description Bit 3-2-1-0***
1	AZM x 100	AZM x 10
2	AZM x 1	AZM x 0.1
3	AZM x 0.01	AZM x 0.001
4	DIST x 10000	DIST x 1000
5	DIST x 100	DIST x 10
6	0000	DIST x 1
7	1111	1111

(continued on next page)

ASCII-16		
Char	***Description***	***Values***
1	DISTANCE x 10000	
2	DISTANCE x 1000	
3	DISTANCE x 100	
4	DISTANCE x 10	
5	DISTANCE x 1	
6	DISTANCE x 0.1	
7	‘SPACE’	space character (0x20)
8	AZIMUTH x 100	
9	AZIMUTH x 10	
10	AZIMUTH x 1	
11	AZIMUTH x 0.1	
12	AZIMUTH x 0.01	
13	‘SPACE’	space character (0x20)
14	‘READY’	1 = data valid, 0 = data not valid
15	<CR>	carriage return (0x13)
16	<LF>	line feed (0x10)

ASCII-17		
Char	***Description***	***Values***
1	DISTANCE x 10000	
2	DISTANCE x 1000	
3	DISTANCE x 100	
4	DISTANCE x 10	
5	DISTANCE x 1	
6	DISTANCE x 0.1	
7	‘SPACE’	space character (0x20)
8	AZIMUTH x 100	
9	AZIMUTH x 10	
10	AZIMUTH x 1	
11	AZIMUTH x 0.1	
12	AZIMUTH x 0.01	
13	AZIMUTH x 0.001	
14	‘SPACE’	space character (0x20)
15	‘READY’	1 = data valid, 0 = data not valid
16	<CR>	carriage return (0x13)
17	<LF>	line feed (0x10)

Decoding Notes

For Artemis data in ASCII format, the quality indicators of the observations reflect the ‘READY’ character in the data string: +1 if the data are valid and –1 if the data are not valid. See Observation Physics display.

(continued on next page)

Database Setup

See description under “SURFACE NAVIGATION SYSTEM DRIVERS”.

Add a new “Surface Navigation System” to the database and select the appropriate Artemis driver and interfacing parameters. Press “Next” button to continue the setup. Select a “Fixed Location” as system location. First add an observation of type “Range”. Select or add a fixed “At Node” for the Artemis station, then select or add a variable “To Node” for the receiver antenna. Secondly, add an observation of type “Bearing, true” and select the same fixed “At Node” and variable “To Node” as for the range observation. Press “Next” button to define the observation properties. Select each observation and set the appropriate unit and (C-O) values. Be sure to press button “Apply Properties” to save the changes. Press “Finish” to save the system.

Note 1. The azimuth observation in *QINSy* should always be given with respect to the true north. When the Artemis system outputs azimuth values with respect to another direction, for example grid north, then be sure to enter a (C-O) value for the azimuth observation in *QINSy*. To correct from grid north to true north, enter the meridian convergence at the Artemis station position as (C-O) value. This value can be obtained using option “Test geodetical parameters”. Enter station coordinates (on survey datum) and press the “Calculate” button to display the results (on survey datum). Enter the convergence with the same sign as (C-O) value.

Note 2. *QINSy* needs three observations to compute a position, while an Artemis system only outputs range and bearing. Usually the third observation will be a height aiding observation for the Artemis system, defined in the Controller under “Settings” – “Heights”. However, it is possible in DB Setup to add a third observation to the Artemis system which can also be used in the computation. Edit the Artemis system and add a third observation of type “Vertical Angle”. Set the unit to degrees. This vertical angle will be computed online from the difference between the antenna heights of the Artemis station node and the vessel node, taking into account the observed range as well as the curvature of the earth. This approach will only work if the distance between the two nodes is large enough and the vessel reference point height is close to survey datum level.

Drivers.io Options

Four command line options are available to select the format: ASCII16, ASCII17, KABCD02, KABCD03. If no format is specified, then the driver assumes an ASCII format and automatically determines the type.

3.15.4 AUV/Buoy Tracking (PARADIGM)

Input / Output:	Input	*Driver class type:*	Terminated <CR>
Executable name:	DrvAUVBuoyTracking.exe	*Drivers.io options:*	*none / format / Id*
Last modified:	2003-July-28		

Driver Description

Driver to decode range measurements between an AUV and floating buoys on the watersurface and to decode the GPS positions of these buoys. See chapter POSITIONING NAVIGATION SYSTEM DRIVERS about how to decode the GPS positions from the buoys

Format Description

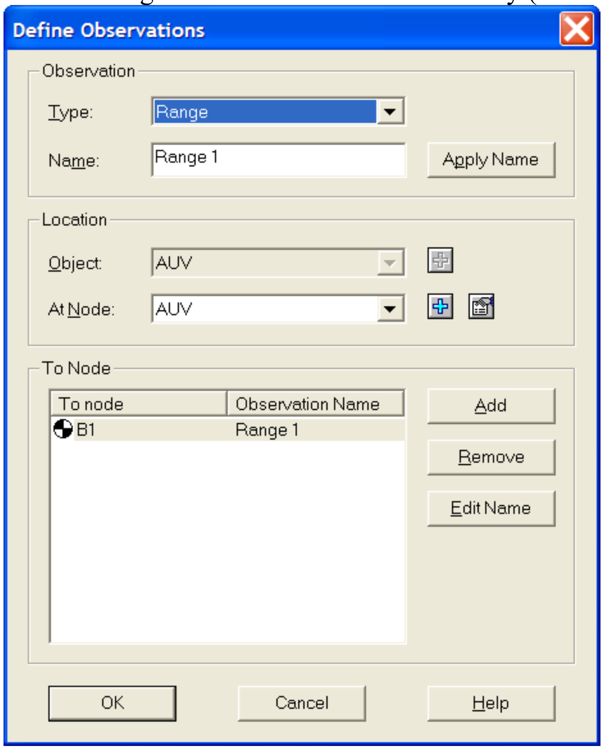
Example data:

```
G2,235548,2726.6582,N,07854.6230,W,2,10,0.8,1.6,
G3,235548,2725.7536,N,07849.0707,W,2,10,0.8,3.2,
G1,235548,2725.6634,N,07847.1891,W,2,10,0.8,0.9,
#B0,P,3
P3
P1
P2
#B1,C
C1,00,00,B6
#B3,C
C3,00,03,B2
#B3,R
R3,01,7A02
#B1,C
C1,00,00,B7
#B3,C
C3,00,01,B3
#B1,C
C1,00,00,B7
#B3,C
C3,00,01,B3
#B1,C
C1,00,00,B7
#B3,C
C3,00,01,B3
#B0,G,D
#B1,C
G3,235600,2725.7539,N,07849.0706,W,2,10,0.8,2.3,
G2,235600,2726.6583,N,07854.6229,W,2,10,0.8,1.3,
G1,235600,2725.6638,N,07847.1895,W,2,10,0.8,-0.7
#B0,P,3
P3
P1
P2
#B1,C
C1,00,00,B6
#B3,C
C3,00,03,B2
#B3,R
R3,02,7EC1
```

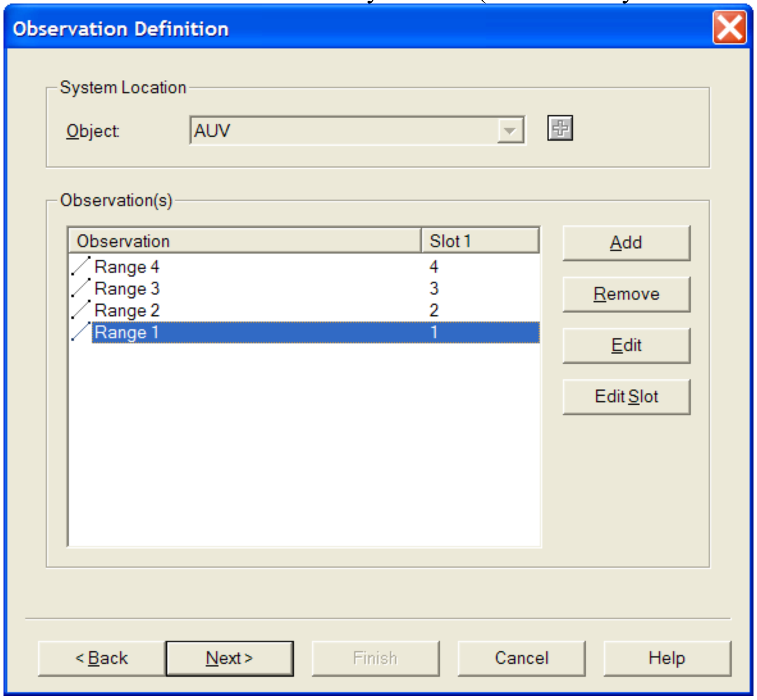
Database Setup

See description under “SURFACE NAVIGATION SYSTEM DRIVERS”.

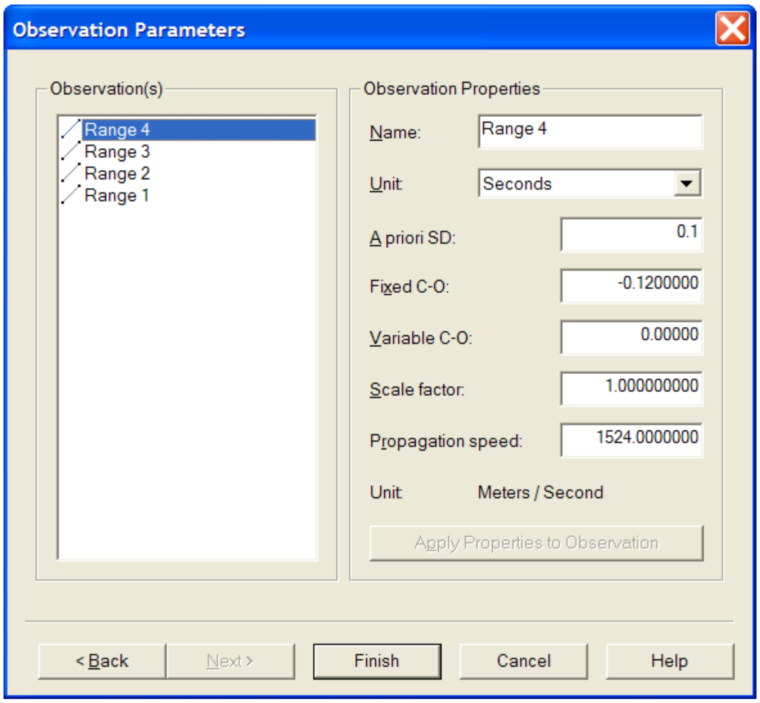
Define a range observation between each buoy (Vessel object) and the AUV (Vessel object)



The slot number must be the buoy address (decimal buoy identification number, range 1..15)



Further, the driver decodes the traveltime of the sound through water between masterbuoy and AUV and between AUV and the other buoys. Therefore the user must select for each range the unit Seconds, the SoundVelocity must be entered in Survey Units / Seconds and the Fixed or Variable C-O must be used to enter the Turn-Around-Delay, also in seconds.
This Turn-Around-Delay should always be entered as a negative number.



3.15.5 Cable Counter (Dynapar, Sidescan Winch)

Input / Output:	Input (one-way)	*Driver class type:*	Terminated <CR>
Executable name:	DrvCableCounter.exe	*Drivers.io options:*	*none*
Last modified:	2000-April-18		

Driver Description

Driver for decoding cable out range observation from a Dynapar cable counter or from a Sidescan Winch. The driver will automatically determine the format of the input data string when the string starts with Dynapar header string "R: Co.", or if it starts with Sidescan Winch header "L=".

Format Description

Each Dynapar string has a (fixed) length of 13 bytes, including termination character <CR>.

`R: Co. RRRRR<CR>` where "RRRRR" is the cable out range value in decimeters.

Each Sidescan Winch string is terminated by character <CR>.

`L=x.xm <CR>` where x.x is the length of the cable in meters
`S=x.xm/m<CR>` where x.x is the Speed of the cable in meters per minute. (Not used by *QINSy*)

Decoding Notes

The decoded range observation is always multiplied by 0.1 to convert decimeters to meters for the Dynapar format.

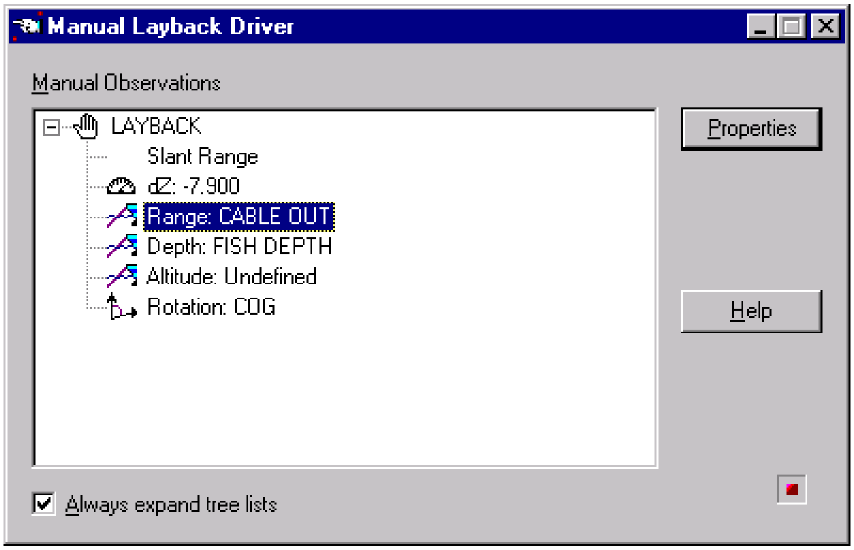
Database Setup

Add a "System" of type "Surface navigation system" to the vessel object in the *QINSy* database and select the appropriate driver and interfacing parameters. Press "Next" button. Add an observation of type "Range" and select (or add) the node for the tow point (at which the cable out is measured). Add the node on the fish object (to which the cable out is measured) to this range observation and enter a name. Press "Next" button. Select range observation and set its unit to "Meters". Apply properties and press "Finish" to save system.

In order to compute the fish position using the cable out range observation, add a system of type "Manual Layback system" to the vessel object in the *QINSy* database. Press "Next" button.). Add the node on the fish object (to which the cable out is measured) to this layback observation and enter a name and sd. "Finish".

Controller Setup

<u>Online</u>, when a manual layback system has been added to the database, a “Manual Layback Driver” is automatically started by the *QINSy* Controller. Open the driver window and select the manual layback observation to define its properties. Select layback type “Slant Range” and the cable out range observation. Select the appropriate depth or altitude observation and/or enter the manual height difference between the vessel tow point and the fish node as Delta Z value. If the fish is trailing the vessel, use COG to rotate the layback observation. To compute the fish position, use layback in an computation. See example below.



3.15.6 Cable Counter (Red Lion)

Input / Output:	Input (two-way)	*Driver class type:*	Interrogated
Executable name:	DrvRedLionCableCounter.exe	*Drivers.io options:*	*none*
Last modified:	1999-Apr-01		

Driver Description

Driver to decode cable out range from Red Lion cable counter. The cable counter is interrogated by *QINSy*, and therefore requires an interface cable that allows bi-directional data communication.

Format Description

Driver sends command <TE*> and then waits for a response.

Decoding Notes

The cable length value is rounded to whole meters (e.g. 2503).

Database Setup

See description under “SURFACE NAVIGATION SYSTEM DRIVERS”.

To decode the ***range***, add a “Range” observation connecting the tow point and the fish to the system setup.

3.15.7 Cable Counter Payout (MD Totco)

3.15.8 Cable Counter Tension / Speed (MD Totco)

Input / Output:	Input	*Driver class type:*	Terminated
Executable name:	DrvTotcoCableCableCounter.exe	*Drivers.io options:*	*none*
Last modified:	2002-Feb-14		

Driver Description

Driver to decode cable out range (payout) , wire tension and speed from MD Totco cable counter. The cable counter is sending data continuously to *QINSy*.

Format Description

```
1234567890123456789012345678901234567890
NN,TTTTTTT,S,PPPPPPP,S,VVVVVVV,S,XXXXCRLF
```

NN	Sensor Unit Number sending this data
TTTTTTT	Tension (float) [lbs.]
PPPPPPP	Payout (float) [ft]
VVVVVVV	Speed (float) [ft/min]
XXXX	Status String (CAL1, CAL2 = Cal relays active, affects current values, 0000 = OK, 0001 – 9999 = Self Test failed)
S	One Character alarm response (H==high-high, h = high, l = low, L =low-low, space = no alarm)

The fields are separated by a comma, and terminated with a CR/LF pair.

Example:
01, 60, , 196, , -33, ,0000

Decoding Notes

No conversion factor is applied to the decoded floating-point values. The sensor unit number is ignored. If the status string is 0000 (OK) then the Quality Indicator of the values are set to zero; any other status string will set the Quality Indicators to –1. One Char. Alarm responses are ignored.

Database Setup

See description under “SURFACE NAVIGATION SYSTEM DRIVERS”
See description under “MISCELANEOUS SYSTEM DRIVERS”.

To decode the ***Payout***, add a “Range” observation connecting the tow point and the fish to the system setup. Make sure to set the units to “International Feet”.
For the ***Tension*** and ***Speed*** fields, generic observations should be defined. First, add a “Miscellaneous system” system to the database and select the “Cable Counter Tension / Speed (MD Totco)” driver, using the same I/O interfacing parameters as with the driver used for the Payout (range). Press “Next” button to define the properties of the generic observations. Apply the appropriate conversion factors if any other units are required then feet and lbs. The slot number should be 1 for the ***Tension*** and 2 for the ***Speed*** field.

3.15.9 DCI Minilir-Fennel

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvMinilirFennel.exe	*Drivers.io options:*	*none*
Last modified:	1997-Jul-25		

Driver Description

Driver for combined RS-232 message from DCI Minilir-Fennel telemetry system. Driver to decode both horizontal and vertical angle from Minilir system as well as range observation from Fennel EDM system.

Format Description

Each combined Minilir-Fennel output string is fixed in length. Horizontal and vertical angle measurements are output in turn, each combined with the latest Fennel range. A missing (or invalid) distance is indicated by the data string "_NO_ECHO_". Some examples of the Minilir-Fennel output message are given below.

Byte	*Format*	*Description*	*Values, Range, Units*
01	'H' or 'V'	type of angle	'H' horizontal , 'V' vertical
02	n	angle × 100 °	0…9
03	n	angle × 10 °	0…9
04	n	angle × 1 °	0…9
05	'.'	decimal point	'.'
06	n	angle × 0.1 °	0…9
07	n	angle × 0.01 °	0…9
08	n	angle × 0.00125 °	0…7
09	'Q' or 'q'	quality of angle	'Q' good, 'q' bad
10	'A'	type of range	'A' range ("afstand")
11	n	range × 1000 m	0…9
12	n	range × 100 m	0…9
13	n	range × 10 m	0…9
14	n	range × 1 m	0…9
15	'.'	decimal point	'.'
16	n	range × 0.1 m	0…9
17	n	range × 0.01 m	0…9
18	n	range × 0.001 m	0…9
19	'O'	age of range	'O' age ("ouderdom")
20	n	age × 100 ms	0…9
21	n	age × 10 ms	0…9
22	n	age × 1 ms	0…9
23	'.'	decimal point	'.'
24	n	age × 0.1 ms	0…9
25	<CR><LF>	record terminator	<CR><LF>

(continued on next page)

Format Example

```
H193.635QA0864.053O066.9
V013.850QA0864.060O027.5
H193.635QA0864.061O058.7
V013.850QANO ECHO O021.5
```

Interfacing Notes

According to DCI specifications, the interface parameters are 9600 baud, 7 data bits, even parity, 1 stop bit. The latency of the Minilir-Fennel system is the time interval between the angle measurement (FLAG) in the Minilir system and the reception of the string at the COM port, which includes the time interval between the FLAG and sending the string and the time interval of the radio link between sending and receiving the string. The age of the Fennel range is decoded from the data string. An additional time correction for the length of the Fennel string (actual measurement) is applied as 70.0 ms, according to the latest DCI specifications.
The Minilir-Fennel output is an ordinary RS-232 output. See Chapter 1 for general interfacing remarks.

Calibration

Refer for the calibration procedure to the separate *MINILIR-FENNEL CALIBRATION MANUAL RWS-MD*.

Database Setup

See description under “SURFACE NAVIGATION SYSTEM DRIVERS”.

Add “Object” for the vessel with the reflector unit. Add a “Fixed Node” for the Minilir-Fennel station and for all the calibration targets to be used in the calibration procedure. Add two times a “Variable Node” (located on the same vessel object) for both the Minilir spot and the Fennel prism on the reflector unit to be used for online positioning. Be sure to enter the height difference between prism and spot as difference in Z-offset. Both variable nodes should have the same X-offset and Y-offset (with respect to the unit’s reference point), since the Fennel prism node should be defined exactly above (or under) the Minilir spot node. A physical horizontal offset, for example in case of a ring of prisms, should be entered as a correction C4, see below. Add three “Observations”, for the Fennel range and for the Minilir horizontal and vertical angles. Be sure to select the same station node for the fixed “At Node”, but different target nodes for the variable “To Nodes”.

Add a “Surface Navigation System” with driver “DCI Minilir-Fennel” and enter the appropriate interfacing parameters and the latency value. Connect the three observations (one range and two angles) to the system. Open the “Station Corrections” tab, select the station node (only one fixed node should have been defined) and enter the corrections H1, C2 and C3; correction H0 is obtained from the instrument height at the node. Open the “Target Corrections” tab, connect all the target nodes to be used during the calibration procedure (fixed nodes) and/or online (one variable node for the Fennel prism), and by selecting the target nodes, enter the corrections C4 and H5. Correction H5 is only used during calibration, but to obtain a consistent printout, H5 should be the same as the height difference between the two variable nodes for the online positioning.

Be careful with the *signs* of the corrections. A height difference dH in *upward* direction is *positive*, for example if the Fennel prism is located above the Minilir spot. A range correction dL which should be *added* to the observed range to get the corrected value to be used in the calibration procedure and/or the online positioning is *positive*, hence a ring of prisms on a reflector unit will result in a positive correction C4.

Carry out a calibration procedure to determine the (additional) instrumental constant for the range and the zero directions for the angle observations. Before starting *QINSy* for online positioning, edit the database to enter the calibration (C-O) results in the “Fixed (C-O)” or “Variable (C-O)” properties of the three Minilir-Fennel observations. Do *not* enter any additional “Node Corrections” in the Minilir-Fennel system definition.

3.15.10 Geodimeter 600

Input / Output:	Input (two-way)	*Driver class type:*	Interrogated
Executable name:	DrvGeodimeter600.exe	*Drivers.io options:*	various
Last modified:	2003-Dec-08		

Driver Description

Driver for Geodimeter initialisation and decoding of standard output data using a Geodimeter telemetry link. Driver to decode range observation and both horizontal and vertical angles from Geodimeter 600 system.

Format Description

After initialisation, during normal interrogation cycles, the GDM target lock status is requested using the "RG,32" command, and measurement data is requested using the "RG" command. GDM replies:

Request	***Response***	***Description***	***Locked on Target***	***Prism Signal***
RG,32	32=0	Target status information	No	No
RG,32	32=1	Target status information	No	Yes
RG,32	32=4	Target status information	Yes	No
RG,32	32=5	Target status information	Yes	Yes
RG	0 7=<hor ang> 8=<vert ang> 9=<dist>	New distance measured	No or Yes	Yes
RG	3 7=<hor ang> 8=<vert ang>	No new distance measured	No or Yes	No

Field	***Format***	***Description***	***Values, Range, Units***
1	x	Quality indicator	0 OK. Other values represent errors
2	<cr><lf>	Separators	separators between data/status lines
3	7=xxx.xxxx	Horizontal angle	0 – 360 degrees or 0 – 400 grads
4	<cr><lf>	Separators	separators between data/status lines
5	8=xxx.xxxx	Vertical angle	0 – 360 degrees or 0 – 400 grads
6	<cr><lf>	Separators	separators between data/status lines
7	9=xxx.xxxx	Range	0 – 9999 meters
8	<cr><lf>	Separators	separators between data/status lines
9	<eot>	Terminator	end of transmission (ASCII 4)

Interfacing Notes

Geodimeter interface parameters can be set using the keyboard, and are default 9600 baud, 8 data bits, 1 stop bit, no parity. The latency of the Geodimeter system is the interval between the time of receiving the first byte of the standard output data transmission and the time at which the actual measurements have been made. The Geodimeter telemetry output is an ordinary RS232 output. See Chapter 1 for general interfacing remarks.

(continued on next page)

Geodimeter Setup and Initialisation

Set up the Geodimeter instrument over a known point (fixed station node). Press the **[PWR]** button to switch on the instrument. Perform a calibration to determine the corrections to the observations (C-O values) and a station establishment procedure to determine the fixed coordinates of the station node, if needed. Refer for the calibration and station establishment procedures to the *GEODIMETER SYSTEM 600 USER MANUAL.*

Press the **[RPU]** button to set up the Geodimeter instrument for remote control. Press **[3]** to choose remote mode and **[1]** if no station establishment has to be performed. Set the limits of the search sector and measure towards a reference object, if needed. Press **[ENT]** or another button to switch over to the remote control.

Geodimeter Radio Channel and Address

The radio channel, telemetry radio address and Geodimeter radio address are read from file GEORADIO.txt which is located in the *QINSy* program directory. This file is created the first time the Geodimeter driver is started. It's contents can be changed (before going or while being) online, after which a "Reset I/O" can be given to re-initialise the telemetry link. Only change the numbers; do NOT change the comment strings.

```
1   GEORADIO CHANNEL
1   GEORADIO ADDRESS
1   GEODI600 ADDRESS
```

Database Setup

See description under "SURFACE NAVIGATION SYSTEM DRIVERS".

Add an "Object" for the vessel with the target unit. Add a "Fixed Node" for the Geodimeter station. Add a "Variable Node" (on the vessel object) for the target unit to be used for online positioning. Be sure to enter right offsets. A physical horizontal offset, in case of a ring of prisms, should be entered as a correction to the range, see below. Add a "Surface Navigation System" with driver "Geodimeter 600 (Active Radio Link)" (Active RS232 Link has not been implemented yet) and enter the appropriate interfacing parameters and latency value. In the system definition wizard select the location(usually fixed), add observations for Range horizontal angle and vertical angle, for each observation select the from and to node.

Enter the appropriate slot number, which is the label number in the standard output data transmission, i.e. "9" for range, "7" for horizontal angle, and "8" for vertical angle. See appendix to the *USER MANUAL.*
On the last page of the wizard: Observation unit for the range should be "metres". Calibration corrections (and prism offset) for the range can be entered under Properties. Observation units for the angles should be "grads". Calibration corrections can be entered under Properties. The calibration (C-O) values can be entered in the "Fixed (C-O)" or "Variable (C-O)" properties of the three observations.

Important
Since the horizontal angle is defined as "true bearing" observation, its (C-O) value must reflect the difference between the zero direction in the Geodimeter instrument and true north. The (C-O) correction is *added* to the observed value before it is used by *QINSy*. Since the vertical angle is really a zenith angle, measured down-wards from the zenith instead of upwards from the horizon, its scale value (C/O) must be –1 (minus 1). The (C-O) value for the vertical angle must be –100 (minus 100), 100 grads to account for the zenith direction and minus to account for the fact that the general observation reduction equation in the *QINSy* system (following UKOOA P2/94 format) is defined as $Obs_{reduced} = (C/O)\ \{ Obs_{raw} + (C\text{-}O)_{fixed} + (C\text{-}O)_{variable} \}$.

(continued on next page)

Drivers.io Options

Command line parameter description for "drivers.io" file in *QINSy* directory. By default, the Geodimeter 600 driver is initialized in actively radio controlled tracking mode, with a 10 seconds timeout for a lock failure.

Parameter	***Description***	***Default***	***Comments***
C	RS-232 control	off	direct cable connection
R	radio control	off	radio link ; same as 'A'
A	active control	on or off	radio link ; see DRIVERS.IO entry
P	passive control	off or on	radio link ; see DRIVERS.IO entry
L	tracking mode	on or off	radio link ; see DRIVERS.IO entry
F	standard mode	off	measuring mode
N	passive mode	off or on	measuring mode ; same as 'P'
TRK	tracking mode	on or off	measuring mode ; same as 'L'
STD	standard mode	off	measuring mode ; same as 'F'
NTC	no target check	on	disables "RG,32" target status command
BOX	message boxes on	off	displays radio link status message boxes
nn	lock failure count	20	< 100 ; counter before re-initialization
nnn	command delay in ms	750	> 100 ; milliseconds to delay commands

Parameter "C" can be used for a RS-232 link; parameters "R" and "A" indicate an active radio link while "P" and "N" initialize a passive radio link (not sending commands). Parameters "L" or "TRK" can be used for tracking mode, while "F" or "STD" are used for standard mode. An integer number (less than 100) can be used to set the count of consecutive lock failure status responses (i.e. the "RG,32" responses), before a message (and target search command) is given. An integer number (greater than 100) can be used to set the time interval (milliseconds) between sending a command (i.e. the "RG" request) and reading a response.

If the update rate of the Geodimeter system is set to more than one second, the integer number will represent the number of seconds. See below for the driver entries that a presently available in the "drivers.io" file.

Remark
In case of an active radio link, using a command delay of 750 ms and with the target check enabled, will mean that only one set of measurements every 1.5 seconds will be read. Using "NTC" as command line parameter will decrease the measurement interval to 0.75 seconds, but then the driver will not be able to determine of the target lock is lost. In (default) tracking mode, 0.4 seconds is needed to measure a distance, plus some time to send the data over the radio link, so do not use command delays less than 500 ms.

Remark
When a passive RS-232 cable link is being used, it is better to use the *QINSy* DrvGeodimeterGST module.

```
100077, Geodimeter GST (Passive RS232 Link) , DrvGeodimeterGST.exe
100078, Geodimeter 600 (Passive Radio Link) , DrvGeodimeter600.exe P 20
100079, Geodimeter 600 (Active Radio Link)  , DrvGeodimeter600.exe A L 20 750
```

3.15.11 Geodimeter Aga 140T

Input / Output:	Input	*Driver class type:*	Terminated '>'
Executable name:	DrvAga140T.exe	*Drivers.io options:*	
Last modified:	2002-June-19		

Driver Description

Driver for Geodimeter Aga 140T. Used for tracking of objects. The Aga 140T measures a range, vertical and horizontal angle. These three values are decoded by the driver.

Format Description

An example of the message sent by the Aga 140T:

0<CR><LF>7=399.9995<CR><LF>8=99.995<CR><LF>9=1999.999<CR><LF>>

which will be seen in the IO tester as:

0	field 1
7=399.9995	field 2
8=99.995	field 3
9=1999.999	field 4
>	field 5

Field	*Format*	*Description*	*Values, Range, Units*
1	x	Quality indicator	0 if ok. All other values represent errors
2	7=xxx.xxxx	Horizontal angle	0 – 360 degrees 0 – 400 grads
3	8=xxx.xxxx	Vertical angle	Degrees or grads
4	9=xxx.xxxx	Range	Normal mode 0-999 long range 1000-1999 meters
5	>	Termination character	Always '>'

Format Example

```
0
7=57.5422
8=89.5848
9=1995.944
>
```

Decoding Notes

The decoded angle values are converted to degrees when in grads. The distance measurements are already in meters. The decoded horizontal angle is with respect to the horizontal orientation in the Aga 140T unit (in the projection grid), and the vertical angle is the zenith angle. *QINSy* is expecting true heading and elevation angle, which means (1) that the orientation of the unit must be set before the actual measurements are done, and (2) that the C-O values with the observation definitions must be used to get true headings and elevation angles. The quality indicator reflects error codes if non-zero. The other status codes are found in the Geodimeter Aga 140T manual.

System Configuration

The interface parameters are fixed at 1200 baud, even parity, 2 stop bits used with RS-232C.

Database Setup

See description under “SURFACE NAVIGATION SYSTEM DRIVERS”.

Add an “Object” for the target unit. Add a “Fixed Node” for the Aga 140T setup node. Add a “Variable Node” (on the target object) for the target unit to be used for online positioning. Be sure to enter its offsets. Add a “Surface Navigation System” with driver “Geodimeter Aga 140T” and enter the interfacing parameters and latency value. Add three “Observations”, for the distance (range) and for the horizontal (Bearing) and vertical angle. The vertical angle of the Aga 140T is the zenith angle: a C-O correction of –90 degrees should be applied.

The latency value for the signal sent by radio link has to be set.

Controller Setup

At startup choose the range offset value in the dialog

Drivers.io Options

N/A

3.15.12 Leica TPS1000 Series Theodolite (GeoCOM)

Input / Output:	Input (two-way)	*Driver class type:*	Interrogated
Executable name:	DrvLeicaTPS1000UI.exe	*Drivers.io options:*	*none*
Last modified:	2002-Jun-04		

Driver Description

Driver for Leica TPS1000 Series Theodolites, using the GeoCOM protocol and a direct cable connection. Driver to decode range observation and both horizontal and vertical angles from a Leica theodolite. The actual interrogation of the Leica theodolite is done on every fix update as defined in the *QINSy* Controller.

Online, the Leica driver starts up with a user interface window, allowing a user to change the driver mode (standby, calibration, measurement data, and manual data entry), select (and aim to) a target prism, and to change certain sensor settings, such as Automatic Target Recognition (ATR), backlight, cross-wire light.

The user interface window will show the user selections, the prism correction, the decoded observations and both the general and data reply codes from the theodolite. When the Leica driver is in calibration mode, the differences (mean and standard deviation) between the observed and computed observations are displayed. After a calibration is done, the computed horizontal orientation can be set to align the Leica to grid north.

Format Description

The driver communicates with the Leica TPS1000 theodolites by means of the GeoCOM interface protocol as described in *GeoCOM Reference Manual, Version 2.2, G2-560-Oen – 1.98, Leica Geosystems AG, 1998.*

Decoding Notes

The decoded angle values are converted to degrees. The distance measurements are already in meters. The decoded horizontal angle is with respect to the horizontal orientation in the Leica theodolite (in the projection grid), and the vertical angle is the zenith angle. *QINSy* is expecting true heading and elevation angle, which means (1) that the orientation of the theodolite must be set before the actual measurements are done, and (2) that the C-O values with the observation definitions must be used to get true headings and elevation angles.

The quality indicator of the observations reflect the reply codes (negative for errors) from the Leica. These codes are visible at the bottom of the driver window. Manual data entries have a quality indicator of –0.99.

The prism correction as used for the range is obtained from the Leica whenever another target is selected.

System Configuration

The Leica theodolite must be set to use the GeoCOM interface protocol. This setting can be found under its “Extra” menu option. The first time that a prism is tracked, the theodolite must be manually aimed to the target. After the horizontal orientation has been calibrated and set, the driver can automatically aim the Leica to prisms on other fixed target nodes or to prisms on variable nodes that have just been tracked before.

Interfacing Notes

Leica interface parameters can be set using the keyboard, and are default 9600 baud, 8 data bits, 1 stop bit, no parity. The GeoCOM protocol uses an ordinary two-way RS232 cable. See Chapter 1 for general remarks.

Database Setup

See description under “SURFACE NAVIGATION SYSTEM DRIVERS”.

Add an “Object” for the target unit. Add a “Fixed Node” for the Leica station setup node. Add a “Variable Node” (on the target object) for the target unit to be used for online positioning. Be sure to enter its offsets. Add a “Surface Navigation System” with driver “Leica TPS1000 Series Theodolite” and enter the interfacing parameters and latency value. Add one or more sets of three “Observations”, for the distance (range) and for the horizontal and vertical angles. Be sure to select the same station node for the fixed “At Node”, and the same target node for the variable “To Node” for one set of corresponding observations. Enter one set of observations for each of the variable target prisms to which the Leica will be measuring. Add an additional set observations with “CAL” in the “Slot 1” field, if calibration observations have to be logged. See below.

Range. Observation unit for the range should be “meters”. Observation type is “range”. A physical horizontal offset, in case of a ring of prisms, should be entered as a correction to the range if they are not set in the Leica. Calibration corrections (and prism offset) for the range can be entered as “Observation Properties”.

Angles. Observation units for the two angles should be “degrees”. The observation type for the horizontal angle is “bearing, true”, whereas the zero direction in the Leica theodolite (after calibration) is a grid bearing. Therefore, the grid meridian convergence at the fixed Leica setup node must be entered as “Fixed C-O” or “Variable C-O” value. This convergence can be calculated using the “Test geodetical paremeters” option. The observation type for the vertical angle is “vertical angle” which must be an elevation angle. Since the Leica driver will normally output a zenith angle, the “Fixed C-O” value must be set to –90 degrees (minus) and the “Scale factor” must be set to –1 (minus), because of the order in which *QINSy* applies these values.

Calibration Observations. Fixed nodes are also available as target in the Leica driver, even if there are no observations to these targets. However, in order to log and use such measurements to unconnected fixed targets, add a new dummy “Object” to the database with a variable node, for example just the reference node. In the Leica system setup, add a new set of obervations (range, horizontal angle, vertical angle) from the fixed Leica setup node to this new dummy variable node, and enter “CAL” as slot number. When a fixed node is selected as target and there are no other connected observations found in the database setup, the driver will transfer the three decoded measurements to the set of observations with “CAL” as slot number. The observations can be used in an computation since they are defined to a variable node so that comparisons can be made between the observed position and known positions obtained from the defined fixed nodes.

Online Setup

The Leica driver has got four modes in which different options for online communication are available.

Standby. In this mode, the Leica will not be interrogated for measurement data and data will not be updated. However, it is possible to automatically aim the Leica theodolite, when a target is selected that is either a fixed node or a variable node with a valid set of observations (i.e. that has been measured before), or to enable-disable the ATR system, keyboard backlight, or reticillum light (illumination of cross-wires).

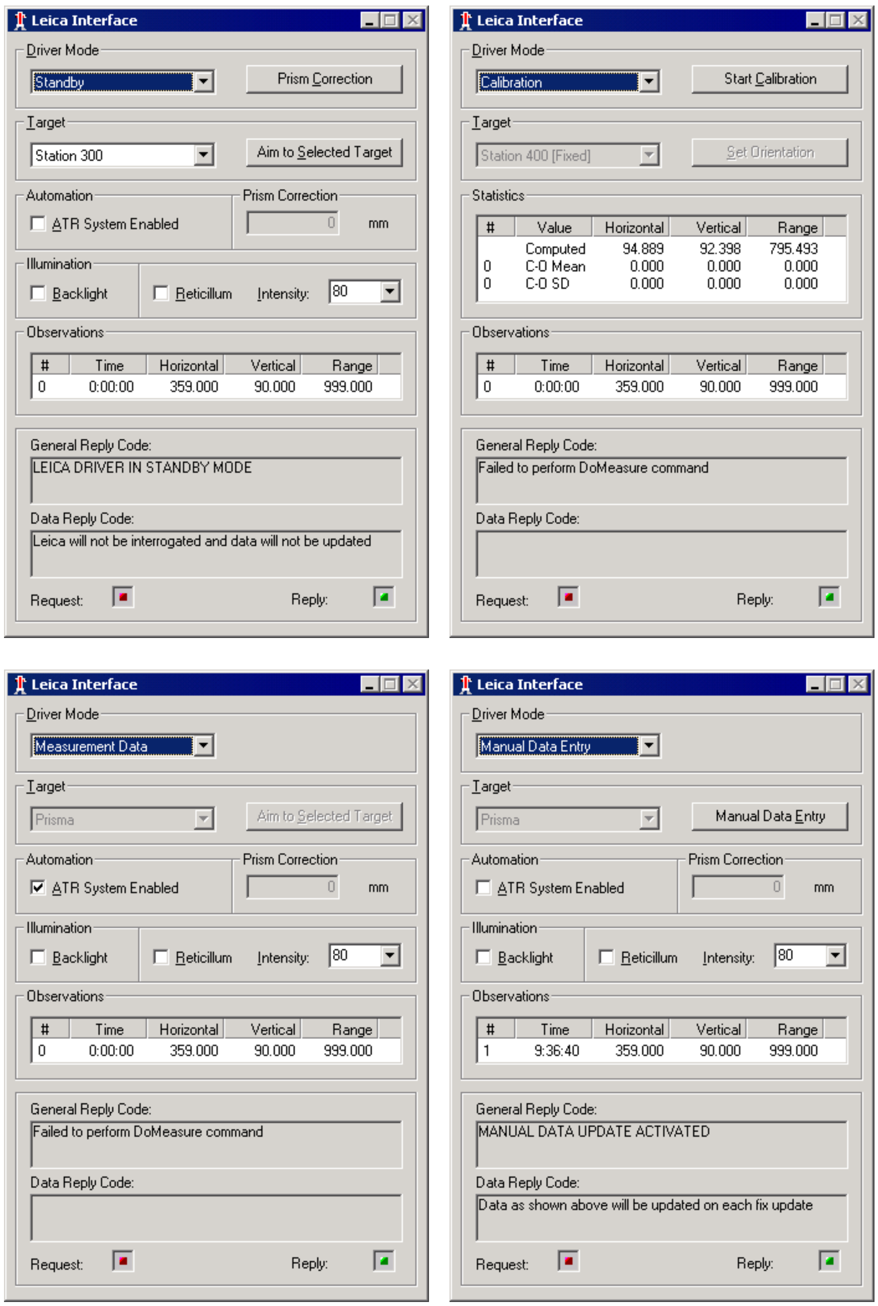
Prism Correction. In standby mode, it is possible to set the prism correction that is used by the Leica, as follows. Select target. Press button “Prism Correction”. Enter the appropriate correction value in the edit box. Press button “Set Prism Correction” to upload the value to the Leica. The edit box is then reset to 0 and the Leica is interrogated to get its new prism correction. The returned prism correction value is then displayed. Press button “Disable Correction” to quit this option. The “Aim to Selected Target” button becomes visible.

Notes. The correction value, together with the target node name, is saved in the Windows registry. The next time that this option is enabled, the driver will look for the previously entered value for the selected target. Users can use “regedit” to add, enter, export and/or import new entries, so that a “table” becomes available. The prism correction as used for the range is obtained from the Leica whenever another target is selected.

Calibration. A list control showing calibration statistics becomes visible. After pressing “Start Calibration”, the current list of observations is cleared and a new list of observations is started. The computed observations are shown together with the mean and the standard deviation (1-sigma) of the C-O values. After pressing the “Stop Calibration” button, the computed horizontal orientation can be uploaded to the Leica theodolite.

Measurement Data. On every fix update, the Leica is interrogated and the measurement data are updated.

Manual Data Entry. On every fix update, the manually entered set of observations is updated to *QINSy*.



4 different driver modes – Standby, Calibration, Measurement Data, Manual Data Entry

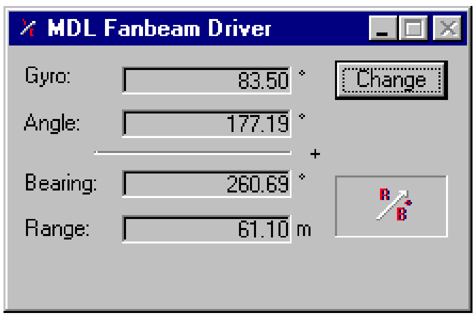
3.15.13 MDL Fanbeam Mk III R & B (MDL Standard)

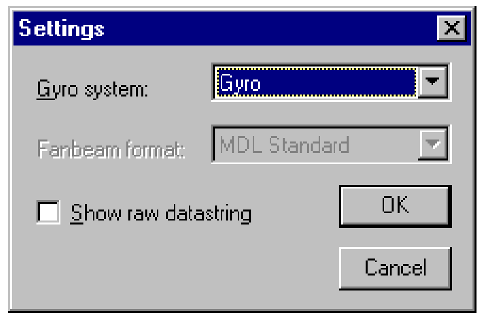
3.15.14 MDL Fanbeam Mk III R & B (Simrad Binary)

Input / Output:	Input	*Driver class type:*	Terminated
Executable name:	DrvFanbeamUI.exe	*Drivers.io options:*	*none / format*
Last modified:	2000-Feb-29		

Driver Description

Driver with user-interface to decode range and angle from MDL Fanbeam Mk III System. The calculated range will be a slant grid range. The driver's dialog will appear in the Windows taskbar when online.





Format Description

It is recommended to use the MDL Standard ASCII Format.

Format:	**MDL STANDARD**	(BAUDRATE 9600, N, 8, 1)
or:	**MDL Mtel**	(BAUDRATE 1200, N, 8, 1)

ITEM	START	LENGTH	DESCRIPTION
Target Number	1	2	NN
Space	3	1	" "
Range	4	7	RRRR.RR
Space	11	1	" "
Bearing	12	6	BBB.BB
Terminators	18	2	<CR><LF>

Example: (Target number 01, Range 61.1m,Angle 177.3°)

```
01   61.10 177.28
01   61.10 177.26
```

Format: **SIMRAD BINARY** (BAUDRATE 9600, N, 8, 1)

ITEM	START	LENGTH	DESCRIPTION
Bearing	1	3	BBB Packed BCD
Range	4	3	RRR Packed BCD
Zero Char	7	1	ASCII 0
Zero Char	8	1	ASCII 0
Terminator	9	1	ASCII 255

Format: **ARTEMIS** (BAUDRATE 9600, N, 8, 1)

ITEM	START	LENGTH	DESCRIPTION
Range	1	6	RRRRRR
Space	7	1	" "
Bearing	8	6	BBBBBB
Space	14	1	" "
Target Number	15	1	N
Terminators	16	2	<CR><LF>

Example: (Range 61m, Angle 177.2°, Target 1)

```
000610 177179 1
000610 177160 1
```

Format: **FB MK.II** (BAUDRATE 1200, N, 8, 1)

ITEM	START	LENGTH	DESCRIPTION
R Char	1	1	"R" Constant
Range * 10	2	5	RRRRR
B Char	7	1	"B" Constant
Bearing * 100	8	5	BBBBB
ARF Chars	13	3	"ARF"
Terminators	16	2	<CR><LF>

Example: (Range 61m, Angle 177.2°, No Target)

```
R00610B17716ARF
R00610B17716ARF
```

Database Setup

See description under “SURFACE NAVIGATION SYSTEM DRIVERS”.

Add a new “Surface Navigation System” to the database and select the appropriate MDL Fanbeam driver (MDL Standard ASCII or Simrad Binary) and set the interfacing parameters. Press “Next” button to continue the setup. Add a range and a true bearing observation to the Fanbeam system. The user may select online in the driver's dialog a gyro system. The gyro reading will be added to the angle. Therefore a Range and a True Bearing will go into the *QINSy* system. If you add an Angle observation instead of a True Bearing, do not select online a gyro system in the driver's dialog. The “At” node must be the Fanbeam Antenna, probably a variable node on the vessel’s object. The “To” node must be the Fanbeam Prism, probably a fixed node.

The Slot Id number must match the target number in the raw datastring, e.g. “01”. If there is no target id in the datastring, e.g. Simrad Binary Format, leave the Slot Id blank.Press the “Next” button to define the observation properties. Select each observation and set the appropriate unit and (C-O) values. Be sure to press button “Apply Properties” to save the changes. Press “Finish” to save the system.

Note *QINSy* needs three observations to compute a position, while a Fanbeam system only outputs a (slant) range and bearing. Usually the third observation will be a height aiding observation for the Fanbeam system, defined in the Controller under “Settings” – “Heights”.

Drivers.io Options

Three command line options are available to select the format: SIMRAD, ARTEMIS or MKII.
If no format is specified, then the driver assumes MDL Standard ASCII format.

3.15.15 GECO Trinav rGPS

Input / Output:	Input	*Driver class type:*	Terminated
Executable name:	DrvTrinavGPSv2.exe	*Drivers.io options:*	*none*
Last modified:	2002-Sep-20		

Driver Description

Driver that is used to decode rGPS information from a Trinav rGPS system.

Format Description

The driver auto senses the following formats

Field	*Format*	*Byte*	*Description*	*Values, Range, Units*
1	A1	1	Start character	[
2	I4	2-5	Object type	0200 = buoy
3	I4	6-9	Format version	0002
4	I4	10-13	Unit Number	0001 and up for buoys
5	A10	14-23	Object name	
6	F12.1	24-35	Time since Jan 1,1988	Total amount of seconds
7	F5.1	36-40	Age of fix	Seconds
8	F8.1	41-48	Range	Meters
9	F8.3	49-56	Bearing	Degrees (0.000-360.000)
10	F5.1	57-61	HDOP	
11	F5.1	62-66	VDOP	
12	F5.X	67-71	Unit variance	
13	3F6.1	72-89	Covariance matrix	Cxx,Cxy,Cyy
14	I2	90-91	Fix status	1=Bad, 2=OK
15	I2	92-93	Altitude flag	0=3D Fix, 2=Weighted Height, 3=Fixed Height used
16	I2	94-95	Doppler smoothing	0=No, 1=Yes
17	I3	96-98	Number of satellites	
18	I3*n	99-98+n*3	Satellite PRN	
19	A1		End character	]
5	A2		Termination characters	CRLF

Example:
```
[020000020001   F1TGPS  450610470.0 3.0  0281.2   69.719 1.0  1.9 .0019   0.8  -
0.1   1.6 2 0 5  8  2  5  7  9 12 21 23 26]
```

Field	Format	Byte	Description	Values, Range, Units
1	A1	1	Start character	[
2	I2	2-3	Object type	02 = buoy
3	I2	4-5	Format version	02
4	I2	6-7	Unit Number	01 and up for buoys
5	A10	8-17	Object name	
6	I4	18-21	GPS week	Week number since August 21 1999
7	F9.1	22-30	Fix time tag	Seconds in GPS week
8	F4.1	31-34	Age of fix	Seconds
9	F8.1	35-42	Horizontal Range	Meters
10	F9.4	43-51	True Bearing	Degrees (0.000-360.000)
11	F5.1	52-56	Height Difference	Meters
12	F5.1	57-61	HDOP	
13	F5.1	62-66	VDOP	
14	F6.x	67-72	Unit Variance	
15	F6.x	73-78	Variance Latitude	Squared Meters
16	F6.x	79-84	Covariance Lat & Lon	Squared Meters
17	F6.x	85-90	Variance Longitude	Squared Meters
18	F6.x	91-96	Variance Height	Squared Meters
19	F6.1	97-102	External Reliability	Meters
20	I2	103-104	Fix Status	
21	I3	105-107	Number of Satellites	
22	I3*n	108-107+3*n	Sats used PRN's	
23	A1		End Character	]
24	A2		Termination characters	CRLF

Example:
```
[020211    XCALIB 151  80091.0 0.7    47.4   8.2847 -0.8  0.9  1.4.508810.1162
0.0100.12730.4518   1.7 3  8 11 14 18 20 21 22 25 30]
```

Database Setup

See description under "SURFACE NAVIGATION SYSTEM DRIVERS".

Add a new "Surface Navigation System" to the database and select the driver and set the interfacing parameters. Press "Next" button to continue the setup. Add a range and a true bearing observation to the system. The "At" node must be the rGPS reference point on the vessel, probably a variable node on the vessel's object. The "To" node must be the rGPS Receiver on the remote object, probably a variable node on a gun float or tailbuoy. . The driver combines the range & height difference (if available) into a slant range. The driver fills the quality field of the observation with unit variance field

The Slot Id number must match the Unit number in the raw datastring, e.g. "1". Press the "Next" button to define the observation properties. Select each observation and set the appropriate unit and (C-O) values. Be sure to press button "Apply Properties" to save the changes. Press "Finish" to save the system.

Note *QINSy* needs three observations to compute a position, while a Trinav system only outputs a range and bearing. Usually the third observation will be a height aiding observation for the Trinav system, defined in the Controller under "Settings" – "Heights".

3.15.16 NavAnalog Analog to Digital Converter

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvNavAnalog.exe	*Drivers.io options:*	None
Last modified:	2002-Jun-24		

Driver Description

This driver can decode up to four analogue input voltages that are sent to *QINSy* by a NAVANALOG Analogue to Digital (RS232) converter.
The Driver can decode voltages as raw observations but it can also be used to calculate the current bearing of an "AziPod" thruster by reading 2 analogue signals that represent the cosine and the sine of this bearing.

Format Description

This format is the default NAVANALOG A/D Converter output.

Explanation of the fields:
$ANLGa,bbbb, cccc,dddd,eeee*ff<CR><LF>

$ANLG	id of string
a	unit id [0..9]
bbbb	Voltage on Channel 1 (MilliVolts) [0..5000]
cccc	Voltage on Channel 2 (MilliVolts) [0..5000]
dddd	Voltage on Channel 3 (MilliVolts) [0..5000]
eeee	Voltage on Channel 4 (MilliVolts) [0..5000]
ff	Checksum

Example:
```
$ANLG1,3347,0033,1000,4999*EC
```

Unit id is 1, Channel 1 is 3.347 Volts etc.

Database Setup

See description under "SURFACE NAVIGATION SYSTEM DRIVERS".
Add a "Surface Navigation System", select system "NavAnalog Analog to Digital converter" and add up to four observations of any type.

Generic aplications:
Correct Scale Factor and Fixed C-O must be entered in DbSetup in order to convert to the correct value in other *QINSy* modules.
Set the first slot number to indicate the channel of the A/D converter so fill in "1" for channel 1 etc. up to 4.
Set the second slot number to "0", this implicates it is a generic analogue observation. If the second slot number is not equal to zero, the driver will decode and process the analogue readings as an "AziPod" bearing.

For AziPod Bearing:
Select Observation of type "True Bearing" , Select "At Node" the node of the Thruster. Select for "To Node" any node you like (the "To Node" is not used). Select Degrees for units. Scale Factor and C-O's can be given any value one finds appropriate. The field number in the input string for the **Sine** of the angle should be entered in **slot1** (1..4). The field number in the input string for the **Cosine** of the angle should be entered in **slot2** (1..4).

Example of setting up the scale factor and C-O:
RPMs should be +160 when 5.0 Volts is decoded, -160 when 1.0 Volts is decoded.
Scale Factor = 320 / 4 = 80.0
C- O = Obs_{calc} / SF – Obs_{raw} = 160 / 80 – 5.0 = -3.0.

Decoding notes

-Checksum is ignored.
-For “AziPod” Bearing mode: Driver calculates an output angle between 0 – 360 degrees with hard coded scale factor and offset, presuming signals are interfaced with a 250 Ohms Resistor.
-Analogue readings in output string are from 0-5000 milliVolts, These are internally converted to 0 to 5.0 Volts.
-Driver does NOT use any conversions for generic analogue observations. It will decode the input voltage divide by 1000 as found in the string to convert from millivots to volts.
-Unit id is ignored.

Interfacing Notes

AziPod:
Every Azimuth Pod will provide three 4-20 mA analogue signals:

1) Sin(Angle)	4mA [-1]	20 mA [+1]
2) Cos(Angle)	4mA [-1]	20 mA [+1]
3) RPM	4mA[-160 Hz]	20 mA [+160 Hz]

These signals should be connected through a 250 ohms 0.1% resistor to convert from Current to Voltage resulting in: 4mA - 1.0 Volts and 20mA – 5Volt.

Generic:
Input range of NavAnalog units is by default 0-5 volts.

Drivers.io Options

None.

3.15.17 ParkerPDFX Stepping Drive Driver

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvParkerPDFX.exe	*Drivers.io options:*	*none*
Last modified:	2001-May-23		

Driver Description

This is a driver for the Parker PDFX Series Mini Stepping Drive. It sends the command "`1GOTO(MAIN`)" to the controller when start recording is performed. It polls the driver every 0.1 second using the "`1R(EP)`" command for the current reading of the angle decoder. This angle is decoded and made available to the rest of *QINSy*. See below for the software that was downloaded in the drive.

Format Description

The drive responds to the "`1R(EP)`" command with the count from the angle decoder. The format is: `*xxxxx<CR><LF>.`

Field	*Format*	*Description*	*Values, Range, Units*
1	*	start of message	
2	xxxxx	decoder count	counts
3	<CR><LF>	end characters	

Format Example

```
*-5375<CR><LF>.
```

Decoding Notes

Data is decoded and passed on unscaled.

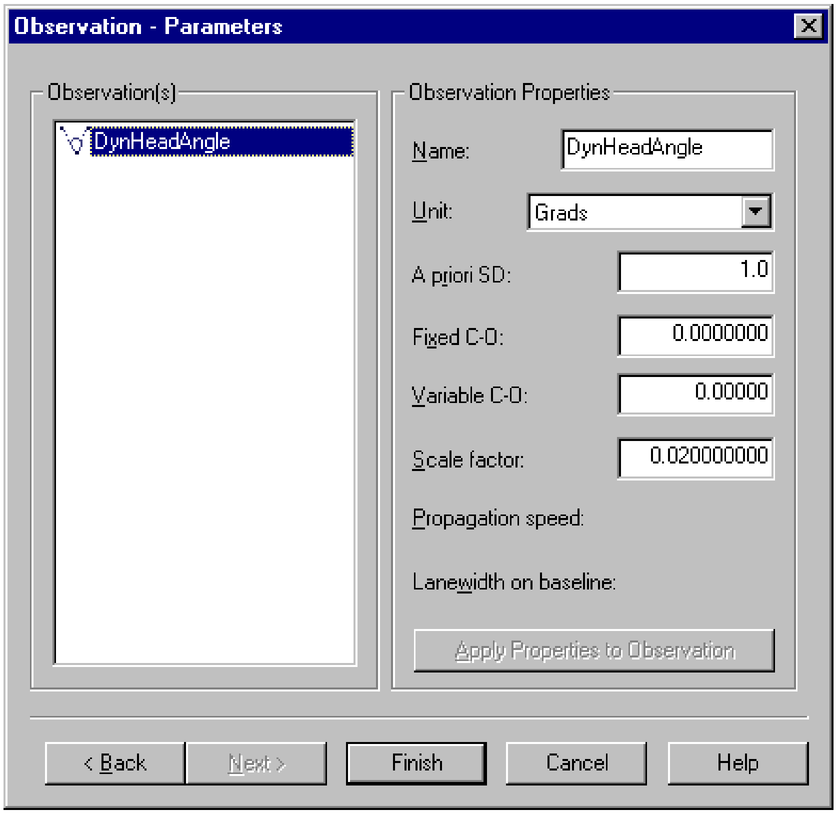
Interfacing Notes

The interface cable is a non-standard RS-232 two-way cable. See the diagram below for wiring details. Communication parameters are 19200 or 9600, 8, None, 1. Note that the echo switch must be ON.

DB-25 Sensor		**DB-9 COM**	**DB-25 COM**
Pin 4 RXD	-----------------	Pin 3 TXD	Pin 2 TXD
Pin 5 TXD	-----------------	Pin 2 RXD	Pin 3 RXD
Pin 3 SG	-----------------	Pin 5 SG	Pin 7 SG

Database Setup

Add an angle observation with the following properties to the system:



The scale factor is set up for a 20000 pulse per revolution encoder (400 / 20000 = 0.02).

Controller Setup

The motor will start and perform the main routine when the record command is received. Normally the main command will perform a single revolution, each time in an alternating direction. This is subject to the software in the motor drive.

Additional Information

See the following page for a list of the software that was uploaded to the PDFX drive.

```
1K
1CLEAR(ALL)
1START:
1DECLARE(MAIN)              ;Declare Programs
1DECLARE(DATUM)
1OFF                        ;switch motor off
1W(MR,4000)                 ;Set motor resolution
1W(MC,70)                   ;Set motor current
1W(MS,50)                   ;Set standby current
1W(ER,400)                  ;Set encoder resolution 20000/50
1W(DU,1)                    ;Set to operate in encoder steps
1HOME1(+,0,+5.00,100.00,3)  ;Set homing parameters
1LIMITS(3,1,0,200.0)        ;Disable limits
1ON                         ;Turn motor on
;1GOSUB(DATUM)
1MI                           ;Motion Incremental
1D20000                       ;Set distance for 360 degrees
1V1.00                        ;Velocity
1VS0.25
1A250.00
1AD300.00
;1LOOP(MAIN,0)
1END

1MAIN:                        ;Main program
;1R(EP)
1G                            ;Begin motion
1T0.50                        ;Pause when motion complete
1H                            ;Change direction
1END

1DATUM:                       ;Homing routine
1W(CQ,0)                    ;Set for continuous execution mode
1O(1XXXXXXX)                ;Turn output 1 on
1GH                           ;Go home
1T0.20
1O(0XXXXXXX)                ;Turn output 1 off
1T0.20
1O(1XXXXXXX)                ;Turn output 1 on
1T1.00
1TR(IP,=,1)                 ;Wait until motion has ceased
1W(PA,0)                    ;Set position to Zero
1W(CQ,1)                    ;Turn off continuous execution
1END

1ARM1                         ;Run start program on power up
1SV
```

Notes:
1. If the movement that occurs every time when record is performed, has to be changed, modify the “`1main`:“ section of the program. Refer to the PDFX manual for available commands.
2. To start in a predefined position, execute the datum routine. This can be done in the following way:
   a) Use a terminal program or, the Easi-tools to send the command ”`1GOTO(DATUM)` to the drive.
   b) Modify the above program. Uncomment the statement “;`1GOSUB(DATUM)`“ (remove the “;” character). Now the motor will go to a predefined position every time the drive is powered on.

3.15.18 Simrad HPR LBL (Raw data)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvSimradLBLRawData.exe	*Drivers.io options:*	*none*
Last modified:	1998-Nov-11		

Driver Description

Driver to decode Simrad HPR 400 LBL ranges, pitch & roll, course and depth in NMEA 0183 format.

Format Description

The LBL Position format is according to the "Standard NMEA 0183 Version 2.20".

#	*Field*	*Name*	*Explanation*
1	$	Start character	
2	PSIMLBM	Address	Propr. Simrad address for LBL measurements.
3	,hhmmss.ss	Clock	Clock in hours, minutes and seconds. Decimal fraction is optional.
4	,c—c	Tp array	Transponder array in which the measurements are done.
5	,xx_	Td ID	Identification of transducer on which reply is received.
6	,x.x	Roll	Roll angle when receiving messages.
7	,x.x	Pitch	Pitch angle when receiving messages.
8	,x.x	Course	Course when receiving messages.
9	,x.x	Depth	Fixed depth or depth received from a depth sensor. Empty when no depth is available.
10	,x.x	Range 1	Range measured to the first location in the array. Empty when no range measured.
11	,x.x	Range 2	Range to location 2 or empty.
12	,x.x	Range 3	Range to location 3 or empty.
13	,x.x	Range 4	Range to location 4 or empty.
14	,x.x	Range 5	Range to location 5 or empty.
15	,x.x	Range 6	Range to location 6 or empty.
16	,x.x	Range 7	Range to location 7 or empty.
17	,x.x	Range 8	Range to location 8 or empty.
18	,aa_	Unit	M when the ranges are in metres. S when the ranges are in seconds.
19	*hh	Checksum	Empty or checksum.
20	CRLF	Termination	

Format Example

```
$PSIMLBM,hhmmss.ss,c—c,xx_,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,aa_*hh<CRLF>
```

Decoding Notes

The *QINSy* driver only decodes the ranges in metres.

(continued on next page)

Database Setup

See description under “SURFACE NAVIGATION SYSTEM DRIVERS”.

To decode the ***ranges***, add a “Fixed Node” with the correct positions for each of the seabed transponder used in the LBL array to the *QINSy* Database. Add the “Surface navigation system” and set the appropriate driver and interfacing parameters. In the observations tab, add “Range” observations connecting the LBL transducer and each of the seabed transponders in the array. For the slot numbers, apply the following convention. The observation between the LBL transducer and the first transponder (location) in the array will get slot number ‘1’, the observation between the LBL transducer and the second transponder will get slot number ‘2’, etc.

To decode the ***pitch & roll,*** add a “Pitch, roll and heave sensor” and set the appropriate driver and interfacing parameters. The two observations are automatically added and connected to the system. Change parameters to match the rotation sign convention and measurement units of the format description.

To decode the ***course***, add a “System” of type “Gyro” and add an “Observation” of type “Bearing, true”.

To decode the ***depth*** , add an “Observation” of type “ROV Depth” to the “Surface navigation system”.

To decode ***all*** five observations, make sure to select the same driver name and I/O parameters for all systems.

3.15.19 Sonardyne PAN (SI/FS format)

3.15.20 Sonardyne PAN (LB format)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvSonardynePAN.exe	*Drivers.io options:*	LBL | FSS
Last modified:	1999-Apr-25		

Driver Description

This driver decodes LBL ranges from received from a PAN unit. It will decode ranges and depth FS, SI strings and ranges only from LB strings.

Format Description

The SI string contains the compatt id, compatt depth and ranges to transponders.

```
SI1003S;1003;+ 182.0E 0; 2, 601.938 ; 3, 410.590 ; 4, 347.561 ; 5, 288.341 ; 6, 485.297 ;
7, 764.243 ; 8, 835.019 ;
```

Explanation of the fields:

SI1003S;	Source identifier
1003;	Compatt identifier
+ 182.0E 0;	Compatt depth
2, 601.938 ;	individual reply frequency (IRF) and range in milliseconds

The LB strings looks like:

```
LBL; 2, 453.715; 3, 367.370; 4, 324.744; 5, 439.538; 6, 391.931; 7, 477.689; 8, 300.736;
```

Explanation of the fields:

LBL;	String identifier
2, 453.715 ;	individual reply frequency (IRF) and range in milliseconds.

Database Setup

See description under “SURFACE NAVIGATION SYSTEM DRIVERS”.

Define a fixed node for each transponder used. Define a variable node on which the transducer or compatt is placed. Define an observation of type “Range” for each measured range. Remember to set the units of the range to milliseconds, to set the scale factor to 0.5 and to enter the propagation speed.

If the FS/SI strings are used, then slot 1 must be set to the interrogating compatt id (e.g. in the string form the previous paragraph this is 1003). The second slot must be set to the Individual reply frequency (IRF) from the interrogated transponder. If the LBL string is used, only the IRF from the interrogated transponder has to be entered in the 1st slot. The IRFs can be found in the LBL array calibration report.

(continued on next page)

Database Setup (continued)

<u>Note on height or depth of ROV.</u>

Normally the transponders are located nearly in a plane so the observations do not contain enough information to solve for the height component of the ROV position. To make the computation calculate the height, it needs extra height information. Defining a height aiding value can provide this. This is done by checking the height aiding box on the first tab of the system property dialog in the DbSetup program. During a replay or online session this displays a height-aiding driver. If no online information is present, select the manual option from the ROV depth box and enter the depth of the ROV manually. In the case of FS/SI strings the height received from the compatt can be used: Define an “ROV Depth” observation at the ROV compatt node and connect this observation to the PAN system. During online or replay this observation will be filled with the depth from the SI string, and can be selected in the ROV depth box.

3.15.21 WAGO Dynamic Transducer Mounting

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvWAGODynaMount.exe	*Drivers.io options:*	*MM | Custom*
Last modified:	2002-May-16		*Frame definition*

Driver Description

Driver is used for calculating the offset mounting angle of a rotation frame on which a Multibeam transducer is mounted. The frame is constructed in such a way that the transducer rotates around it's acoustic centre. This driver decodes a hydraulic cylinder displacement (range) and a vertical offset that is sent by the "WAGO" unit (via the WAGO stand alone program). With the displacement and three fixed, frame dependant parameters; it calculates a vertical, roll-offset angle. The Roll Offset angle is 0 when the transducer points downwards along the Z-axis of the vessels reference frame, and is 90 degrees when transducers' Nadir beam points horizontal.

Format Description

The WAGO software outputs the vertical offset and cylinder displacement in micrometers. Warning, older WAGO software versions may output in 1/10 of millimetres. In order to cope with these units, add command line parameter "MM" in Drivers.io file.

$WAGO, C, V

$WAGO	id of string
C	cylinder displacement in micrometers, length variable, range 0 – 74 mm
V	vertical offset of mounting frame, length variable

Example:
```
$WAGO,74000,1160900
$WAGO,0,0
$WAGO,0,16900
```

Database Setup

See description under "SURFACE NAVIGATION SYSTEM DRIVERS".
Add a "Surface Navigation System", select system "Wago Dynamic Transducer Mounting" and add two obsevations:

1) Observation of type "Angle" , Select "At Node" the node of the Multibeam transducer. Select for "To Node" any node you like (the "To Node" is not used). The driver outputs the angle in the unit that is selected on the next page, degrees will ususally suffice.

   <u>*note: type of observation must be angle, otherwise it can not beassigned as a MBE Head Dynamic Alignment Observation*</u>

   The calculated angle is added to the corresponding mounting offset angle in the *QINSy* "Multibeamer" component. Therefor for example, a positve roll angle observation will be interpreted as the frame rotating clockwise along the +Forward Axis (looking from aft to bow). By applying a Scale factor of –1 to the Anlge observation properties, one can compensate for the fact that the calculated angle sign is opposite of the default Roll convention (positve Roll -> starboard down).

2) Observation of type Range, Select any "At" and "To" nodes.

After Observations are defined , the angle observation must be assigned in the MBE Setup Pages as a MBE Head Dynamic Alignment Observation. Refer to “MULTIBEAM ECHOSOUNDER SYSTEM DRIVERS” chapter for more information.

Drivers.io Options

MM:
If parameter MM is entered in drivers.io then driver will decode the found values as being 1/10 of a millimetre instead of the default micrometers.

Frame Parameters:
The frame parameters are hard-coded into the driver as:
A: 98 mm
B: 413 mm
C: 350 mm
By default these are used, that is if no extra parameters are found in driver.io.
However it is possible to enter custom parameters in drivers.io as command line parameters following the executable name. The order is crucial, it should be:

Driversname.exe <SPACE> A <SPACE> B <SPACE> C <SPACE> MM (optional)

Example for the default parameters with decoding in micrometers:
```
DrvWAGODynaMount.exe  98 413 350
```

note: The values must be entered in millimeters.

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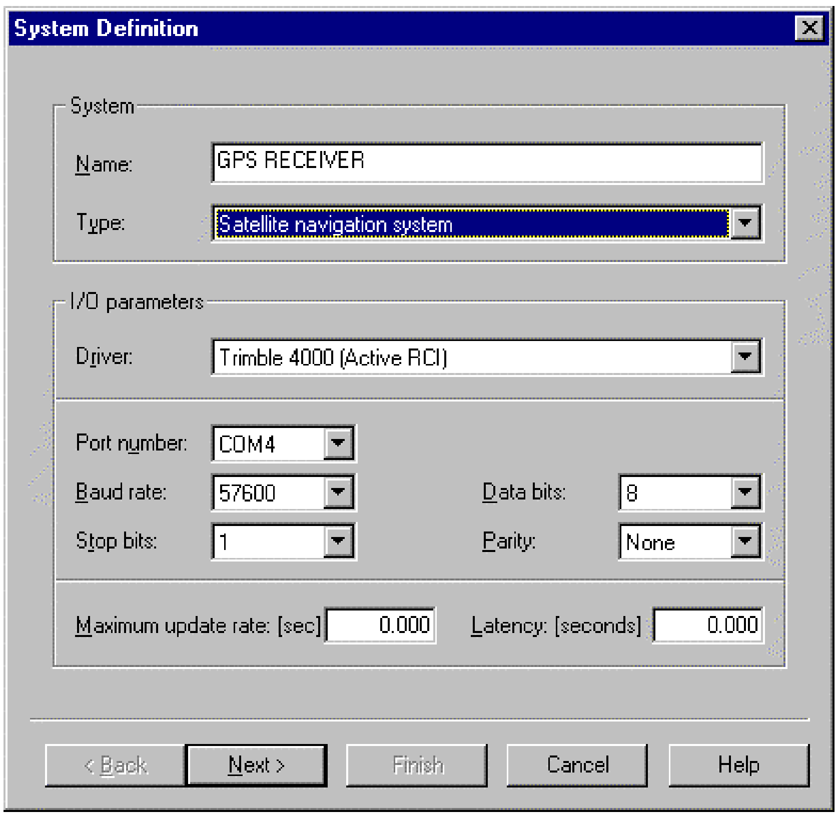
3.16 SATELLITE NAVIGATION SYSTEM DRIVERS

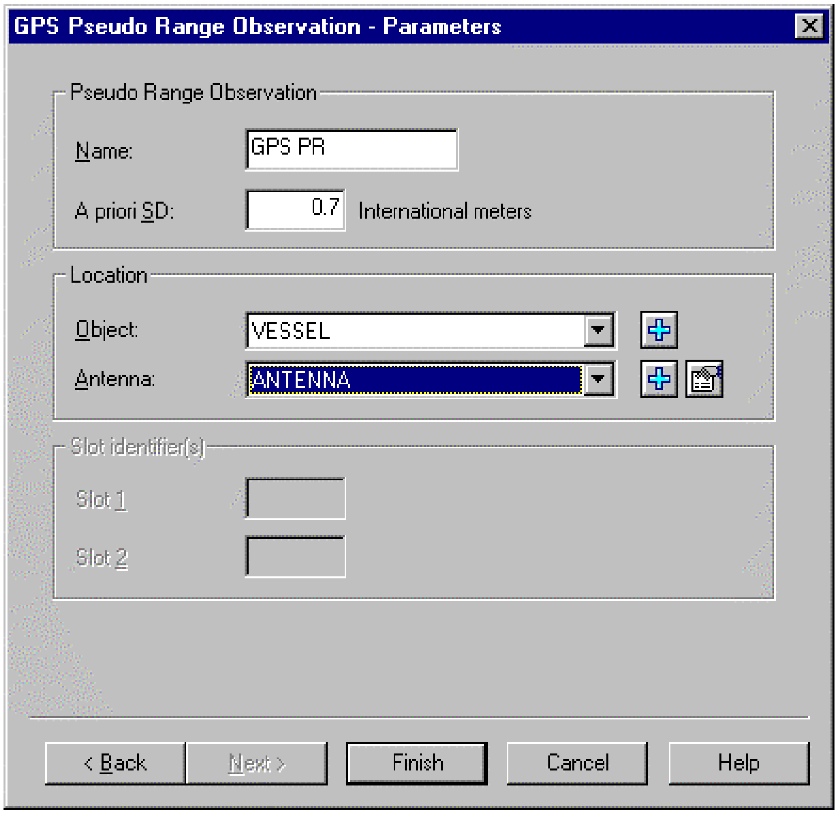
Database Setup

First define and select the “Object” on which the GPS antenna is located. Select item “Systems” and define a new “Satellite navigation system”. Select the appropriate driver and interface parameters. It is recommended to set the baud rate as high as possible (and leave the update rate and latency at 0 seconds). Press the “Next” button to complete the setup. There is no need to define the (32) ***pseudo-range*** observations separately, since they are automatically added to the system. If wanted, change name and a priori SD for the PR observations. Select object and node for the GPS antenna. Press “Finish” button to save system. See example below.



Database Setup (continued)

A new antenna node can be added by pressing the button; to change its properties, press the button.



See for more information the *QINSy* DB Setup Help Topics or the *QINSy* Knowledge Base.

3.16.1 Aquarius (Port A)

3.16.2 Aquarius (Port B)

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <ETX>
Executable name:	DrvAquarius.exe	*Drivers.io options:*	A | B
Last modified:	2003-Dec-10		

Driver Description

Driver to be used to obtain raw GPS pseudo-ranges and various GPS broadcast data (as well as differential corrections) from a Aquarius^2 GPS receiver (Thales Ashtech DSNP Sercel).

System Configuration

Aquarius^2 GPS receivers have four ports (A, B, C and D) and one auxiliary (AUX) port. The AUX port is used for the PPS signal. Port A ***or*** B must be configured to output the raw GPS data (SVAR!R, SVAR!D, SVAR!E and SVAR!U messages). No other messages should be outputted. Easiest is to connect to port B, because this is the only RS232 port on the receiver's rear panel.

It is advisable to have the interfacing two-way, so the driver will send commands to the receiver asking for ephemeredes, iono and UTC parameters. Therefor it is important to select the right driver, Aquarius (Port A) or Aquarius (Port B). If the interfacing is not two-way and you go on-line, it may take more than half a hour before before a GPS solution can be calculated, d/t missing ephemeredes.

Format Description

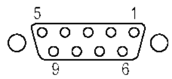
Four types of messages will be decoded: SVAR!R (Raw Ranges), SVAR!D (Differential Corrections), SVAR!E (Ephemerides) and SVAR!U (Iono and UTC parameters)
All messages are in hexadecimal values represented in ASCII format.

See for a detailed description of the message the Ashtech Aquarius^2 User Manual.

❑ Port A (RS422)

Sub D9-female

Pin No.	Signal	Designation
1	GND	Electrical Ground
2	CTS1+	RS422 CTS signal output (Clear To Send)
3	CTS1-	
4	RX1+	RS422 RX signal input (Receive Data)
5	RX1-	
6	RTS1-	RS422 RTS signal output (Request To Send)
7	RTS1+	
8	TX1+	RS422 TX signal output (Transmit Data)
9	TX1-	

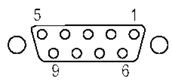


Connector shown from outside the case

❑ Port B (RS232)

Sub D9-female

Pin No.	Signal	Designation
1	DCD212	RS232 DCD input (Data Carrier Detect)
2	TX212	RS232 TX output (Transmit Data)
3	RX212	RS232 RX input (Receive Data)
4	DSR212	RS232 DSR input (Data Set Ready)
5	GND	Electrical Ground
6	DTR212	RS232 DTR output (Data Terminal Ready)
7	CTS212	RS232 CTS input (Clear To Send)
8	RTS212	RS232 RTS output (Request To Send)
9	RI212	RS232 RI input (Ring Indicator)

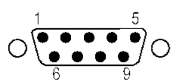


Connector shown from outside the case

❑ AUX Connector

Sub D9-male

Pin No.	Signal	Designation
1	GND	Electrical Ground
2	SENS-EVT	Defines active edge of external event signal (rising edge if grounded, falling edge if not connected)
3	EVT	External Event Input
4	1PPS1+	1 PPS symmetrical output
5	1PPS1-	
6	NC	Not connected
7	NC	Not connected
8	NC	Not connected
9	NC	Not connected



Connector shown from outside the case

AUX, Port A and Port B connector at the rear panel of the Aquarius^2 GPS receiver.

3.16.3 Ashtech ADU2 [old version]

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvAshtechADU2.exe	*Drivers.io options:*	A | B | *filename*
Last modified:	1997-May-01		

Driver Description

Driver for Ashtech ADU2 GPS receiver, Driver used to obtain raw GPS pseudo-ranges and GPS ephemeris data from the GPS receiver. Driver can also be used to decode positions, attitude and heading data that is outputted by the Ashtech ADU2 GPS receiver in Ashtech (ASCII or binary) raw data message format.

Format Description

The Ashtech $PASHQ/$PASHR protocols define query commands and (partly binary) responses to be used by a computer to control and interrogate Ashtech receivers. See Ashtech manuals for more information.

System Configuration

Raw data parameter settings commands are controlled by the *QINSy* Ashtech ADU2 driver. The driver uses the file "DrvAshtechADU2.txt" located in the *QINSy* program directory, for example "C:\Program Files\QPS*QINSy* 70\". Most vessels most likely will require changes in the antenna vector settings and the C-O values ($PASHS,3DF).

!!! BE SURE TO CHECK THIS FILE BEFORE USING THE *QINSy* Ashtech ADU2 DRIVER !!!

One can also use a utility program to communicate directly with an Ashtech GPS receiver, such as *QINSy* IO Test or HyperTerminal under Windows, or Procomm Plus under MS-DOS. All command messages (set, query or general) must be all UPPER CASE and completed by <CR><LF>. A valid set command ($PASHS) causes the ADU2 to return the $PASHR,ACK*3D, acknowledged message. Unrecognized commands cause the $PASHR,NAK*30, not-acknowledged response message. Valid queries return the requested data.

Query receiver options: $PASHQ,RID<CR><LF>

Query general parameters: $PASHQ,PAR<CR><LF>
Query differential parameters: $PASHQ,RTC<CR><LF>
Query 3DF ADU parameters: $PASHQ,3DF<CR><LF>

Query port and baud rate: $PASHQ,PRT<CR><LF>
Set baud rate on port x : $PASHS,SPD,x,s<CR><LF>
where 5=9600, 6=19200, 7=38400, 8=56800, 9=115200 baud
Set raw data output interval: $PASHS,RCI,x.x<CR><LF>

Set all data/NMEA strings off: $PASHS,NME,ALL,x,OFF<CR><LF>
Set raw data/NMEA string off: $PASHS,NME,str,x,OFF<CR><LF>
Set raw data/NMEA string on: $PASHS,NME,str,x,ON<CR><LF>

Output pseudo ranges (binary): $PASHS,OUT,x,MBN,BIN<CR><LF>
Output attitude info (binary): $PASHS,OUT,x,ATT,BIN<CR><LF>
Output ephemerides (binary): $PASHS,OUT,x,SNV,BIN<CR><LF>

See also the description of the ResetAshtech *utility on the next page.*

Format Description

The Ashtech $PASHQ/$PASHR protocols define query commands and (partly binary) responses to be used by a computer to control and interrogate Ashtech receivers. See Ashtech manuals for more information.

Database Setup

See description under “SATELLITE NAVIGATION SYSTEM DRIVERS”.

Drivers.io Options

Command line parameter A or B indicates the COM port to which the *QINSy* driver is connected. A filename can be added after the port parameter, if the setup file is not the default “DrvAshtechADU2.txt” file.

Driver Utility

The “**ResetAshtech**“ utility is necessary if the hardware reset on the Ashtech ADU2 receiver is used. After this reset has been pressed, but before *QINSy* is started, double-click the “Reset Ashtech” icon. This will upload a file to the ADU2, which will set port A of the receiver to a higher baud rate than the usual 9600. If no “Reset Ashtech” icon is available on the desktop, create a shortcut to this utility as is described below.

The ResetAshtech utility sends a file over a COM port to the ADU2. The COM parameters are 9600 baud, 8 databits, 1 stopbit and NO parity, and can not be altered. The program accepts two optional arguments:

ResetAshtech [com [file]]

com	COM port number to be used; default is COM 1;
file	filename of the file to be uploaded to the ADU2; default is “ResetAshtech.txt”.

The utility can be executed by selecting the “Run…” option in the Start menu in the Windows NT taskbar, by entering the following command, “C:\Program Files\QPS*QINSy* 70\ResetAshtech.exe” if above mentioned defaults can be used, or “C:\ Program Files\QPS*QINSy* 70\ResetAshtech.exe n filename”, where “n” is the COM port to which the Ashtech receiver is connected and “filename” is the file to be uploaded. The file should contain the line “$PASHS,SPD,x,d”, where “x” is the serial port (A or B), and “d” is the baud rate (5 = 9600, 6 = 19200, 7 = 38400, etcetera).

A shortcut to ResetAshtech.exe can be created (under the Explorer or on the desktop), and put in directory “\Winnt\Profiles\All Users\Desktop\”, if the icon has to show up on every desktop, or in the directory “\Winnt\Profiles\Peter\Desktop\”, if the icon has to show up on the desktop of a single user only.

The command line arguments for ResetAshtech can be modified by clicking the shortcut icon, and selecting “Properties” – “Shortcut” – “Target”. Also pay attention to the “Start in” line and the “Change icon” button.

Note. If the default “DrvAshtechADU2.txt” setup file is used and the baud rate should not be reset to 9600, comment out the line to reset the receiver to defaults, i.e. change “$PASHS,RST” to “// $PASHS,RST”.

3.16.4 Ashtech ADU2 Raw Data

3.16.5 Ashtech G12 GPS Board

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvAshtech.exe	*Drivers.io options:*	ADU2 | G12 | Z12
Last modified:	2004-Apr-26		A | B | C | NOCS

Driver Description

Driver for Ashtech GPS board and receivers, which output raw data compatible with ADU2, G12 or Z12. Driver to be used to obtain raw GPS pseudo-ranges and GPS broadcast data from the GPS receiver board. The Ashtech ADU2 driver can also decode positions (PBEN/PSAT) and/or attitude data (ATTD/PSAT). The driver also supports a setup file to configure an Ashtech receiver or GPS board, see details below.

Format Description

The Ashtech $PASHQ/$PASHR protocols define query commands and (partly binary) responses to be used by a computer to control and interrogate Ashtech receivers. See Ashtech manuals for more information. The following raw data messages are decoded by the Ashtech G12/Z12 drivers: **MCA, MPC, SNV, ION**. The Ashtech ADU2 driver will decode the MCA, MPC, SNV, ION, plus the **PBN, ATT, PSA** messages.

Drivers.io Options

Required command line parameter for using DrvAshtech for ADU2 GPS receivers, including the options to decode positions (PBEN/PSAT) and/or attitude data (ATTD/PSAT) is "ADU2". Required command line parameter for using DrvAshtech for G12 GPS boards and G12 compatible GPS receivers (e.g. DG14 and DG16) is "G12". Required command line parameter for using DrvAshtech for Z12 receivers is "Z12". The command line parameter "A", "B" or "C" is the port designator for the raw data message output. Add "NOCS" to the Ashtech driver command lines in Drivers.io to skip the checksum computations.

Interfacing Notes

It is important that the wiring of the cable between the Ashtech board and the COM port is bi-directional, i.e. allows two-way data transfer, so that the *QINSy* driver can control and interrogate the GPS receiver/board.

System Configuration

To communicate with an Ashtech receiver or GPS board, use a utility program such as the *QINSy* utility IO Tester or HyperTerminal under Windows or PROCOMM PLUS under MS-DOS. Command messages (set, query or general) must be all UPPER CASE and completed by <CR><LF>. A valid set command ($PASHS) causes Ashtech recievers to return the $PASHR,ACK*3D acknowledged message. Unrecognised commands cause the $PASHR,NAK*30, not-acknowledged response message. Valid queries return the requested data.

For GPS receivers using an Ashtech G12 GPS board, see the appropriate manufacterer's manuals. To give an example, in configuring the GBX PRO combined GPS/Beacon Receiver from Communication Systems International (C.S.I.) Inc., put the selector switch on the rear panel to GPS (or NORM), to communicate with the Ashtech G12 GPS receiver inside the GBX PRO using for example the *QINSy* IO Test Utility.

$PASHS,RST<CR><LF>	:	Reset all parameters to their default values
$PASHS,SAV,Y<CR><LF>	:	Set save parameters to enabled (until RST)

DrvAshtechADU2.txt

For the Ashtech ADU2 driver, if the file "DrvAshtechADU2.txt" is found in the *QINSy* setup directory, the non-comment lines in this file (i.e. lines not starting with "//") will be sent to the Ashtech receiver upon startup (and when resetting the driver). Create an empty setup file in order to suppress sending commands.

If the "DrvAshtechADU2.txt" file is not found, the following set of commands is sent by the driver, where 'A' is the port for the message output and is replaced by 'B' depending on the selected driver:

```
// Set recording interval
$PASHS,ONE,Y
$PASHS,RCI,1
// Set minimum elevation
$PASHS,ELM,0
// Set minimum number of SV's
$PASHS,MSV,0
// Turn ON filtering of attitude data
$PASHS,3DF,FLT,Y
// Reset kalman filters used for attitude computations
$PASHS,3DF,RST
// Turn OFF all output
$PASHS,OUT,A
// Turn ON output of following records (all in binary)
// MBN = Measurement Data
// SNV = Ephemerides Data
// ATT = Attitude Data     (We need one of these for
// PBN = Position Data      the GPS time contruction)
$PASHS,OUT,A,MBN,SNV,PBN,ATT,BIN
// Ask for ephemerides
$PASHQ,SNV
```

DrvAshtechG12.txt

For the Ashtech type G12 driver, if the file "DrvAshtechG12.txt" is found in the *QINSy* setup directory, the non-comment lines in this file (i.e. lines not starting with "//") will be sent to the Ashtech receiver upon startup (and when resetting the driver). Create an empty setup file in order to suppress sending commands.

If the "DrvAshtechG12.txt" file is not found, the following set of commands is sent by the driver, where 'A' is the port for the message output and is replaced by 'B' depending on selected driver:

```
// Set recording interval
$PASHS,RCI,1
// Set minimum elevation
$PASHS,ELM,0
// Set minimum number of SV's
$PASHS,MSV,0
// Ask for ionospheric parameters
$PASHQ,ION,A
// Turn OFF all NMEA output records
$PASHS,NME,ALL,A,OFF
// Turn OFF all raw output records
$PASHS,RAW,ALL,A,OFF
// Turn ON output ephemerides
$PASHS,RAW,SNV,A,ON
// Turn ON output of C/A pseudo ranges
$PASHS,RAW,MCA,A,ON
// Ask for ephemerides
$PASHQ,SNV
```

CONFIGURING GBX PRO FOR (INTERNAL) USE OF RTCM DIFFERENTIAL CORRECTIONS

When reset, the GPS receiver does not communicate with the Beacon receiver. Set and check:

$PASHS,RTC,REM,B<CR><LF>	:	Set receiver as differential remote using port B (!!!)
$PASHS,RTC,AUT,N<CR><LF>	:	Set auto differential mode to disabled (Y : enabled)
$PASHS,RTC,MAX,x<CR><LF>	:	Set maximum age of corrections to x seconds
$PASHQ,RTC<CR><LF>	:	Query differential parameters : MODE:REM PORT:B

CONFIGURING GBX PRO FOR NMEA OUTPUT OF (INTERNAL) GPS POSITION RESULTS

See G12 Reference Manual for (default) receiver commands. Give non-default settings commands:

$PASHS,ALT,x<CR><LF>	:	Set 2D position ellipsoidal antenna height to x metres
$PASHS,ION,Y<CR><LF>	:	Set ionospheric model to be included (N : excluded)
$PASHS,NME,PER,x<CR><LF>	:	Set send interval of response message to x seconds
$PASHS,NME,GGA,A,ON<CR><LF>	:	Set GGA message on port A to enabled
$PASHQ,PAR<CR><LF>	:	Query general parameters : RTC:REM PRT:B
$PASHQ,PRT<CR><LF>	:	Query connected serial port baud rate : A,x

CONFIGURE GBX PRO FOR OTHER BAUD RATE THAN DEFAULT 9600 BAUD SETTINGS

Possible G12 baud rate codes for *QINSy* are 5=9600, 6=19200, 7=38400, 8=56800. Set and check:

$PASHS,SPD,A,x<CR><LF>	:	Set baud rate of G12 serial port A to x
$PASHQ,PRT<CR><LF>	:	Query connected serial port baud rate : A,x

Database Setup

See general description under “SATELLITE NAVIGATION SYSTEM DRIVERS”.

The Ashtech ADU2 driver can also decode positions (PBEN/PSAT) and/or attitude data (ATTD/PSAT). See general descriptions under “POSITION NAVIGATION SYSTEM DRIVERS”, “GYRO’S AND COMPASSES SYSTEM DRIVERS” and/or “PITCH, ROLL AND HEAVE SENSOR DRIVERS”. Make sure to select the same driver name (COM port) and the same I/O parameters for all systems.

3.16.6 Ashtech Z12 Raw Data

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvAshtech.exe	*Drivers.io options:*	ADU2 | G12 | Z12
Last modified:	2004-Apr-26		A | B | C | NOCS

Driver Description

Driver for Ashtech Z12 GPS receiver. Driver to be used to obtain raw GPS pseudo-ranges and various GPS broadcast data from the GPS receiver. At present, the (binary) position data messages are not decoded.

Format Description

The Ashtech $PASHQ/$PASHR protocols define query commands and (partly binary) responses to be used by a computer to control and interrogate Ashtech receivers. See Ashtech manuals for more information.

System Configuration

The Ashtech Z12 GPS receiver can be configured for use by *QINSy* by using the Screen 4 Mode Control.

INTERVAL [001.0] defines output rate of real-time MBEN (measurement) files;
MIN SVS [3] as well as ELEV MASK [00°] influence number of sent MBEN files.
SNAV (ephemeris data) files are to be output every 15 minutes [default].

PORT A/B (whichever is connected to the PC) must be configured as follows:

NMEA	OFF	BAUD RATE	nnnnn	(as high as possible)
REAL TIME	ON			

Options (MEASUREMENTS OUTPUT ON PORT A/B) should be configured as follows:

MBEN	ON	BINARY	format
PBEN	OFF	DBEN	OFF
SNAV	ON	EPB	OFF
SALM	OFF		

RS-232 cable with 09-pin connection can be configured for handshake by connecting 7 RTS and 8 CTS;
RS-232 cable with 25-pin connection can be configured for handshake by connecting 4 RTS and 5 CTS.

Interfacing Notes

It is important that the wiring of the cable between the Ashtech Z12 and the COM port is bi-directional, i.e. allows two-way data transfer, so that the *QINSy* driver can request new ephemerides from the receiver.

Database Setup

See description under “SATELLITE NAVIGATION SYSTEM DRIVERS”.

Drivers.io Options

Required command line parameter for using DrvAshtech for Ashtech Z12 receivers is “Z12”.

3.16.7 Leica MX 9400N (Active Raw Data)

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvMagnavox.exe	*Drivers.io options:*	ACTIVE 9400
Last modified:	1998-Aug-06		

Driver Description

Driver for Leica MX 9400N receiver. Driver to be used to obtain raw GPS pseudo-ranges and GPS broadcast data in compressed measurement format. The active mode of the Leica MX 9400N driver switches off all output on the control port, redirects the raw data port to the control port, switches on the record type mentioned above, and asks for ephemerides.

Format Description

The receiver outputs the raw data record type 3 (compressed measurement data) and types 200-203 (satellite ephemeris data). For use with the Magnavox PPS driver, output sequence $PMVGG,830 is also needed.

System Configuration

The Leica MX 9400N receiver can be configured using the “CDU” program as follows.

- Receiver Port Config: Set the interface parameters for the receiver. QPS advises 19200 or as high as possible, 8, N, 1 for port 1 (CDU port).

Interfacing Notes

The cable between the Leica multiport interface cable CDU port 1 and the PC serial COM port must be:

DB-25 CDU Port		DB-9 COM	DB-25 COM
Pin 2 RXD	-----------------	Pin 3 TXD	Pin 2 TXD
Pin 3 TXD	-----------------	Pin 2 RXD	Pin 3 RXD
Pin 7 SG	-----------------	Pin 5 SG	Pin 7 SG

Alternatively the PC serial COM port can be connected directly to the multiport interface connector:

DB-25 MultiPort		DB-9 COM	DB-25 COM
Pin 10 RXD	-----------------	Pin 3 TXD	Pin 2 TXD
Pin 11 TXD	-----------------	Pin 2 RXD	Pin 3 RXD
Pin 24 SG	-----------------	Pin 5 SG	Pin 7 SG

Database Setup

See description under “SATELLITE NAVIGATION SYSTEM DRIVERS”.

Drivers.io Options

Required command line parameters for using DrvMagnavox for these receiver options are “ACTIVE 9400”.

3.16.8 Leica MX 9400N (Passive Raw Data)

Input / Output:	Input (one-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvMagnavox.exe	*Drivers.io options:*	RAW 9400
Last modified:	1998-Aug-06		

Driver Description

Driver for Leica MX 9400N receiver. Driver to be used to obtain raw GPS pseudo-ranges and GPS broadcast data in compressed measurement format. The same driver can also be used to decode (computed or predicted) positions, output by the Leica MX 9400N receiver in proprietary NMEA sentence format.

Format Description

The Leica proprietary NMEA sentence format always start with the "$PMVXG" label, followed by the sentence type, consisting of three decimal digits, the data string, the (optional) checksum, and <CR><LF>. The "**$PMVXG,021**" output sentence contains the ***computed*** position, height, velocity and navigation mode; the "**$PMVXG,121**" output sentence contains the ***predicted*** position, height, velocity and navigation mode, within a few milliseconds of measurement receipt time, synchronised to the 1PPS output. The measurements currently received are used in the fix computation found in the type "021" and "023" sentences, and will be extrapolated forward to produce the 'predicted' position found in the type "121" and "123" sentences.

System Configuration

The Leica MX 9400N receiver can be configured for **raw data output** using the "CDU" program as follows.
- Receiver Port Config: Set the interface parameters for the receiver. QPS advises 19200 or as high as possible, 8, N, 1 for port 1 (CDU port).
- Receiver Port Assign: Control port = 1, Raw Data port = 1, RTCM port = 3, Equipment port = None.
- Receiver Raw Data Control: Nav Results = Off
  Raw Measurements = Compressed Type 3
  Almanac / Ephemerides = Yes
  Constellation = No
  Differential = Off
  External Event = 0000
  Beacon Receiver = No
  Time Recovery = No
  Full Debug = No
  Partial Debug = 0000

The Leica MX 9400N receiver can be configured for **position output** using the "CDU" program as follows.
- Receiver Port Config: Set the interface parameters for the receiver. QPS advises 19200 or as high as possible, 8, N, 1 for port 1 (CDU port) and port 2.
- Receiver Port Assign: Control port = 1, Raw Data port = 1, RTCM port = 3, Equipment port = 2.
- NMEA Message Control: Port = Equipment
  Message ID = 021 (Computed Position)
  Interval = 1 sec
  Select Add To List, press Enter.

NMEA computed positions are now output to port 2.

(continued on next page)

Interfacing Notes

The cable between the Leica multiport interface cable CDU port 1 and the PC serial COM port must be:

DB-25 CDU Port		DB-9 COM	DB-25 COM
Pin 3 TXD	-----------------	Pin 2 RXD	Pin 3 RXD
Pin 7 SG	-----------------	Pin 5 SG	Pin 7 SG

Alternatively the PC serial COM port can be connected directly to the multiport interface connector:

DB-25 MultiPort		DB-9 COM	DB-25 COM
Pin 11 TXD	-----------------	Pin 2 RXD	Pin 3 RXD
Pin 24 SG	-----------------	Pin 5 SG	Pin 7 SG

Database Setup

See description under “SATELLITE NAVIGATION SYSTEM DRIVERS”.

Drivers.io Options

Required command line parameters for using DrvMagnavox for these receiver options are “RAW 9400”.

3.16.9 Magnavox 9212 (Active Raw Data)

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvMagnavox.exe	*Drivers.io options:*	ACTIVE
Last modified:	1997-Sep-08		

Driver Description

Driver for Magnavox 9212 DGPS Navigator. Driver to be used to obtain raw GPS pseudo-ranges and GPS broadcast data in compressed measurement format. The active mode of the Magnavox 9212 driver switches off all output on the control port, redirects the raw data port to the control port, switches on the record type mentioned above, and asks for ephemerides.

Format Description

The receiver outputs the raw data record type 3 (compressed measurement data) and types 200-203 (satellite ephemeris data). For use with the Magnavox PPS driver, output sequence $PMVGG,830 is also needed.

Interfacing Notes

The cable between the Magnavox multiport interface cable CDU port 1 and the PC serial COM port must be:

DB-25 CDU Port		DB-9 COM	DB-25 COM
Pin 2 RXD	-----------------	Pin 3 TXD	Pin 2 TXD
Pin 3 TXD	-----------------	Pin 2 RXD	Pin 3 RXD
Pin 7 SG	-----------------	Pin 5 SG	Pin 7 SG

Alternatively the PC serial COM port can be connected directly to the multiport interface connector:

DB-25 MultiPort		DB-9 COM	DB-25 COM
Pin 10 RXD	-----------------	Pin 3 TXD	Pin 2 TXD
Pin 11 TXD	-----------------	Pin 2 RXD	Pin 3 RXD
Pin 24 SG	-----------------	Pin 5 SG	Pin 7 SG

Database Setup

See description under “SATELLITE NAVIGATION SYSTEM DRIVERS”.

Drivers.io Options

Required command line parameter for using DrvMagnavox for these receiver options is “ACTIVE”.

3.16.10 Magnavox 9212 (Passive Raw Data)

Input / Output:	Input (one-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvMagnavox.exe	*Drivers.io options:*	RAW
Last modified:	1997-May-01		

Driver Description

Driver for Magnavox 9212 DGPS Navigator. Driver to be used to obtain raw GPS pseudo-ranges and GPS broadcast data in compressed measurement format. The same driver can also be used to decode (computed or predicted) positions, output by the Magnavox 9212 GPS receiver in proprietary NMEA sentence format.

Format Description

The Magnavox proprietary NMEA sentence format always start with the "$PMVXG" label, followed by the sentence type, consisting of three decimal digits, the data string, the (optional) checksum, and <CR><LF>. The "**$PMVXG,021**" output sentence contains the ***computed*** position, height, velocity and navigation mode; the "**$PMVXG,121**" output sentence contains the ***predicted*** position, height, velocity and navigation mode, within a few milliseconds of measurement receipt time, synchronised to the 1PPS output. The measurements currently received are used in the fix computation found in the type "021" and "023" sentences, and will be extrapolated forward to produce the 'predicted' position found in the type "121" and "123" sentences.

Interfacing Notes

The cable between the Magnavox multiport interface cable CDU port 1 and the PC serial COM port must be:

DB-25 CDU Port		DB-9 COM	DB-25 COM
Pin 3 TXD	-----------------	Pin 2 RXD	Pin 3 RXD
Pin 7 SG	-----------------	Pin 5 SG	Pin 7 SG

Alternatively the PC serial COM port can be connected directly to the multiport interface connector:

DB-25 MultiPort		DB-9 COM	DB-25 COM
Pin 11 TXD	-----------------	Pin 2 RXD	Pin 3 RXD
Pin 24 SG	-----------------	Pin 5 SG	Pin 7 SG

Database Setup

See description under "SATELLITE NAVIGATION SYSTEM DRIVERS".

Drivers.io Options

Required command line parameter for using DrvMagnavox for these receiver options is "RAW".

3.16.11 Sercel NR103 (Passive Raw Data)

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <ETX>
Executable name:	DrvNR103.exe	*Drivers.io options:*	*none*
Last modified:	1998-Aug-19		

Driver Description

Driver for Sercel NR103 and NR203. Driver to be used to obtain raw GPS pseudo-ranges and various GPS broadcast data (as well as differential corrections) from a Sercel NR103 or NR203 series GPS receiver.

System Configuration

To configure Sercel NR103 receivers, use the AUX and INIT menus. The following description defines only the essential settings; those not shown are not important to the operation of the *QINSy* system. QPS strongly recommends to interface to port A for the auxiliary position and to port B for the raw GPS output data.

- Use the AUX menu to set the RS 232 parameters:

QPS recommends	:	Baudrate	19200	(or as high as possible)
		Databits	8	
		Parity	N	
		Stopbits	1	

- Use the INIT menu to select the port messages:

  Port A Messages : A1, A2, A3 ON, 1 sec update

  All other messages on port A, as well as the raw data output should be switched off.

Port B Raw Data	:	CDAT, DGPS, SMEAS, SYNCH 600s 2*0.6 sec.	(In case a HF station has been selected on the receiver.)
or	:	CDAT, NONE, SMEAS, SYNCH 600s 2*0.6 sec.	(In case no HF but a RTCM station has been selected.)

  All B-messages should be switched off.

- Switch on the following messages in case you are using a NR103 only for retrieving HF corrections:

  Port A or B Raw Data : CDAT, DGPS, OFF,
  SYNCH 600s 2*0.6 sec.

(continued on next page)

Interfacing Notes

It is important that the wiring is **bi-directional**. Every time *QINSy* needs ephemerides (e.g. at initialisation), it will ask the receiver for it. This also applies to the case where only corrections are read from the receiver.

Therefore, the wiring of the 9-pin port A or port B of the NR103 receiver to a 9-pin or 25-pin multiple COM interface board (e.g. Digi 8e) must be as follows:

DB-9 NR103		DB-9 COM	DB-25 COM
Pin 2 TXD	----------------------	Pin 2 RXD	Pin 3 RXD
Pin 3 RXD	----------------------	Pin 3 TXD	Pin 2 TXD
Pin 5 SG	----------------------	Pin 5 SG	Pin 7 SG

Note 1. In case the wiring can not be full duplex, it is possible to manually set the NR103 to send the ephemerides at initialisation time to the *QINSy* system: Switch off the raw data output on the receiver (OFF), then turn it back on (SYNCH). New ephemerides data will be send immediately.
Note 2. Also in case that a NR103 receiver is used ***only*** for receiving HF corrections (often the case in a configuration with more than one Sercel receiver), the link should always be bi-directional. The program needs to ask for IOD information (in CDAT), which is not part of the HF correction message (DGPS).

Database Setup

See description under “SATELLITE NAVIGATION SYSTEM DRIVERS”.

If the differential corrections from the Sercel NR103 are also to be used, select the item “Auxiliary systems” and add a new “Differential corrections system” to the *QINSy* Database, select the “Sercel NR103 (Passive Corrections)” driver and use the same interface parameters as with the satellite navigation system driver. In most cases, HF Reference Station ID should be 1 (slot number). Verify this number by using the IO Test utility (or HyperTerminal or PCPLUS). In the “#D” structure, the HF ID is the first number on each line.

See description under “DIFFERENTIAL CORRECTIONS SYSTEM DRIVERS”.

3.16.12 Sercel NR203 (Active Raw Data)

Input / Output:	Input (two-way)	*Driver class type:*	Interrogated
Executable name:	DrvNR203.exe	*Drivers.io options:*	none
Last modified:	2001-Feb-21		

Driver Description

Driver for interrogation of Sercel NR203. Driver to be used to obtain raw GPS pseudo-ranges and various GPS broadcast data (as well as differential corrections) from a Sercel NR203 series GPS receiver.

System Configuration

To configure Sercel NR203 receivers, use the AUX and DIF menus on the receiver. It is important to know that *QINSy* should be connected to **Port A**, which is an RS-232 serial port. The other ports are not capable of outputting raw data or are not RS-232 ports.

Configuring Port A:

- Press [**AUX**] and select "**9-INP/OUTP**"
- Select "**1-PORTS**"
- Press [↓] or [↑] until "**Port**" reads **"A**"
- Press [↵] to make any changes
- Press [↓] or [↑] until "**Baud"** reads "**19200**"
- Press [→] or [←] and then [↓] or [↑] until "**DaBit**" reads "**8**"
- Press [→] or [←] and then [↓] or [↑] until "**Parity**" reads "**NO**"
- Press [→] or [←] and then [↓] or [↑] until "**StBit**" reads "**1**"
- Press [↵] to store any changes

Port A is now set up to use 19200 baud rate, 8 data bits, no parity and 1 stop bit.

Checking Selected Messages and Activated Output:

QINSy uses the Sercel command RAWDAT to modify the output when the driver is started or reset. After the NR203 driver has been started or used by *QINSy*, the result of RAWDAT can be checked:

- Press [**AUX**] and select "**9-INP/OUTP**"
- Select "**2-OUTPUT**" and "**2-RAWDATA**"
- "**No**" reads "**1**"
- "**Po**" reads "**A**"
- "**Gdat**" reads "**NONE**"
- "**Dgps**" reads "**DVAR**" (or "**DGPS**")
- "**Gmea**" reads "**RBI0**" (or "**SBIN**")
- "**Mode**" reads "**TRGA**"
- "**Period**" reads "**1.0**"
- "**Tau**" reads "**600**"

Port A is now set up to output compacted ephemerides (on trigger request), differential corrections and binary smoothed pseudo ranges the GPS event after a trigger pulse on pin 1 of port A.

(continued on next page)

Interfacing Notes

It is important that the wiring is **bi-directional** and that pin 1 of port A is connected to receive a DTR signal from the COM port. Every time *QINSy* needs pseudo-ranges, differential corrections or ephemerides (e.g. at initialisation), it will ask the receiver for it. This also applies to the case where only corrections are read.

The wiring of port A of a Sercel NR203 receiver to a 9-pin or 25-pin COM port (e.g. Digi 8e) is as follows:

DB-9 Port A		DB-9 COM	DB-25 COM
Pin 1 TRG	----------------------	Pin 4 DTR	Pin 20 DTR
Pin 2 TXD	----------------------	Pin 2 RXD	Pin 3 RXD
Pin 3 RXD	----------------------	Pin 3 TXD	Pin 2 TXD
Pin 5 SG	----------------------	Pin 5 SG	Pin 7 SG

<u>Note</u>. It is important that the wiring is ***bi-directional***, even in the situation that only corrections are to be read. Data output (raw pseudo-ranges and differential corrections) is triggered by a signal on pin 1 of port A.

CONNECTING THE SERCEL NR 203 USING PORT I OR J

If RS232C Port A is used for raw data, then RS422 Port I or J can be used to output other data, for example the position computed by the Sercel NR203 contained in a NMEA $GPGGA string. The (one-directional) wiring for an ASCII string between the 9-pin RS422 port I (or J) and a serial COM port must be as follows.

DB-9 Port I
Pin 1 SG
Pin 8 TXD+
Pin 9 TXD–

DB-9 COM	DB-25 COM
Pin 2 RXD	Pin 3 RXD
Pin 5 SG	Pin 7 SG

Database Setup

See description under “SATELLITE NAVIGATION SYSTEM DRIVERS”.

If the differential corrections from the Sercel NR203 are also to be used, select the item “Auxiliary systems” and add a new “Differential corrections system” to the *QINSy* Database, select the “Sercel NR203 (Passive Corrections)” driver and use the same interface parameters as with the satellite navigation system driver. Use the station ID’s (including any leading zero’s) as slot numbers for the stations. Refer to the NR203 manual for how to obtain these ID’s.

See description under “DIFFERENTIAL CORRECTIONS SYSTEM DRIVERS”.

3.16.13 Sercel NR203 (Passive Raw Data)

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <ETX>
Executable name:	DrvNR103.exe	*Drivers.io options:*	none
Last modified:	2001-Feb-01		

Driver Description

Driver for Sercel NR103 and NR203. Driver to be used to obtain raw GPS pseudo-ranges and various GPS broadcast data (as well as differential corrections) from a Sercel NR103 or NR203 series GPS receiver.

System Configuration

To configure Sercel NR203 receivers, use the AUX and DIF menus on the receiver. It is important to know that *QINSy* should be connected to **Port A**, which is an RS-232 serial port. The other ports are not capable of outputting raw data or are not RS-232 ports.

<u>Configuring Port A</u>:

- Press [**AUX**] and select "**9-INP/OUTP**"
- Select "**1-PORTS**"
- Press [↓] or [↑] until "**Port**" reads **"A**"
- Press [↵] to make any changes
- Press [↓] or [↑] until "**Baud"** reads "**19200**"
- Press [→] or [←] and then [↓] or [↑] until "**DaBit**" reads "**8**"
- Press [→] or [←] and then [↓] or [↑] until "**Parity**" reads "**NO**"
- Press [→] or [←] and then [↓] or [↑] until "**StBit**" reads "**1**"
- Press [↵] to store any changes

Port A is now set up to use 19200 baud rate, 8 data bits, no parity and 1 stop bit.

<u>Selecting Messages and Activating Output:</u>

- Press [**AUX**] and select "**9-INP/OUTP**"
- Select "**2-OUTPUT**" and "**2-RAWDATA**"
- Press [↓] or [↑] until "**No**" reads "**1**"
- Press [↵] to make any changes
- Press [→] or [←] and then [↓] or [↑] until "**Po**" reads "**A**"
- Press [→] or [←] and then [↓] or [↑] until "**Gdat**" reads "**CDAT**"
- Press [→] or [←] and then [↓] or [↑] until "**Dgps**" reads "**DGPS**" (or "**DVAR**)
- Press [→] or [←] and then [↓] or [↑] until "**Gmea**" reads "**SMEA**" (or "**SVAR**")
- Press [→] or [←] and then [↓] or [↑] until "**Mode**" reads "**SYNC**"
- Press [→] or [←] and then [↓], [↑] or the numeric keys until "**Period**" reads "**2.0**"
- Press [→] or [←] and then [↓], [↑] or the numeric keys until "**Tau**" reads "**600**"
- Press [↵] to store any changes

Port A is now set up to output compacted ephemerides, differential corrections and smoothed pseudo ranges every GPS event with an update rate of 1.2 (= 2 * 0.6) seconds, and the filter constant is set to 600 seconds.

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System Configuration (continued)

***Note 1*.** The output rate should be set as high as possible. At a baud rate of 19200 bps and update rate of 1.2 s, only a limited amount of data can be transferred. When raw data and ephemerides are output for most of the channels, not all of the differential corrections may be transferred to *QINSy*.
***Note 2*.** "**Gdat**" should always read "**CDAT**", since ephemerides are needed to get IOD info in all cases.
***Note 3*.** When only pseudo ranges need to be generated "**Dgps**" should read "**OFF**".
***Note 4*.** When only corrections need to be generated "**Gmea**" should read "**OFF**".

Interfacing Notes

It is important that the wiring is **bi-directional**. Every time *QINSy* needs ephemerides (e.g. at initialisation), it will ask the receiver for it. This also applies to the case where only corrections are read from the receiver.

The wiring of port A of a Sercel NR203 receiver to a 9-pin or 25-pin COM port (e.g. Digi 8e) is as follows:

DB-9 Port A		**DB-9 COM**	**DB-25 COM**
Pin 2 TXD	----------------------	Pin 2 RXD	Pin 3 RXD
Pin 3 RXD	----------------------	Pin 3 TXD	Pin 2 TXD
Pin 5 SG	----------------------	Pin 5 SG	Pin 7 SG

If RS232C Port A is used for raw data, then RS422 Port I or J can be used to output other data, for example the position computed by the Sercel NR203 contained in a NMEA $GPGGA string. The (one-directional) wiring for an ASCII string between the 9-pin RS422 port I (or J) and a serial COM port must be as follows:

DB-9 Port I
Pin 1 SG
Pin 8 TXD+
Pin 9 TXD–

DB-9 COM	**DB-25 COM**
Pin 2 RXD	Pin 3 RXD
Pin 5 SG	Pin 7 SG

Database Setup

See description under "SATELLITE NAVIGATION SYSTEM DRIVERS".

If the differential corrections from the Sercel NR203 are also to be used, select the item "Auxiliary systems" and add a new "Differential corrections system" to the *QINSy* Database, select the "Sercel NR203 (Passive Corrections)" driver and use the same interface parameters as with the satellite navigation system driver. Use the station ID's (including any leading zero's) as slot numbers for the stations. Refer to the NR203 manual for how to obtain these ID's.

See description under "DIFFERENTIAL CORRECTIONS SYSTEM DRIVERS".

3.16.14 Trimble 4000 (Active RCI)

Input / Output:	Input (two-way)	*Driver class type:*	Interrogated
Executable name:	DrvTrimbleRCI.exe	*Drivers.io options:*	*none*
Last modified:	1997-May-01		

Driver Description

Driver for Trimble Remote Control Interface (RCI) protocol. Driver to be used to obtain raw GPS pseudo-ranges and various GPS broadcast data from a Trimble 4000 series GPS receiver.

Format Description

The Trimble RCI protocol defines (binary) commands and responses which can be used by *QINSy* to control and interrogate the Trimble receiver. See Trimble manuals for more information.

System Configuration

In configuring the Remote Control Interface (RCI) of a Trimble 4000 receiver use the CONTROL function key on the receiver. The following description defines only the essential settings; those not shown are not important to the operation of *QINSy*.

RTCM	:	OFF		
NMEA Output	:	OFF		
Baud Rate Format	:	Baudrate	57600	(or as high as possible)
		Databits	8	
		Parity	N	
		Stopbits	1	
Mask/Sync Time	:	Mask	0	
		PDOPmask	99.9	
		SV synctime	1.0	
Positioning Mode	:	Lat/Long/Hght or Lat/Long		(NB: this is one setting)
Cycle Printouts	:	OFF		
Remote Protocol	:	4000 A/S compatible		

GENERAL PROCEDURE FOR SETTING UP AND TESTING TRIMBLE RECEIVERS:

1. Cycle through all the control functions and set the controls to the values defined above.
2. Start the HyperTerminal program and set the required COM port to the correct I/O parameters. At this juncture no Trimble data should be visible on the screen.
3. Turn on one of the cycle printouts, defining the port to which the *QINSy* system is connected. The ASCII position printout is useful for this purpose. Using the HyperTerminal program, check that you are receiving the position printout correctly. If no data is being read, check the interface settings and all the electrical connections.
4. Turn off cycle printout, and, using HyperTerminal, check that no data is being received.
5. Make sure the interface settings in DB Setup are set correctly, and start the Online module.
6. After a short interval of perhaps 10-20 seconds, raw ranges should be displayed on the observation page of the Online module, if the connection is working correctly.

(continued on next page)

Interfacing Notes

This directive is applicable when interfacing the Trimble 4000 directly to the *QINSy* system, in the case where a Trimble OSM interface box is not supplied. If a longer cable is needed, just make a direct 2-2, 3-3 and 7-7 connection from the DB25 end to the multiple COM board (e.g. Digi 8e).

If connecting to Port #1, the 5-pin LEMO plug is to be used.

The wiring is as follws:

Pin	LEMO	DB25
3	rxd 1	2
4	sgnd	7
5	txd 1	3

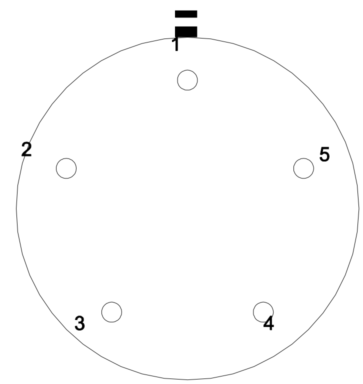


Figure 1

5-pin LEMO plug. View from behind at the soldering end.

If connecting to Port #2, the 7-pin LEMO plug is to be used.

The wiring is as follws:

Pin	LEMO	DB25
1	sgnd	7
3	rxd 2	2
7	txd 2	3

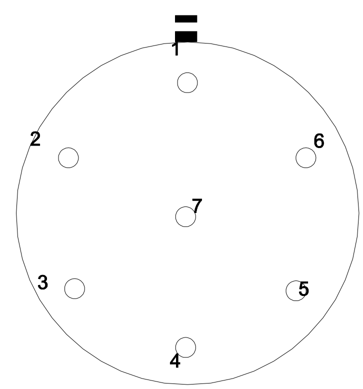


Figure 2

7-pin LEMO plug. View from behind at the soldering end.

Database Setup

See description under “SATELLITE NAVIGATION SYSTEM DRIVERS”.

3.16.15 Trimble 7400 RealTime Survey Data

Input / Output:	Input (two-way)	*Driver class type:*	Counted
Executable name:	DrvTrimbleRT.exe	*Drivers.io options:*	ACTIVE | PASSIVE
Last modified:	1998-Oct-07		

Driver Description

Driver for Trimble 7400 series Real Time Survey Data (RT17). Driver extracts pseudoranges, ephemerides, ionospheric and utc data and optionally position information from the receiver.

Format Description

For this driver the "Trim Comm" protocol is used. This format has evolved from the "Data Collector" format found with the Trimble 4000 series receivers. The Remote Protocol (Under <Control> must be set to "4000 A/S compatible".

System Configuration

The Trimble 7400 receivers can be configured using the remote controller program (RemCon).

- Receiver Port Config: Set the interface parameters for the receiver.
- – Click the "CONTROL" key
- – Click the "ALPHA" key to go down one screen
- – Click the <SERIAL PORT SETUP> key to configure the serial port I/O settings. Clicking the "ALPHA" key changes the values. The next field can be reached by pressing the "ENTER" key.
- Configure the receiver raw data output format by the following sequence on the simulated display
- – Click the "CONTROL" key
- – Click the "ALPHA" key to go down one screen
- – Click the <SERIAL PORTS OUTPUT> softkey
- – Click the <RT!&/BINARY OUTPUT> softkey
- – Now set the following using the "ALPHA" and "ENTER" key:
- – PORT: the port to which *QINSy* is connected, i.e. 1 to 4.
- – CONCISE: **on**
- – MEASUREMENTS: **1 HZ**
- – R-T FLAGS: **on**
- – POSITIONS: **off** or **1 HZ**
- – EPHEMERIS: **on**

Interfacing Notes

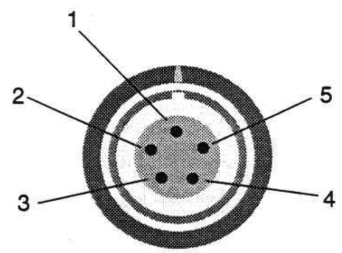
All four IO ports of the receiver can be used. The following table shows where the ports are located .

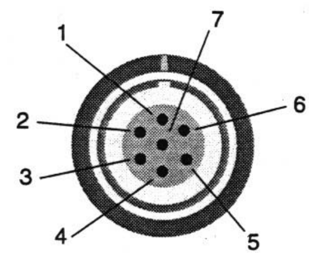
Port #	Connector
Port 1	PWR I/O 1
Port 2	I/O 2
Port 3	PWR 2&3
Port 4	AUX

(continued on next page)

Interfacing Notes (continued)

The wiring for the receiver has to be **bi-directional**. Either Trimble supplied cables can be used together with a DB-9 to DB-25 converter, or a special made cable. Pin numbers of the 5 and 7 pin LEMO plugs are shown below. The view is towards the rear panel of the receiver, which is the same as the soldering end of the plug.





The 7-pin LEMO ports 2 and 4 have to be wired as follows:

LEMO I/O 2 or **7-pin AUX**		**DB-9 COM**	**DB-25 COM**
Pin 1 SG	----------------	Pin 5 SG	Pin 7 SG
Pin 3 Data in	----------------	Pin 3 TXD	Pin 2 TXD
Pin 7 Data out	----------------	Pin 2 RXD	Pin 3 RXD

The 5-pin LEMO port 1 and 3 have to be wired as follows:

LEMO PWR 2&3 5-pin PWR-I/O 1		**DB-9 COM**	**DB-25 COM**
Pin 3 Data in	----------------	Pin 3 TXD	Pin 2 TXD
Pin 4 SG	----------------	Pin 5 SG	Pin 7 SG
Pin 5 Data out	----------------	Pin 2 RXD	Pin 3 RXD

Database Setup

See description under “SATELLITE NAVIGATION SYSTEM DRIVERS”.

If the position output is also configured, select item “Systems” under the object and define a new “Position navigation system”. Select the same driver, I/O parameters and antenna node as with the satellite system.

See description under “POSITION NAVIGATION SYSTEM DRIVERS”.

3.16.16 Trimble DSM (TSIP)

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <ETX>
Executable name:	DrvTrimbleSIP.exe	*Drivers.io options:*	*none*
Last modified:	1997-Jun-10		

Driver Description

Driver for Trimble DSM (DGPS Survey Module) GPS receiver, using the TSIP (Trimble Standard Interface Protocol) messages to obtain raw GPS pseudo-ranges and various GPS broadcast data from the receiver.

Format Description

The Trimble SIP protocol defines (binary, stuffed) commands and reports which can be used by an external computer to interrogate a Trimble DSM receiver. The protocol was originally defined for TANS (Trimble Advanced Navigator Sensor) and is also known as the ANS protocol. See Trimble manuals for more info.

Interfacing Notes

It is important that the wiring of the cables between the DSM and the PC COM port is **bi-directional**. Every time *QINSy* needs new ephemerides (e.g. at initialisation or with new satellites), it will ask the receiver for it. Port B (Control) is designed for RS-232 data connections and is reserved for TSIP input and output. Only Port B lets the *QINSy* System Configuration, control, and transfer raw GPS data using the TSIP interface.

The wiring of the 9-pin control port B of the Trimble DSM receiver (using the DSM adapter cable to disable hardware flow control) to a 9-pin or 25-pin multiple COM interface board (e.g. Digi 8e) must be as follows:

DB-9 DSM		DB-9 COM	DB-25 COM
Pin 2 TXD	----------------------	Pin 2 RXD	Pin 3 RXD
Pin 3 RXD	----------------------	Pin 3 TXD	Pin 2 TXD
Pin 5 SG	----------------------	Pin 5 SG	Pin 7 SG

Database Setup

See description under “SATELLITE NAVIGATION SYSTEM DRIVERS”.

3.16.17 Trimble DSM (TSIP) PosNet

Input / Output:	Input (two-way)	*Driver class type:*	Counted
Executable name:	DrvTrimbleSIPPOD.exe	*Drivers.io options:*	*none*
Last modified:	1997-Jun-16		

Driver Description

Driver for PosNet pod Trimble DSM GPS receiver, using the special TSIP Packet 6F Subcode 3 to obtain raw GPS pseudo-ranges from the receiver. This special Short Synchronised Measurement Packet was developed to meet WGC's specifications and is encapsulated in a proprietary wrapper for use in a radio link.

This driver cannot be used as the only GPS system in *QINSy*, since it will not decode satellite ephemerides and other GPS broadcast data. The PosNet pod does not output these data and cannot be queried to do so. Therefore, it is important that at least one other GPS receiver is available in the same *QINSy* setup.

Interfacing Notes

See description under “Trimble DSM (TSIP)” driver for interfacing information.

Database Setup

See description under “SATELLITE NAVIGATION SYSTEM DRIVERS”.

When defining the PR observations, enter the appropriate mobile unit id's as slot numbers: the *sending* unit number as *slot 1* identifier and the *receiving* unit number as *slot 2* identifier.

Additional Notes

The driver is able to decode more than one TSIP Packet 6F from the same PosNet pod radio link receiver, for example if more than one mobile unit is sending raw GPS pseudoranges. Just a “Satellite navigation system” with driver “Trimble DSM (TSIP) PosNet” for each of the mobile units. Be sure to select the same COM port number and interface parameters for each of these systems, and that slot identifiers correspond to the mobile unit combination which is to be decoded. Only the sending unit identifiers will be different, the receiving unit identifiers will be the same, but this number still has to be entered. *QINSy* will regard each of the systems as separate GPS systems, but only one driver process has to be started, and only one COM port has to be used.

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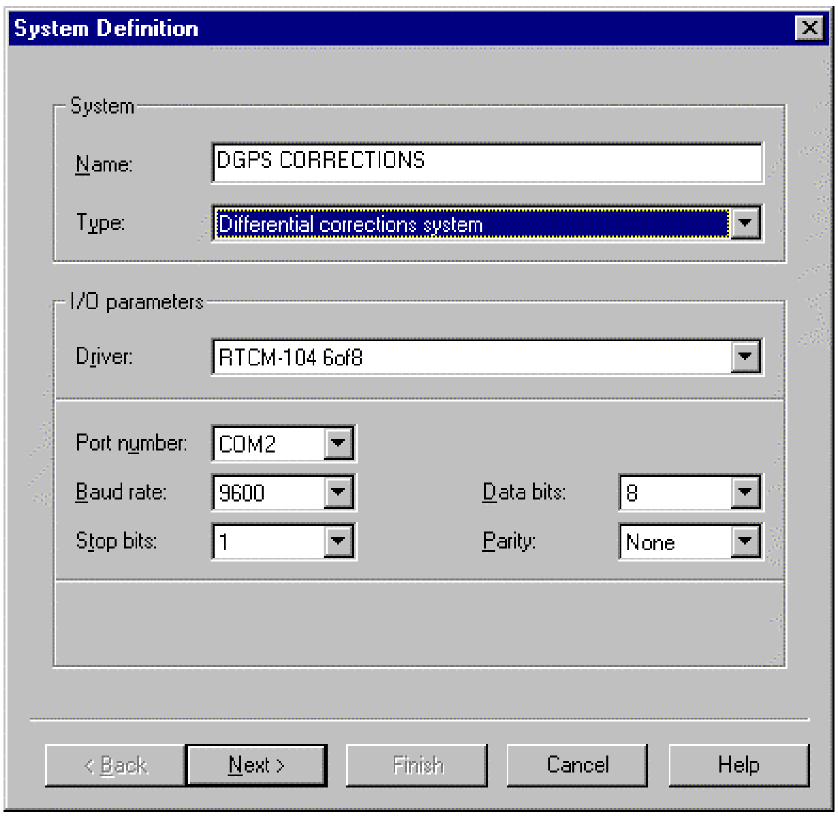
3.17 DIFFERENTIAL CORRECTIONS SYSTEM DRIVERS

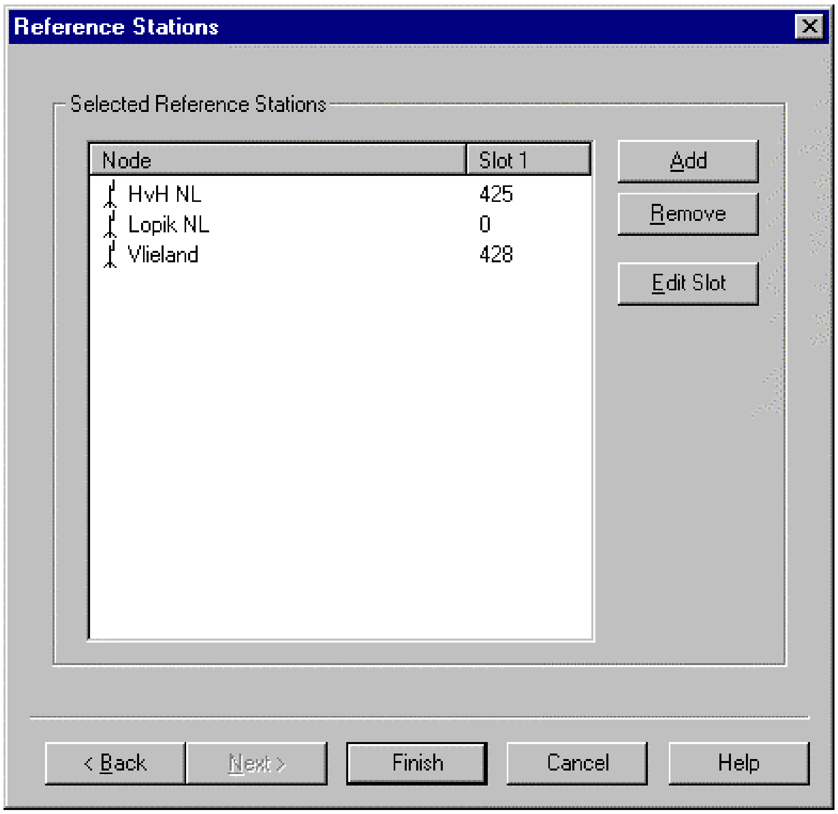
Database Setup

Select item "Auxiliary systems" and add a new "Differential corrections system" to the *QINSy* database. Select the appropriate driver and interface parameters. Press the "Next" button to define reference stations. Enter the transmitting station number(s) as slot number(s); because only those stations will be decoded from the differential corrections messages. Press the "Finish" button to save the system. See example below.



Database Setup (continued)

A new reference station can be added by pressing the “Add” button on the second page of the system wizard, or by selecting the system in the database setup tree and select option “New Reference Station”. To change station properties, expand the corrections system in the database setup tree, and select and edit the station.



See for more information the *QINSy* DB Setup Help Topics or the *QINSy* Knowledge Base.

3.17.1 Aquarius (Port A)

3.17.2 Aquarius (Port B)

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <ETX>
Executable name:	DrvAquarius.exe	*Drivers.io options:*	A | B
Last modified:	2003-Dec-10		

Driver Description

See description under “SATELLITE NAVIGATION SYSTEM DRIVERS.

3.17.3 NMEA RTCM (DGPRC-DGDDC-DGREF)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvRTCMNMEA.exe	*Drivers.io options:*	*format*
Last modified:	1997-May-1		

Driver Description

Driver to decode RTCM SC-104 differential correction messages, "$DGPRC" (Pseudo Range Correction, RTCM types 1 & 9), "$DGDDC" (Delta-Differential Correction, RTCM type 2), and "$DGREF" (Reference station position, type 3), as output by for example a Trimble 4000 GPS receiver. This output is a decoded and scaled ASCII representation of the RTCM messages. The format is similar to NMEA-0183 messages.

Format Description

All three message types start with a "$" to mark the beginning of a new message, followed by "DG" to identify the message as Differential GPS data. The format of the RTCM messages are as follows.

```
PRC - Pseudorange Correction (RTCM types 1 and 9)
PRC,xxxx,xx,xxxx.x,xx,xxxx.xx,xxxx.xx,xxx,xx,[*hh]<CR><LF>
DDC - Delta-Differential Correction (RTCM type 2)
DDC,xxxx,xx,xxxx.x,xx,xxxx.xx,xxxx.xx,xxx,xx,[*hh]<CR><LF>
```

Field	*Format*	*Description*	*Values, Range, Units*
1	xxxx	reference station number	0 … 9999
2	xx	reference station health	0 … 7
3	xxxx.x	z-count time flag	0 … 3599.4 s
4	xx	satellite number	1 … 32
5	xxxx.xx	pseudo-range correction	
6	xxxx.xx	pseudo-range rate correction	
7	xxx	ephemeris issue number	0 … 255
8	xx	User Differential Range Error	0, 1, 2, 3
9	*hh	checksum	EOR of values between "S" and "*"

```
REF - Reference Station Position (RTCM type 3)
REF, xxxx,xx,xxxx.x,xxxxx.xxx,xxxxx.xxx,xxxxx.xxx,[*hh]<CR><LF>
```

Field	*Format*	*Description*	*Values, Range, Units*
1	xxxx	reference station number	0 … 9999
2	xx	reference station health	0 … 7
3	xxxx.x	z-count time flag	0 … 3599.4 s
4	xxxxx.xxx	x-coordinate	
5	xxxxx.xxx	y-coordinate	
6	xxxxx.xxx	z-coordinate	
7	*hh	checksum	EOR of values between "S" and "*"

Database Setup

See description under "DIFFERENTIAL CORRECTIONS SYSTEM DRIVERS".

3.17.4 RTCM-104 6 of 8

3.17.5 RTCM-104 6 of 8 [Bit-Slipped]

3.17.6 RTCM-104 8 of 8

Input / Output:	Input	*Driver class type:*	Counted
Executable name:	DrvRTCM.exe	*Drivers.io options:*	SIX | EIGHT
Last modified:	1997-May-1		

Driver Description

Driver to decode (binary) RTCM SC-104 VERSION 2 differential correction messages of types 1, 2, 3, 9 and/or 16, containing Differential GPS Corrections, Delta Differential GPS Corrections, Reference Station Parameters, High Rate Differential GPS Corrections and User Definable Special Message, respectively.
The RTCM ‘(6-of-8)’ driver reads the RTCM-104 message in the standard 6 bits per byte format. The RTCM ‘(8-of-8)’ driver reads the RTCM-104 message in GeoTeam’s (non-standard) 8 bits per byte format.

Format Description

RTCM messages consist of 2 thirty-bit header words, containing reference station information, the reference time, and frame synchronisation information, followed by N words containing the data of the message. See the *RTCM Recommended Standards for Differential NAVSTAR GPS Service (Version 2)* for information.

Database Setup

See description under “DIFFERENTIAL CORRECTIONS SYSTEM DRIVERS”.

3.17.7 Sercel NR103 (Passive Corrections)

3.17.8 Sercel NR203 (Passive Corrections)

Input / Output:	Input (two-way)	*Driver class type:*	Terminated <ETX>
Executable name:	DrvNR103.exe	*Drivers.io options:*	*none*
Last modified:	1997-May-1		

Description

See description under “SATELLITE NAVIGATION SYSTEM DRIVERS”.

3.17.9 Sercel NR203 (Active Corrections)

Input / Output:	Input (two-way)	*Driver class type:*	Interrogated
Executable name:	DrvNR203.exe	*Drivers.io options:*	*none*
Last modified:	1997-Aug-31		

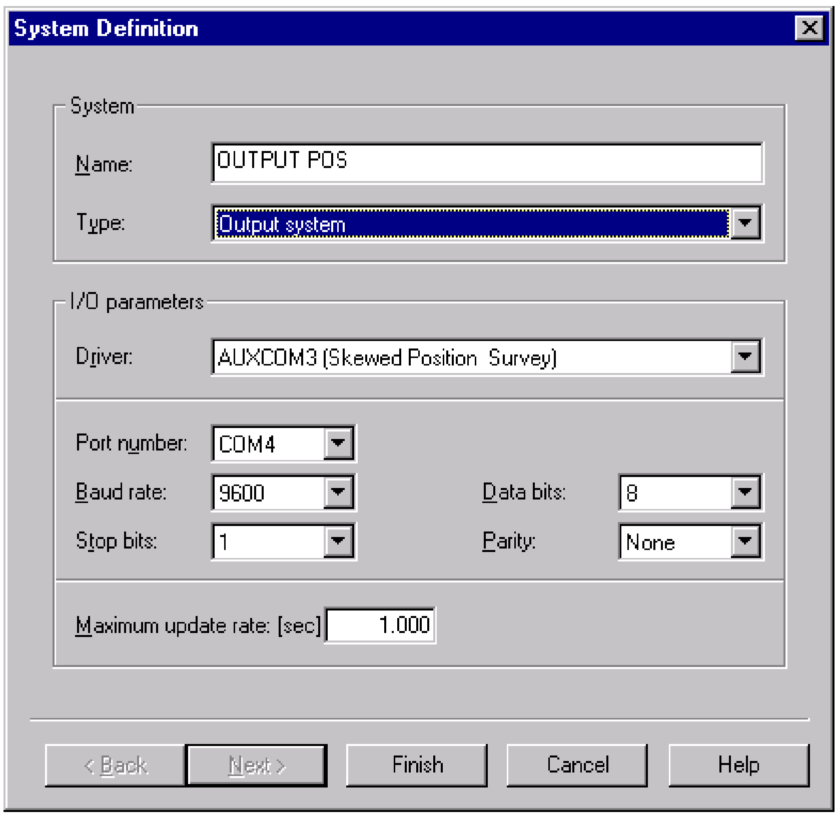
Description

See description under “SATELLITE NAVIGATION SYSTEM DRIVERS”.

3.18 OUTPUT SYSTEM DRIVERS

Database Setup

Select item "Auxiliary systems" and add an "Output system" to the *QINSy* Database . If an output system is added for an "Object", then the system will still be defined as an "Auxiliary system". Select the output driver and set the serial I/O parameters. The output rate will be the maximum update rate. It is adviced to set the output rate to at least 1 second. Press "Finish" button to save the output system setup. See example below.



Note. Output drivers without user interface need to be "triggered" the first time online by selecting the computation and node to output in the Controller menu "Settings – Node Output". The selection will be stored in the *QINSy* database for the next time online. Output drivers with user interface will usually startup with an icon in the Windows task bar. Restore the driver window the first time online and enter the output node and other parameters. The selection(s) will be stored in the Windows registry settings for the current user.

See for more information the *QINSy* DB Setup Help Topics or the *QINSy* Knowledge Base.

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3.18.1 6041 Win Socket Output

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOut6041.exe	*Drivers.io options:*	none
Last modified:	2001-Jul-16		

Driver Description

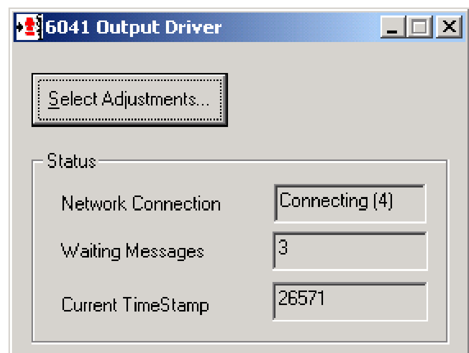
This driver (with user interface) is used to send various raw sensor observations (incl. Sidescan images), node positions, object SOG, sound velocity profiles and geodesy set-up to the Reson 6041 software package.

Either Survey Datum or Secondary datum must be set as WGS-84 because all output positions are referenced to the WGS-84 Datum. If no WGS-84 datum is set then positions will NOT be output.

After controller is started, the 6041 Output Driver Dialog can be selected by clicking on it's icon in the taskbar. In the dialog, one can view some status info and select the computation for the results that should be output.

Dialog contents:

1) Click button "Select Computations..." in order to select an computation. This information is stored in the registry and will be reloaded next time the controller is started.



2) Status – Network Connection
This displays the status of the actual connection to the 6041 computer.
Connecting means that the driver is trying to establish a connection but has not yet succeeded.
Sending means it has established connection and is now transferring data to 6041 computer.
The connection status code is displayed between the brackets.

3) Status – Waiting Messages
This gives an indication of how many messages are in a queue waiting to be sent. Normally the driver stores the incoming data in a queue for 5 seconds in order to send everything sorted in time to 6041. Size depends on how many sensors are sending data to *QINSy*.

4) Status- Current Timestamp
Shows Timestamp that is used for time tagging messages to 6041.

Format Description

Formats are described in the Reson propriety 6041/6042 Interface Specification. An overview is given below of the possible sent messages.

-Control Packets

These packets send information about the current session and set-up. Except for the Command packet, they are all sent at start-up of the controller only.

- SyncTime
  Used to synchronize both computer times
- SysConfig
  Contains which systems and objects are used in the current set-up
- Command
  Used to synchronize recording process between the two software packages
- Geodesy
  Contains all set-up data regarding the selected spheroid, datum, datum transformation and Projection. This packet is used by 6041 to calculate grid coordinates.
- SVP
  Contains profile points from the currently selected sound velocity profile

-Raw Observation Packets

These packets send various raw sensor observations from various system types. The driver will send for every applicable system that is encountered in the set-up, the packet as described below as soon as it detects that a new observation is available. A system selection dialog in order to reduce the number of packets being send over is not (yet) available.

- Bathymetry
  Contains complete swath from a MULTIBEAM ECHOSOUNDER SYSTEM
- Sidescan
  This contains all raw image data from a SIDESCAN SONAR SYSTEM
- Position
  Contains position obtained from a POSITION NAVIGATION SYSTEM
- Heading
  Contains compass heading observation obtained from a GYRO SYSTEM
- Attitude
  This package contains the Pitch and Roll values obtained from a PITCH, ROLL AND HEAVE SENSOR
- Heave
  Contains the Heave values as obtained from a PITCH, ROLL AND HEAVE SENSOR
- Altitude
  Contains the Altitude values obtained from a SURFACE NAVIGATION SYSTEM that outputs a ROV Altitude observation
- Depth
  This contains the ROV Depth observation obtained from a SURFACE NAVIGATION SYSTEM
- Tide
  Contains the Tide value from a TIDE GAUGE SYSTEM

-Result Packages

- SpeedOG
  Contains Speed over ground information of an objects' reference node. The driver will send one SpeedOG message for every object it encounters in the current set-up, as soon as new computation result data becomes available. This is usually once a second.

- Position
  This packet uses the identical format as the Position package mentioned under Raw Observation Pack, but this packet contains the node position which is calculated by the computation. Driver outputs all the node results of nodes that are connected to either a USBL transponder or a SIDESCAN SONAR S SYSTEM. I will be send as soon as new node results become available, usually once a second.

Notes:
-a built-in security prevents Multibeam data originating from non-Reson MBE Systems being send over.
-sidescan Sonar packages originating from “old” Sidescan Systems can NOT be send over.

Database Set-up

Since this is a winsocket driver that uses an TCP/IP network connection, one must select a valid port number and IP number of the computer on which 6041 runs. For more information regarding setup see description under “OUTPUT SYSTEM DRIVERS”.

Controller Setup

Online, for this driver it is not necessary / possible to select a node in the controller under “Node Output…” menu.

3.18.2 ADCP Lat/Lon & X/Y Position (Node Output | Steered Point)

3.18.3 ADCP X/Y Position (Node Output | Steered Point)

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutPosition.exe	*Drivers.io options:*	STEER
Last modified:	2004-Aug-09	SYL | FQ | Q | ADCP | SNGLL | T | G	

Driver Description

Driver to output an ASCII string containing date, time, lat/lon/height, easting/northing/heigth, speed and course to an ADCP System. Positions are skewed for the time of output. Two types of output modes:

1. position for currently selected output position, as set in Controller's Node Output;
2. Steered Point position for currently active steered node, determined by the Controller (Online).

Format Description

ADCP Lat/Lon & X/Y

The ASCII string starts with a header (see Drivers.io Options) and is terminated by a Carriage Return and a Line Feed. Fields are separated by commas and of fixed length (except when the value is too large to fit).

```
$GHR,DDMMYY,HHMMSS,DDMM.MMMMMMH,DDDMM.MMMMMMH,HHH.HH,EEEEEE.EE,NNNNNN.NN,HHH.HH,SS.SS,CCC.CC<CRLF>
```

Field	*Format*	*Description*	*Values, Units*
1	$AAA	header	"$" + Driver.io string
2	DDMMYY	UTC date of positions	day month year
3	HHMMSS	UTC time of positions	hours minutes seconds
4	DDMM.MMMMMMH	latitude on survey datum	degrees minutes hemisphere
5	DDDMM.MMMMMMH	longitude on survey datum	degrees minutes hemisphere
6	HHH.HH	height above survey datum	survey units
7	EEEEEE.EE	easting on projection grid	survey units
8	NNNNNN.NN	northing on projection grid	survey units
9	HHH.HH	height above projection grid	survey units
10	SS.SS	speed over ground	survey units / second
11	CCC.CC	course over ground	degrees
11	<CRLF>	record termination	<CR><LF>

ADCP X/Y

This ASCII string does not start with a header. It is terminated by a Carriage Return and a Line Feed. Fields are of fixed length (except when the value is too large to fit). Normally, its length will be 46 bytes.

```
HH:MM:SS EEEEEEEE.EE NNNNNNNN.NN      HHH.HH<CRLF>
```

Field	*Format*	*Description*	*Values, Units*
1	HH:MM:SS	UTC time of positions	hours : minutes :seconds
2	EEEEEEEE.EE	easting on projection grid	survey units
3	NNNNNNNN.NN	northing on projection grid	survey units
4	HHH.HH	heading of vessel object	degrees
5	<CRLF>	record termination	<CR><LF>

Encoding Notes

When PPS is used by *QINSy*, time will be UTC, otherwise it will be the *QINSy* computer's systemtime.

The header is obtained from the Drivers.io file. When the header is not empty, a "$" character is added to the start of the output string, so that it resembles a NMEA output string. Presently, the header is "$GHR".

Heading or course over ground reference is obtained from the Drivers.io command line. See below.

Drivers.io Options

Command line parameters are evaluated in the next sequence. "STEER" will use the Steered Node position, otherwise the position is used for the node that is selected in the Controller's Node Output settings.

"G" will output headings and CMG values with respect to grid north. "T" will output heading and CMG with respect to true north. Otherwise, headings will be true bearings and CMG values will be grid bearings.

"SYL" will start DrvOutPosition in Syledis mode. See "Syledis Y/X Position" driver description below.
"SNGLL" will start DrvOutPosition in SNGLL mode. See "ADCP Lat/Lon Position ($SNGLL)" driver.

"ADCP" will start DrvOutPosition with the ***ADCP X/Y*** format as described above. Any other command line string, such as "GHR", or no string at all (except for "STEER", "G" or "T") will start DrvOutPosition with the ***ADCP Lat/Lon & X/Y*** format as described above. The actual command line string will be used as header. If the header is not empty, it will preceded by a "$" character, to resemble a NMEA string.

Database Setup

See description under "OUTPUT SYSTEM DRIVERS".

Controller Setup

Online, except when the "Steered Point" option of this driver has been selected, the appropriate output node must be selected before the driver starts cycling. After going online with the Controller for the first time, select the "Node Output..." option under Settings and select an computation and node for this system.
In case of outputting the Steered Node position, the user has to set up also one or more Steered Points.

3.18.4 ADCP Lat/Lon Position ($SNGLL) (Node Output | Steered)

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutPosition.exe	*Drivers.io options:*	STEER
Last modified:	2004-Aug-09		SYL | FQ | Q | ADCP | SNGLL | T | G

Driver Description

Driver will output an ASCII string, containing Date/Time, Position (Lat/Lon on Survey Datum), Speed and heading to Transect Remote Cherry Console of the RDI ADCP Doppler. The Position is skewed for the time of output. Two types of output modes:

1. Node Output — position for currently selected output position, as set in Controller's Node Output;
2. Steered Point — position for currently active steered node, determined by the Controller (Online).

Format Description

```
$SNGLL,ddmmyy,hhmmssss,DDMM.MMMMS,DDDMM.MMMMS,000000000.0,0000000.0,00,00000.000
0E,0,0,vv.vv,hhh.h<CR><LF>
```

All fields are comma separated. Some fields are not used, and therefore filled with zero's.

ddmmyy	Date (day, month, year)
hhmmssss	Time (Hours, minutes, seconds, milliseconds always zero)
DDMM.MMMM	Latitude in decimal degrees
S	Sign of Latitude 'N' or 'S'
DDDMM.MMMM	Longitude in decimal degrees
S	Sign of Latitude 'W' or 'E'
vv.vv	Speed in m/s
hhh.h	Heading in degrees
<CR><LF>	Carriage return + Linefeed

Format Example

```
$SNGLL,190600,15053200,2815.0395N,04936.0700E,000000000.0,0000000.0,00,00000.0000E,0,0,01.6,026.0,
$SNGLL,190600,15053400,2815.0405N,04936.0706E,000000000.0,0000000.0,00,00000.0000E,0,0,01.6,026.0,
$SNGLL,190600,15053500,2815.0414N,04936.0711E,000000000.0,0000000.0,00,00000.0000E,0,0,01.7,026.0,
```

Encoding Notes

If the computation fails for the current steered point, its position will be predicted for the number of seconds set in the Filter option in the Controller (default 10 seconds) and then changed automatically to the next steered point. If there is no more steered point left, the last known position will be outputted.

Database Setup

See description under "OUTPUT SYSTEM DRIVERS".

Controller Setup

Online, except when the "Steered Point" option of this driver has been selected, the appropriate output node must be selected before the driver starts cycling. After going online with the Controller for the first time, select the "Node Output..." option under Settings and select an computation and node for this system.
In case of outputting the Steered Node position, the user has to set up also one or more Steered Points.

3.18.5 Anchor Output (Network)

Input / Output:	Output	*Driver class type:*	UDP/IP Output
Executable name:	DrvOutAnchors.exe	*Drivers.io options:*	None
Last modified:	2004-Jul-13		

Driver Description

Driver to be used to send the anchor configuration/position of the *QINSy* computer on which this driver is installed to another *QINSy* computer. The latter can visualize the anchors from the other machine. Driver is used in conjunction with Anchor input Driver.

Both computers should be connected together through their network connection; this can either be a direct cross over cable or though a hub. The TCP/IP settings on both machines should be set-up correctly.

Note: The anchor positions are transferred as Eastings/Northings on the survey datum so for correct visualization it is important that both *QINSy*'s have the same geodetic set-up.

The driver sends status information and position of all the anchors on every update.

Format Description

Each output message is variable in length, depending on the number of anchors. It contains a header and for every anchor an sAnchorDef Structure and an sAnchorPosition structure and finally a footer.

Header

Item	*Format*	*Description*	*Values*
01	STX	STX	Always 02
02	ID	Message Id	0
03	Size	Overall Message Size incl. Header	Typically 1070 bytes for 2 anchors
04	Sender ID	String of max 100 bytes	"*QINSy* Output Driver"
05	Anchor Count	Number of Anchors In Message	Usually up to 12 anchors

Anchor Definition Array
This block contains AnchorCount times an sAnchorDef structure. Structure layout is proprietary information.

Anchor Position Array
This block contains AnchorCount times an sAnchorPos structure. Structure layout is proprietary information.

Footer

Item	*Format*	*Description*	*Values*
01	Checksum	From STX up to field before this field	NOT USED YET
02	ETX	ETX	Always 03

Database Setup

See description under "OUTPUT SYSTEM DRIVERS".
Update time can be set to 1 second, this is sufficient.

3.18.6 Atlas Deso 15 Annotator (Node Output | Steered Point)

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutFish.exe	*Drivers.io options:*	DES | STEERED
Last modified:	2000-Jun-13		

Driver Description

Driver to be used to generate output strings compatible with the Atlas Deso 15 annotator. This system annotates the Atlas Deso 15 echosounder. The output driver has a hard coded output format. Output will only be generated on fix updates.
Two output position modes are:
1. position for currently selected output node, as set in the Controller's Node Output;
2. Steered Point position for currently active steered point, determined by the Controller (Online).

Format Description

Each output sentence is variable in length, depending on the values that are encoded.

```
WFix# dd/mm/yy hh:mm:ss E: 875855.16 N: 5985508.61<CR><LF>
```

Item	*Format*	*Description*	*Values*
01	W	Start of text	
02	Fix#	Fix number	1
03	dd/mm/yy	Date	01/05/2000
04	hh:mm:ss	time	23:59:59
05	E: 875855.16	Easting in meters	875855.16
06	N: 5985508.61	Northing in meters	5985508.61

Format Example

```
W1 01/05/2000 23:59:59 E: 875855.16 N: 5985508.61
```

Database Setup

See description under "OUTPUT SYSTEM DRIVERS".

Controller Setup

Online, except when the "Steered Point" option of this driver has been selected, the appropriate output node must be selected before the driver starts cycling. After going online with the Controller for the first time, select the "Node Output..." option under Settings and select an computation and node for this system.
In case of outputting the Steered Node position, the user has to set up also one or more Steered Points.

3.18.7 Atlas Fansweep 20 Output Driver

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutFanSweep.exe	*Drivers.io options:*	WGS84
Last modified:	1999-Feb-03		

Driver Description

Driver for outputting an ASCII string to the Atlas Fansweep 20 System, output every *QINSy* update on whole second. The update-rate can be defined as system property in DB Setup. The string contains NMEA GGA, ZDA and VTG records with data of the selected node. In the GGA/GLL string the time is that for the position, whilst the time in the ZDA string is that at which the data was put on the output port.

Format Description

Refer to the NMEA drivers for a full description of the GPGGA, GPGGL, GPZDA, GPVTG messages.

Format Example

```
$GPGGA,092155.00,521123.49,N,0051657.88,E,2,00,0.0,77.0,M,,M,,*40
$GPGLL,521123.49,N,0051657.88,E,092155.00,A*05
$GPVTG,165.1,T,,M,0.35,N,0.65,K*66
$GPZDA,092156.40,02,03,1999,,*62
```

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”.

The "Atlas Fansweep 20 (WGS84)" version, will present the position as is being output in the GPGGA part, in the WGS84 datum. The "Atlas Fansweep 20" version will give the positions relative to the survey datum. Note that the correct datum shift parameters must have been entered in the Geodetic part of the DB Setup.
The output rate will be the maximum update rate. It is adviced to set the output rate to at least 1 second.

Controller Setup

Online, except when the “Steered Point” option of this driver has been selected, the appropriate output node must be selected before the driver starts cycling. After going online with the Controller for the first time, select the “Node Output...” option under Settings and select an computation and node for this system.
In case of outputting the Steered Node position, the user has to set up also one or more Steered Points.

3.18.8 AutoPilot Euro500 Output Driver

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutRobTrack.exe	*Drivers.io options:*	EURO500
Last modified:	1999-Sep-10		

Driver Description

Driver (with user interface) for outputting settings to a Euro500 AutoPilot System, output every update. This update-rate can be defined as system property in DB Setup. The outputted offset will be calculated, using the selected AutoPilot Steered Node and the current Controller's Mainline. The user has the possibility to define a Track Offset, which will be subtracted from the calculated offset. This might be useful when you want to sail e.g.10m starboard off the current mainline. In that case, define a Track Offset of +10m.

Format Description

```
$1AO+xxxxx.xx<CRLF>
```

- $1AO is always the same. (Note that O is not the zero character)
- + means starboard of the line, - means port of the line.
- xxxxx.xx means a multiple of 200mV, where 1m equals 200mV
- <CRLF> means the Carriage Return and Linefeed character

Format Example

`$1AO+00020.00`	means offset of +0.1m
`$1AO+01000.00`	means offset of +5.0m
`$1AO-02000.00`	means offset of -10.0m

Encoding Notes

- The outputted offtrack will be the calculated offtrack of the selected node from the Controller's Mainline MINUS the user-defined Track Offset (default zero).
- The outputted offtrack is rounded to the nearest 0.1m
- Maximum offset should be less than 499.95m (which equals 99990.00 mV)

Database Setup

See description under "OUTPUT SYSTEM DRIVERS".

Note. For the best result it is advisable to define an AutoPilot Steering Node some meters ahead of the vessel (e.g. half the vessel length).

3.18.9 AutoPilot RobTrack/STS500 Output Driver

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutRobTrack.exe	*Drivers.io options:*	*none*
Last modified:	1999-Sep-01		

Driver Description

Driver (with user interface) for outputting settings to a RobTrack AutoPilot System, output every *QINSy* update. This update-rate can be defined as system property in DB Setup. The outputted offset will be calculated, using the selected AutoPilot Steered Node and the current Controller's Mainline.

Format Description

```
$DNRTR,r.r,x.x,v.v,a.a,o.o,t.t*hh<CRLF>
```

r.r :	Track ref. (direction of track) Line Heading
x.x :	Cross track error (distance across) Positive when heading must change to port to get closer to track E.g. +12.2 -> Vessel must steer 12.2 to port Unit: metres
v.v :	Velocity along track. Positive when vessel SMG is in the track direction. Unit: metres / second
a.a :	Velocity across. Positive when vessel moves to starboard. E.g. -0.33 -> vessel moves to port with 0.33 m/sec Unit: metres / second
o.o:	Track offset. Positive when vessel shall follow a parallel track to starboard side of track. E.g. +77 -> vessel moves to a parallel track 77m to starboard. Unit: metres
t.t:	Nav computer control of maximum allowed turn-rate. E.g. 20.0 means that the vessel will use 20 seconds to change the heading with one degree. Unit: seconds / degree
hh:	Checksum
<CRLF>	Carriage Return and Linefeed character

Database Setup

See description under "OUTPUT SYSTEM DRIVERS".

Note. For the best result it is advisable to define an AutoPilot Steering Node some meters ahead of the vessel (e.g. half the vessel length).

3.18.10 AUXCOM 3 (Position; Age=0) (Survey | WGS84)

3.18.11 AUXCOM 3 (Position and Age) (Survey | WGS84)

3.18.12 AUXCOM 3 (Skewed Position) (Survey | WGS84)

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutAuxcom3.exe	*Drivers.io options:*	*various*
Last modified:	1997-Sep-08		

Driver Description

Driver for DNAVN ASCII Position Archive Data Stream (AUXCOM3) output strings. Driver to be used to generate output strings containing position and solution results from the *QINSy* system.

The AUXCOM 3 output driver has two different types of output modes, time and datum:

1.	Position; Age=0	position at time of fix with time of fix; age is not computed (0 seconds)
2.	Position and Age	position at time of fix with time of fix; age is update time – time of fix
3.	Skewed Position	position at update time with update time; age is 0 seconds by definition
A.	Survey	position (latitude, longitude, height) on survey datum
B.	WGS84	position (latitude, longitude, height) on WGS84 datum

Format Description

Each AUXCOM3 record is variable in length, depending on the number of satellites tracked. The maximum record size, however, is limited by 15 SV's and is 211 bytes, computed as follows: header/position = 86 bytes, plus 15 SV's of 8 bytes per SV = 120 bytes, plus trailer = 5 bytes.

The fields within the output record are of fixed length. Some fields are output as a single, hexadecimal digit (0-9, A-F). Each bit in such a field is a binary flag, organised from the most significant bit (MSB) to the least significant bit (LSB). Hex flag fields are represented by "x". Other fields are "n" (for decimal digit or part of decimal number), "mmddyy" (month, day, year), "hhmmss (hours, minutes, seconds), and "ddmmss" (degrees, minutes, seconds). Characters that do not change are indicated by quotes: ‘ ‘.

```
[1365123197235959.901.11N521122.81E0051657.15+0058.0001.1002.2  3  2 3.3 2.2579990011A
01050050020500500305005004050050050500500605005007050050080500500905005010050050]
```

Byte	Format	Description	Values, Range, Units
01	‘[‘	start character	ASCII 91
02	n	day of week	0..6, 0 = Sunday
03	nnn	day of year	1..366
06	mmddyy	date	month, day, year
12	hhmmss.s	UTC (time of record)	hours, minutes, seconds
20	ss.s	time of record minus time of fix	seconds
24	n	datum flag	1 = WGS84
25	‘N’ or ‘S’	latitude	northern or southern
26	ddmmss.ss	latitude	degrees; minutes; seconds
35	‘E’ or ‘W’	longitude	eastern or western
36	dddmmss.ss	longitude	degrees; minutes; seconds
45	‘+’ or ‘–’	height	above or below ellipsoid
47	nnnn.n	height	meters wrt ellipsoid
53	nnn.n	course over ground	degrees true

58	nnn.n	speed over ground	knots
63	nnn	3D position error	1 sigma meters
66	nnn	2D position error	1 sigma meters
69	nn.n	PDOP or F-test	
73	nn.n	HDOP	
77	n	operating mode	0 = no solution, 1 = 4 SV, 2 = 3 SV + alt aid, 3 = 3 SV + clk aid, 4 = 2 SV + alt/clk aid, 5 = all SV in view
78	n	receiver mode	7 = C/A, L1 only, carrier aided
79	n	receiver dynamics	0 = static, 1 = low, …, 9 = high
80	n	position quality	0 = bad, …, 9 = good
81	n	differential quality	0 = no corr., 1 = bad, …, 9 = good
82	mmss	time since last correction	minutes, seconds maximum age is 60 seconds
86	x	number of SV tracked	maximum number = 'F' = 15
…			
+1	nn	PRN number	
+3	nn	SNR	Trimble units
+5	nnn	range residual	meters
+8	x	status flag	BIT 0 is elevation (0 = above mask), BIT 1 is SV health (0 = SV healthy)
…			
N	']'	stop character	ASCII 93; N = 87 + number SV × 8
+1	xx	checksum	exclusive or from '[' to ']' inclusive
+1	<CR><LF>	record termination	

Encoding Notes

QINSy sets predefined values for following fields (with column): receiver code ≡ 0 (78), receiver dynamics ≡ 9 (79), time since last correction ≡ 0 (82), satellite SRN values ≡ 0. The checksum is always computed.

Interfacing Notes

No specific interfacing or configuring recommendations. See Chapter 1 for general interfacing remarks.

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”.

Controller Setup

Online, except when the “Steered Point” option of this driver has been selected, the appropriate output node must be selected before the driver starts cycling. After going online with the Controller for the first time, select the “Node Output...” option under Settings and select an computation and node for this system.
In case of outputting the Steered Node position, the user has to set up also one or more Steered Points.

3.18.13 Bennex Left Right Indicator

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvoutBennexLR.exe	*Drivers.io options:*	*none*
Last modified:	2001-Feb-02		

Driver Description

This driver sends the steered node line information (i.e. distance along line and distance off line) to the Bennex Left right indicator.

Format Description

ASCII output string, 39 bytes long, terminated by carriage return linefeed.
The next string will server as an example for the description of the fields.

```
S +53 -1001 180 306 000 003950 0000 0000 0000<CR><LF>
```

Note: spaces are inserted for clarity.

Field	Format	Description	Values, Range, Units
S	1 char	Mode	G: storing, S: offline, N: No navigation
+53	sign + 2 digits	Angle to the line	degrees
-1001	sign + 4 digits	Distance offline	decimeters
180	3 digits	Line heading	degrees
306	3 digits	Course made good	degrees
000	3 digits	Speed over ground	decimeters / second
003950	6 chars	Line name	
0000	4 digits	MP (line) or KP (route)	meters or kilometers
0000	4 digits	Distance from start of line	meters
0000	4 digits	Depth	centimeters
<CR><LF>	2 char	End of message	0x0D, 0x0A

Format Example

```
S+53-150118030600000400000000000000
S+53-150018030600000395000000000000
S+53-100118030600000395000000000000
```

Decoding Notes

The mode is always set to offline, the depth field is always 0.0.

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”.

Controller Setup

Because the driver outputs the Steered Node position, the user has to set up also one or more Steered Points.

3.18.14 Coda Navigation Output Driver

Input / Output: Output
Executable name: DrvOutSubspection.exe
Last modified: 2000-Jun-02
Driver class type: Output
Drivers.io options: CODA | CDAT

Driver Description

Driver (with user interface) for outputting an ASCII string to a Coda Navigation System, output every *QINSy* update. The update-rate can be defined as system property in DB Setup. The string contains a Time and Kp-value (in meters) for the selected node. Notice that the Kp value is skewed for time of output.

Format Description

ASCII String, terminated by a carriage return linefeed.

Coda Format Example

```
CODA 123.354 33998.005 12.234 77.09 34.5 10.2 4.3 031.8 L_001 344 1453.89 1.03
797619096.002<CR><LF>
```

Coda-Date Format Example

```
CODA-DATE 123.354 33998.005 12.234 77.09 34.5 10.2 4.3 031.8 L_001 344 1453.89 1.03
15:50:00 20:04:94 <CR><LF>
```

Item	*Format*	*Description*	*Example Values*
01	"CODA" or "CODA-DATE"	Start character for Coda format or Start character for Coda-Date format	-
02	" "	Space (ASCII #32)	-
03	%.3lf	Easting is UTM value of the tow fish in meters	123.354
04	%.3lf	Northing is UTM value of the tow fish in meters	33998.005
05	%.3lf	Kp is along-track kilometer point in kilometers	12.234
06	%.2lf	Distance offtrack in meters	77.09
07	%.1lf	Water depth of the tow fish in meters	34.5
08	%.1lf	Altitude of the tow fish in meters	10.2
09	%.1lf	Speed of the tow fish in knots	4.3
10	%5.1lf	Heading of the tow fish in degrees (0 –360)	031.8
11	%s	Survey line name (5 character ASCII string)	L_001
12	%d	Fix number	344
13	%.2lf	Sound velocity in meters per second	1453.89
14	%.2lf	Delay between the time of data receipt and the time of transmission in seconds	1.03
15	%.3lf or hh:mm:ss dd:mm:yy	System UTC time since January 1st 1970 in seconds or in hour:minute:seconds day:month:year format	797619096.002 or 15:50:00 20:04:94

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”.

3.18.15 CorrOcean Cathodic Protection System Output Driver

3.18.16 CorrOcean CP (Steered Point) Output Driver

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutCorrOcean.exe	*Drivers.io options:*	STEERED
Last modified:	1999-Jan-12		

Driver Description

Driver (with user interface) for outputting an ASCII string to a CorrOcean Cathodic Protection System, output every *QINSy* update. The update-rate can be defined as system property in DB Setup. The string contains a Time and Kp-value (in meters) for the selected node. In case the second driver has been selected, the output node used for the Kp calculation will always be the Steered Node.
Notice that the Kp value is skewed for time of output.

Format Description

ASCII String, terminated by a carriage return, fixed length of 17 characters, inclusive the <CR>.

```
HH:MM:SS sFFFFFF<CR>
```

"HH:MM:SS"	Hours, Minutes and Seconds. It will be UTC time in case Pps is connected, otherwise computer system time.
" "	Space (ASCII #32)
"s"	Sign of the Kp value; ' ' when positive, '-' when negative.
"FFFFFF"	Kp value in meters, skewed for time of output. Always right-aligned in the string and proceeded with zero's. When the value exceed 999.999 Km, it will output 999999 in the string.
"<CR>"	Carriage Return (ASCII #13) (Notice that there is no linefeed character)

Format Example

```
05:14:01 -001053
05:14:02 -001052
05:14:03 -001050
```

means Kp value of -1.053

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”.

Controller Setup

Online, except when the “Steered Point” option of this driver has been selected, the appropriate output node must be selected before the driver starts cycling. After going online with the Controller for the first time, select the “Node Output...” option under Settings and select an computation and node for this system.
In case of outputting the Steered Node position, the user has to set up also one or more Steered Points.

3.18.17 Echosounder Depth Output

Input / Output:	Output (User Interface)	*Driver class type:*	Output
Executable name:	DrvOutDepthUI.exe	*Drivers.io options:*	*age*
Last modified:	2004-March-02		

Driver Description

Driver with user interface, to be used to generate output strings containing raw (or corrected) depth values from Singlebeam, Multibeam or Multi-Transducer Echosounders, or DTM Results as calculated using depth values from one of these types of echosounders. Driver starts up as minimized window on Windows taskbar.

Depending on the selected depth observation, several selections for beams and corrections are available:

Singlebeam Echosounder	Single Beam, DTM Results
Multibeam Echosounder	Nadir Beam, Center Beam, Min Depth, Max Depth, DTM Results
Multi-Transducer Echosounder	Center Beam, Minimum Depth, Maximum Depth, DTM Results

Single Beam	Raw Data Value, Corrected Data Value
Nadir Beam	Correct for Roll, Correct for Roll and Pitch
Center Beam	Raw Data Value, Correct for Roll, Correct for Roll and Pitch
Minimum Depth	Raw Data Value, Exclude Zero Values
Maximum Depth	Raw Data Value, Exclude Zero Values
DTM Results	Closest DTM Point, Interpolated Point

If the “DTM Results” option is selected, the driver does not read the raw data value buffers, but the DTM results as calculated by the Multibeamer process. These data are always corrected for roll, pitch, heave and system offsets such as mounting angles and sound velocities. However, the echosounder system must have been selected on the Echosounder Parameters page of the Controller’s Session Setup Wizard.

For the other options, the driver uses the roll and pitch values from the vertical reference unit that has been selected for the object on which the echosounder is defined. The (C-O) values for the roll and pitch values as well as the mounting offsets for a Multibeam or Multi-Transducer system are taken into account.

The “Corrected Data Value” for a Singlebeam Echosounder is the raw data value, scaled by the “Calibrated Velocity” divided by the “Used Velocity” as defined with the system setup in the database. The “Corrected Data Value” that is available with a ROV depth or altitude observation, is the raw values, corrected for the (C-O) values and scale factor, that has been defined during the observation’s setup in the database.

The Nadir Beam is always corrected for roll (including transducer roll offset). It is defined as the beam that is closest to the vertical direction after applying any roll compensation. Pitch compensation is optional.

In order to find Minimum Depth or Maximum Depth, roll and pitch are always taken into account.

Format Description

Several output formats are available. Output strings are always ended by a <CR><LF> pair.

(continued on next page)

NMEA $SDDPT $SDDPT,10.000,5.000,<CR><LF>

Item	*Field*	*Description*	*Format, Units*
01	$SDDPT	Header	"$SDDPT"
02	x.xxx	Water Depth Value	meters
03	x.xxx	Transducer Offset to Reference Point	meters
04	x.x	Maximum Range Scale	(empty)
05	<CR><LF>	Termination Characters	Carriage Return + Line Feed

NMEA $SDDBT $SDDBT,32.808,f,10.000,M,5.468,F<CR><LF>

Item	*Field*	*Description*	*Units*
01	$SDDBT	Header	"$SDDBT"
02	x.xxx, f	Water Depth Value	"f" = feet
03	x.xxx, M	Water Depth Value	"M" = meters
04	x.xxx, F	Water Depth Value	"F" = fathoms
05	<CR><LF>	Termination Characters	Carriage Return + Line Feed

ASCII Meters (x) 10
ASCII Units (x) 10

Item	*Field*	*Description*	*Format, Units*
01	x	Water Depth Value	meters or survey units, 0 decimals
02	<CR><LF>	Termination Characters	Carriage Return + Line Feed

ASCII Meters (x.xxx) 10.000
ASCII Units (x.xxx) 10.000

Item	*Field*	*Description*	*Format, Units*
01	x.xxx	Water Depth Value	meters or survey units, 3 decimals
02	<CR><LF>	Termination Characters	Carriage Return + Line Feed

Sonardyne NMEA $SONDEP $SONDEP,24.6,,M*58<CR><LF>

Item	*Field*	*Description*	*Format, Units*
01	$SONDEP	Header	"$SONDEP"
02	x.x	Water Depth Value	meters
03	x.xxx	Observation error – field is blank if not sent	
04	M	Units: M = Meters, F = Feet	Always M
05	*hh	Checksum – not compulsory	
06	<CR><LF>	Termination Characters	Carriage Return + Line Feed

NMEA $DBS $DBS,24.6,M*22<CR><LF>

Item	*Field*	*Description*	*Format, Units*
01	$SONDEP	Header	"$SONDEP"
02	x.x	Water Depth Value	meters
03	M	Units: M = Meters	Always M
04	*hh	Checksum – not compulsory	
05	<CR><LF>	Termination Characters	Carriage Return + Line Feed

Drivers.io Options

If the command line in the drivers.io file contains a value, then this value is used as maximum age for the output data, i.e. when the depth is more than this number of seconds old, the driver stops outputting data. Default value for the age (command line value) is 5.0 seconds. Delete the number to skip the age check.

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”.

Controller Setup

Online, click on the Depth Output Driver button in the taskbar. Select Echosounder, Beam, Option, Format. The output data string is also shown. If there is no data update, or the data are invalid or too old, then no data string is sent and the edit box becomes empty. Selections are saved in the registry between sessions.

3.18.18 Fish output to 6041 (WinSocket)

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutFish6041.exe	*Drivers.io options:*	none
Last modified:	2000-Oct-5		

Driver Description

Driver to be used to generate an output string compatible with the Reson 6041 software. The output driver has a hard coded output format and will only output data that originates from the following drivers:

1. Klein2000 SSS VRU R-P (with Annotation) located in the "Pitch, roll and heave sensor" systems.
2. Klein2000 SSS Heading (with Annotation) located in the "Gyro's and compasses" systems.
3. Klein2000 SSS Info (with Annotation) located in the "Surface navigation system" category.
4. Klein2000 SSS Info (with Annotation) located in the "Miscellaneous systems" category.
5. Klein595 SSS Altitude (with Annotation) located in the "Surface navigation system" category

When no VRU or Heading system is available the roll & pitch or heading information from the object on which the selected node is located will be used in the output message

Format Description

Item	*Format*	*Description*	*Remarks*
01	WORD	Identifier	Always 0x4845
02	WORD	Packet type	Always 0x01
03	Float	Temperature from fish	Degrees Celsius
04	Float	Fish altitude	Meters
05	Float	Fish depth	Meters
06	Float	Fish heading	Degrees
07	Float	Fish pitch	Degrees
08	Float	Fish roll	Degrees
09	Float	SSS range setting	Meters
10	Float	Fish speed	Knots
11	Double	Fish easting	Survey units
12	Double	Fish northing	Survey units
13	Double	Time stamp of position	Seconds since Jan 1st, 1970
14	Double	Time stamp of fish information	Seconds since Jan 1st, 1970

Database Setup

See description under "OUTPUT SYSTEM DRIVERS".

Controller Setup

Online, the appropriate output node must be selected before the driver starts outputting positions. After going online with the Controller for the first time, select the "Node Output..." option under Settings and select an computation and node for this system.

3.18.19 Ballast Nedam X/Y (Local)

3.18.20 Ballast Nedam X/Y (Steered Point)

3.18.21 GeoCom X-Star

Input / Output:	Output	*Driver class type:*	Output <CRLF>
Executable name:	DrvOutBallast.exe	*Drivers.io options:*	
Last modified:	2001-Jul-13 (Friday)	STEERED | GEOCOM	

Driver Description

Driver to output an ASCII string containing date, time, easting/northing, SOG/COG and linename to either the Multibeam Echosounder o/b the Ballast Nedam “Amsterdam” (default) or the GeoCom X-Star Software (GEOCOM). Output modes:

1) Position for currently selected output position, as set in Controller’s Node Output (default)
2) Position for currently active steered node, determined by the Controller (STEERED option)

-Time in the message is the time of the moment that *QINSy* outputs the serial string.
-Position is skewed to the time in the message.

Format Description

Ballast Nedam Format

The ASCII string starts with a fixed header and is terminated by a Carriage Return and a Line Feed. Fields are separated by commas and of fixed length (except when the value is too large to fit).

```
$QPS_OUT,13:51:38.058,X=00534391.035,Y=05755035.430,*5E,CRLF
```

Field	*Format*	*Description*	*Values, Units*
1	$QPS_OUT	header	Always $QPS_OUT
2	HH:MM:SS.SSS	UTC time of positions	hours minutes seconds
3	X=EEEEEEEE.EEE	easting on projection grid	Survey units
4	Y=NNNNNNNN.NNN	northing on projection grid	Survey units
5	*XX	Checksum	
11	<CRLF>	record termination	<CR><LF>

GeoCom X-Start Format

The ASCII string starts with a fixed header and is terminated by a Carriage Return and a Line Feed. Fields are separated by commas and of fixed length (except when the value is too large to fit).

```
$GCX,164389.19,455033.56,045.0,02.6,05,11,2001,144258,Line_1,CRLF
```

Field	***Format***	***Description***	***Values, Units***
1	$GCX	header	Always $GCX
2	EEEEEE.EE	easting on projection grid	Survey units
3	NNNNNN.NN	northing on projection grid	Survey units
4	HHH.HH	Course made good of node	Degrees
5	SSS.S	Speed Over ground of node	Metres/second
6	DD	Date - Day	
7	MM	Date – Month	
8	YYYY	Date – Year	
9	Hhmmss	Local time	Local time of machine
10	SSSSSS	Line name	First 6 chars. of active line
5	<CRLF>	record termination	<CR><LF>

Encoding Notes

When PPS is used by *QINSy*, time will be UTC, otherwise it will be the *QINSy* computer's system time.

Drivers.io Options

STEERED Use steered node, node selection in controller is suppressed
GEOCOM Instead of the ballast format, output GeoCom X-Start Format

Database Setup

See description under "OUTPUT SYSTEM DRIVERS".

Controller Setup

Online, except when the "Steered Point" option of this driver has been selected, the appropriate output node must be selected before the driver starts cycling. After going online with the Controller for the first time, select the "Node Output..." option under Settings and select an computation and node for this system.
In case of outputting the Steered Node position, the user has to set up also one or more Steered Points.

3.18.22 GeoLab ESP Annotator (Node Output | Steered Point)

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutFish.exe	*Drivers.io options:*	LAB | STEERED
Last modified:	2000-Jun-13		

Driver Description

Driver to be used to generate output strings compatible with the GeoLab ESP annotator. This system annotates subbottom profiler, sidescan sonar and magnetometer. The output driver has a hard coded output format. Output will only be generated on fix updates.
Two output position modes are:
1. position for currently selected output node, as set in the Controller's Node Output;
2. Steered Point position for currently active steered point, determined by the Controller (Online).

Format Description

Each output sentence is variable in length, depending on the values that are encoded.

```
$@01Fix# dd/mm/yy hh:mm:ss E: 875855.16 N: 5985508.61<CR><LF>
```

Item	*Format*	*Description*	*Values*
01	$	Start of text	
02	@	Annotation channel	A,B,C or @ (all)
03	0	Start position of annotation	0-255
04	1	Paper direction	0 = right to left, 1 = guess what
05	Fix#	Fix number	1
06	dd/mm/yy	Date	13/13/1313
07	hh:mm:ss	Time	23:59:59
08	E: 875855.16	Easting in meters	875855.16
09	N: 5985508.61	Northing in meters	5985508.61

Format Example

```
$@011 13/13/1313 23:59:59 E: 875855.16 N: 5985508.61
```

Database Setup

See description under "OUTPUT SYSTEM DRIVERS".

Controller Setup

Online, except when the "Steered Point" option of this driver has been selected, the appropriate output node must be selected before the driver starts cycling. After going online with the Controller for the first time, select the "Node Output..." option under Settings and select an computation and node for this system.
In case of outputting the Steered Node position, the user has to set up also one or more Steered Points.

3.18.23 Geomap (Fish Positions)

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutFish.exe	*Drivers.io options:*	GEO
Last modified:	1999-Jan-25		

Driver Description

Driver to be used to generate output strings compatible with the geomap system containing position and solution results for a node from the *QINSy* system.
The Fish output driver has a hard coded output format. Output position will always be the current Steered Node, the Line offsets are always calculated for the current selected Mainline

Format Description

Each output sentence is variable in length, depending on the values that are encoded.

```
LineID,Fix#,dd/mm/yy,hh:mm:ss.s,XF.xx,YF.yy,SF.ss,CF.cc,DistAlong.dddd,DistOff.d<CR><LF>
```

Item	*Format*	*Description*	*Values*
01	LineID	Linename or ID	Text
02	Fix#	Fixnumber	
03	Dd/mm/yy	Date of position	e.g. 19/11/98
04	Hh:mm:ss.s	Time of position (UTC)	e.g. 07:45:36.6
05	XF.xx	Easting of fish in survey units	2 decimals
06	YF.yy	Northing of fish in survey units	2 decimals
07	SF.ss	Speed of fish (knots)	2 decimals
08	CF.cc	CMG of fish (degrees)	2 decimals
09	DistAlong.dd	Distance along (KP) line for fish	4 decimals
10	DistOff.d	Distance offline for fish (survey units)	1 decimal

Format Example

```
InPac,0,28/04/99,08:03:32.8,517169.40,5761068.98,2.00,87.80,-0.6278,9.2
InPac,0,28/04/99,08:03:34.8,517171.46,5761069.06,2.00,87.80,-0.6258,9.6
InPac,1,28/04/99,08:03:35.8,517172.49,5761069.10,2.00,87.80,-0.6248,9.8
InPac,1,28/04/99,08:03:36.8,517173.51,5761069.14,2.00,87.80,-0.6238,10.0
InPac,1,28/04/99,08:03:37.8,517174.54,5761069.18,2.00,87.81,-0.6228,10.2
```

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”.

Controller Setup

Online, except when the “Steered Point” option of this driver has been selected, the appropriate output node must be selected before the driver starts cycling. After going online with the Controller for the first time, select the “Node Output...” option under Settings and select an computation and node for this system.
In case of outputting the Steered Node position, the user has to set up also one or more Steered Points.

3.18.24 HOV (HDAS-A) (WinSocket)

3.18.25 HOV (HDAS-B) (WinSocket)

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutHOV.exe	*Drivers.io options:*	*Cmdline: HDAS-A | HDAS-B*
Last modified:	2003-Dec-10		

Driver Description

LAN output driver to send position structure from *QINSy* (Hydrographic Data Acquisition System, HDAS) to Imtech's Navigation Sensor Manager o/b HOV (Hydrografisch Opnemings Vaartuig van de Koninklijke Marine).

Format Description

For HOV navigation and hydrographic survey integration purposes, *QINSy* needs to send a message containing the latest data from its Navigation Filter Module to the two Navigation Sensor Managers. Since there are also two Hydrographic Data Acquisition System (HDAS) workstations, the message includes a zero-terminated string inside of the header part that indicates the sender: “HDAS-A” or “HDAS-B”.
The definition of the struct is as follows.

```
typedef struct _NavFilterModuleMsg
{
   MessageHeader   Header;

   FILETIME        FileTime;            // UTC GPS time

   double          dLatitude;           // WGS84 (position of center of vessel)
   double          dLongitude;          // WGS84 (position of center of vessel)
   double          dHeight;             // Height of waterlevel

   double          dErrorEllipsAxisA;   // in [m]
   double          dErrorEllipsAxisB;   // in [m]
   double          dwErrorEllipsAlpha;  // in degrees, orientation (north related)

   double          dHeading;            // in degrees from North clockwise
   double          dGroundSpeed;        // in [knots], cannot be negative
   double          dGroundDirection;    // in degrees from North clockwise

   double          dPitch;              // in degrees
   double          dRoll;               // in degrees
   double          dYaw;                // in degrees

   double          dSet;                // in degrees
   double          dDrift;              // in [m/s]
   double          dHeave;              // in [m]

   DWORD           dwQuality;           // see enum ONavFilterModuleMsgQuality
}
NavFilterModuleMsg;

typedef struct _MessageHeader
{
   unsigned int    uiMessageId;         // Identifies message uniquely
   unsigned int    uiMessageSize;       // Total size of message including header size
   DWORD           dwMessageCount;      // Incremented each time message is transmitted
   char            strSender[8];        // msg sender ASCII string identifying originator
}
MessageHeader;
```

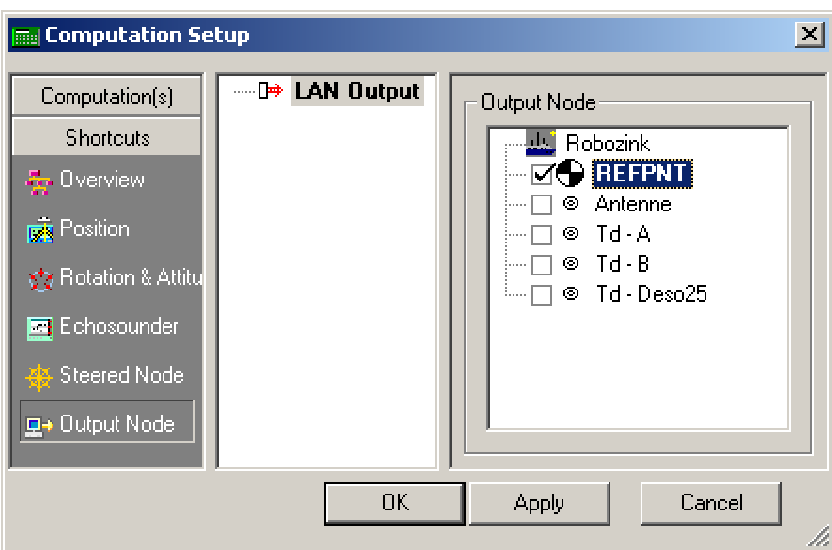
```
'Or' each one of the constants below for each signal that you consider
to be of good enough quality. Leaving out a constant means the
corresponing value should not be used to navigate.

enum ONavFilterModuleMsgQuality
{
   ONavFilterModuleMsgQualityLatitude =          (1 <<  0),
   ONavFilterModuleMsgQualityLongitude =         (1 <<  1),
   ONavFilterModuleMsgQualityErrorEllipsAxis1 =  (1 <<  2),
   ONavFilterModuleMsgQualityErrorEllipsAxis2 =  (1 <<  3),
   ONavFilterModuleMsgQualityErrorEllipsRot =    (1 <<  4),
   ONavFilterModuleMsgQualityHeading =           (1 <<  5),
   ONavFilterModuleMsgQualitySpeed =             (1 <<  6),
   ONavFilterModuleMsgQualitySpeedDirection =    (1 <<  7),
   ONavFilterModuleMsgQualityPitch =             (1 <<  8),
   ONavFilterModuleMsgQualityRoll =              (1 <<  9),
   ONavFilterModuleMsgQualityYaw =               (1 << 10),
   ONavFilterModuleMsgQualitySet =               (1 << 11),
   ONavFilterModuleMsgQualityDrift =             (1 << 12),
   ONavFilterModuleMsgQualityHeave =             (1 << 13),
   ONavFilterModuleMsgQualityHeight =            (1 << 14)
};
```

Sizes of types are based on WIN32. Likewise, FILETIME is a 64-bit value representing the number of 100-nanosecond intervals since January 1, 1601.
The counter dwMessageCount increments one for each message send to a specific receiver.

Database Set-up

Since this is a winsocket driver that uses an TCP/IP network connection, one must select a valid port number and IP number of the other ends computer. For more information regarding setup see description under "OUTPUT SYSTEM DRIVERS".

Controller Setup



Online,
Select in the Computation Setup under Output Node the reference node of the vessel.

3.18.26 LAMs Gyro Position output (Node Output | Steered Point)

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutLAMsGyro.exe	*Drivers.io options:*	STEERED
Last modified:	2002-Sep-25		

Driver Description

Driver to be used to generate output strings compatible with the LAMs Gyro system. The output driver has a hard coded output format. The driver will output filtered positions (lat, lon) on survey datum for a user selected node or the steered node.

Format Description

Field	***Description***
STX	Start of text (ASCII 2)
SP	Space
VES:	Vessel name
SP	Space
DEVT	Start of Device time (Position measurement time)
HH	Hours
SP	Space
MM	Minutes
SP	Space
SS.SS	Seconds and milliseconds (2 decimals)
SP	Space
LAT	Start of Latitude
dd	Degrees
SP	Space
MM.MMMM	Minutes and milliminutes (4 decimals)
SP	Space
h	Hemisphere (N/S)
SP	Space
LON	Start of Longitude
ddd	Degrees
SP	Space
MM.MMMM	Minutes and milliminutes (4 decimals)
SP	Space
h	Hemisphere (E/W)
SP	Space
BLKT	Start of Block time (Data transmission time)
HH	Hours
SP	Space
MM	Minutes
SP	Space
SS.S	Seconds and milliseconds (1 decimals)
SP	Space
ETX	End of text (ASCII 3)

Format Example

```
[STX]VES: DEVT13 27 26.35 LAT47 30.1723 N LON122 36.0001 W BLKT13 27 26.3 [ETX]
```

Database Setup

See description under "OUTPUT SYSTEM DRIVERS".

Controller Setup

Online, except when the "Steered Point" option of this driver has been selected, the appropriate output node must be selected before the driver starts cycling. After going online with the Controller for the first time, select the "Node Output..." option under Settings and select an computation and node for this system.
In case of outputting the Steered Node position, the user has to set up also one or more Steered Points.

3.18.27 VOACZ Video Eventing (Steered Point)

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutFish.exe	*Drivers.io options:*	ACZ & STEERED
Last modified:	2001-Aug-13		

Driver Description

Driver to be used to generate output strings compatible with the VO-ACZ Video Eventing system. The output driver has a hard coded output format. This driver always outputs the last available steered point information. When no new information is available the driver will stop outputting.

Format Description

Each output sentence is fixed in length, since values are truncated or spaces are added until fields are filled.

```
Eas1234567.89 Nor12345678.90 KP1234.567 Lin:123456789012345678901  dd mmm yyyy  hh:mm:ss
```

Item	*Format*	*Description*	*Length*
01	Eas1234567.89	Easting of steered node	label 3, value 10, total 13
02		space	1 character
03	Nor12345678.90	Northing of steered node	label 3, value 11, total 14
04		space	1 character
05	KP1234.567	KP value of steered node	label 2, value 8, total 10
06		space	1 character
07	Lin:LINENAME	Line name	label 4, value 21, total 25
08		spaces	2 characters
09	dd mmm yyyy	Date	total 11
10		spaces	2 characters
11	Hh:mm:ss	Time	total 8

Format Example

```
Eas 544985.55 Nor 7154042.38 KP-675.905 Lin:PIPELINE AS-FOUND      13 Aug 2001  17:31:16
```

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”.

Controller Setup

Online, since the driver always outputs the Steered Node position, user has to set up also Steered Point(s).

3.18.28 ISIS (JD, Soundvelocity, Depth, Fixnumber)

3.18.29 ISIS (Start/Stop Logging)

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutISIS.exe	*Drivers.io cmdline options:*	*PORT3 | PORT4*
Last modified:	2003-July-12		

Driver Description

Driver to output soundvelocity and depth data to Port 3 of the ISIS Acquisition System, or to output start and stop recording commands to Port 4 of the ISIS Acquisition System.

Format Description

ISIS (JD, Soundvelocity, Depth, Fixnumber)

```
ISIS,ttt,ssss.s,dddd.d,ffffff<CR><LF>
```

where `ttt`: Julian day (1..365)
`ssss.s`: Sound velocity [surveyunits/s] (from last sound profile, at fish depth)
`dddd.d`: Depth [surveyunits] (of the fish)
`ffffff`: Fixnumber
`<CR><LF>`: Carriage return + Linefeed

ISIS (Start/Stop Logging)

```
START_LOGGINGJDjjjThhmmFlllSCss_surveyfilename<CR><LF>
```

or

```
STOP_LOGGING<CR><LF>
```

where `jjj`: Julian day (1..365)
`hhmm`: Actual time [hours minutes]
`lll`: Log file number
`ss`: Ships code
`_`: Separator (underscore)
`surveyfilename`: Survey filename (any length)
`<CR><LF>`: Carriage return + Linefeed

Notice that the log file number starts with 1, and will be incremented every new recording session
The shipscode will be the first two characters, defined in the steered point description (administrative) of the first defined object in the template Db Setup.

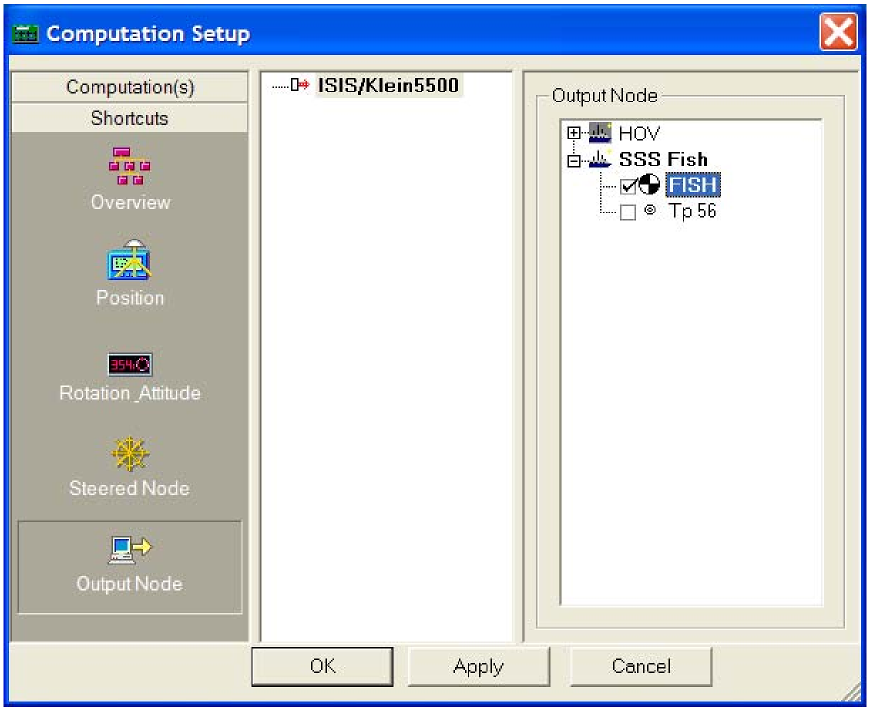
Database Set-up

Add an output system to the database and select the driver “ISIS (JD, Sound Velocity, Depth, Fix Number)” to output to Port 3 of the ISIS Acquisition System. Select the COM port that is connected to Port 3.
Add another output system and select the driver “ISIS (Start/Stop Logging)” to output to Port 4 of the ISIS Acquisition System. Select the correct COM port that is connected to Port 4.

Under the Geodetic Parameters you can set the Vertical Datum for Height results. If you select a MSL model, depths outputted by the “ISIS (JD, Soundvelocity, Depth, Fixnumber)” driver will match the depthrange of the soundvelocity profile

For more information regarding setup see description under “OUTPUT SYSTEM DRIVERS”.

Controller Setup



Online, Select in the Computation Setup under Output Node the reference node of the fish object.

3.18.30 ISIS (Vessel and Fish Positions)

3.18.31 REDAS (Vessel and Fish Positions)

3.18.32 SMD (Vessel and ROV Positions)

3.18.33 DOWTY (Vessel and Fish Positions)

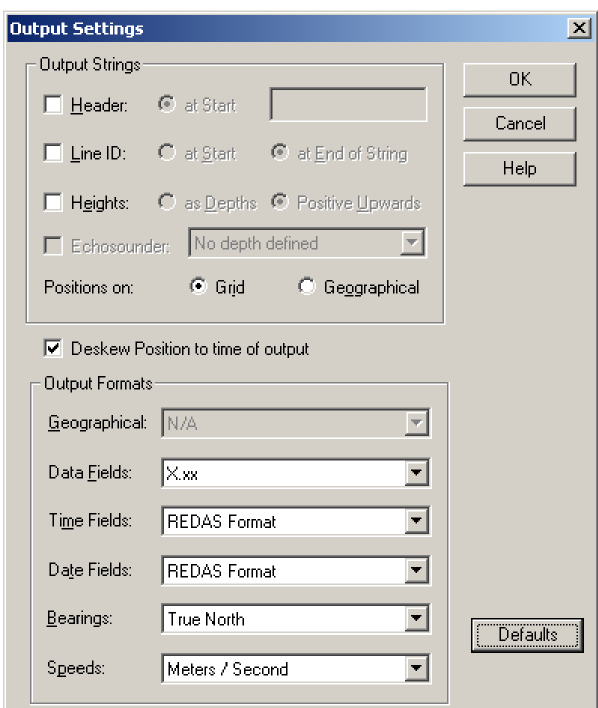
Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutIsisUI.exe	*Drivers.io options:*	ISIS | REDAS | SMD | DOWTY
Last modified:	2002-Oct-21		

Driver Description

Driver to be used to generate output strings containing position and solution results for the vessel and a fish or ROV from the *QINSy* system. Vessel and fish or ROV positions are default skewed to the moment the data is at the output port. System time and GPS time are also skewed to the moment the data is at the output port. Disable the option, "Deskew position to time of output", under Output Settings, if you don't want to deskew the position and time.
The ISIS output driver has hard-coded output fields, but for some fields, different formats are available.

The REDAS output format is almost identical to the ISIS format, except that the default REDAS format does not contain the LineID field, and that the message starts with a asterix ("*") character and ends with an "&" character. The SMD ROV output driver has got the same number of fields with some different formats, some of which can be changed. The DOWTY format is used to annotate Side Scan Sonar records.

Drivers from 2001-May-25 have the option to format some data fields, using the "Output Settings …" button:



Format Description

The ISIS format, the REDAS format & SMD ROV (default) formats each have a variable length, depending on the values that are encoded. The (default) DOWTY format has fixed length of 83 characters including the <CR><LF> combination. The actual length with all these formats depends on the field formats selected.

ISIS Format

```
LineID,Fix#,dd/mm/yy,hh:mm:ss.s,hh:mm:ss.s,XF.xx,YF.yy,SF.ss,CF.cc,XV.xx,YV.yy,
SV.ss,CV.cc,GV.gg,DistAlong.dddd,DistOffline.dd<CR><LF>
```

REDAS Format

```
*Fix#,dd/mm/yy,hh:mm:ss.s,hh:mm:ss.s,XF.xx,YF.yy,SF.ss,CF.cc,XV.xx,YV.yy,
SV.ss,CV.cc,GV.gg,DistAlong.dddd,DistOffline.dd&<CR><LF>
```

Item	*Field*	*Description*	*Format*
01	LineID	Line name or ID	ASCII text
02	Fix#	Fix number	integer value
03	Dd/mm/yy	Date	e.g. 19/11/98
04	Hh:mm:ss.s	1PPS GPS time	e.g. 07:45:36.6
05	Hh:mm:ss.s	Computer time	e.g. 07:44:12.1
06	XF.xx	Easting of fish	2 decimals
07	YF.yy	Northing of fish	2 decimals
08	SF.ss	Speed of fish	units/second (2 decimals)
09	CF.cc	CMG of fish	dec. degrees (2 decimals)
10	XV.xx	Easting of vessel	2 decimals
11	YV.yy	Northing of vessel	2 decimals
12	SV.ss	Speed of vessel	units/second (2 decimals)
13	CV.cc	CMG of vessel	dec. degrees (2 decimals)
14	GV.gg	Gyro of vessel	2 decimals
15	DistAlong.dddd	Kp or Distance along line for fish	4 decimals
16	DistOffline.dd	Distance offline for fish	2 decimals

Format Example

```
InPac,152,28/04/99,07:35:07.6,07:35:07.7,518278.98,5761113.49,1.03,87.79,518278.98,5761113.49,1.03,87.79,90.00,0.07,229.4
InPac,152,28/04/99,07:35:08.6,07:35:08.7,518280.00,5761113.53,1.03,87.79,518280.00,5761113.53,1.03,87.79,90.00,0.07,229.6
```

SMD ROV Format

```
$SMD,Fix#,ddmmyy,hhmmss,hhmmss,XF.xx,YF.yy,SF.ss,CF.cc,XV.xx,YV.yy,SV.ss,CV.cc,
GV.gg,DistAlong.dddd,DistOffline.dd<CR><LF>
```

Item	*Field*	*Description*	*Format*
01	$SMD	Header	"$SMD"
02	Fix#	Fix number	integer value
03	Ddmmyy	Date	e.g. 300699
04	Hhmmss	Computer time	e.g. 074559
05	Hhmmss	1PPS GPS time	e.g. 074559
06	XF.xx	Latitude of ROV	"DDD.MMmmmmm" *(see below)*
07	YF.yy	Longitude of ROV	"DDD.MMmmmmm" *(see below)*
08	SF.ss	Speed of ROV	units/second (2 decimals)
09	CF.cc	CMG of ROV	dec. degrees (2 decimals)
10	XV.xx	Latitude of vessel	"DDD.MMmmmmm" *(see below)*
11	YV.yy	Longitude of vessel	"DDD.MMmmmmm" *(see below)*

12	SV.ss	Speed of vessel	units/second (2 decimals)
13	CV.cc	CMG of vessel	dec. degrees (2 decimals)
14	GV.gg	Gyro of vessel	dec. degrees (2 decimals)
15	DistAlong.dddd	Kp or Distance along line for ROV	(4 decimals)
16	DistOffline.dd	Distance offline for ROV	(2 decimals)

Encoding Notes

The “DDD.MMmmmmm” format field contains latitude or longitude as “degrees (integer; 1-3 characters) – ‘dot’ – minutes (integer part; 2 characters with leading zero’s) – minutes (fractional part; 5 characters).

DOWTY Format

```
D hh:mm:ss mm:dd:yy SS.s GGG.g -Dd:Mm.mmm -Ddd:Mm.mmm -Dd:Mm.mmm -Ddd:Mm.mmm
Xxxx<CR><LF>
```

Item	*Field*	*Description*	*Format*
01	D	Header	“D”
02	Hh:mm:ss	Time	e.g. 23:59:59
03	Mm:dd:yy	Date	e.g. 12:31:88 = 31 December 1988
04	SS.s	Ship’s speed	knots
05	GGG.g	Ship’s heading	True heading in degrees
06	-Dd:Mm.mmm	Latitude of Vessel	On survey datum
07	-Ddd:Mm.mmm	Longitude of Vessel	On survey datum
08	-Dd:Mm.mmm	Latitude of Fish	On survey datum
09	-Ddd:Mm.mmm	Longitude of Fish	On survey datum
10	Xxxx	Contact number	Fixnumber
11	<CR><LF>	Carriage Return & Line Feed character.	

Format Example

```
D 11:41:14 06:05:00 10.0 180.0 -61:17.353  002:17.484 -61:17.356  002;17.482 0210
D 11:41:15 06:05:00 10.0 180.0 -61:17.356  002:17.484 -61:17.359  002;17.482 0211
```

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”.

Controller Setup

Online, click on the ISIS or SMD output driver button in the taskbar.
Select button “Node Selection…” and select the computation and nodes you wish to output for vessel and fish or ROV.
When in the Output Strings, under Output Settings, the option Heights is enabled, than the Height value of the Vessel and Fish / ROV is included in the output datastring, just after the X and Y fields.
When in the Output Strings, under Output Settings, the option Echosounder is enabled, than the raw data value of the selected Echosounder/Altitude or Depth Sensor is included at the end of the output datastring.

ISIS control commands "START_LOGGING" and "STOP_LOGGING" can be sent in between the other *QINSy* to ISIS output data strings. Select button “Output Control…” to enable this option. The start logging command also sends a file name but no directory path. This file name is derived from mainline name (and a counter), but can be changed using the dialog box (be sure to change mainline selection first).

3.18.34 Naval GPS Data Link (PLO)

Input / Output:	Output (User-Interface)	*Driver class type:*	Output
Executable name:	DrvOutMultiPositionUI.exe	*Drivers.io option:*	NAVSEA
Last modified:	2003-Aug-20		

Driver Description

Driver for outputting multiple nodes using the Naval GPS Datalink Controller Output format. The user interface makes it possible to select output computation and node, heading and height reference. There are also options to enter a maximum node age and to enable a node status check before outputting the update.

Format Description

All messages start with "^" and end with <CR><LF>. Individual items are separated by a space ("_").

#	*Format*	*Item Description*	*Values, Range, Units*
01	^	Header	"^" (5E Hex or ASCII 94)
02	XXX_	Heading or CMG	TRUE, user interface
03	X_	Time Slot	1 to 8, user interface
04	HH:MM:SS_	Time	UTC if available, or system time
05	DD:MM.MMMMN_	Latitude	WGS84 if available, or survey datum
06	DDD:MM.MMMMN_	Longitude	WGS84 if available, or survey datum
07	X_	GPS Quality	PLO input value if available
08	XX_	Satellites Used	presently always set to zero
09	XX.XX_	Horizontal DOP	PLO input value if available
10	XXXXX.XX_	Elevation	see below, user interface
11	XX	Checksum	00 to FF
33	<CR><LF>	Terminators	<CR><LF> (0D Hex, 0A Hex)

Note. The checksum adds the ASCII value of each character starting with the '^' and ending with the space prior to the checksum. Only the lower 8 bits of the checksum are saved and displayed at the end of the line.

Format Example

```
^025 1 11:07:13 47:41.092200N 122:19.343912W 2 04 2.5 12.37 B4
^025 2 11:07:13 47:41.092200N 122:19.343912W 2 05 2.5 24.74 BA
```

Drivers.io Options

Drivers.io command line parameter controls the output data format:

"NAVSEA" "Naval GPS Data Link" output format
"SUBSEA" "Subsea Telemetry" output format
"STATOIL" "Statoil Data Server" output format
"GEOLAB" "GeoLab ESP Annotator" output format

(continued on next page)

Registry Options

`[HKEY_CURRENT_USER\Software\QPS\QINSy\7.0\Drivers\PLO\Settings]`

The following 3 PLO input/output driver setup parameters are read from registry: time separator character (by default ':'), UTC GPS time indication ('U' or 'G', by default 'U'), and height unit (1 to 14, by default 1). The height units are according to the *QINSy* unit.dll, 1 is meters, 2 is feet, 3 is yards, 4 is US survey feet.

These driver setup parameters are also used by a Naval GPS Data Link (PLO) input driver if this driver has got a command line parameter "REG". See the description of the Naval GPS Data Link (PLO) input driver.

Database Setup

See description under "OUTPUT SYSTEM DRIVERS".

3.18.35 Meteo Report Generator (WMO – SYNOP)

Input / Output:	Output	*Driver class type:*	File Output
Executable name:	DrvMeteoReport.exe	*Drivers.io options:*	*none*
Last modified:	2003-01-27		

Driver Description

The Weather Report Generator generates a SYNOP report. This is a weather report sent from ships (manned platforms). The weather report is created using sensor data and human observations. A SYNOP report is to be generated on the synoptic hours (00:00Z, 06:00Z, 12:00Z and 18:00Z).

Format Description

Field	***Format***	***Description***	***Values, Range, Units***
0	BBXX	Message identifier	
1	SHIP	Call sign vessel	SHIP for navy vessels
2	YYGGIw	YY = day of the month, GG = hour (GMT), Iw = wind indicator	Ix = 1 which means that the wind speed is measured in meters / second
3	99LLLa	99 = position field identifier, LLLa = latitude	Latitude is in tenths of degrees: 35°45’ = 357 07°17’ = 072
4	QLLLLo	Q = quadrant LLLLo = longitude	Quadrant: 1 = NE, 3 = SE, 5 = SW, 7 = NW Longitude is in tenths of degrees: 090°03’ = 0900 000°59’ = 0009 179°02’ = 1790
5	IrIxhVV	Ir = precipitation indicator Ix = station indicator h = Cloud base height VV = Visibility	Ir = 4 which means that the precipitation is not measured Ix = 1: manned station HVV: see lookup tables
6	Nddff (00fff)	N = total cloud coverage dd = wind direction ff = wind speed (< 99 m/s) 00fff = wind speed (> 99 m/s)	N: see lookup table dd: direction in degrees: (085-094) 090° = 09 (175-184) 180° = 18 ff = wind speed in m/s fff = wind speed in m/s When the wind speed exceeds 99 m/s 00fff is outputted and ff is 99.
7	1SnTTT	1 = Air temperature identifier Sn = sign of temperature TTT = air temperature	Sn: 0 positive, 1 negative TTT: in tenths of °C
8	2SnTTTd	2 = Dew point temperature identifier Sn = sign of temperature TTTd = dew point temperature	Sn: 0 positive, 1 negative TTTd: in tenths of °C
9	4PPPP	4 = Atmospheric pressure identifier PPPP = pressure	PPPP: pressure in tenths of millibar (hPa) 1020.5 hPa = 0205 0995.4 hPa = 9954

10	5APPP	5 = Pressure tendency identifier A = tendency character PPP = pressure difference in past 3 hours	A: see lookup table PPP: pressure in tenths of millibar (hPa) 10.5 hPa = 105 -15.4 hPa = 154 (sign is captured in A)
11	7wwW1W2	7 = Weather type identifier ww = present weather type W1 = weather type past 12 hours W2 = weather type past 24 hours	See lookup tables for weather codes
12	8NhClCmCh	8 = Clouds iidentifier Nh = base cloud coverage Cl = low cloud type Cm = medium cloud type Ch = high cloud type	See lookup tables for weather codes
13	9GGgg	9 = Time identifier GG = hours (GMT) gg = minutes	
14	222DsDv	222 = Course and speed identifier Ds = course over past 3 hours Dv = speed over past 3 hours	See lookup tables for weather codes
15	0SsTTTw	0 = Water temperature identifier Ss = sign and type of measurement TTTw = temperature	Ss: see lookup table TTTw: in tenths of °C
16	2PPwHHw	2 = Sea wave identifier PPw = wave period HHw = wave height	PPw in seconds HHw in meters
17	3DDw1DDw2	3 = wave direction identifier DDw1 = predominant wave direction DDw2 = secondary wave direction	Ten degrees accurate: 090° = 09 140° = 14
18	4PPw1HHw1	4 = Predominant wave identifier PPw1 = wave period HHw1 = wave height	PPw1 in seconds HHw1 in meters
19	5PPw2HHw2	5 = Secondary wave identifier PPw2 = wave period HHw2 = wave height	PPw2 in seconds HHw2 in meters
20	6IsEEsRs	6 = Accretion identifier Is = cause of accretion EEs = accretion thickness Rs = Situation and trend of accretion	Is, Rs: see lookup tables EEs: thickness in cm
21	ICE csbdz	ICE = sea ice identifier C = concentration or arrangement S = Stage of development B = Ice of land origin D = Principal ice edge Z = Situation and trend	See lookup tables
22	8SwTTTb	8 = Wet bulb temperature identifier Sw = sign and type of measurement TTTb = temperature	Ss: see lookup table TTTb: in tenths of °C

Format Example

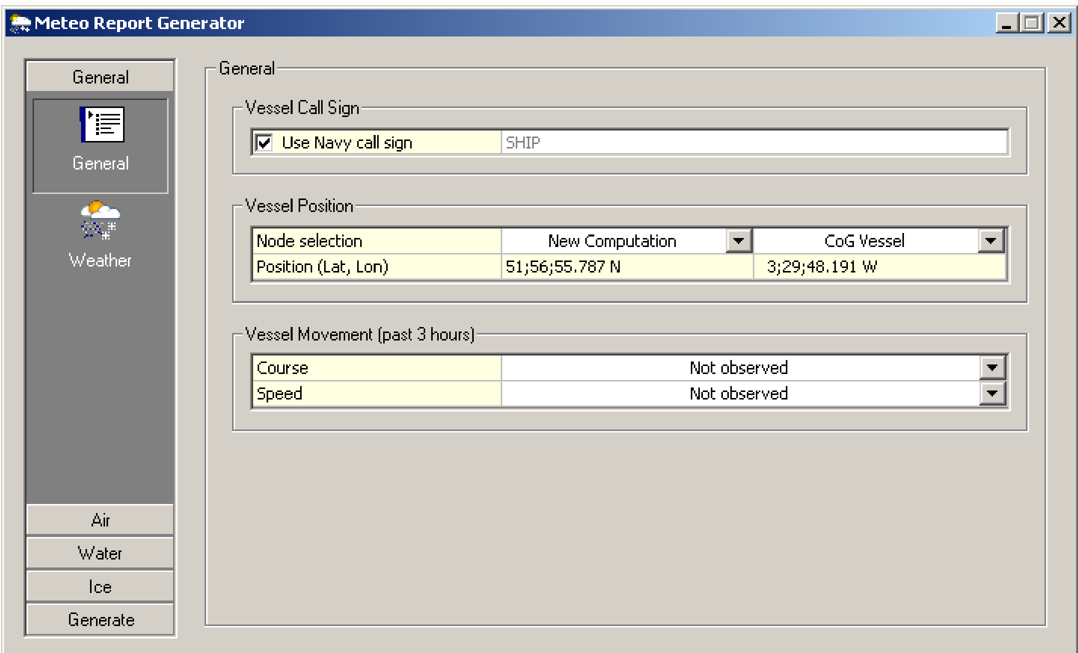
```
BBXX SHIP 27091 99519 70035 41/99 /0000 10000 20000 40000 54000 70000 8/000
90840 2229/ 00000 20000 3//// 20000
```

Database Setup

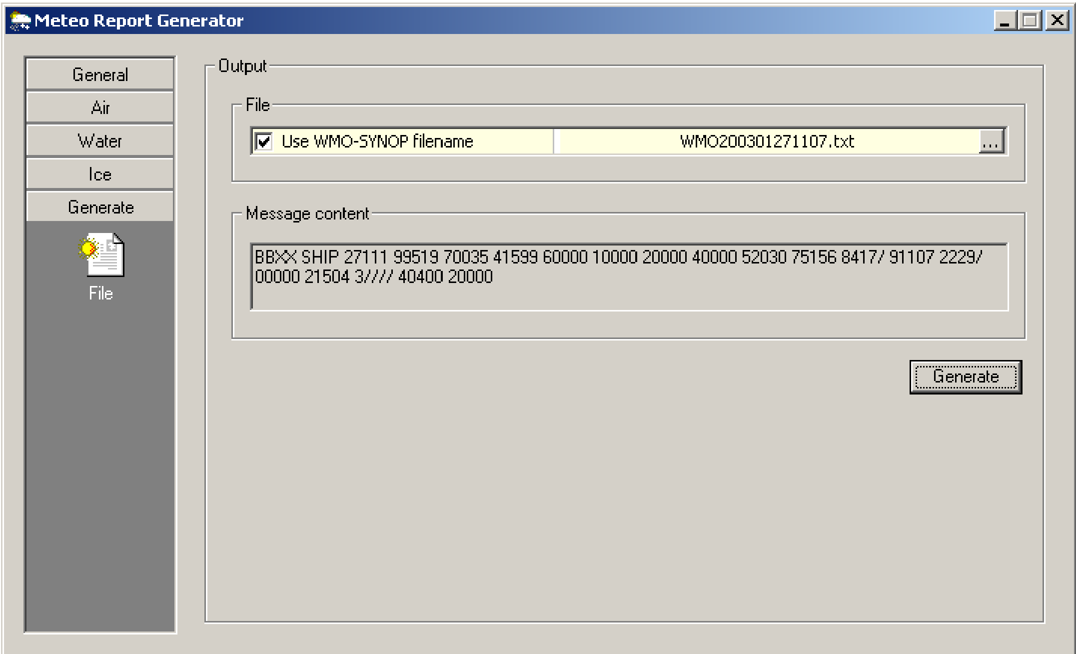
To create a database, which uses this driver, choose the following options. Create a new system. Choose *Output System* and find the driver named *Weather Report Generator (WMO-SYNOP)*. No other options have to be chosen.

Controller Setup

First time online, select a computation and node for this output driver on the *General* page.



On the synoptic hours the user is supposed to walk through all the pages and check if all the settings are still valid. If not the settings have to be changed. On the last page a preview can be seen of the report that will be generated. By default the filename is set to the WMO standard (WMOyyyymmddhhmm: date and time) and will update every minute. The default path is the *Export* folder, which is chosen in the *Console*.



When the file is generated a message box appears.

3.18.36 NMEA Autopilot Strings Output Driver

3.18.37 NMEA Autopilot Strings (Steered Point) Output Driver

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutAutopilot.exe	*Drivers.io options:*	*format | factor*
Last modified:	2001-March-13		

Driver Description

Driver for outputting an ASCII NMEA string to an Autopilot, output every *QINSy* update. The update-rate can be defined as system property in DB Setup. The string may contain either only the APA sentence, or the VHW and ABP sentences, or the BWW and XTE sentences, or the SSA and SSD and SSX sentences for the selected node (The latter sentences are typically used by an E.M.R.I. SEM200 Autopilot and Track Controller).

In case the second driver has been selected, the output node used for the calculation will always be the current Steered Node.

Format Description

`$--APA,A,A,x.x,a,N,A,A,x.x,a,c--c[*hh]<CR><LF>`

--: Talker identifier, controlled by Drivers.io command line.
A: Status, 'A' = data valid, 'V' = reliable fix not available
A: Status, always 'A'
x.x Magnitude for cross track error (XTE)
a: Direction to steer 'L' = Left, 'R' = Right
N: XTE units, 'N' = Nautical miles
A: Status: 'A' = Arrival circle entered, always set to 'V'
A: Status, perpendicular passed at way point, always set to 'A'
x.x: Bearing origin to waypoint
a: Magnetic / True, 'M' or 'T'
c—c: Destination waypoint ID, set to main line ID
hh: Checksum, controlled by Drivers.io command line.

`$--APB,A,A,x.x,a,N,A,A,x.x,a,c--c,x.x,a,x.x,a,a[*hh]<CR><LF>`

--: Talker identifier, controlled by Drivers.io command line.
A: Status, 'A' = data valid, 'V' = reliable fix not available
A: Status, always 'A'
x.x Magnitude for cross track error (XTE)
a: Direction to steer 'L' = Left, 'R' = Right
N: XTE units, 'N' = Nautical miles
A: Status: 'A' = Arrival circle entered, always set to 'V'
A: Status, perpendicular passed at way point, always set to 'A'
x.x: Bearing origin to waypoint
a: Magnetic / True, 'M' or 'T'
c—c: Destination waypoint ID, set to main line ID
x.x: Bearing present position to destination
a: Magnetic / True, 'M' or 'T'
x.x: Bearing to steer to destination waypoint

a: Magnetic / True, 'M' or 'T'
a: Mode indicator (left blank)
hh: Checksum, controlled by Drivers.io command line.

$--VWH,x.x,T,x.x,M,x.x,N,x.x,K[*hh]<CR><LF>

--: Talker identifier, controlled by Drivers.io command line.
x.x: True Heading, degrees
T: 'T', True
x.x: heading, degrees (not used)
M: 'M', magnetic
x.x: Speed
N: 'N', knots
x.x: Speed, (not used)
K: 'K', km/hr
hh: checksum, controlled by Drivers.io command line.

$--BWW,x.x,T,x.x,M,c--c,c--c[*hh]<CR><LF>

--: Talker identifier, controlled by Drivers.io command line.
x.x: True Heading, degrees
T: 'T', True
x.x: heading, degrees (not used)
M: 'M', magnetic
c—c: TO waypoint ID, set to main line ID
c—c: FROM waypoint ID, set to main line ID
hh: checksum, controlled by Drivers.io command line.

$--XTE,A,A,x.x,a,N[*hh]<CR><LF>

--: Talker identifier, controlled by Drivers.io command line.
A: Status, 'A' = data valid, 'V' = reliable fix not available
A: Status, always 'A'
x.x Magnitude for cross track error (XTE)
a: Direction to steer 'L' = Left, 'R' = Right
N: XTE units, 'N' = Nautical miles
hh: checksum, controlled by Drivers.io command line.

For a description of the $--VTG message refer the *NMEA GPGGA-GPVTG (Skewed Position).*

Format Example

```
$IIVHW,227.1,T,,,0.4,N,,<CR><LF>
$IIAPB,A,A,0.0045,R,N,V,A,37.70,T,01,37.70,T,,<CR><LF>
$CCAPA,A,A,0.2655,R,N,V,A,50.2,T,Test*3A<CR><LF>
$IIVTG,32.0,T,,M,5.00,N,9.26,K<CR><LF>
```

Format Description EMRI SEM200 Autopilot specific messages

(following is an extract from EMRI SEM200 System Description Manual, 8307-3-1.lwp)

`$PESSA,,XXX.X,,,,,,,,,[*hh]<CR><LF>`

$PESSA:	Proprietary EMRI Steering System Sentence A.
XXX.X:	Autopilot Course To Steer, in degrees. It is the linebearing of the current mainline/section. If the current line is curved, it will be the tangential course of the current position on the curved track.
hh:	checksum, controlled by Drivers.io command line.

All other fields not used.

$PESSD,,,RRAD,N,,,,,,R,G,I,T,OPTI,,OPTII[*hh]<CR><LF>

$PESSD:	Proprietary EMRI Steering System Sentence D.
RRAD:	Requested Radius Of Turn (Range 0.10 – 9.99 NM) in Nautical Miles. It is the radius of the current mainline/section . If the vessel is on a straight track, it will be the minimum allowed value of 0.10 NM.
R:	Means Remote operating mode.
G:	Means Gyro steering mode.
I:	Means Immediate course change mode.
T:	Means Track control mode.
OPTI:	Option field I. Set to “2000”, activating the Navigation Computer Control Lamp
OPTII:	Optional Flag II. Set to “4000” if position is on a curved line/section. Empty field when on a straight track.
hh:	checksum, controlled by Drivers.io command line.

All other fields not used.

$PESSX,XX.X,L,XXX.X,[*hh]<CR><LF>

$PESSX:	Proprietary EMRI Steering System Sentence X.
XX.X:	XTE, Cross track Error in meters (Always positive)
L:	“L” = Steer left, “R” = Steer right
XXX.X:	HSC, Heading to Steer Command in degrees. It will be the linebearing of the next line/section.
hh:	checksum, controlled by Drivers.io command line.

All other fields not used.

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”.

Controller Setup

Online, except when the “Steered Point” option of this driver has been selected, the appropriate output node must be selected before the driver starts cycling. After going online with the Controller for the first time, select the “Node Output...” option under Settings and select an computation and node for this system.
In case of outputting the Steered Node position, the user has to set up also one or more Steered Points.

Drivers.io Options

The first 2 characters of the first command line argument control which talker id is used in the output sentences. Other characters following this talker id that may be used are:

A: Output $--APA sentence
B: Output $--APB sentence
C: Output $--VHW sentence
D: Output $--BWW sentence
E: Output $--XTE sentence
F: Output $--SSA sentence
G: Output $--SSD sentence
H: Output $--SSX sentence
I: Output $--VTG sentence

V: Skew output position and it's derivations like cross track error to real time
W: Output only when recording
X: Output steered node
Y: Mainline ID (not name)
Z: Add checksum to sentences

The second command line argument is a multiplication factor that will be applied to the cross track error (XTE) before it is output. Use a factor greater than 1 to simulate a high-performance autopilot system.

3.18.38 NMEA GPGGA-GPVTG (Skewed Position)

3.18.39 NMEA GPGGA-GPVTG (Skewed Steered Point)

3.18.40 NMEA GPGGA-GPVTG (Steered Point)

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutNMEA.exe	*Drivers.io options:*	*format* | *various*
Last modified:	2001-Nov-16		

Driver Description

Driver for NMEA-0183 $GPGGA and $GPVTG output strings. Driver to be used to generate output strings containing position and solution results from the *QINSy* system.

The NMEA output driver has three different types of output modes:

1. Skewed Position — position at update time with update time; age is 0 seconds by definition
2. Steered Point — position for currently active steered point, determined by the Controller
3. Sounding Datum — output height above sounding datum instead of WGS84

Format Description

Each $GPGGA sentence is variable in length, depending on the altitude and age values that are encoded. However, most fields in the string are of fixed length; only altitude and age fields are of variable length. Refer to *NMEA 0183- Standard For Interfacing Electronic Devices - Version 2.30* for more information.

```
$GPGGA,hhmmss.ss,ddmm.mmmm,a,dddmm.mmmm,a,Q,nn,h.h,a.a,M,g.g,M,s.s,iiii*hh<CR><LF>
```

#	*Format*	*Description*	*Values*
01	“$”	start character	“$” (24 Hex)
02	aaccc	address field	“GPGGA”
04	hhmmss.ss	UTC of position (hours,minutes,seconds)	0…23, 0…59, 0.00…59.99
06	ddmm.mmmm	latitude on WGS84 (degrees, minutes)	0…90, 0.00…59.9999 (4 decimals)
08	a	latitude on WGS84 (northern or southern)	“N” or “S”
10	ddmm.mmmm	longitude on WGS84 (degrees, minutes)	0…180, 0.00…59.9999 (4 decimals)
12	a	longitude on WGS84 (eastern or western)	“E” or “W”
14	Q	GPS quality indicator	0 = fix not available or invalid; 1 = GPS SPS mode, fix valid; 2 = DGPS SPS mode, fix valid
16	nn	number of satellites in use (≠ in view)	00…12
18	h.h	HDOP (horizontal dilution of precision)	
20	a.a	antenna altitude above WGS84 (not MSL)	
22	“M”	altitude units (meters)	“M”
24	g.g	geoidal separation above ellipsoid	“0.0” (NOT USED)
26	“M”	altitude units (meters)	“M”
28	s.s	age of differential GPS data	
30	iiii	differential reference station id	“” (NOT USED)
31	“*”	checksum field delimiter	“*” (2A Hex)
32	hh	checksum (XOR from “$” to “*” exclusive)	
33	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

```
$GPVTG,x.x,T,x.x,M,x.x,N,x.x,K*hh<CR><LF>
```

#	*Format*	*Description*	*Values*
01	"$"	start character	"$" (24 Hex)
02	aaccc	address field	"GPVTG"
04	x.x	course over ground (degrees True)	0…360
06	"T"	course over ground (degrees True)	"T"
08	x.x	course over ground (degrees Magnetic)	0…360
10	"M"	course over ground (degrees Magnetic)	"M"
12	x.x	speed over ground (Knots)	
14	"N"	speed over ground (Knots)	"N"
16	x.x	speed over ground (Km/hr)	
18	"K"	speed over ground (Km/hr)	"K"
19	"*"	checksum field delimiter	"*" (2A Hex)
20	hh	checksum (XOR from "$" to "*" exclusive)	
21	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)

Encoding Notes

QINSy does not encode the geoidal separation and reference station id fields. Latitude and longitude are always given in 4 decimals. The antenna altitude is given with respect to the WGS84 ellipsoid.
The age of the differential data will be the age value of the most recent differential correction observation, since each correction observation can have its own age (especially in case of a Sercel HF link).

STEERED POINT OUTPUT

If the computation fails for the current steered point, its position will be predicted for the number of seconds set in the Filter option in the Controller (default 10 seconds) and then changed automatically to the next steered point. If there is no more steered point left, the last known position will be outputted.

With DGPS, the quality indicator Q will be 2 in case everything is OK. Q stays 2 during prediction. If the prediction is caused by No Diff (Stale Corrections), then the number of satellites in use stays the number of satellite observations. If the prediction is caused by e.g. No SVs, then the number of satellites drops to 0.
If the prediction time exceeds 10 seconds, Q will change to 1. This 10 seconds is hard-coded in the driver.
If the filter prediction time is passed, the Controller will swap to the next steered node. If there is no next steered node defined, output will be the last known position, and Q = 0.

If the steered node position comes from an computation that does not contain differential corrections, e.g. with standalone GPS, Q is always 1, also during prediction, and swaps to 0 when prediction time is over. During prediction, the number of satellites will drop to 0. The age of the differential data will always be 0.

Database Setup

See description under "OUTPUT SYSTEM DRIVERS".

Controller Setup

Online, except when the "Steered Point" option of this driver has been selected, the appropriate output node must be selected before the driver starts cycling. After going online with the Controller for the first time, select the "Node Output..." option under Settings and select an computation and node for this system.
In case of outputting the Steered Node position, the user has to set up also one or more Steered Points.

3.18.41 NMEA GPGGA ROV Output Driver

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutGPGGAROV.exe	*Drivers.io options:*	
Last modified:	2000-Jul-20		

Driver Description

Driver for outputting an ASCII NMEA GPGGA string, output every *QINSy* update. The update-rate can be defined as system property in DB Setup. The latitude and longitude fields in the string refer to the position of the selected “Position Node”. The height field in the output string contains the height difference between a “Reference Node” and a “Target Node”, which could differ from the “Position Node”.

Format Description

Each $GPGGA sentence is variable in length. Refer to *NMEA 0183- Standard For Interfacing Electronic Devices - Version 2.30* for more information.

```
$GPGGA,hhmmss.ss,ddmm.mmmmmm,a,dddmm.mmmmmm,a,Q,nn,h.h,a.a,M,g.g,M,s.s,iiii*hh<CR><LF>
```

#	*Format*	*Description*	*Values*
01	“$”	start character	“$” (24 Hex)
02	aaccc	Address field	“GPGGA”
04	hhmmss.ss	UTC of position (hours,minutes,seconds)	0…23, 0…59, 0.00…59.99
06	ddmm.mmmmmm	Latitude on WGS84 (degrees, minutes)	0…90, 0.00…59.999999 (6 decimals)
08	a	Latitude on WGS84 (northern or southern)	“N” or “S”
10	dddmm.mmmmmm	Longitude on WGS84 (degrees, minutes)	0…180, 0.00…59.999999 (6 decimals)
12	A	Longitude on WGS84 (eastern or western)	“E” or “W”
14	Q	GPS quality indicator	0 = fix not available or invalid; 1 = GPS SPS mode, fix valid
16	Nn	Number of satellites in use	“” (NOT USED)
18	h.h	HDOP (horizontal dilution of precision)	
20	a.a	Height difference	
22	“M”	Altitude units (meters)	“M”
24	g.g	Geoidal separation above ellipsoid	“” (NOT USED)
26	“M”	Altitude units (meters)	“M”
28	s.s	age of differential GPS data	“” (NOT USED)
30	iiii	Differential reference station id	“” (NOT USED)
31	“*”	Checksum field delimiter	“*” (2A Hex)
32	hh	Checksum (XOR from “$” to “*” exclusive)	
33	<CR><LF>	Termination characters	<CR><LF> (0D Hex, 0A Hex)

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”.

Controller Setup

Online, the appropriate output nodes must be selected before the driver starts cycling. After going online with the Controller for the first time, select the “Change Nodes...” option in the output driver’s dialog and select the appropriate computation and nodes.

3.18.42 PGS NAV Header (Node Output | Steered Point)

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutPGSNavHdr.exe	*Drivers.io options:*	STEERED
Last modified:	1997-Oct-06		

Driver Description

Driver for PGS Nav Header output strings. Driver to be used to generate output strings every *QINSy* fix update, containing the current line name, the fix number, date and time of position, and the easting and northing from the *QINSy* system to a Dragged Array onboard PGS OBC vessels. Two output modes are:

3. position for currently selected output position, as set in the Controller's Options;
4. Steered Point position for currently active steered point, determined by the Controller (Online).

Format Description

There are two different formats for PGS NAV headers: one for Dragged Array (DA); and one for Vertical Cable (VC), which is not implemented yet. Each PGS NAV header field separated by a comma delimiter. Notice the additional trailing comma. The data string is terminated by <CR><LF>. Dragged Array (DA):

Item	*Format*	*Description*	*Length and Alignment*
1	cccccccccc…	line name	at least 10 chars; left-aligned
2	nnnnn…	shot point	at least 5 chars; right-aligned
3	hh:mm:ss	time of position (hours:minutes:seconds)	8 chars (fixed length)
4	dd-mm-yyyy	date of position (day-month-year)	10 chars (fixed length)
5	e.e	easting	(1 decimal accuracy)
6	n.n	northing	(1 decimal accuracy)
7	<CR><LF>	termination characters	carriage return | line feed

Format Examples

```
L4-0383   ,  845,16:46:39,08-05-1997,499658.1,6838178.4,<CR><LF>

L2-1120   , 1386,14:04:10,09-16-1997,522891.3,6681293.7,<CR><LF>
```

Encoding Notes

The output rate of the PGS header is every fix. The last calculated position will be skewed to the time of fix.
Steered Point Output If the computation fails for the current steered point, its position will be predicted for the number of seconds set in the Filter option in the Controller (default 10 s) and then changed automatically to the next steered point. If there is no more steered point left, the last known position will be outputted.

Database Setup

See description under "OUTPUT SYSTEM DRIVERS".

Controller Setup

Online, except when the "Steered Point" option of this driver has been selected, the appropriate output node must be selected before the driver starts cycling. After going online with the Controller for the first time, select the "Node Output..." option under Settings and select an computation and node for this system.
In case of outputting the Steered Node position, the user has to set up also one or more Steered Points.

3.18.43 Pseudo Artemis (Range-Bearing)

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutPseudoArtemisUI.exe	*Drivers.io options:*	*none*
Last modified:	1998-Jun-17		

Driver Description

Driver (with user interface) for outputting Pseudo-Artemis strings, containing a range and bearing between a (fixed) station and the current position, output every *QINSy* update. The update-rate can be defined as system property in DB Setup. Online, the coordinates of the Pseudo-Artemis station must be entered as easting and northing on the survey datum. Current position can be either the steered node or any node from an existing computation. The output to a DP system can be in four different formats, two binary encoded messages and two ASCII messages. It is also possible to temporarily hold the output. The user can optionally be notified when the output range exceeds predefined limits by enabling an alert option in the drivers dialog window.

Format Description

The following four peripheral output telegram formats are available in the *QINSy* Pseudo-Artemis driver:

5) KA-BCD(0.1) 7 byte BCD telegram, distance resolution of 1.0m, azimuth resolution of 0.01º.
6) KA-BCD(0.01) 7 byte BCD telegram, distance resolution of 1.0m, azimuth resolution of 0.001º.
7) ASCII-16 16 character ASCII string, distance resolution of 0.1m, azimuth resolution of 0.01º.
8) ASCII-17 17 character ASCII string, distance resolution of 0.1m, azimuth resolution of 0.001º.

KA-BCD(0.1)		
Byte	***Description Bit 7-6-5-4***	***Description Bit 3-2-1-0***
1	AZM x 100	AZM x 10
2	AZM x 1	AZM x 0.1
3	0000	AZM x 0.01
4	DIST x 10000	DIST x 1000
5	DIST x 100	DIST x 10
6	0000	DIST x 1
7	1111	1111
KA-BCD(0.1)		
Byte	***Description Bit 7-6-5-4***	***Description Bit 3-2-1-0***
1	AZM x 100	AZM x 10
2	AZM x 1	AZM x 0.1
3	AZM x 0.01	AZM x 0.001
4	DIST x 10000	DIST x 1000
5	DIST x 100	DIST x 10
6	0000	DIST x 1
7	1111	1111

(continued on next page)

ASCII-16		
Char	**Description**	**Values**
1	DISTANCE x 10000	
2	DISTANCE x 1000	
3	DISTANCE x 100	
4	DISTANCE x 10	
5	DISTANCE x 1	
6	DISTANCE x 0.1	
7	‘SPACE’	space character (0x20)
8	AZIMUTH x 100	
9	AZIMUTH x 10	
10	AZIMUTH x 1	
11	AZIMUTH x 0.1	
12	AZIMUTH x 0.01	
13	‘SPACE’	space character (0x20)
14	‘READY’	1 = data valid, 0 = data not valid
15	<CR>	carriage return (0x13)
16	<LF>	line feed (0x10)
ASCII-17		
Char	**Description**	**Values**
1	DISTANCE x 10000	
2	DISTANCE x 1000	
3	DISTANCE x 100	
4	DISTANCE x 10	
5	DISTANCE x 1	
6	DISTANCE x 0.1	
7	‘SPACE’	space character (0x20)
8	AZIMUTH x 100	
9	AZIMUTH x 10	
10	AZIMUTH x 1	
11	AZIMUTH x 0.1	
12	AZIMUTH x 0.01	
13	AZIMUTH x 0.001	
14	‘SPACE’	space character (0x20)
15	‘READY’	1 = data valid, 0 = data not valid
16	<CR>	carriage return (0x13)
17	<LF>	line feed (0x10)

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”.

Controller Setup

The node which is to be used for calculating the output values has to be selected in the driver dialog.

3.18.44 Range Site Data Format (Geodesic)

Input / Output:	Output (User-Interface)	*Driver class type:*	Output
Executable name:	DrvOutRSDFUI.exe	*Drivers.io options:*	
Last modified:	2004-Mar-19		

Driver Description

Driver for US Navy's Naval Undersea Warfare Center (NUWC) RSDF position, heading and speed data. The Range Site Data Format (RSDF) and Range Site Data Format Geodesic (RSDFG) are used to send data from remote ranges to NUWC Keyport's Range Information Display Center (RIDC) over a high speed data link. The RSDF input driver can be used together with the RSDF output driver to buffer the input data stream, insert and convert position records and/or change the RSDF format, and output the updated data stream.

Format Description

See for more information on the Range Site Data Format (Geodesic), the documentation from the NUWC.

Encoding Notes

The output format for position records depends on the selected output driver. If an RSDF input driver is running, it will buffer incoming records and the RSDF output driver will operate in "pass through" mode.

If the RSDF output driver is operating in "pass through" mode, any position present in the records that are passed through is converted to WGS84 latitude, longitude, altitude or in tangent plane coordinates (X, Y, Z) depending on the format with which the output driver is started. If positions are both passed through and modified by *QINSy*, the latter positions will prevail. The modified position will then be put in a PG record format to replace the original position, even if this was incoming in another position record format.

With the driver in "pass through" mode, all generated positions are added to the received blocks. This means that a position created on 2003-07-18 15:01.45 will be added to a block for e.g. 2003-07-18 15:02.00 with a timing offset of 550 ms. No blocks will be created, even if incoming blocks are missed. In the "output only" mode, blocks will be generated at a frequency depending on the update rate as entered in the database.

Records that are either always encoded or can be encoded by the RSDF-RSDFG output driver are:

- SR - Run Security
- HR - Run ID Header
- MK - Mark Information
- HS - Run Statistics Header
- PP - Processed PSK Data
- PC - Processed Cinesextant Data
- PG - Processed GPS
- PR - Processed Radar
- TC - Trailer Comments
- ED - End Record
- BC - Block Byte Count
- CS - Checksum Information

Encoding Notes (continued)

More information on encoding can be found in the QPS “RSDF I/O Driver Detailed Design” document.

SR record. The “security classification” field is obtained from the “survey type” field in the “general” category of the database. Record is not modified if the driver is operating in “pass through” mode.

HR record. The “sequence number” field contains *QINSy* sequence number, the “mark” field contains first part of object name, the “mod” field contains second part of object name, the “register” field contains third part of object name, the “run plan” field contains *QINSy* line name. An underscore character (“_”) should separate parts of object name in the *QINSy* database. Not modified if operating in “pass through” mode.

MK record. All fixed nodes present in the database will be outputted as MK records at the start of a run.

HS record. The “date” and “time” fields are filled with UTC or local time. The “security class” field is based on the contents of the “survey type” field in the “general” category of the database setup program. The “point count A” field contains an incrementing output counter since the output driver was started. “event count B” and “signals” fields are always empty. Record is not modified if driver is operating in “pass through” mode.

PG record. Default record to output positions computed by *QINSy*. Type can be changed in registry.

TC record. Trailer comment is passed through, altered (or added) depending on the driver UI option.

ED record. By default, the end of data signifier is “9999”, but this number can be changed in registry.

BC or CS record. The block byte count and checksum record is always updated by *QINSy*. By default, the “BC” record is used, but this can be replaced by the “CS” record, by changing the appropriate registry key.

Registry Options

`[HKEY_CURRENT_USER\Software\QPS\QINSy\7.0\Drivers\RSDF\Settings]`

Registry Key	***Default***	***Records***	***Description, Values***
Year Modulus	1900	HS	year number to add to decoded year value
Time Frame	1	HS	block time not used (0), UTC (1) or local time (2)
Timing Offset	0	PF,PG,PP,PR	offsets not used (0), to be added (1) or subtracted (2)
Length Unit	4	PF,PG,PP,PR	meters (1), int. feet (2), yards (3), US survey feet (4)
Convert Heights	0	PF,PG,PP,PR	update height information during conversions
Convert Courses	0	PF,PG,PP,PR	update course information during conversions
Position Record	PG	PF,PG,PP,PR	default record type to output *QINSy* positions
CheckSum Record	BC	BC,CS	default record type to end a block of records
Object Separator	“_”	HR	default character to separate object name

Note. If HS Time Frame is set to 2, then HS block times are supposed to be in the local system time of the computer on which *QINSy* is running. Timetags are converted from UTC using the local time zone setting.

Note. The Timing Offset key is also used by the RSDF input driver, where 0 and 2 have different meanings. Since the RSDF output driver always computes a timing offset, only the registry value 1 is important.

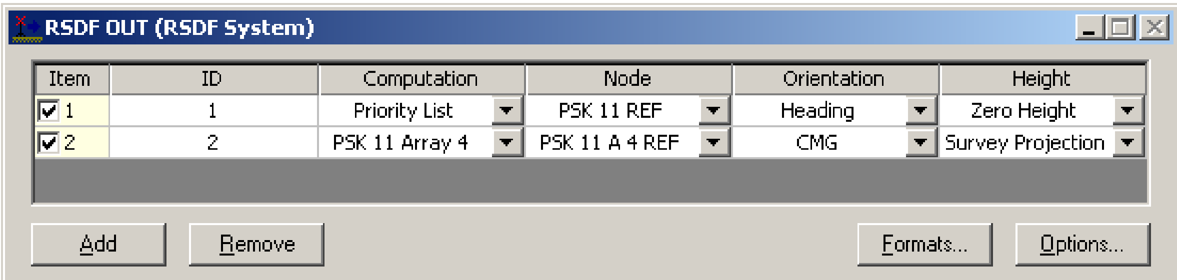
Note. The first registry keys can be changed online using the “Formats...” dialog. See online options below.

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”.

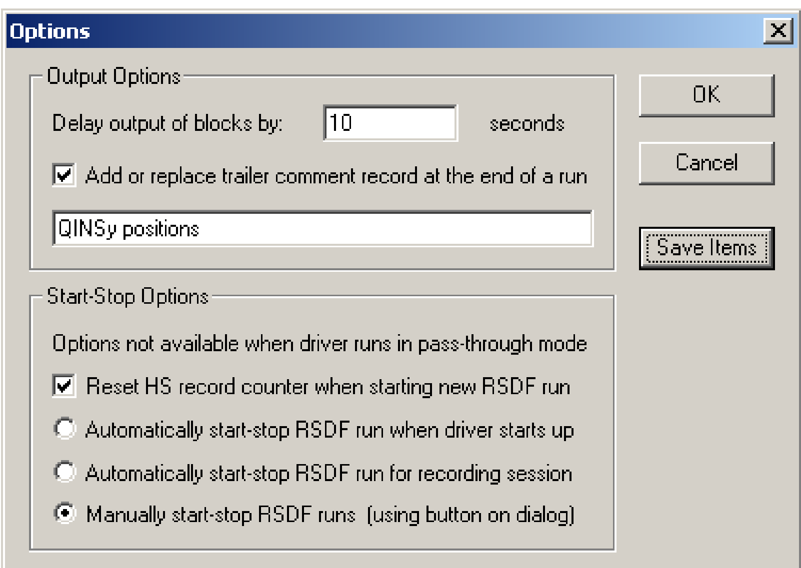
Note. Only one output system has to be defined per output COM port. Output nodes are selected online.

Online Setup



The “Add” and “Remove” buttons can be used to add or remove an item (position). Whether an item is actually used to output a “PG” record, depends on the item checkbox. “ID” is the object ID that is used in the “PG” record. “Computation” and “Node” determine the position that is used for the “PG” record. The selected “Orientation” angle will be a grid bearing in case of the RSDF output driver and a true bearing in case of the RSDFG output driver. The “Height” option can be used to output for example 0.0 heights.

Online Options

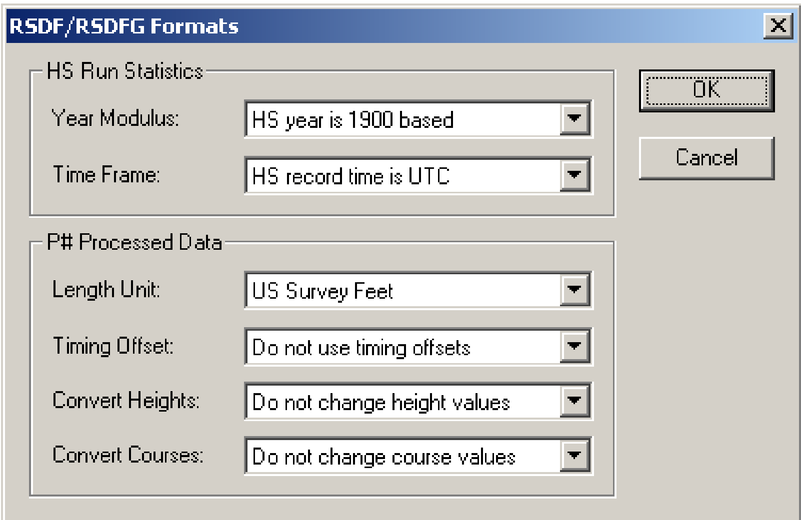


The “Save” items button can be used to save the selected items to registry during a *QINSy* online session.

The output of record blocks can be delayed for a couple of seconds, so that *QINSy* positions can be inserted in the proper block. This value should reflect the maximum latency of the input record blocks that can be expected when the output driver is operating in “pass through” mode. One can use 0 in “output only” mode.

The Start-Stop options are only available when the driver is operating in "output only" mode. When the manual option is selected, a "Start-Stop Run" button will appear on the output driver window, that can be used to start and stop a run. When the output driver is operating in "pass through" mode, these options are not used and the start run records and stop run records will be obtained from the RSDF input driver buffer.

Online Options



The first four options are also used for RSDF / RSDFG input drivers. If a selection is changed, then running input drivers will apply them immediately, so there is no need to restart an online If a selection is changed, then running input drivers will apply them immediately, so there is no need to restart an online *QINSy* session.

The Year Modulus indicates which value is to be added to the year values in HS records, i.e. 0, 1900 or 2000. The Time Frame indicates whether HS timetags are encoded (and decoded) as UTC or local system time. Presently, Length Unit can be meters, international feet, international yards or US survey feet. Timing Offset values in PF,PG,PP,PR records can be disregarded, added to or subtracted from the HS block timetags.

The last two options are only available if the RSDF output driver is operating in "pass through" mode and if the input format is different from the output format. Heights (Depth / Altitude) and Courses can be updated during the datum conversions, according to the selections in the driver window, or can be copied from the input data.

3.18.45 Seabat 8000 Series UTC Synchroniser

3.18.46 Sercel Axyle UTC Synchroniser

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvSeabatSynch.exe	*Drivers.io options:*	AXYLE
Last modified:	1999-Dec-10		

Driver Description

Driver for synchronisation of a Reson Seabat 8000 series multibeam or Sercel Axyle AP1 to the *QINSy* UTC time. When Pulse-Per-Second (PPS) support is used, timing can be very accurate, otherwise synchronisation is done with the system time of the *QINSy* computer. Driver obtains the current PPS time, formats the string and outputs the data to the serial port. Timestamp is valid for the first character of the output string.
Note: no PPS is required in Axyle mode when used in combination with the Axyle 0 message position driver.

Format Description Seabat

```
$UTC,yyyymmdd,hhmmss.ssss<CR><LF>
0123456789012345678901234
```

Item	*Format*	*Description*	*Values,Units*
1	"$UTC"	header identifier	fixed string
2	yyyymmdd	date of sensor message	yyyy = year, mm = month, dd = day
3	hhmmss.ssss	time of sensor message	hh = hours, mm = minutes, ss.ssss = seconds
4	<CR><LF>	carriage return – line feed	ASCII 13 – ASCII 10

Format Description Axyle

```
000 DATE 048,15:05:30<CR><LF>
0123456789012345678901234
```

Item	*Format*	*Description*	*Values,Units*
1	000	AP1 receiver identifier	fixed string [addresses all recievers]
2	ddd	date	Day of the year , 1 to 365 (3character)
3	HH:MM:SS	time of sensor message	hh = hours, mm = minutes, ss.ssss = seconds
4	<CR><LF>	carriage return – line feed	ASCII 13 – ASCII 10

Interfacing Notes

A simple one-way wired RS-232 cable is enough. However a bi-directional cable is more practical.

Drivers.io Options

AXYLE: Format will be set to Axyle type. Data will be output exactly on the second.

Database Setup

For the Axyle output, it is best to setup the update time at 30 seconds. In this case, every 30 seconds a time sync message is sent to the AP1 receiver. See further description under "OUTPUT SYSTEM DRIVERS".

3.18.47 Simrad ADP70X (Position and Waypoints)

Input / Output:	Input	*Driver class type:*	Output/UI
Executable name:	DrvOutSimradADP70X.exe	*Drivers.io options:*	*None*
Last modified:	2004-Aug-17		

Driver Description

Driver is used to send position information and waypoints to a Simrad ADP-70X Dynamic Positioning (DP) system. The position information is sent every computation update to the DP. Although the output telegram can contain two positions, a primary and a secondary position, only the primary position is filled. The positions that are sent to the DP are all in UTM, user-definable zone. The conversion from survey datum is done in the driver so there is no need to have the UTM projection defined in the geodetic parameters of the template database.

Format Description

The outputted messages are in a binary form, the digits are BCD (Binary Coded Decimal) formatted. One byte is split into 2 four-bit pieces. The four bit part is be used to place one binary digit in, representing a number between 0 and 9. One byte contains two BCD Digits.

POSITION TELEGRAM:

BYTE	*Description*	*Values, Range, Units*
01	Telegram Id	Always 11
02	Number of Nav systems	Always 1
03	Nav System Id	Always 23 (GPS)
04	Status	Always 1 (Pos update)
05-09	UTM North (MSB Byte 05)	UTM position, zone user definable
10 - 14	UTM East (MSB Byte 10)	
15	CRC Checksum	XOR over bytes 01-14
16	END OF REPORT	Always 255 (11111111 binary)

Note: This is a shorter version of the 27-byte original telegram that contains space for 2 positions. Refer to manual for full details on this telegram.

WAYPOINT TELEGRAM:

One waypoint telegram can contain up to 10 waypoints. If more waypoints are to be transferred then this is possible by splitting the waypoints in batches and transmitting them to the DP batch by batch. The table number in the telegram is incremented after every batch and identifies the batch.

BYTE	*Description*	*Values, Range, Units*
01	Telegram Id	Always 04
02	Number of Waypoints	1 – 10
03	Table Number	
04-21	Track name (ASCII)	CR Terminated
22-26	UTM North	Point 1 Start
27-31	UTM East	
32-33	Vessel wanted heading	Not used Always 0D-01

34-35	Vessel Wanted speed	Not used Always 0D-01 point 1 End
36-161	Same as above point 2- 10	
162	CRC Checksum	XOR over bytes 01-161
163	END OF REPORT	Always 255 (11111111 binary)

Note: Depending on the number of waypoints the telegram may be shorter. The CRC and EOR must always follow after the last waypoint.

Interfacing Notes

Cable details are unknown, please refer to DP manual.

Database Setup

See description under "OUTPUT SYSTEM DRIVERS".

Controller Setup

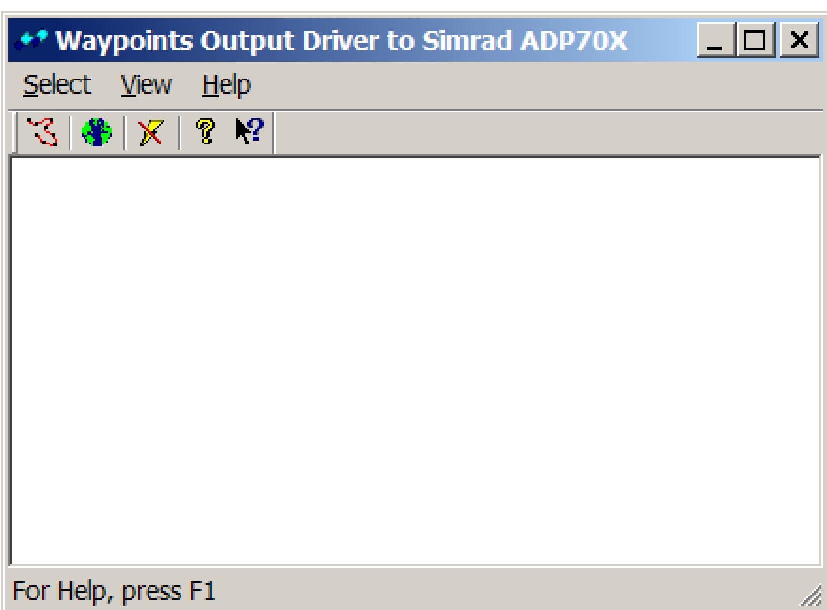
The Update Rate depends on the update rate of the computation. If the computation updates at 1 Hz then the output will also be at 1 Hz.

The appropriate output node must be selected before the driver starts cycling. After going online with the Controller for the first time, select the "Computation Setup..." menu under Settings and select group item "Shortcuts" and item "Output nodes". Select the output driver and the required node.

<u>Note: The simrad DP always expects the COG (Center Of Gravity) of the vessel.</u>

User Interface

The main dialog of this driver and the Select menu:



Output Threshold:
If enabled the driver can keep track of the positions sent to the DP, if these positions remain the same for the entered amount of cycles, all output is suspended until the position changes again.

Send Waypoints:
With this option the user can send the the current mainline, whether it is a route, point or line to the DP.

UTM Zone:
This option allows setting the specified UTM zone. All output positions are converted to the user selected UTM zone.

3.18.48 Simrad S90 Telegram Output Driver

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutSubspection.exe	*Drivers.io options:*	S90
Last modified:	2000-Jun-02		

Driver Description

Driver (with user interface) for outputting the Simrad S90 position telegram, output every *QINSy* update. The update-rate can be defined as system property in DB Setup. The string contains a position in lat, lon on survey datum for the selected node, and a ROV depth for the selected bathy system.

Format Description

ASCII String, terminated by a carriage return linefeed.

S90 Format Example

```
$TLS90,130502,07263634,5157.4572N,00330.7400E,000000000.0,0000000.0,00,00000.000
0B,3,A,00.0,000.0
```

For format description see the EM3000 Datagram formats document.

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”.

3.18.49 Simrad DP Force Output Driver

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvOutSimradDPForce.exe	*Drivers.io options:*	
Last modified:	2002-June-13		

Driver Description

In order to help the Simrad DP control the vessel position as good as possible *QINSy* will transmit cable forces on a separate port using this driver and the position of the grab ROV reference node.

Format Description

The $PQPSC message is a proprietary NMEA0183 sentence,

```
$ PQPSC - Forces on the horizontal plane (X, Y) for three points.
$ PQPSC,hh,xxxx,yyyy,hh,xxxx,yyyy,hh,xxxx,yyyy[*hh]<CR><LF>
```

The output message of the grab ROV position is a standard NMEA $GPGGA message. See the *Sercel 103 NMEA Position ($GPGGA)* for more information on the $GPGGA format.

Field	*Format*	*Description*	*Values, Range, Units*
01	$	Start character	24 HEX
02	PQPSC	Identifier	
03	Hh	Cable identifier	Always 01
04	Xxxx	Force hoisting winch fore X axis	KN
05	Yyyy	Force hoisting winch fore Y axis	KN
06	Hh	Cable identifier	Always 02
07	Xxxx	Force hoisting winch aft X axis	KN
08	Yyyy	Force hoisting winch aft Y axis	KN
09	Hh	Cable identifier	Always 03
10	Xxxx	Force umbilical X axis	KN
11	Yyyy	Force umbilical Y axis	KN
12	*hh	Checksum	XOR
13	<CR><LF>	Termination characters	0D 0A HEX

Format Example

```
$PQPSC,01,0300,0400,02,0100,0200,03,0500,0600*6A
$GPGGA,172452.99,5224.337,N,00452.979,E,9,8,1,35,M,82,M
$PQPSC,01,0200,0400,02,0100,0200,03,0500,0400*69
$GPGGA,172452.99,5224.337,N,00452.979,E,9,8,1,35,M,82,M
```

Decoding Notes

No decoding for the cable forces direct output from generic observation. No data conversions.

System Configuration

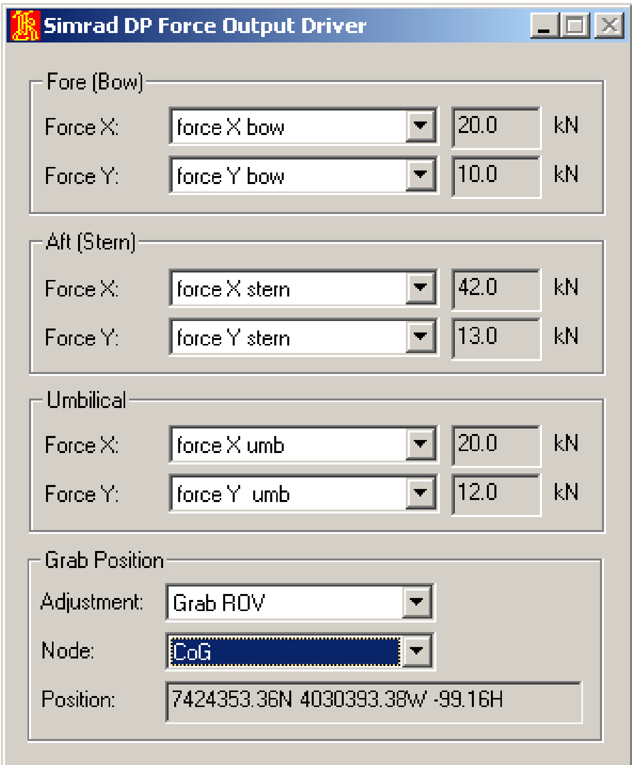
The Update Rate is user defined in the Database Setup program. The observations should be selected in the corresponding combo boxes. The output of the grab position is defined by choosing the computation and node of the grab ROV reference node.

Database Setup

See description under "OUTPUT SYSTEM DRIVERS".

User Interface

The user interface of this driver:



3.18.50 Statoil Data Server Format

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutSubseaTelemetry.exe	*Drivers.io options:*	*none*
Last modified:	2000-April-19		

Driver Description

Driver for output of position(s) and heading(s) to the Statoil data server. One may manually select which node(s) are being used to generate the output.

Format Description

STATOIL DATA SERVER FORMAT:

```
$G2,153229.0,591096.6,6746122.7,1,0,85
$G1,153229.0,590858.1,6746168.3,1,0,273.9
$G3,153229.0,591073.1,6746133.8,1,0,178.9
```

#	*Format*	*Description*	*Values, Range, Units*
01	$Gn	Identifier with vessel id 'n'	n = 0 – 9
02	,hhmmss.ss	Time	
03	,eeeeee.e	Easting	UTM
04	,nnnnnnn.n	Northing	UTM
03	,z	UTM Zone	number between 1 – 60
04	,d	Depth	metres, -ve below water
05	,b.b	Heading	degrees, True. ***N.B*** system uses 0 degrees = north and west = +90 degrees, i.e. the opposite rotation convention from normal survey conventions
06	<CR><LF>	Carriage Return Line Feed	

Database Setup

See description under "OUTPUT SYSTEM DRIVERS".

3.18.51 Subsea Telemetry Format Output

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutSubseaTelemetry.exe	*Drivers.io options:*	*none*
Last modified:	2000-April-19		

Driver Description

Driver for output of position(s) and heading(s) to the Subsea telemetry system. One may manually select which node(s) are being used to generate the output.

Format Description

Refer to paragraph 3.2.47 for a full format description.

Interfacing Notes

A simple one-way wired RS-232 cable is enough. However a bi-directional cable is more practical.

Database Setup

See description under "OUTPUT SYSTEM DRIVERS".

3.18.52 Syledis Y/X Position (Fault Quality) (Node Output | Steered Point)

3.18.53 Syledis Y/X Position (Quality) (Node Output | Steered Point)

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutPosition.exe	*Drivers.io options:*	STEER
Last modified:	2004-Aug-09	SYL | FQ | Q | ADCP | SNGLL | T | G	

Driver Description

Driver to output position results (Northing/Easting on Survey Datum) in a Syledis Message format.
The position is always skewed to the time of output. The driver supports two types of output modes:

- position for currently selected output node, as set in Controller’s Node Output;
- Steered Point position for currently active steered node, determined by the Controller (Online).

Format Description

The driver supports two formats, one with Y/X followed by a ‘Fault’ field and a ‘Quality’ field, e.g. to a Cegelec DPS 901 system, and one with Y/X followed by a ‘Quality’ field only. The output ASCII string is terminated by Carriage Return and Line Feed characters. The fields in the string are of fixed length.

Format (Fault Quality) - length of output data string : 40 characters (including <CR><LF).

```
_YSNNNNNNN.N_XSEEEEEEE.E_F000_Qsww____<CR><LF>
```

- _ Space Character
- Y Northing identifier (fixed character "Y")
- X Easting identifier (fixed character "X")
- S Sign, "+" or "-"
- NNNNNNN.N UTM Northing of the selected node or Steered Node
- EEEEEEE.E UTM Easting of the selected node or Steered Node
- F000 Fault Field identifier (fixed characters; not used)
- Q Quality identifier (fixed character "Q")
- s Sensor number (registry setting, default “1”)
- ww System link weight (registry setting, default “10”)

Example: ‟ Y+2946016.4 X+0416104.0 F000 Q110”

Format (Quality) - length of output data string : 35 characters (including <CR><LF).

```
_YSNNNNNNN.N_XSEEEEEEE.E_Qfaaabbb<CR><LF>
```

- _ Space Character
- Y Northing identifier (fixed character "Y")
- X Easting identifier (fixed character "X")
- S Sign, "+" or "-"
- NNNNNNN.N UTM Northing of the selected node or Steered Node
- EEEEEEE.E UTM Easting of the selected node or Steered Node
- Q Quality identifier (fixed character "Q")
- f Filtering strictness (registry setting, default “0”)
- aaa Distance Root-Mean-Square (meters; see registry settings)
- bbb Line of Position Mean Error (meters; see registry settings)

Example: ‟ Y+2946016.4 X+0416104.0 Q0005005”

Encoding Notes

If the 'Steered Point' mode has been selected and the computation fails for the current steered point, its position will be predicted for the number of seconds set in the Filter option in the Controller (default 10 seconds) and then changed automatically to the next steered point. If there is no more steered point left, the last known position will be outputted. To limit the output to a certain position age, add 'AGE' to the Drivers.io file (see below). In this case, the drivers stops outputting data if the position results are older that 'N' times the output system update rate, where 'N' is the 'Age factor' from registry (see below).

The sensor number will not by default contain the Computation Id of the selected node or Steered Node anymore, but has been fixed to "1" because a Cegelec DP 901 did not accept any other number.

The DRMS value is computed as sqrt($\sigma_E^2+\sigma_N^2$) and the LPME value is just the standard deviation for the horizontal position, taking correlation into account. Both values are by default 1-sigma = 68%.

Registry Settings

If the output drivers has been started once, some registry variables are available under the following key:
`[HKEY_CURRENT_USER\Software\QPS\QINSy\7.0\Drivers\DrvOutPosition\Settings]`

"Age factor"	default 5	multiplication factor for system update rate, to compute maximum age.
"Quality factor"	default 1	0: set zero DRMS LPME values; 1: 1-sigma values; 2: 2-sigma values.
"Sensor number"	default 1	1-4: fixed sensor number; 0: replace sensor number by computation id.
"Link weight"	default 10	10-99: system link weight (see *NGL User Manual* for more info).
"Filter strictness"	default 0	0-9: filter strictness value (see *Alstom Manual, Cegelec Manual).*

Drivers.io Options

Command line parameters for use in the Drivers.io file are as follows. "STEER" will use the Steered Node position, otherwise the position is used for the node that is selected in the Controller's Node Output settings.

"SYL" will start DrvOutPosition in Syledis mode. "ADCP", "SNGLL" or another header will start the driver in ADCP mode. See "ADCP Lat/Lon Position" and "ADCP X/Y Position" drivers for more information.

"FQ" will start DrvOutPosition with the "(Fault Quality)" format, "Q" will output the "(Quality)" format.

Database Setup

See description under "OUTPUT SYSTEM DRIVERS".

Controller Setup

Online, except when the "Steered Point" option of this driver has been selected, the appropriate output node must be selected before the driver starts cycling. After going online with the Controller for the first time, select the "Node Output..." option under Settings and select an computation and node for this system.
In case of outputting the Steered Node position, the user has to set up also one or more Steered Points.

3.18.54 Syntrak 480 Output

3.18.55 Syntrak 480 Output (Steered)

Input / Output:	Output	*Driver class type:*	Terminated <LF>
Executable name:	DrvOutSyntrak480.exe	*Drivers.io options:*	STEERED
Last modified:	2003-April-24		

Driver Description

This driver sends a message to the Syntrak 480 system whenever a fix is generated in *QINSy*. The message contains information about the fix: number, date, time, position, water depth, course and speed. There is a delay between the fix and sending the message of minimal 100 milliseconds.
The position being sent is the node selected in *Node Output…* When the STEERED option is used the steered node position will be used.
The water depth is the depth the first found echo sounder system has sent to the *QINSy* system. So if more than one echo sounder is available to take data from the first one in the list will be used to fill the depth field.

Format Description

The format of the output string is of fixed length. Numerical fields will be padded with zero's (ASCII 48), ASCII fields will be padded with "-" characters to fit the defined field length. The output message will be built up as follows:

Field	*Format*	*Values, Range, Units*	*Format*
0	Master Block ID	$1	A2
1	Record Length	Length of Remaining Message	I4
2	Program Revision	0001	A4
3	Shot Switch	03=Online	I2
4	Shot Time	(hhmmssyyyymmdd---) UTC Time	A17
5	Shot Number		I6
6	Line Id	Current line name (----A12793P1-038)	A16
7	CRP Latitude	Decimal Degrees (+=North / -=South)	F11.6
8	CRP Longitude	Decimal Degrees (+=East / -=West)	F11.6
9	Water Depth	Meters	F6.1
10	Master Gyro	Degrees	F5.1
11	Master CMG	Degrees	F5.1
12	Master Speed	Knots	F4.1
13	CR LF	CR LF	2

Format Example

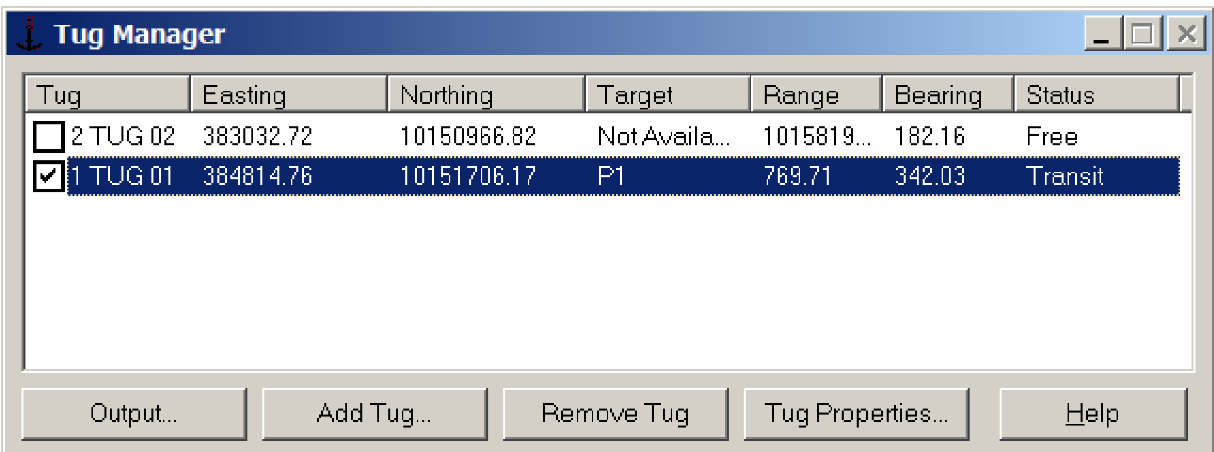
```
$1099000103124626200304 24---000000----------Noname0047.6666680003.0972250012.3045.0044.900.1<CR><LF>
$109900010312462720030424---000002----------Noname0047.6666690003.0972250012.3045.0044.900.1<CR><LF>
$109900010312463220030424---000003----------Noname0047.6666700003.0972280012.3045.0044.900.1<CR><LF>
$109900010312463720030424---000004----------Noname0047.6666720003.0972300012.3045.0044.900.1<CR><LF>
```

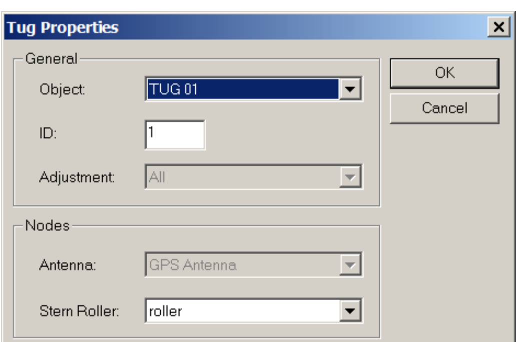
3.18.56 Tug Manager

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutXXXManager.exe	*Drivers.io options:*	
Last modified:	2004-July-09		

Driver Description

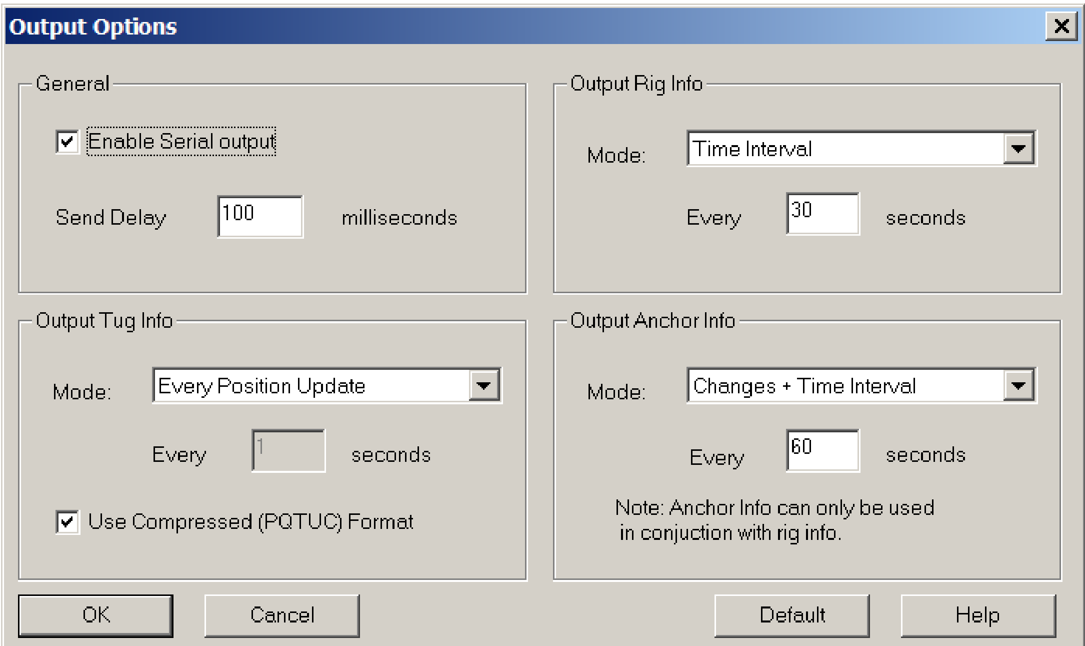
Driver to output tug, rig and anchor positions to the QPS Tug Display. User can add a tug and set its nodes for the stern roller and the GPS antenna through the properties dialog. The target is retained from the anchor planning in the controller. The driver supports multiple tugs. It is important to give each tug a unique ID so that the Tug Displays on the tugs can filter out the data meant for that tug. By checking / unchecking the checkboxes in front of the tugs data can be send (or not). Beside tug information also information can be send to the tug display regarding the position of the rig or barge and the anchor positions. The output interval of all messages can be user definable to save bandwidth on the radio link.





Output options

The driver can output various messages. The output frequency of the various message types may be changed by the user. Usually it will be a trade-off between available radio bandwidth and refresh frequency.
Press the “Output…” button to activate the output options dialog (see below).



Description of available options:

- Enable Serial output
  Switch on/off generation of serial data. Can be used to disable the output of the driver.
- Send Delay
  The send delay is the amount of time that the driver will wait between sending two consecutive messages. This delay is introduced to give the radio modem some time to recover after sending a string. For example when new node results are available for multiple tugs at the same time then multiple TUG messages will be send. Between the PQTUG messages the driver will insert a delay.
- Output Tug info
  Can be either: off, every user definable second or every position update. If the “Use compressed PQTUC) Format” option is used (this is the default) then the much smaller PQTUC message is sent instead of the legacy, bulkier (but more precise) PQTUG message. In order to save bandwidth in multiple tug Anchor management we advice the usage of PQTUC.
- Output Rig Info
  Can be either: off, every user definable second or every position update. This will change the output of the PQRIG message. Can be used to visualize a rig or barge shape onto the tug display(s).
- Output Anchor Info
  Can be either: off or Changes + Time interval. Single PQANC message is generated whenever a change in anchor state occurs (e.g. it is dropped or picked up). All anchor are transmitted every user defined number of seconds. This is useful for (re-)starting tug displays or whenever an anchor message is not received properly when it changed. . This message can be used to visualize the actual anchor positions onto the tug display(s). Anchor info can only be output when Rig info is also output at the same timer. This is because the tug display needs the rig positions to calculate one end of the anchor wire.

Format Description

All ASCII strings are comma separated and terminated by a <CR><LF> pair. They all contain a checksum.

PQTUG
Contains survey datum/grid positions and tug/anchor state info for one tug. Eastings and northings are specified to a 1/100 survey unit accuracy.

```
$PQTUG,ID1,ID2,E1,N1,E2,N2,E3,N3,E4,N4,HDG,SOG,COG,R,B,STATE,UNIT,FIXCS<CRLF>
```

$PQTUG:	Tug manager header
ID1	Tug ID
ID2	Anchor ID
E1,N1:	Position of reference point on tug
E2,N2:	Position of GPS antenna on tug
E3,N3:	Position of stern roller on tug
E4,N4:	Planned position of anchor
HDG:	Heading of tug
SOG:	Speed over ground of tug
COG:	Course over ground of tug
R,B:	Range and bearing from stern roller to planned position
STATE:	Anchor state, Free, Transit or Dropped
UNIT:	Survey unit as defined in DB Setup
FIX:	Current Fix number
CS:	Checksum

Example

```
$PQTUG,1,1,390867.36,10146623.09,390871.95,10146619.24,390859.70,10146629.52,384577.34,10152438.35,1
30.00,5.14,130.02,8556.31,312.76,1,1,418*51
```

PQTUC
Contains survey datum/grid position and tug/anchor state info for one tug. Because it holds one reference position and for the others offsets with respect to the ref. Position it is much more compressed. Eastings Northings and delta Eastings/Northings are specified to 1 survey unit. One exception is the delta Easting/Norting of the planned position this is specified in 1/10 survey unit.

```
$PQTUC,ID1,ID2,E1,N1,ER1,NR1,ER2,NR2,ER3,NR3,HDG,SOG,COG,STATE,UNIT,FIXCS
```

$PQTUC:	Tug manager header
ID1	Tug ID
ID2	Anchor ID
E1,N1:	Position of reference point on tug
ER1,NR1:	Position og GPS antenna on tug (Offsets from ref point)
ER2,NR2:	Position of stern roller on tug (Offsets from ref point)
ER3,NR3:	Planned position of anchor (Offsets from ref point)
HDG:	Heading of tug
SOG:	Speed over ground of tug
COG:	Course over ground of tug
STATE:	Anchor state, Free, Transit or Dropped
UNIT:	Survey unit as defined in DB Setup
FIX:	Current Fix number
CS:	Checksum

Example

```
$PQTUC,1,1,390505,10146927,5,-4,-8,6,-5928,5511,130,5.1,130,1,1,400*7D
```

PQRIG

Contains survey datum/grid position info for one rig. Eastings and northings are specified to a 1/100 survey unit accuracy.

```
$PQRIG,ID1,E1,N1,HDG,SOG,COG,UNIT,FIXCS
```

$PQRIG:	Tug manager header
ID1	Object ID
E1,N1:	Position of reference point on rig
HDG:	Heading of rig
SOG:	Speed over ground of rig
COG:	Course over ground of rig
UNIT:	Survey unit as defined in DB Setup
FIX:	Current Fix number
CS:	Checksum

Example

```
$PQANC,1,349575.10,10144038.89,0.00,0.00,0.03,1,628*7E
```

PQANC

Contains survey datum/grid position info for one anchor. Eastings and northings are specified to a 1/100 survey unit accuracy.

```
$PQRIG,ID1,ID2,E1,N1,NAME,STB,FWDCS
```

$PQANC:	Tug manager header
ID1	Anchor ID
ID2	Tug ID that is handling this anchor
E1,N1:	Drop Position (zero if in transit or free)
NAME:	Anchor name
STB:	Offset X direction of anchor winch on board rig
FWD:	Offset Y direction of anchor winch on board rig
CS:	Checksum

Example

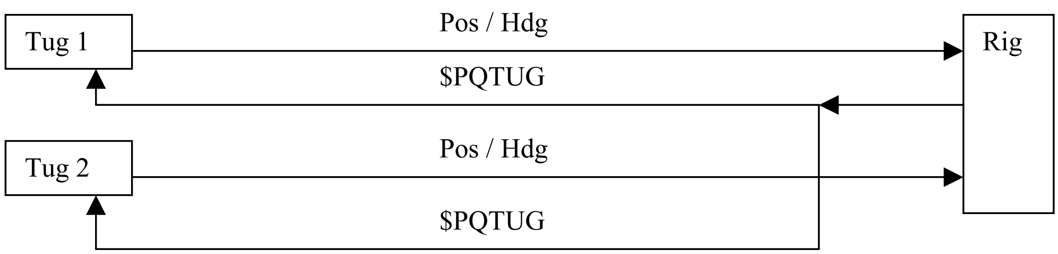
```
$PQANC,4,2,1,1,387786.33,10149210.52,S1,10.00,18.00*1
```

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”.

Interfacing Notes

The tug manager is developed in conjunction with the Tug Display. In operation it will probably make use of a two way radio connection.
On the tug position and heading data will be send to the rig or barge. If this is a GGA and HDT message each updating once a second it is adviced to us the combined NMEA GGA / HDT driver.
On the barge the tug data is send back to the tugs.



If there is a two way radio link you will get for each tug a position / heading on an I/O port and for all the tugs one I/O port for the tug manager output driver. This data then needs to be splitted to each of the separate radio links to the tugs.

3.18.57 VisualWorks Event Output

Input / Output:	Output	*Driver class type:*	Output <CRLF>
Executable name:	DrvOutEvent	*Drivers.io options:*	NONE
Last modified:	2002-Aug-21		

Driver Description

Driver to output an ASCII string containing date, time, event code and comment to the VisualSoft made VisualWorks software. All in formation present in the string is taken from the data as generated by the event generation driver

Format Description

The ASCII string contains the fields shown in the table below separated by a comma and terminated by a Carriage Return and a Line Feed.

```
21/08/2002,13:17:14,FS,Start of Freespan 1
```

Field	***Format***	***Description***
1	DD/MM/YYYY	Date of event (UTC)
2	HH:MM:SS	Time event (UTC)
3	Text	Event Code as entered in QPS Ini File Editor
4	Text	Description as entered in the Generic Event Driver
5	<CRLF>	Record termination

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”. For this driver it is required that a system of the type “Event Generator” is also added to the database.

Controller Setup

In order for this driver to output data the user should enable the recording and generate events using the system of the type “Event Generator”.

3.18.58 Waypoints - NMEA ECDIS 3500 (WinSocket)

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutWaypointsUISocket.exe	*Drivers.io options:*	None
Last modified:	2003-Jan-14		

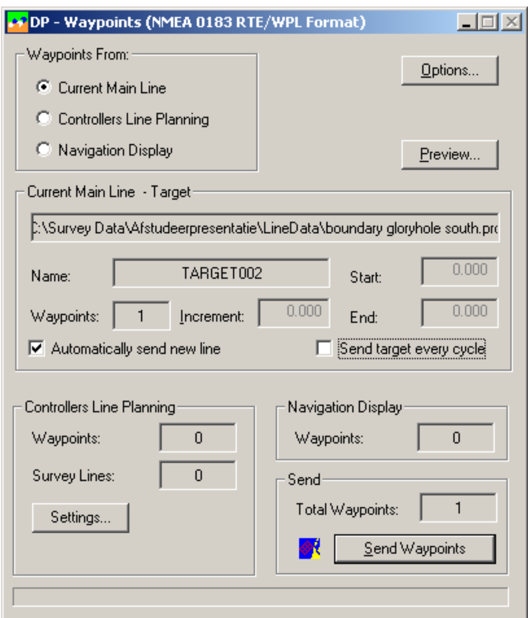
Driver Description

Driver to output waypoint coordinates (single targets, surveylines, or pipelines) via TCP/IP to the ECDIS 3500 system. Driver with user-interface, and therefore always present in the windows taskbar online:

Use Options to select whether lat/lon coordinates should be outputted on Survey Datum or on WGS'84.

The user can select the source of the waypoint track to send in the driver's dialog:

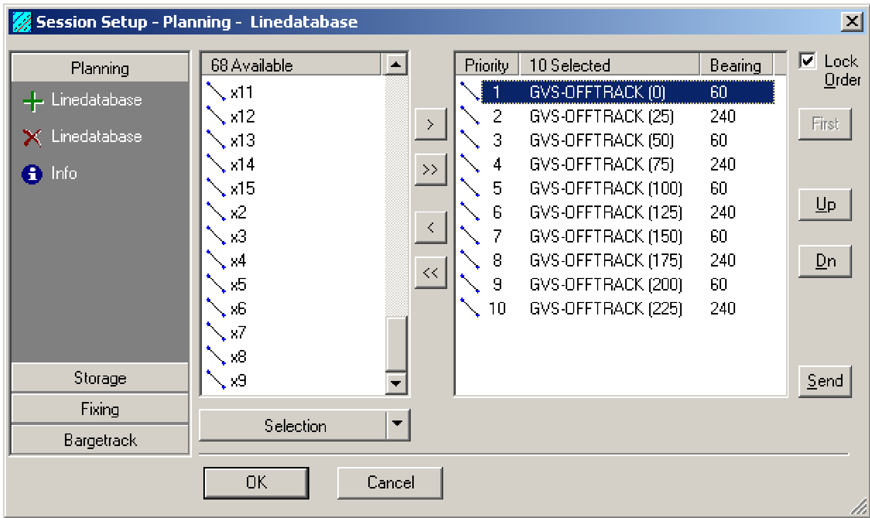
- Waypoints from the Current Mainline (See A))
- Waypoints from the Controllers Waypoint Planning (See B))
- Waypoints from the defined track of the Navigation Display (See C))



Example of the Waypoint Output Driver's dialog

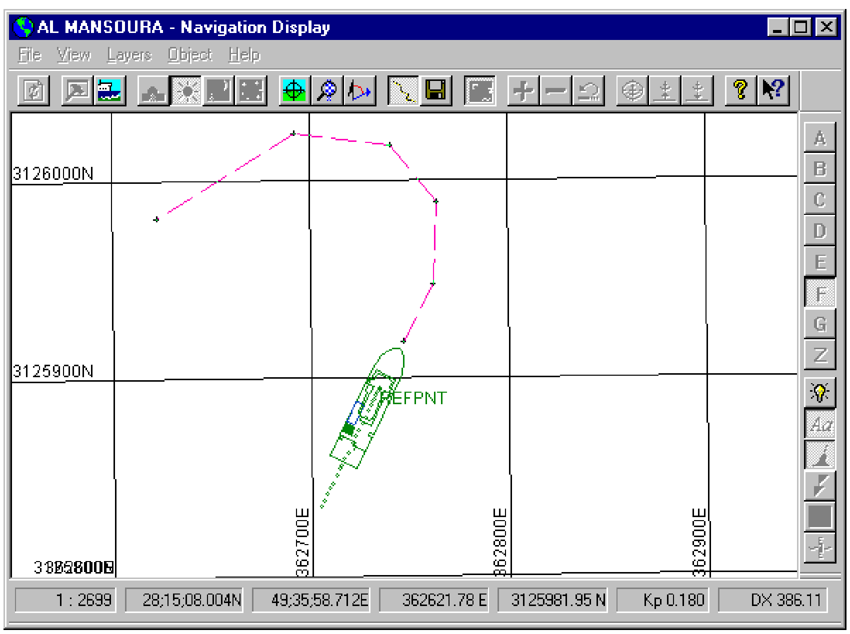
A) The Current Mainline will be changed automatically when the user selects in the Controller's Session Setup a new mainline. This can be a target (one waypoint), single survey line (two waypoints) or a pipeline (two or more waypoints). The new Mainline will be sent automatically if "Automatically send new line" is enabled.

B) Select *Waypoints from the Controllers Waypoint Planning* if you want to send more than one single survey line in one go to the DP. Which lines?, and in what order?, and with which bearing? must be defined in the Controllers Session Setup. Select on the first Session Setup Wizard page the Planning option (Note that this option is only available when one of the Waypoint Output drivers exist in the database template).



If you sending parallel survey lines, each one opposite to the previous one, you can enable the calculation of extra waypoints for a smooth turn between the line changes. Go to Settings… to fill in the Turn Parameters.

C) Select Waypoints from the Navigation Display if you want to send the last defined waypoint track.



Every time when you click and add a new waypoint in the display, the number of Total Waypoints will be incremented in the driver’s dialog. The current waypoint track will be lost when you define a new Waypoint Track, or when you close the Navigation Display.

TIP Prior sending actually the selected waypoints to the DP, use Preview to check the waypoint track

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”.

3.18.59 Waypoints - NMEA RTE/WPL (Simrad SDP)

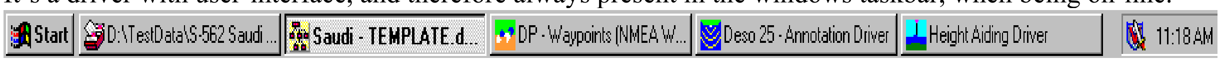
3.18.60 Waypoints - NMEA WPC (Cegelec DPS 901)

3.18.61 Waypoints - NMEA WPL (Serial / Simrad SDP)

Input / Output:	Output	*Driver class type:*	Output
Executable name:	DrvOutWaypointsUI.exe	*Drivers.io options:*	
Last modified:	2003-Jan-14	WPC | WPL | RTEWPL	

Driver Description

Driver for outputting waypoint co-ordinates (single targets, surveylines, or pipelines) to a DP system.
It's a driver with user-interface, and therefore always present in the windows taskbar, when being on-line.

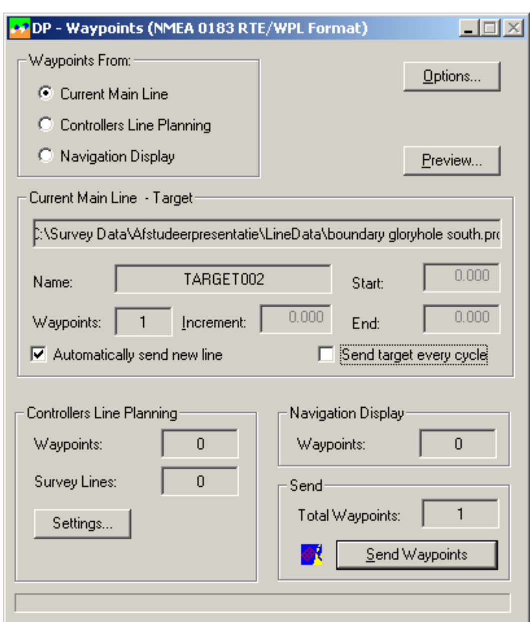


The update rate of sending waypoints (the time between sending each co-ordinate pair) is default the update-rate set in the database template (Db Setup), but can be over-ruled in the driver's dialog (Options…). Recommended is 0.5 sec or 1 sec. Some DP Systems don't like sending the data too fast. Only when "Send Target every cycle is enabled use a bigger Update Rate (10 seconds).

Use Options to select whether the latitude/longitude co-ordinates should be outputted on Survey Datum or on WGS'84. Notice that the WPC format outputs eastings/northings, which are always on Survey Datum.

The user can select the source of the waypoint track to send in the driver's dialog:

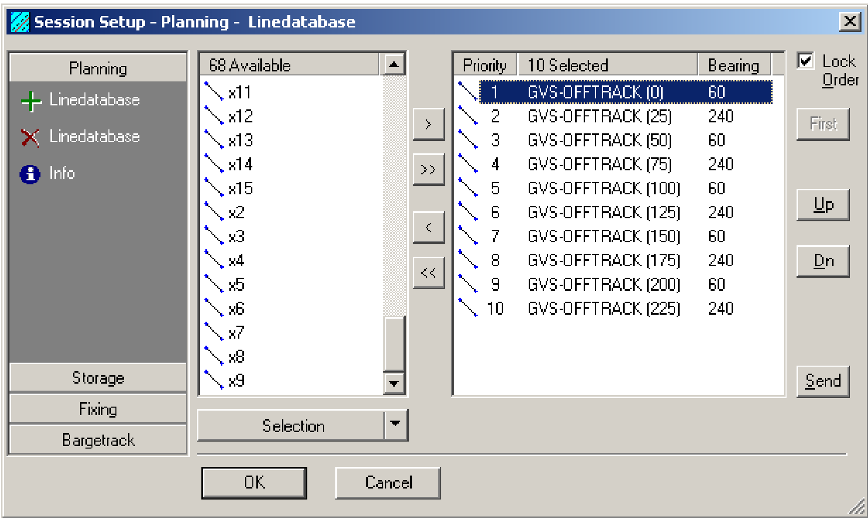
- Waypoints from the Current Mainline (See A))
- Waypoints from the Controllers Waypoint Planning (See B))
- Waypoints from the defined track of the Navigation Display (See C))



Example of the Waypoint Output Driver's dialog

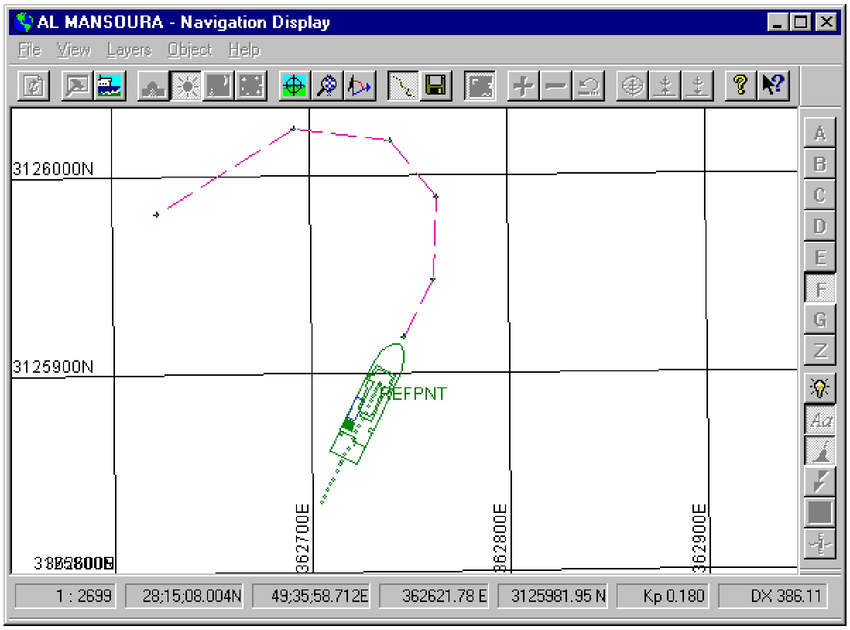
D) The Current Mainline will be changed automatically when the user selects in the Controller's Session Setup a new mainline. This can be a target (one waypoint), single survey line (two waypoints) or a pipeline (two or more waypoints). The new Mainline will be sent automatically if "Automatically send new line" is enabled.

E) Select *Waypoints from the Controllers Waypoint Planning* if you want to send more than one single survey line in one go to the DP. Which lines?, and in what order?, and with which bearing? must be defined in the Controllers Session Setup. Select on the first Session Setup Wizard page the Planning option (Note that this option is only available when one of the Waypoint Output drivers exist in the database template).



If you sending parallel survey lines, each one opposite to the previous one, you can enable the calculation of extra waypoints for a smooth turn between the line changes. Go to Settings… to fill in the Turn Parameters.

F) Select Waypoints from the Navigation Display if you want to send the last defined waypoint track of the Navigation Display.



Every time when you click and add a new waypoint in the display, the number of Total Waypoints will be incremented in the driver's dialog. The current waypoint track will be lost when you define a new Waypoint Track, or when you close the Navigation Display.

TIP Prior sending actually the selected waypoints to the DP, use Preview to check the waypoint track

Format Description

- NMEA RTE/WPL FORMAT

  Example, sending 5 waypoint

```
$GPRTE,1,1,c,1,1,2,3,4,5*1B<CR><LF>
$GPWPL,2817.854572,N,04927.765339,E,1*7A<CR><LF>
$GPWPL,2817.970839,N,04927.763668,E,2*7B<CR><LF>
$GPWPL,2817.972998,N,04927.955528,E,3*7E<CR><LF>
$GPWPL,2817.848608,N,04927.957312,E,4*7A<CR><LF>
$GPWPL,2817.846472,N,04927.767271,E,5*73<CR><LF>
```

- NMEA WPC

  Example, sending 5 waypoint:

```
<STX>$PKNCW,0001<CR><LF>
<ETX>
<STX>$PKNNW,<CR><LF>
$PKTID,0001,    Al Mansoura Area,0005<CR><LF>
$PKWPC,0001,0001,003131170.25,M,N,000349255.06,M,E,U,39,000010,M,000.0,T,03.5,K,KP0.000<CR><LF>
<ETX>
<STX>$PKNNW,<CR><LF>
$PKTID,0001,    Al Mansoura Area,0005<CR><LF>
$PKWPC,0001,0002,003131385.00,M,N,000349255.06,M,E,U,39,000010,M,000.0,T,03.5,K,KP0.215<CR><LF>
<ETX>
<STX>$PKNNW,<CR><LF>
$PKTID,0001,    Al Mansoura Area,0005<CR><LF>
$PKWPC,0001,0003,003131385.00,M,N,000349568.72,M,E,U,39,000010,M,090.0,T,03.5,K,KP0.528<CR><LF>
<ETX>
```

- NMEA WPL

  Example, sending 5 waypoint

```
$GPWPL,0000.000000,N,00000.000000,E,0*7B<CR><LF>
$GPWPL,2817.854572,N,04927.765339,E,1*7A<CR><LF>
$GPWPL,2817.970839,N,04927.763668,E,2*7B<CR><LF>
$GPWPL,2817.972998,N,04927.955528,E,3*7E<CR><LF>
$GPWPL,2817.848608,N,04927.957312,E,4*7A<CR><LF>
$GPWPL,2817.846472,N,04927.767271,E,5*73<CR><LF>
$GPWPL,0000.000000,N,00000.000000,E,999*72<CR><LF>
```

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”.

3.18.62 WinFrog Decoder Output

Input / Output:	Output (User-Interface)	*Driver class type:*	Output <CRLF>
Executable name:	DrvOutWinFrogUI	*Drivers.io options:*	NONE
Last modified:	2002-Dec-11		

Driver Description

Driver to output an ASCII string containing ROV (or other object) data to a “WinFrog Decoder” module.

Format Description

The ASCII string contains the fields shown in the table below separated by a comma and terminated by a Carriage Return and a Line Feed. Data values are in survey units or degrees. See also ‘Registry Options’.

```
13:29:30.454,12/11/2002,E690910.338,N10900902.430,RD21.440,Hdg90.000,KP0.228243,
XTrk40.247,ALT0.000,PCH0.797,RLL0.797,Vehicle:Trenchsetter
```

Field	*Prefix*	*Format*	*Description*
1		HH:MM:SS.sss	Time (UTC)
2		MM/DD/YYYY	Date (UTC)
3	E	x.xx	Easting
4	N	x.xx	Northing
5	RD	x.xx	Depth, corrected for (C-O)
6	Hdg	x.xx	Heading (True), corrected for (C-O)
7	KP	x.xxxxx	KP, or distance along, or distance to go
8	Xtrk	x.xx	DCC, or distance across, or bearing to go
9	ALT	x.xx	Altitude, corrected for (C-O)
10	PCH	x.xx	Pitch, corrected for (C-O)
11	RLL	x.xx	Roll, corrected for (C-O)
12	Vehicle:	c	Vehicle name
13		<CRLF>	Record termination

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”.

Controller Setup

After starting a database for an online session, a button on the taskbar becomes visible. Clicking this button will pop up a dialog showing the latest data values. Press the “Settings…” button to select the node that will be used to obtain positions and angles. There is also a possibility to select depth and/or altitude observations.

Registry Options

Output formats can be changed by editing their values using the Windows RegEdit utility (‘Start’-‘Run’). Please do not change these values yourself, but contact the QPS support department for more information.

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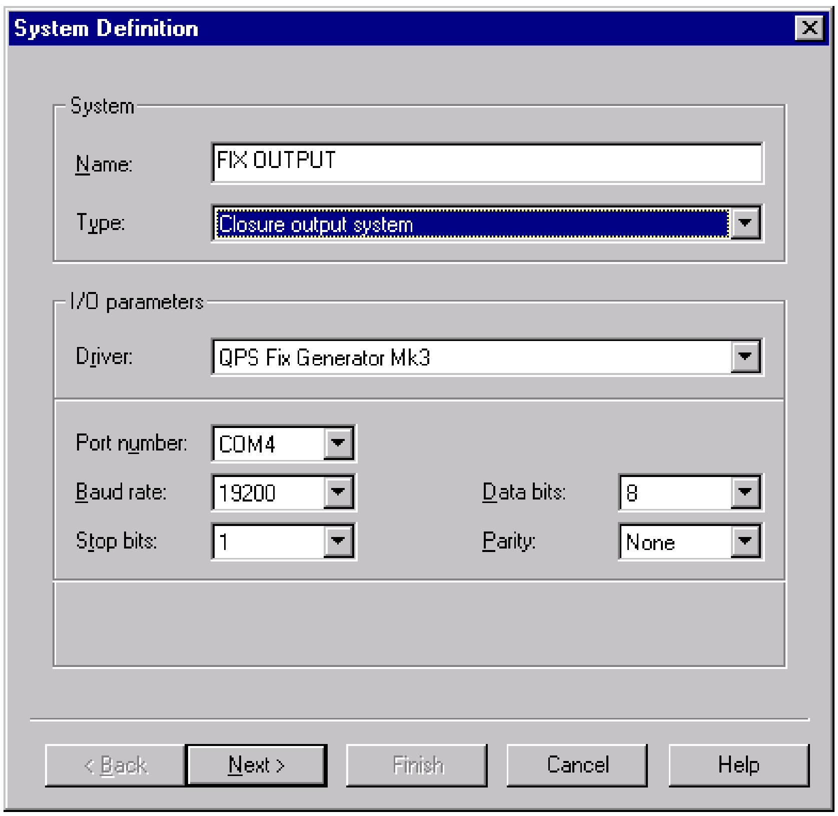
3.19 CLOSURE OUTPUT SYSTEM DRIVERS

Database Setup

Select item “Auxiliary systems” and add an “Output system” to the *QINSy* Database . If an output system is added for an “Object”, then the system will still be defined as an “Auxiliary system”. Select the output driver and set the serial I/O parameters. Press “Next” button to define the closure ports on the trigger box, if a QPS trigger box is used, otherwise the selections will be disabled. Press “Finish” button to save the system.



See for more information the *QINSy* DB Setup Help Topics or the *QINSy* Knowledge Base.

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3.19.1 QPS Fix Generator Mk1 | Mk2 | Mk3

Input / Output:	Output	*Driver class type:*	Closure
Executable name:	DrvOutFix.exe	*Drivers.io options:*	1 | 2 | 3
Last modified:	1999-May-06		

Driver Description

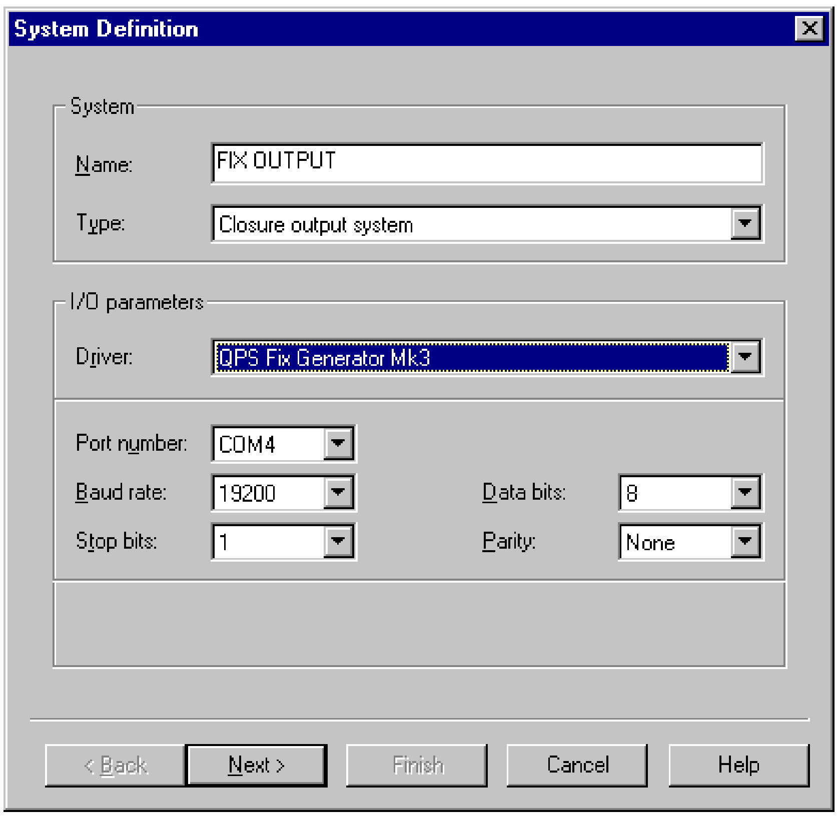
The QPS trigger device may be used as an output device for one or two closure(s) and/or TTL pulse(s).

Interfacing Notes

See chapter 2.2 on TRIGGER DEVICES for more information on QPS trigger devices Mk1, Mk2, Mk3.

Database Setup

The QPS Trigger device may be used as an output device for one or two closure(s) and/or TTL pulse(s).
In both cases the following communication parameters should be set in the database, where the port number refers to the interface port to which the serial cable is connected (COM4 in the example):



3.19.2 Knudsen Event Marker

Input / Output:	Output	*Driver class type:*	Closure
Executable name:	DrvOutTxt.exe	*Drivers.io options:*	*header*
Last modified:	2000-Dec-01		

Driver Description

Driver to be used to generate an event marker annotation for the Knudsen 320M Echosounder. Output will be every fix event in an online session of *QINSy*. Knudsen formats are also supported by the Annotation Driver.

Format Description

The Knudsen 320M Echosounder accepts on COM3 commands that will create event markers on paper:

```
$PKEL02,usertext<CR><LF>
```

will create only an internal event marker;

```
$PKEL03,usertext<CR><LF>
```

will create an internal and external event marker; i.e. next to the line also info like time and depth.

Note 1. This driver only sends the second command.
Note 2. Usertext can be any text, this driver leaves it blank.

Database Setup

In DB Setup, add an “Closure Output system” and select the “Event Marker to Knudsen 320M Echosounder” driver and interfacing parameters. Update rate will not be used! The events will occur on every Controller fix. Further, leave the Closure Parameters Tabsheet for what it is. Settings will not be used for this driver.

Controller Setup

When Online in the Controller, closures will only be generated after you enable the Closure Generation option on the third page of the Session Wizard. These settings are not saved by the Controller!

Important. Driver has been replaced by Annotation Driver. See description under “ECHOSOUNDERS”.

3.19.3 Text Annotation

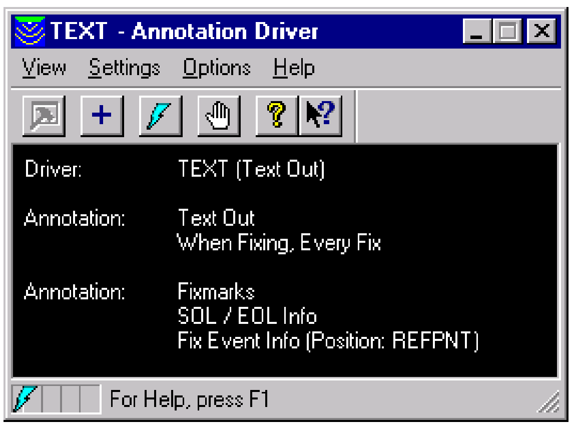
Input / Output:	Input (two-way)	*Driver class type:*	Closure
Executable name:	DrvAnnotate.exe	Drivers.io options:	TEXTOUT
Last modified:	2000-Dec-01		

Driver Description

Driver for sending annotation messages (Fix Marks, SOL / EOL Info, Fix Event Info, etc.) to echosounders.

Driver with user-interface, so settings can be changed online, by clicking on system button on taskbar.

The format of the annotation output string can be selected online, under Settings – Annotation. By default, no header is added before the output message. There are also possibilities to send direct annotation messages.



Annotation Output

See the Annotation Output paragraph for the “Annotation Drivers”.

Database Setup

See description under “OUTPUT SYSTEM DRIVERS”.

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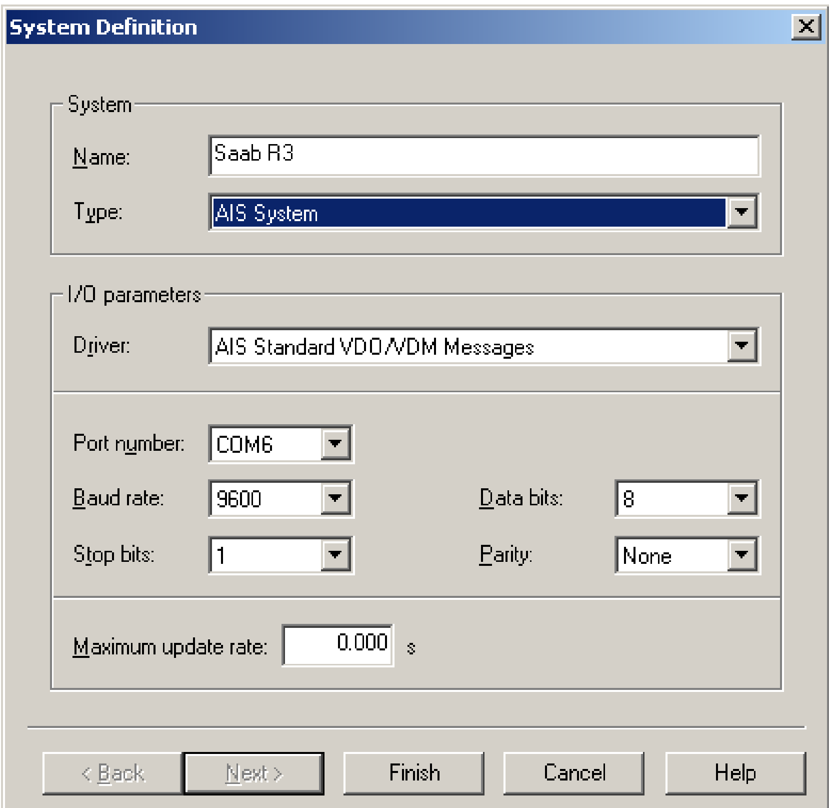
3.20 AIS SYSTEM DRIVERS

Database Setup

In DB Setup, the Automatic Identification System drivers are listed as “AIS System”.

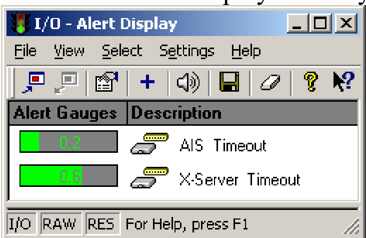
The only properties the user has to select are the I/O parameters.



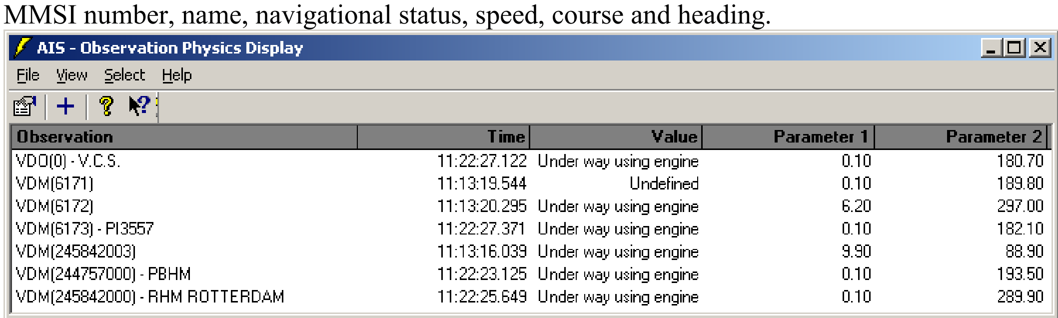
Controller Setup

There are no additional settings in the Controller, however, there are three displays that can be used to monitor AIS Targets:

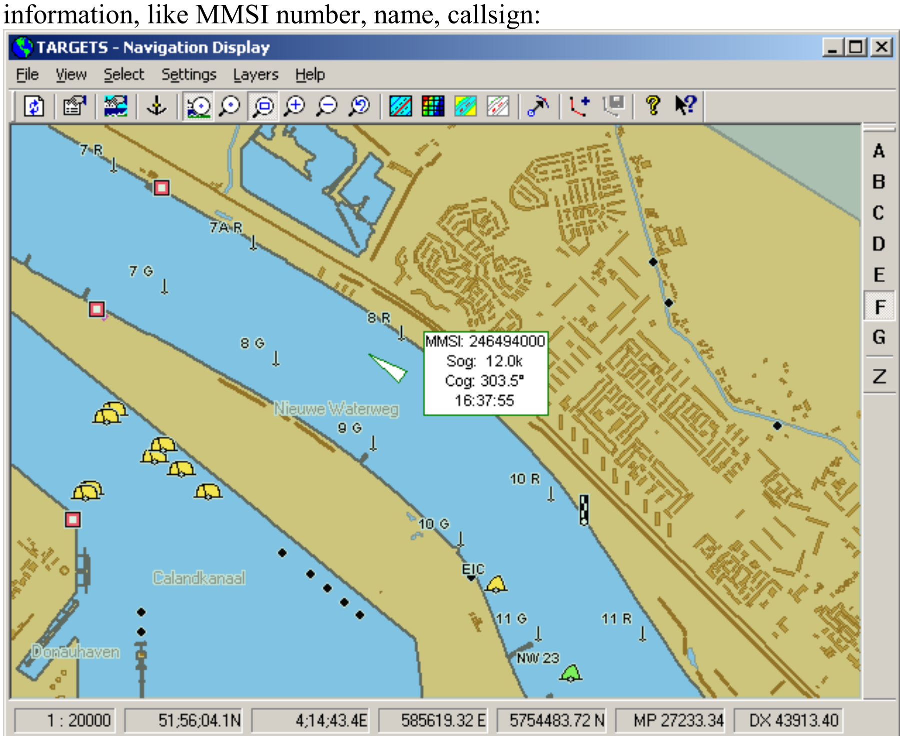
Use an I/O Alert display to verify that data is received by the selected driver.



Use an Observation Physics display to monitor for each received targets the following properties: Type and MMSI number, name, navigational status, speed, course and heading.



Use a Navigation Display to draw the received targets on their exact location, with or without additional text information, like MMSI number, name, callsign:



3.20.1 AIS Standard VDO/VDM Messages

Input / Output: Input *Driver class type:* Terminated <LF>
Executable name: DrvAISStandard.exe *Drivers.io options:* *none*
Last modified: *2002*-Nov-15

Driver Description

Driver to decode data received from AIS Transponders. Both VDO (Ship's Own) as VDM (other vessels) Messages are decoded.
The sentences are composed of several Message type. The driver will only decode data from Message type 1, 2, 3 and 5.
The following data is decoded:
MMSI (Mobile Maritime Service Identity) number, Name, Callsign, Destination, Navigational status, Position (WGS'84), Speed over ground (knots), Course over ground (deg), Heading (deg), Rate of turn (deg/min).
The user may also use the VDO message to decode the ship's own position and heading as a separate Position Navigation System and Gyro System.

Format Description

Some part of the data is ASCII, some part is binary. Each datastring is terminated by <CR><LF>. For an exact format description the International Standard Document, IEC 61993-2 and ITU (international Telecommunication Union) Document 8/17-E.

Format Example

```
!AIVDO,1,1,,A,1000H7@P010D2B6MdgHVbgvPP5Pl,0*53
!AIVDO,1,1,,,1000H7@P010D2B6MdgHVbgvPP000,0*2B
!AIVDO,1,1,,,1000H7@P010D2B6MdgH`H?vRP000,0*6D
!AIVDO,1,1,,,1000H7@P010D2B6MdgHVaOvTP000,0*04
!AIVDM,1,1,,A,1000H70P010Cr8nMdMDp6gvTP0SE,0*3B
!AIVDM,2,1,7,A,5000H6P2<w0e90772210K;WCF22222222222220o1h>3540Ht5TSm51D,0*14
!AIVDM,2,2,7,A,Q0CH88888888888,2*41
!AIVDM,1,1,,A,4>qc9wiu:l<=D0DAjJMdk0i005Pl,0*78
!AIVDM,1,1,,A,D>qc9wiMdvfqUQN9H0,4*2E
!AIVDM,1,1,,A,F>qc9wj2N2P3D73EB6`>6bT20000,0*58
!AIVDM,2,1,8,B,5000H6P2<w0e90772210K;WCF22222222222220o1h>3540Ht5TSm51D,0*18
!AIVDM,2,2,8,B,Q0CH88888888888,2*4D
```

Decoding Notes

System Configuration

Interfacing Notes

The driver can handle maximum 100 targets (default). If you need to track more targets at the same time, change the decimal value of registry key "HKEY_CURRENT_USER\Software\QPS*QINSy*\7.0\Drivers\Targets\Settings\ MaxTargetsOnIPC".

If a target has not been updated for more than 30 seconds (default), it will be removed. If you want to track lost targets for a longer period, change the decimal value (in seconds) of registry key "HKEY_CURRENT_USER\Software\QPS*QINSy*\7.0\Drivers\Targets\Settings\MaxAge"

3.20.2 NMEA Target Messages (TLL/TLB/TTM)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvContactData.exe	*Drivers.io options:*	*NMEA*
Last modified:	*2003*-Jan-22		

Driver Description

Driver to decode data received from systems tracking or detecting targets, e.g the Furuno CH-250 Sonar, and using the NMEA 0183 Standard for outputting target message.

These message can be $--TLL – Target Latitude and Longitude
$--TTM – Tracked Target Message
$--TLB – Target label

The following data is decoded from the TLL:
Target Id Number (0..99), Latitude (WGS84), Longitude (WGS84), Name, Target Status (Lost, Query, Tracking), Target Reference (indicating whether the given position is for own ship, or for other target)

The following data is decoded from the TTM:
Target Id Number (0..99), Speed, Course, Name , Status (Lost, Query, Tracking), Target Reference.
Data is only used for own ship messages!!!

The following data is decoded from the TLB:
None at the moment

Format Description

Each datastring is terminated by <CR><LF>. See for an exact format description the NMEA 0183 Standard Document, v2.3.

Format Example

Interfacing Notes

The driver can handle maximum 100 targets (default). If you need to track more targets at the same time, change the decimal value of registry key
“HKEY_CURRENT_USER\Software\QPS*QINSy*\7.0\Drivers\Targets\Settings\ MaxTargetsOnIPC”.

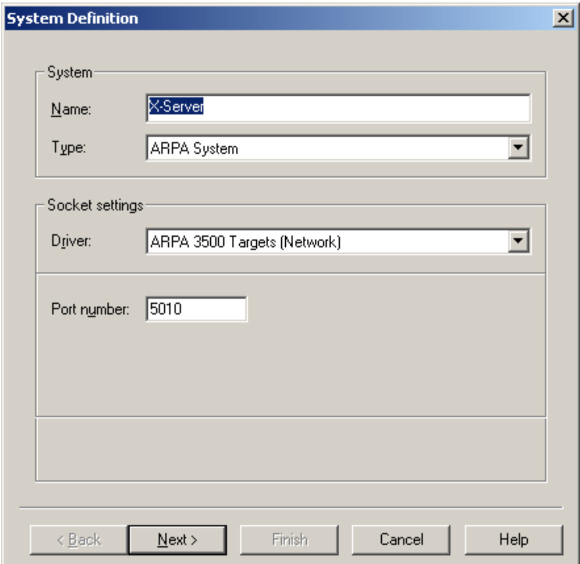
If a target has not been updated for more than 30 seconds (default), it will be removed. If you want to track lost targets for a longer period, change the decimal value (in seconds) of registry key
“HKEY_CURRENT_USER\Software\QPS*QINSy*\7.0\Drivers\Targets\Settings\MaxAge”

3.21 ARPA SYSTEM DRIVERS

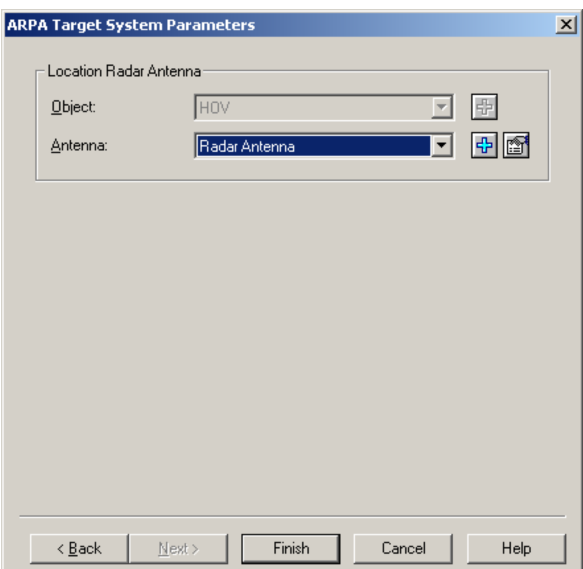
Database Setup

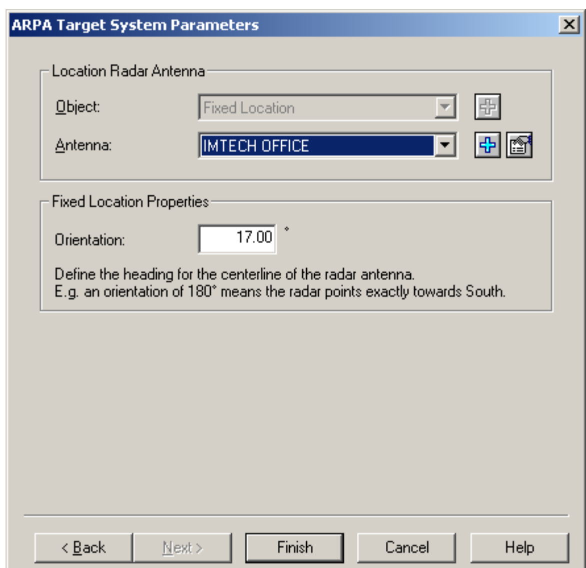
In DB Setup, the ARPA Radar System drivers are listed as “ARPA System”.

The only properties the user has to select are the I/O parameters and the location of the Radar antenna.



The location of the radar antenna is needed because the received target data contains a relative range/bearing or X/Y offset. The radar antenna can be located on a variable node, e.g. on a vessel, or on a fixed node.

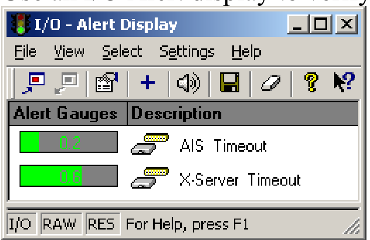




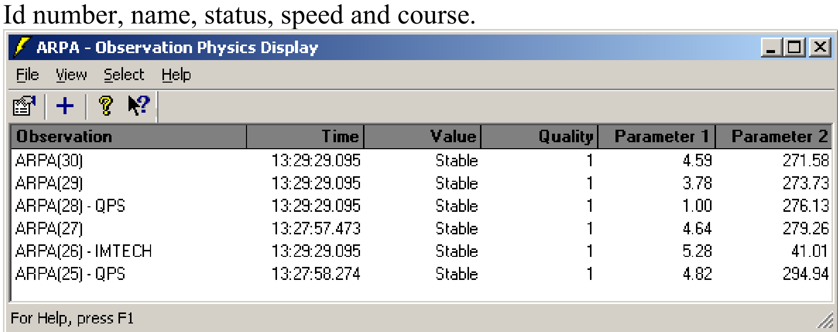
Controller Setup

There are no additional settings in the Controller, however, there are three displays that can be used to monitor ARPA Targets:

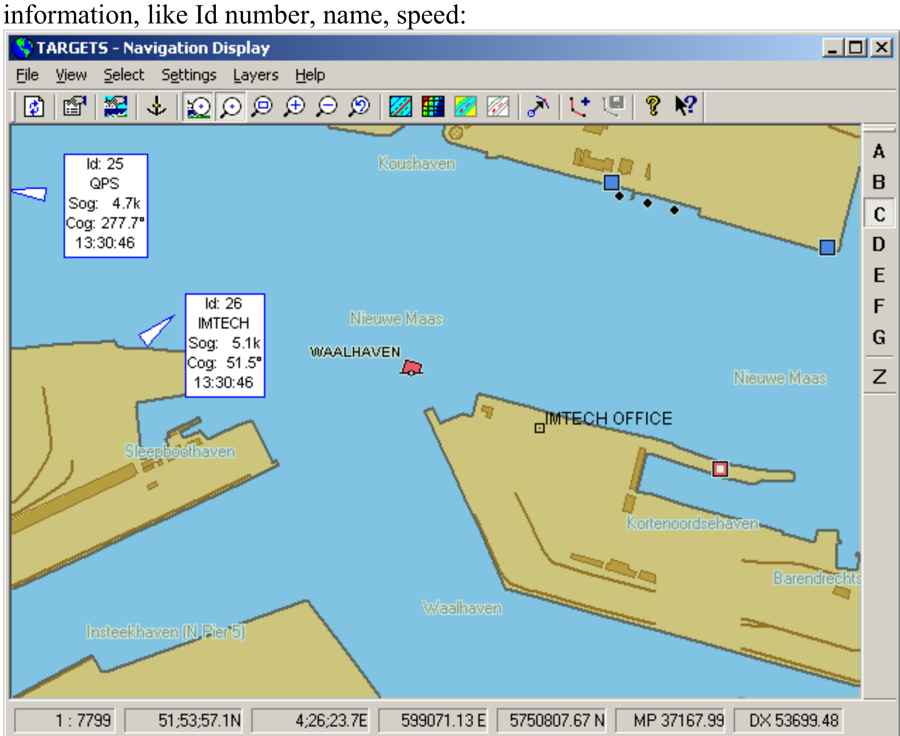
Use an I/O Alert display to verify that data is received by the selected driver.



Use an Observation Physics display to monitor for each received targets the following properties: Type and Id number, name, status, speed and course.



Use a Navigation Display to draw the received targets on their exact location, with or without additional text information, like Id number, name, speed:



3.21.1 ARPA 3500 Targets (Network)

Input / Output:	Input	*Driver class type:*	LAN
Executable name:	DrvARPA3500Socket.exe	*Drivers.io options:*	*none*
Last modified:	*2002*-Nov-18		

Driver Description

Driver to decode data received from ARPA 3500 Radar Server.
The Radar Server is responsible for tracking ARPA targets. The Radar Server broadcasts the resulting position of the targets on the network. The network port is configurable. By default, the network ports are as follows. X-Band server: 5010, S-Band server: 6010.
ARPA Target message broadcasts use the UDP broadcast protocol.
The following data is decoded: Id number, Name, Status, X/Y Offset (relative to antenna), Speed over ground (knots), Course over ground (deg), Quality number

Format Description

See “HOV Interface Design” Document.

Format Example - (binary characters as ‘.’ dots represented)

```
.IMI-S.....-....................&...........|..............................z.........glgl.........IMI-S.....-
....................&...........}..............................IMI-S...2.-.....................-
..........~.....&........................p.........klkl.........IMI-S.../.-.....................-
......................................oIMI-S.....IMTECH.F......AoIMI-S.....QPS.CH.F......AoIMI-S.....QPS.CH.F......A.IMI-S...2.-
....................-................-.........).)............f.........klkl.........IMI-S.../.-.....................-
......................................oIMI-S.....IMTECH.F......AoIMI-S.....QPS.CH.F......AoIMI-S.....QPS.CH.F......A.IMI-S...J.-
....................3..........................................IMI-S...N.-
....................3................6.........$.$............\...|.....klkl.........IMI-S...f.-
....................:..........................................IMI-S...i.-
....................:................@.........'.'............Q...w.....}l}l.........IMI-S...f.-
....................:..........................................IMI-S...i.-
```

Interfacing Notes

The driver can handle maximum 100 targets (default). If you need to track more targets at the same time, change the decimal value of registry key “HKEY_CURRENT_USER\Software\QPS*QINSy*\7.0\Drivers\Targets\Settings\ MaxTargetsOnIPC”.

If a target has not been updated for more than 30 seconds (default), it will be removed. If you want to track lost targets for a longer period, change the decimal value (in seconds) of registry key “HKEY_CURRENT_USER\Software\QPS*QINSy*\7.0\Drivers\Targets\Settings\MaxAge”

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3.22 GUN CONTROLLER DRIVERS

Database Setup

General desription to be added.

See for more information the *QINSy* DB Setup Help Topics or the *QINSy* Knowledge Base.

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3.23 P5/94 GENERATOR DRIVERS

Database Setup

General desription to be added.

See for more information the *QINSy* DB Setup Help Topics or the *QINSy* Knowledge Base.

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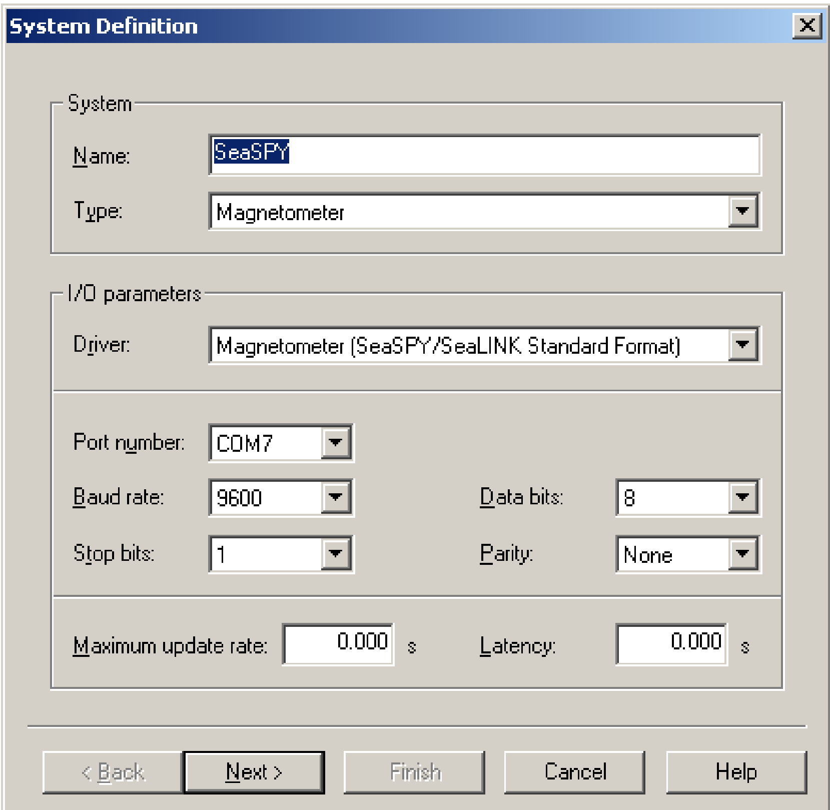
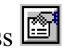
3.24 MAGNETOMETER DRIVERS

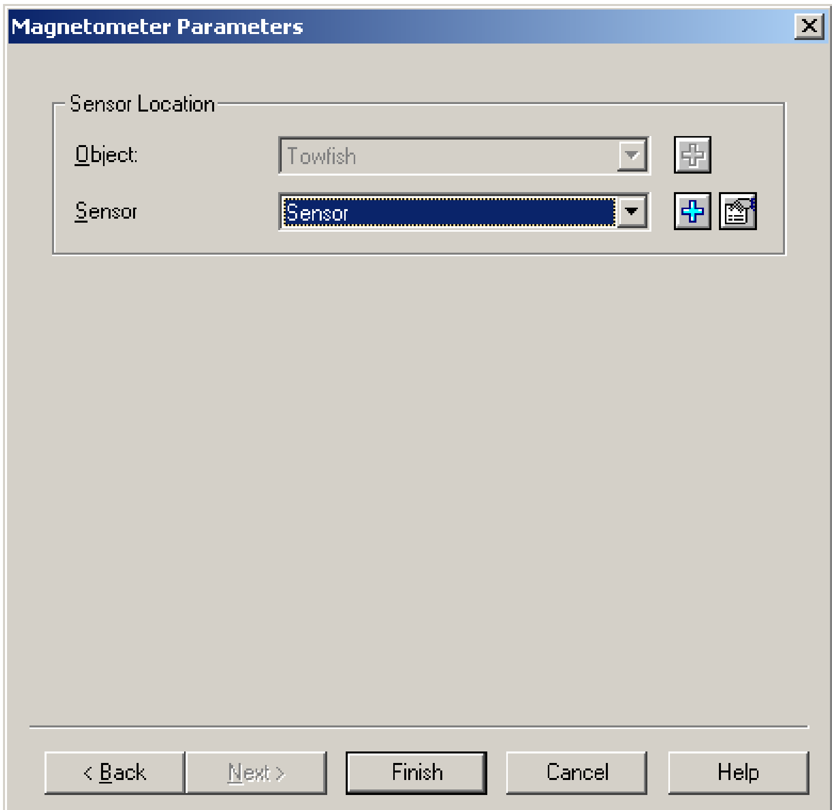
Database Setup

First define and select the “Object” on which the magneto meter is located. Add a system of type “Magnetometer” and select the appropriate driver and interface parameters. Press “Next” button to continue. There is no need to define a separate ***magnetic field*** observation, since it is automatically added to the system. Select or add the sensor node and enter the system parameters. Finally, press “Finish” to save the system.



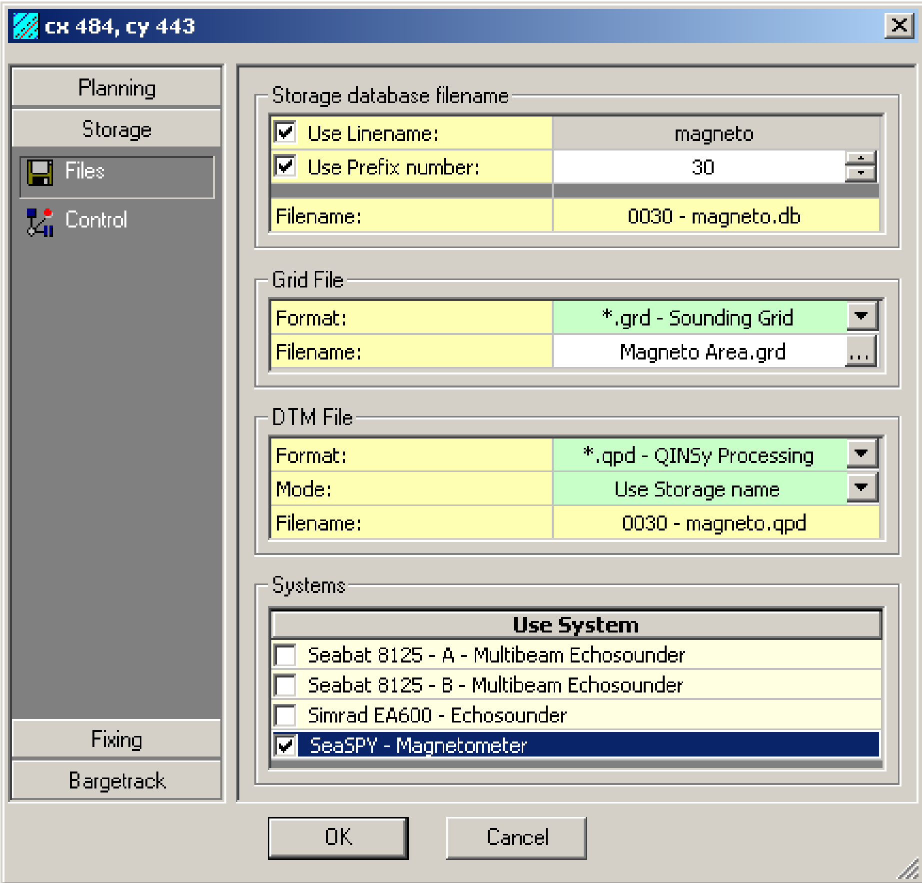
Database Setup (continued)

A new sensor node can be added by pressing the  button; to change its properties, press  button.



Controller Setup

The decoded magnetic field data will be stored in the raw database when recording. The user may also store magnetic field data in a "DTM" file: A sounding grid and/or a ASCII/QPD/PRO file.



Select Files Storage under Session Setup, enable the Magnetometer system and select the required "DTM" file format.

See for more information the *QINSy* DB Setup Help Topics or the *QINSy* Knowledge Base.

3.24.1 Magnetometer (Geometrics G880)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvGeometricsMagneto.exe	*Drivers.io options:*	None
Last modified:	2003-Jan-14		

Driver Description

Driver to decode magnetic field, depth and/or altitude observations from a Geometrics G880 Magnetometer system.

Format Description

Output data are ASCII strings. Each observation is outputted as a separate line of data. Each line starts with an identifier that designates the type of data present in the line. The identifier is followed by the actual value for the observation. Three empty lines follow each set of observations. <CR> <LF> terminate each line.

#	*Identifier*	*Description*
1	F	Magnetometer Field observation
2	S	Magnetometer Signal observation
3	D	Fish Depth observation
4	A	Fish Altitude observation

Format Examples

```
F 26775.9  <CR>LF>
S 1243.0  <CR><LF>
D 4.0      <CR><LF>
A 14.9     <CR><LF>
<CR><LF>
<CR><LF>
<CR><LF>
```

Database Setup

See also description under "MAGNETOMETER DRIVERS".

To decode the magnetometer field observation (nT) a Magnetometer system needs to be defined.
The quality factor (e.g. shown in the Observation Physics Display) is the actual signal strength of the reading.

For information on how to decode the fish depth & altitude observations see the entry for "Magnetometer (Geometrics G880)" driver in the "UNDERWATER SENSOR DRIVERS" section of this document.

3.24.2 SeaSPY/SeaLINK Standard Format (Passive)

3.24.3 SeaSPY/SeaLINK Standard Format (with UTC) (1Hz)

3.24.4 SeaSPY/SeaLINK Standard Format (with UTC) (4Hz)

Input / Output:	Input/Output	*Driver class type:*	Terminated <LF>
Executable name:	*DrvMagnetometer.exe*	*Drivers.io options:*	*STANDARD | ACT*
Last modified:	2003-Dec-10		1 | 2 | 3 | 4 | 5 | 6

Driver Description

Driver to decode magnetometer observations, magnetic field and signal strength from Marine Magnetics SeaSPY/SeaLINK Magnetometer system, outputting in Standard Data Format (ASCII).

The passive driver will timestamp the data when it's received at the I/O port.
The active driver, "(With UTC) (1Hz)", will use the time from the datastring to timestamp the magnetic data. In order to have both systems (*QINSy* and the SeaSPY) working in the same timeframe, the active driver will send a command to the magnetometer to set the current time. This command will be send everytime the Controller goes on-line, and everytime the I/O will be resetted in the Controller.
Further, the driver will also send a command, "3", to set the cycle update rate of the magnetometer to 1 reading per second (1Hz). The commandline parameter "3" may be changed to another number between 0 and 6, with the following meaning: 6 = 0.1Hz, 5 = 0.2Hz, 4 = 0 .333Hz, 3 = 1Hz, 2 = 2Hz, 1 = 4Hz. Special value 0 means: Stop cycling.

The driver can decode the depth reading of the fish, coming from the pressure sensor. In that case, define an Underwater Sensor System on the fish object, select the driver 'Depth – SeaSPY/SeaLINK Standard Format (x)', and add a ROV Depth observation. Make sure that the value between brackets in the drivers name is the same as the driver selected for this Magnetometer system.

Format Description

Data that is presented by the magnetometer during cycling always appears in the following format.
The first character of each line is always * (ASCII code 42). This leading character is supplied for automated data collection systems that require periodic synchronization with the data stream. Each letter shown in Italics stands for a digit of a particular record in the reading.

```
*YY.JJJ/HH:MM:SS.S_F:FFFFFF.FF_S:SSS_D:+DDD.Dm_L:L_TTTms_Q:QQ_WWWW CR LF
```

Letter	Description
_	Space Character
Y	Year (time of reading).
J	Julian day (time of reading).
H	Hour (time of reading).
M	Minute (time of reading).
S	Second (time of reading).
F	Magnetic field (nT).
S	Signal Strength of reading. This is a raw number generated by the magnetometer that gives (in part) a good indication of the quality of the final total field measurement. Anything over 70 is considered an acceptable signal, and anything over 130 is considered excellent.
D	Depth of the fish. The value shown is in meters. The depth sensor can be calibrated using the P and p commands.
L	Leak sensor output, 0-9. 0 indicates no leak, 9 indicates a severe leak. The leak sensor replaces the temperature sensor, so in models with a temperature sensor this value can be ignored.

T Measurement time. Ideally, this should be the magnetometer's cycling time minus 32ms, with a maximum of 968ms. If you see a G message, indicating that measurement was prematurely terminated due to a high gradient condition, this value will tell you how severe the gradient is.
Q Signal quality. This is a two-digit number between 00 to 99. The left digit is a good indication of signal strength, and the right digit indicates how much information was available for measurement.
W Warning Messages.
CR Carriage Return (ASCII code 13).
LF Line Feed (ASCII code 10).

There are five different warning messages that can be displayed by the magnetometer, four of which are not mutually exclusive. The warning messages may be summarized as follow.

Letter	Meaning
W	Weak signal. This message is displayed if the signal strength for the reading is below a threshold value
G	Gradient condition. In high magnetic gradients, the precession signal produced by the sensor decays more quickly. This message occurs if the measurement time was prematurely terminated due to a quickly decaying signal. The strength of the gradient can be estimated by observing the measurement time. Take note that sensitivity will decrease as the measurement time decreases.
P	Poor reading. This message is displayed if too few zero crossings are taken, for whatever reason. Expect this message under conditions of extremely high magnetic gradient.
M	Instrument Mistuned. The magnetometer may decide to display this message under extremely poor signal conditions, which is characteristic of poor tuning setting. When this message occurs, the instrument will attempt to retune by executing an initialize tuning procedure, if the auto-tuning feature is enabled.
NS	No signal. This message is never displayed in conjunction with any other messages. It occurs when the magnetometer determines that signal conditions are so poor that there is very likely no sensor connected to the instrument. Since running the unit with no sensor attached for an extended period of time abuses the polarization circuitry, the magnetometer will cease cycling if this message occurs.

Format Examples

```
*00.001/00:02:18.5 F:027611.325 S:069 D:-005.4m  L0 0006ms Q:00  P G<CR><LF>
*00.001/00:02:19.5 F:027476.006 S:072 D:-005.4m  L0 0006ms Q:00  P G<CR><LF>
*00.001/00:02:20.5 F:027528.771 S:072 D:-005.4m  L0 0007ms Q:00  P G<CR><LF>
*00.001/00:02:21.5 F:027380.757 S:073 D:-005.4m  L0 0008ms Q:00  P G<CR><LF>
*00.001/00:02:22.5 F:027269.113 S:072 D:-005.4m  L0 0006ms Q:00  P G<CR><LF>
```

Database Setup

See also description under "MAGNETOMETER DRIVERS".

To decode the magnetometer field observation (nT) a Magnetometer system needs to be defined.
The quality factor (e.g. shown in the Observation Physics Display) is the actual signal strength of the reading.

The leak sensor output is also checked. It should be always zero. If the value is different than zero, the reading of the magnetic observation will be set hardcoded to –999.9. One may define an alert display that monitors this value. It is important to get the unit immediate to the surface in case of any leakage!

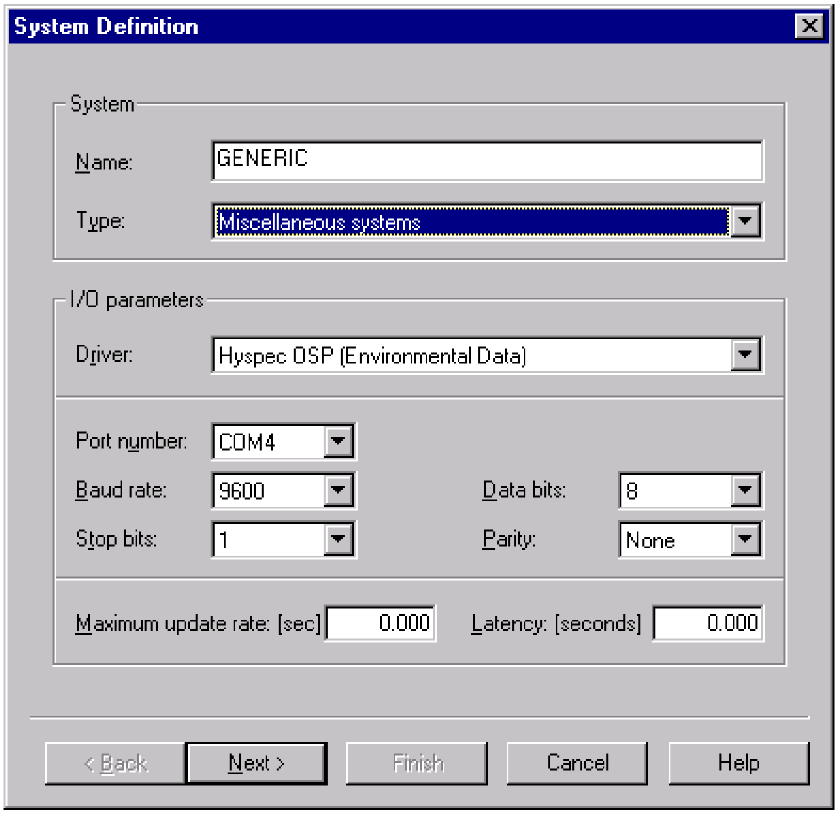
Interfacing Notes

When the active driver is selected (With UTC), it is important that the wiring of the cable is ***bi-directional***, i.e. allows two-way data transfer, so that the *QINSy* driver can send the command telegrams.

3.25 MISCELLANEOUS SYSTEM DRIVERS

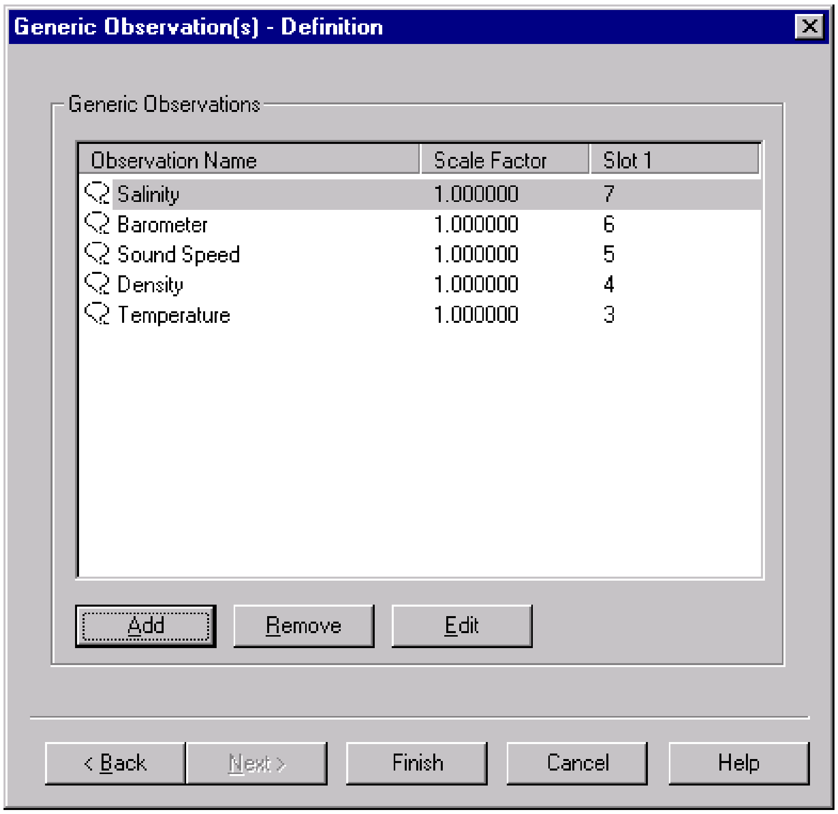
Database Setup

Select item "Auxiliary systems" and add an "Miscellaneous system" to the *QINSy* Database . If such a system is added for an "Object", then the system will still be defined as an "Auxiliary system". Select the appropriate driver and I/O parameters. Press the "Next" button to define the (generic) observations to be connected to the system. Press the "Finish" button to save the system setup. See example below.



Database Setup (continued)

A new (generic) observation can be added by pressing the "Add" button; to change its properties, select the observation and press the "Edit" button. To remove a connected observation, select it and press "Remove".



See for more information the *QINSy* DB Setup Help Topics or the *QINSy* Knowledge Base.

3.25.1 Airpax Tachtrol RPM

Input / Output:	Input	*Driver class type:*	Terminated <CR>
Executable name:	DrvAirpaxTachtrol.exe	*Drivers.io options:*	*none*
Last modified:	1999-Oct-28		

Driver Description

Driver for decoding RPM values from Airpax Tachtrol System.

Format Description

`<LF><SPACE>DO:sZZT.TT<CR>`

Item	*Format*	*Description*	*Values, Units*
1	<LF>	Line feed	ASCII 10
2	<SPACE>	Space	ASCII Space
3	DO:	Data label	ASCII Text
4	SZZT.TT	Data value	S = sign, ZZT.TT 1.99 .. 199.9 ZZ are spaces when obsolete
5	<CR>	Carriage return	ASCII 10

Interfacing Notes

A simple one-way wired RS-232 cable is enough. However, a bi-directional cables is more practical.

Database Setup

See description under "MISCELLANEOUS SYSTEM DRIVERS".

3.25.2 Anchor Input (Network)

Input / Output:	Output	*Driver class type:*	UDP/IP Client
Executable name:	DrvAnchorInput.exe	*Drivers.io options:*	None
Last modified:	2004-Jul-13		

Driver Description

Driver to be used to receive the anchor configuration/position of another *QINSy* computer. The so-called remote anchor information can be visualized in the Navigation Display. Driver is used in conjunction with Anchor input Driver.

Both computers should be connected together through their network connection; this can either be a direct cross over cable or though a hub. The TCP/IP settings on both machines should be set-up correctly.

Note: The anchor positions are transferred as Eastings/Northings on the survey datum so for correct visualization it is important that both *QINSy*'s have the same geodetic set-up.

Format Description

Refer to Anchor Output driver for details on format.

Database Setup

See description under "MISCELLANEOUS DRIVERS".
Make sure to select the same port number as set-up on the computer that sends the Anchor Information.

It is not necessary to define any generic observations when using this driver.

3.25.3 Campbell Scientific CR10 Datalogger

Input / Output:	Input (two-way)	*Driver class type:*	Interrogated
Executable name:	DrvCR10Datalogger.exe	*Drivers.io options:*	*none*
Last modified:	2004-09-29		

Driver Description

Driver to decode generic observations from a CR10 Datalogger.
The CR10 Datalogger is capable of obtaining data using multiple interfaces. The driver was designed for RWS Noord Holland, Petten project. This project gathers meteorological data during the Dutch storm season along the coast. It measures waveheight, wavespeeds etc. The CR10 can be interrogated through several means, direct serial, Satel radio modem and MD9 network connection.
The driver has the following features:

- Automatically retrieving of data on a user defined interval.
- Automatically synchronizing of the CR10 internal clock on a user defined interval.
- Monitoring of real time data.
- Uploading of logger programs to the CR10.
- Terminal function for manual control of the logger.

Format Description

Because of the complexity of the communication with the datalogger it is adviced to look in the specific manuals for the CR10, Satel and MD9.
The data coming from the CR10 is decoded in two formats:

1. Data blocks, identified by the ID 113.
2. Time blocks, identified by the ID 117.

The update rate of each of the blocks depends on the programming of the CR10. If there are no time blocks available in the output from the CR10 *QINSy* will not be able to decode the data because it uses the time blocks to interpolate the data inbetween.

System Configuration

Some notes which are not directly clear from the manuals.
For the MD9 to work with Windows, it is necessary that the master MD9 ID is set to 255, this means that all the dipswitches in the MD9 are set to open.

Interfacing Notes

Cabling should be as described in the manuals.

Database Setup

See description under “MISCELLANEOUS DRIVERS”.

To define the observations connected to the datalogger the slotnumbers should be defined the way the observations are arranged in the data message (ID 113). For decoding data from the timestring (ID 117) the slotnumber starts at 21 (the first observation starts after the time string).
The MD9 is a special case. Because multiple MD9’s can be defined on the network the slotnumbers should be defined as follows: “MD9_ID x 100 + n”, where n is the place of the observation in the data message. So observation 1 for MD9 16 in string 113 will get slotnumber 1601, observation one in string 117 will get slotnumber 1621.

Additional Information

For more detailed information on the used equipment see the following manuals:
CR10 Measurement & Control Module – Instruction Manual. Campbell Scientific
User guide Satelline 2Asx Radio data modem – Satel Oy or Nautikaris bv.
MD9 Multidrop Interface – Campbell Scientific.

3.25.4 DeepC AUV AFS Control

Input / Output:	Bi-Directional (Network)	*Driver class type:*	TCP Client
Executable name:	DrvDeepCAFS.exe	*Drivers.io options:*	*none*
Last modified:	2004-Feb-13		

Driver Description

Driver that is used to connect the DeepC AUV's mission control computer (AFS) to the payload (*QINSy*). The AFS can control *QINSy* through this AFS Driver. For example, the AFS can start logging, stop logging, quit *QINSy*, start/stop the optionally attached Seabat7K Multibeam and shutdown Windows OS.
Beside controlling *QINSy*, this driver can also be used for decoding Positioning, Underwater and Sound Velocity Profile data.

The Driver will make contact to the AFS Server over TCP/IP. The port number and IP number must be specified in DbSetup. Once The connection is established the driver sends the current *QINSy* status and Quality indicator to the AFS with an update rate of 1Hz. The AFS will send a message (update rate 10 Hz) that encapsulates navigation/depth/sound velocity info together with new commands for *QINSy*. The AUV can perform a special Sound velocity profiling manoeuvre, if a Sound Velocity Profile system is defined then the sound velocity/depth values are stored in a profile and automatically send to the controller when the maoeuvre is finished.

The driver makes contact to the following *QINSy* components by special events and/or buffers:

-Controller	control recording commands
-Seabat 7K Multibeam Driver	start pinging / stop pinging / shutdown commands
-Alert display(s)	provides quality indication status
-Seabed Gradient Driver	provides seabed steepness alarm that will invoke a mission abort and an event manoeuvre request to the AFS

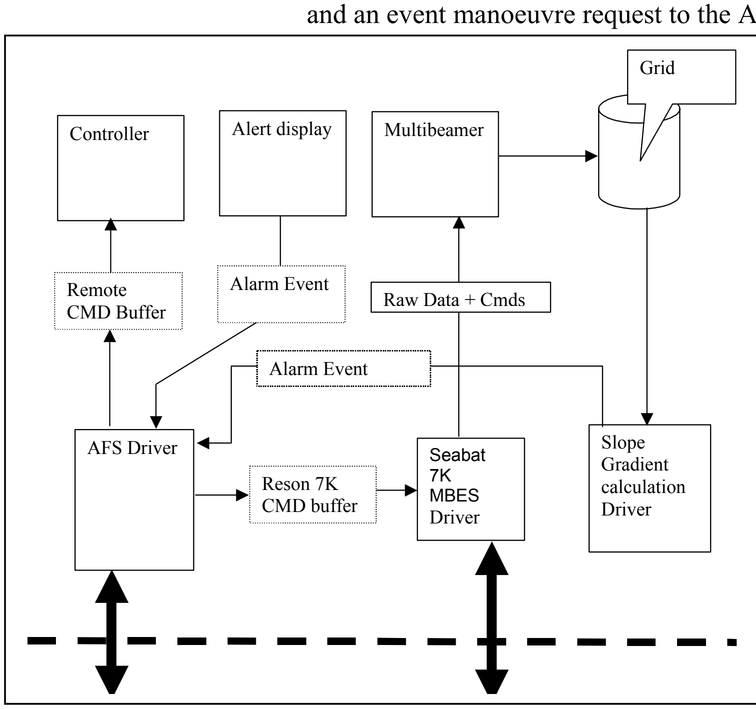


Figure: Global Architecture

Format Description

Refer to DeepC documentaton for message layout definition.

Decoding Notes

Packets from the AFS are decoded with an update rate of 10 Hz. If *QINSy* is connected to a PPS system then the timestamp from the message is used else the time of arrival is used. Make sure that the AFS and *QINSy* are synchronized to the same clock.

Database Setup

Multiple systems must be defined in order to decode all the data from the AUV. Make sure that IP and port number are the same for all these systems!

-To decode position data, add a positioning system and select driver “DeepC AUV Position”. Height of the system is made equal to the reported AUV Depth * -1.

-To decode underwater sensor data select an Underwater Sensor system and select driver “Bathy - DeepC AUV (Depth & Altitude)”. Add an ROV Altitude observation and/or a ROV Depth observation.

-To decode the recorded Sound Velocity profile add a Sound Velocity Profile system “Depth, SV (DeepC AUV)”. Note: Only one SVP system is allowed in the database.

No generic observations can yet be decoded. This may be extended in the future.

3.25.5 Draught Measurement System (Imtech DMS 3500)

Input / Output:	Input	*Driver class type:*	*WinSocket*
Executable name:	DrvDraughtSocket.exe	*Drivers.io options:*	*none*
Last modified:	2004-May-10		

Driver Description

Driver for decoding the average draught value coming in via a network connection from Imtech's DMS3500 Draught Measurement System. Draught is constantly measured but only valid when the vessel has no speed. So operational wise: monitor the value, using e.g. a Timeplot display, while the vessel is not moving, and then enter the monitored value in the vessels height settings in the Controller's Computation Setup.
The data message also contains, next to the draught, seawater temperature and depth of a sweep system, if installed. When pressure sensors have been mounted on a bar to do a barcheck, you may decode the depth below water surface. In that case, you may define an Echosounder System, and select driver 'Sweep Depth (Imtech DMS 3500)', or define an Underwater Sensor, select driver 'Depth – Sweep (Imtech DMS 3500)' and add an 'ROV Depth' observation. Port number must identical to the Draught Measurement System.

Format Description

Data is in binary format, and has the following C type definition:

```
{
        DWORD    dwID;                                               // equals EHOVDmsMsgValues
        DWORD    dwSize;                                             // sizeof(CHOVDmsMsgValues)
        DWORD    dwReferenceCount;                                   // See HOV_DMS_REFERENCE_COUNT_MAX
        DWORD    dwReserved1;                                        // 8 byte alignment
        double   dDraught;                                           // m, computed
        double   dDraughtAvg;                                        // m, computed
        double   dSeawaterTemperature;                               // degC, measured (A/D)
        double   dSoundVelocity;                                     // m/s, measured (NMEA)
        double   dBarometricPressure;                                // Pa, repeated from Meteo (SMC)
        double   dLatitude;                                          // deg, repeated from GPS (WGS84) (NMEA)
        double   dLongitude;                                         // deg, repeated from GPS (WGS84) (NMEA)
        double   dGravity;                                           // m/s2, computed based on GPS position
        double   dRoll;                                              // deg, repeated from Motion Sensor (SMC)
        double   dPitch;                                             // deg, repeated from Motion Sensor (SMC)
        double   adPressureMeasured[EHOVDmsPressureSensorCount];     // Pa, measured (A/D)
        double   adDepthComputed[EHOVDmsPressureSensorCount];        // m
        double   adDepthCorrected[EHOVDmsPressureSensorCount];       // m, corrected for Roll & Pitch
        double   adPressureAvg[EHOVDmsPressureSensorCount];          // Pa, filtered
        DWORD    dwFilterInterval;                                   // in msec
        DWORD    dwQuality;                                          // See ODmsMsgQuality
        double   dPressureSweep;                                     // Pa, optional sweep system, 0.0 when not installed
        double   dDepthSweep;                                        // m,  optional sweep system, 0.0 when not installed
        double   dNotUsed1;                                          // Extra double, added from v7.30.2004.04.23.1 on
        double   dNotUsed2;                                          // Extra double, added from v7.30.2004.04.23.1 on
}
```

Interfacing Notes

Data is transmitted as UDP messages to a specific IP network number on a specific port number, e.g. 6001. Every computer connected to this network may listen to the specific port number

Database Setup

Define in Db Setup a (auxiliary) system of type 'Miscellaneous System' and select the driver 'Draught Measurement System (Imtech DMS 3500)'. Enter the specific port number. You don't have to define an IP address. On the next page add a new (generic) observation, change the name to 'Draught', enter for the slot id 'D", and leave the scalefactor to 1.000. To decode the seawater temperature, add a new observation, change the name to 'Seawater temp', enter for the slot id 'S", and leave the scalefactor to 1.000.
Hint: One may monitor if (binary) data is coming at the specific port using the I/O Test Utility: Define a new Port and select Port Settings to connect to a Network and define the port number.

See further description under "MISCELLANEOUS SYSTEM DRIVERS".

3.25.6 Javad IMU Unit (Sensor Data)

Input / Output:	Input (two-way)	*Driver class type:*	Counted
Executable name:	DrvJavadAT4.exe	*Drivers.io options:*	None
Last modified:	2004-June-15		

Driver Description

Driver to decode message from Javad AT4 or from Javad IMU unit.
These messages may contain attitude (roll, pitch and heading) data, external event markers, position (lat/lon/height) data, and/or **sensors information data**.

Messages from the Javad AT4 that will be decoded are [AR] and/or [XA] records.
These records are defined in the Topcon GPS Receiver Interface Language (GRIL) Manual, version 2.2.
The [AR] records contain roll and pitch (no heave available!) and heading information
The [XA] records contain the external event markers

Messages from the Javad IMU unit that will be decoded are [ap], [SE], [po], and/or [at] records.
The [ap] records contain roll and pitch (no heave available!), heading, and position information.
The [SE] records contain **sensor information (acceleration and angular velocities around the axis).**
The [po] records contain position information.
The [at] records contain roll and pitch (no heave available!) and heading information.

The driver will detect automatically the different message types.

Format Description

[SE] Sensors' Data {size = 29}

```
struct SE
{
  u4  t;               //*** AT4 time in msec.
  f4  ax;              //*** Acceleration along x axis
  f4  ay;              //*** Acceleration along y axis
  f4  az;              //*** Acceleration along z axis
  f4  wx;              //*** Angular velocity around x axis
  f4  wy;              //*** Angular velocity around y axis
  f4  wz;              //*** Angular velocity around z axis
  u1  cs;              //*** Checksum
};
```

Format Example

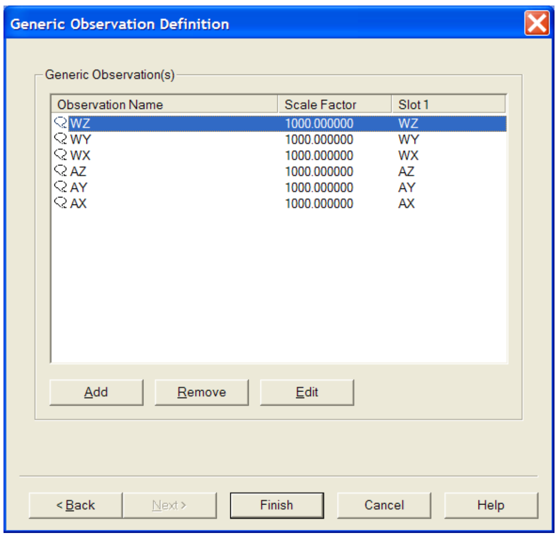
[SE] Records (binary):

```
SE01D..E....:.z..r.b..T(..s.:=.v7]
SE01D..E.5......;.f..U..:.sq:@y.8.
SE01D..E../".N=.....:I..;.q.:J....
SE01D..E.*/......SN.;.f.;.VT.4...N
SE01D..E..p..K......;..e....:..`9{
SE01D..E..G.<z.....I;|D.:...:.>.9q
```

Database Setup

Define in Db Setup a (auxiliary) system of type ‘Miscellaneous System’ and select the driver ‘Javad IMU unit (sensor Data)’. On the next page, add six new (generic) observations, as follows:

- To decode the Acceleration along the x axis, add an observation, change the name to (e.g.) “AX” and set the Slot Id to “AX”. The raw data may be small numbers, so set the scale factor to 1000.0.
- To decode the Acceleration along the y axis, add an observation, change the name to (e.g.) “AY”, set the Slot Id to “AY” and set the scale factor to 1000.0.
- To decode the Acceleration along the z axis, add an observation, change the name to (e.g.) “AZ”, set the Slot Id to “AZ” and set the scale factor to 1000.0.
- To decode the Angular velocity around the x axis, add an observation, change the name to (e.g.) “WX”, set the Slot Id to “WX” and set the scale factor to 1000.0.
- To decode the Angular velocity around the y axis, add an observation, change the name to (e.g.) “WY”, set the Slot Id to “WY” and set the scale factor to 1000.0.
- To decode the Angular velocity around the z axis, add an observation, change the name to (e.g.) “WZ”, set the Slot Id to “WZ” and set the scale factor to 1000.0.



See further description under “MISCELLANEOUS SYSTEM DRIVERS”.

3.25.7 Magnetometer (Geometrics)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	DrvGeometricsMagneto.exe	*Drivers.io options:*	None
Last modified:	2000-Dec-19		

Driver Description

Driver to decode depth, altitude and/or magnetometer observations, such as field strength and field signal from a Geometrics G880 Magnetometer system.

Format Description

Output data are ASCII strings. Each observation is outputted as a separate line of data. Each line starts with an identifier that designates the type of data present in the line. The identifier is followed by the actual value for the observation. Three empty lines follow each set of observations. <CR> <LF> terminate each line.

#	*Identifier*	*Description*
1	F	Magnetometer Field observation
2	S	Magnetometer Signal observation
3	D	Fish Depth observation
4	A	Fish Altitude observation

Format Examples

```
F 26775.9  <CR>LF>
S 1243.0  <CR><LF>
D 4.0      <CR><LF>
A 14.9     <CR><LF>
<CR><LF>
<CR><LF>
<CR><LF>
```

Database Setup

See also description under “MISCELLANEOUS SYSTEM DRIVERS”.

To decode the magnetometer signal and field observation a Miscellaneous system needs to be defined. After this system has been added the user needs to define the magnetometer field and signal observation. To be able to decode the correct observation the user is required to enter slot information. For each observation the identifier that corresponds with the field for which you are defining the observation needs to be entered as the slot i.e. ‘S’ when defining the magnetometer signal observation.

For information on how to decode the fish depth & altitude observations see the entry for “Geometrics Magnetometer” driver in the “UNDERWATER SENSOR DRIVERS” section of this document.

3.25.8 Magnetometer (SeaLINK)

Input / Output:	Input	*Driver class type:*	Terminated <LF>
Executable name:	*Magnetometer(SeaLink).ini*	*Drivers.io options:*	None
Last modified:	2000-Dec-19		

Driver Description

Driver to decode magnetometer observations, magnetic field and signal strength from a SeaLINK Marine Magnetics Magnetometer system, outputting in Text Mode Data Format.

Format Description

Data that is presented by the magnetometer during cycling always appears in the following format.
The first character of each line is always * (ASCII code 42). This leading character is supplied for automated data collection systems that require periodic synchronization with the data stream. Each letter shown in Italics stands for a digit of a particular record in the reading.

```
*YY.JJJ/HH:MM:SS.S_F:FFFFFF.FF_S:SSS_D:+DDD.Dm_L:L_TTTms_Q:QQ_WWWW CR LF
```

Letter	Description
_	Space Character
Y	Year (time of reading).
J	Julian day (time of reading).
H	Hour (time of reading).
M	Minute (time of reading).
S	Second (time of reading).
F	Magnetic field (nT).
S	Signal Strength of reading. This is a raw number generated by the magnetometer that gives (in part) a good indication of the quality of the final total field measurement. Anything over 70 is considered an acceptable signal, and anything over 130 is considered excellent.
D	Depth of the fish. The value shown is in meters. The depth sensor can be calibrated using the P and p commands.
L	Leak sensor output, 0-9. 0 indicates no leak, 9 indicates a severe leak. The leak sensor replaces the temperature sensor, so in models with a temperature sensor this value can be ignored.
T	Measurement time. Ideally, this should be the magnetometer's cycling time minus 32ms, with a maximum of 968ms. If you see a G message, indicating that measurement was prematurely terminated due to a high gradient condition, this value will tell you how severe the gradient is.
Q	Signal quality. This is a two-digit number between 00 to 99. The left digit is a good indication of signal strength, and the right digit indicates how much information was available for measurement.
W	Warning Messages.
CR	Carriage Return (ASCII code 13).
LF	Line Feed (ASCII code 10).

There are five different warning messages that can be displayed by the magnetometer, four of which are not mutually exclusive. The warning messages may be summarized as follow.

Letter	Meaning
W	Weak signal. This message is displayed if the signal strength for the reading is below a threshold value
G	Gradient condition. In high magnetic gradients, the precession signal produced by the sensor decays more quickly. This message occurs if the measurement time was prematurely terminated due to a quickly decaying signal. The strength of the gradient can be estimated by observing the measurement time. Take note that sensitivity will decrease as the measurement time decreases.
P	Poor reading. This message is displayed if too few zero crossings are taken, for whatever reason. Expect this message under conditions of extremely high magnetic gradient.

M Instrument Mistuned. The magnetometer may decide to display this message under extremely poor signal conditions, which is characteristic of poor tuning setting. When this message occurs, the instrument will attempt to retune by executing an initialize tuning procedure, if the auto-tuning feature is enabled.

NS No signal. This message is never displayed in conjunction with any other messages. It occurs when the magnetometer determines that signal conditions are so poor that there is very likely no sensor connected to the instrument. Since running the unit with no sensor attached for an extended period of time abuses the polarization circuitry, the magnetometer will cease cycling if this message occurs.

Format Examples

```
*00.001/00:02:18.5 F:027611.325 S:069 D:-005.4m  L0 0006ms Q:00  P G<CR><LF>
*00.001/00:02:19.5 F:027476.006 S:072 D:-005.4m  L0 0006ms Q:00  P G<CR><LF>
*00.001/00:02:20.5 F:027528.771 S:072 D:-005.4m  L0 0007ms Q:00  P G<CR><LF>
*00.001/00:02:21.5 F:027380.757 S:073 D:-005.4m  L0 0008ms Q:00  P G<CR><LF>
*00.001/00:02:22.5 F:027269.113 S:072 D:-005.4m  L0 0006ms Q:00  P G<CR><LF>
```

Database Setup

See also description under “MISCELLANEOUS SYSTEM DRIVERS”.

To decode the magnetometer field observation (nT) a Miscellaneous system needs to be defined. After this system has been added the user needs to define the magnetometer field observation. The quality factor (e.g. shown in the Observation Physics Display) is the actual signal strength of the reading.
The driver does not decode other observations from the datastring.

3.25.9 Network Data Logger (UDP Port)

Input / Output:	Input	*Driver class type:*	UDP/IP Client
Executable name:	*DrvUDPDataLogger.exe*	*Drivers.io options:*	None
Last modified:	2004-Mai-11		

Driver Description

Driver will store all received data on an UDP Network port, straight to a file on disk.

Use Db Setup to add a miscellaneous system in your template database, and select the driver "Network Data Logger (UDP Port)". Enter the port number and select <Finish> (You don't have to add observations for this driver).

When the Controller is on-line and a recording session is started, this driver will store all received network data to a file in the current project's LogFiles folder.
The filename has the same name as the current storage db name, plus the name of the system between brackets and has extension ".raw".

An advanced user may tweak the following registry key:
“HKEY_CURRENT_USER\Software\QPS*QINSy*\7.0\Drivers\Network Data Logger\Settings”
Default extension ("raw") may be changed, e.g. to "bin"
LogMode is default set to 1. If you change it to 0, no data will be stored to disk.
Flags is default set to 1. If you change it to 0, no UNIX filename convention will be used.
Do not change the InitBufferSize, should be 40000hex.

3.25.10 NMEA Miscellaneous (ROT / MWD / MWV), (XDR / MTR), (MTW)

Input / Output:	Input (one-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvNMEAMiscellaneous.exe	*Drivers.io options:*	*NOCS*
Last modified:	2004-01-27		

Driver Description

Driver to decode the following NMEA sentences:

$--ROT	Rate Of Turn
$--MWD	Wind Direction & Speed
$--MWV	Wind Speed and Angle
$--XDR	Meteorological data (air temperature, pressure, humidity and dewpoint)
$--MTW	Seawater temperature
$--MTR	Meteorological Trend (temperature trend, pressure trend, humidity trend)

Format Description

Refer to *NMEA 0183- Standard For Interfacing Electronic Devices - Version 2.30* for more information.

Field	***Format***	***Description***	***Values, Range, Units***	***Slot***
01	"$"	start character	"$" (24 Hex)	
02	aa	talker id	i.e. "IN"	
03	ccc	sentence	"ROT"	
04	","	field delimiter	"," (2C Hex)	
05	x.x	rate of turn	deg/min, "-" = bow turns to port	**ROT0**
06	","	field delimiter	"," (2C Hex)	
07	"A" / "V"	status	"A" = data valid, "V" = data invalid	
08	"*"	checksum field delimiter	"*" (2A Hex)	
09	hh	checksum	XOR from "$" to "*" exclusive	
10	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)	

Field	***Format***	***Description***	***Values, Range, Units***	***Slot***
01	"$"	start character	"$" (24 Hex)	
02	aa	talker id	i.e. "NV"	
03	ccc	sentence	"MWD"	
04	","	field delimiter	"," (2C Hex)	
05	x.x	wind direction	0 to 359 degrees True	**MWD0**
06	","	field delimiter	"," (2C Hex)	
07	"T"	wind direction mode	"T" to indicate True	
08	","	field delimiter	"," (2C Hex)	
09	x.x	wind direction	0 to 359 degrees Magnetic	**MWD1**
10	","	field delimiter	"," (2C Hex)	
11	"M"	wind direction mode	"M" to indicate Magnetic	
12	","	field delimiter	"," (2C Hex)	
13	x.x	wind speed	Knots	**MWD2**
14	","	field delimiter	"," (2C Hex)	
15	"N"	wind speed unit	"N" to indicate knots	
16	","	field delimiter	"," (2C Hex)	
17	x.x	wind speed	Meters/second	**MWD3**

18	“,”	field delimiter	“,” (2C Hex)	
19	“M”	wind speed unit	“M” to indicate meters/second	
20	“*”	checksum field delimiter	“*” (2A Hex)	
21	hh	checksum	XOR from “$” to “*” exclusive	
22	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)	

Field	***Format***	***Description***	***Values, Range, Units***	***Slot***
01	“$”	start character	“$” (24 Hex)	
02	aa	talker id	i.e. “IN”	
03	ccc	sentence	“MWV”	
04	“,”	field delimiter	“,” (2C Hex)	
05	x.x	wind angle	0 to 359 degrees	**MWVT for true MWVR for relative**
06	“,”	field delimiter	“,” (2C Hex)	
07	“T”/“R”	wind angle reference	“T” = True, “R” = Relative	
08	“,”	field delimiter	“,” (2C Hex)	
09	x.x	wind speed		**MWV0 for true MWV1 for relative**
10	“,”	field delimiter	“,” (2C Hex)	
11	“K” / “N” / “M”	wind speed unit	“N” = Knots, “M” = meters/second & “K” = km/hour	
12	“,”	field delimiter	“,” (2C Hex)	
13	“A”	status	“A” = valid	
14	“*”	checksum field delimiter	“*” (2A Hex)	
15	hh	checksum	XOR from “$” to “*” exclusive	
16	<CR><LF>	termination characters	<CR><LF> (0D Hex, 0A Hex)	

Field	***Format***	***Description***	***Values, Range, Units***	***Slotnumbers***
1	$WIXDR	Message type identifier	“$WIXDR”	
3	x.x	Air temperature	Degrees Celsius	**XDR0**
7	x.x	Dew point	Degrees Celsius	**XDR1**
11	x.x	Compensated air pressure	Bar	**XDR2**
15	x.x	Measured air pressure	Bar	**XDR3**
19	x.x	Humidity	%	**XDR4**
22	*hh	Checksum	XOR from “$” to “*” exclusive	
23	<CR><LF>	Termination characters	<CR><LF> (0D Hex, 0A Hex)	

Field	***Format***	***Description***	***Values, Range, Units***	***Slotnumbers***
1	$WIMTW	Message type identifier	“$WIMTW”	
3	x.x	Water temperature	Degrees Celsius	**MTW0**
7	C	Fixed field	“C”	
22	*hh	Checksum	XOR from “$” to “*” exclusive	
23	<CR><LF>	Termination characters	<CR><LF> (0D Hex, 0A Hex)	

Field	***Format***	***Description***	***Values, Range, Units***	***Slotnumbers***
1	$PMTR	Message type identifier	“$PMTR”	
2	n	Temperature trend	Integer (-1, 0, 1)	**MTR0**
2	n	Pressure trend	Integer (-2, -1, 0, 1, 2)	**MTR1**
3	n	Humidity trend	Integer (-1, 0, 1)	**MTR2**

22	*hh	Checksum	XOR from “$” to “*” exclusive	
23	<CR><LF>	Termination characters	<CR><LF> (0D Hex, 0A Hex)	
	Trend values: 2: Rising Fast, 1: Rising, 0: Steady, -1: Falling, -2: Falling Fast			

Format Examples

```
$INROT,0.0,A*21

$NVMWD,220,T,,,9.0,N,4.6,M*2A

$INMWV,175,R,9.0,N,A*2E

$WIXDR,C,45.0,C,1,C,42.9,C,2,P,1.0350,B,1,P,1.0350,B,2,H,90.0,P,1*60

$WIMTW,8.0,C*35

$PMTR,0,,1*36
```

Decoding Notes

When observations are being decoded from a sentence that also contains quality information the quality information is automatically decoded as well and placed in corresponding observation quality indicator field.

Database Setup

See description under “MISCELLANEOUS SYSTEM DRIVERS”.

When adding observations to the systems the slotnumbers as mentioned in the slot column of the tables above should be used to connect an observation to a field.

Drivers.io Options

Command line parameter *NOCS* disables the checksum checking.

3.25.11 Nortek Aquadopp (3D Velocity, Pressure, Temp, Heading, P+R)

Input / Output:	Input (one-way)	*Driver class type:*	Counted <LF>
Executable name:	DrvAquadopp.exe	*Drivers.io options:*	*none*
Last modified:	2000-May-12		

Driver Description

The driver will decode three velocities (E, N en Z), pressure, temperature, compass heading, pitch and roll. It is assumed that the Aquadopp is outputting data at continuous rate and that the output format is according to the format description described below.

Format Description

Data format as defined by Nortek in "System integrator manual for Paradopp family products. Version 1.0. Document No. N3001-101. Page 15.

Aquadopp specific structures. Measurement data (30 + f(nBeams) bytes), structure PdMeas

Field	*Format*	*Description*	*Size (Nibbles)*
1	Char	Sync = 0xa5	2
2	Char	Identification = 0x01	2
3	Short	Size of structure (words) = 21 words	4
4	Char	Minute in BCD format	2
5	Char	Second in BCD format	2
6	Char	Day in BCD format	2
7	Char	Hour in BCD format	2
8	Char	Year in BCD format	2
9	Char	Month in BCD format	2
10	Short	Error code	4
11	Short	Spare	4
12	Short	Battery voltage in 1/10 volts	4
13	Short	Speed of sound in dm/s	4
14	Short	Compass heading in 1/10 degrees (0, 3600)	4
15	Short	Compass pitch in 1/10 degrees (-1800, 1800)	4
16	Short	Compass roll in 1/10 degrees (-1800, 1800)	4
17	Char	MSB of pressure	2
18	Char	Status byte	2
19	Unsigned short	LSW of pressure, ie pressure = MSB * 65536 + LSW	4
20	Short	Temperature in 0.01 Degrees Celsius	4
21	Short	Velocity for three beams in mm/s	3 * 4
22	Unsigned char	Amplitude in counts (0-255)	3 * 2
23	Char	Unused	2
24	Short	Checksum	4

Format Example

```
A5 01 15 00 12 51 22 09 00 09 00 00 00 00 83 00 55 39 78 0C 61 01 1E 01
00 A0 9D 00 5C 06 22 FD A5 FF E5 FF 1F 1E 1E 00 2B 25
```

Decoding Notes

The time used for timetagging is the PC systemtime or PPS time. The time in the datastring is ignored. All the values decoded from the data are internally converted to SI units (meters, degrees, degrees Celsius).

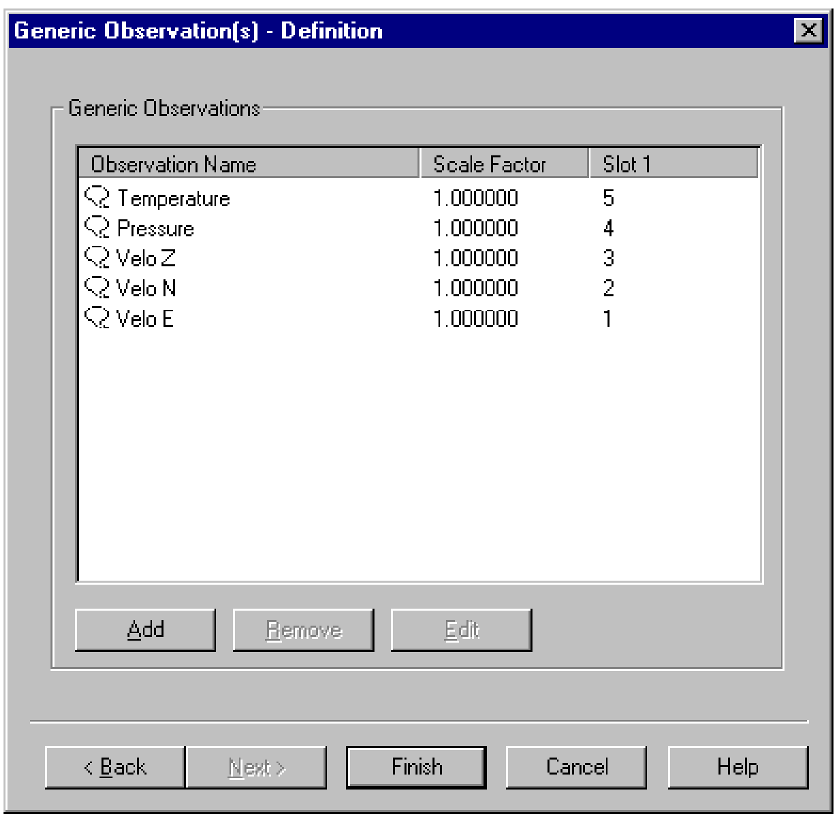
Interfacing Notes

Type of cable wiring (one-way or two-way).

DB-25 Sensor		DB-9 COM	DB-25 COM
Pin 2 RXD	-----------------	Pin 3 TXD	Pin 2 TXD
Pin 3 TXD	-----------------	Pin 2 RXD	Pin 3 RXD
Pin 7 SG	-----------------	Pin 5 SG	Pin 7 SG

Database Setup

For decoding the 3D velocity, pressure and temperature, define a "miscellaneous system" and select driver "**Nortek Aquadopp 3D Velo, Pressure, Temp**". Add generic observations using the slot numbers below. For decoding the compass heading, define a "gyro's and compasses system" and select the driver "**Nortek Aquadopp Compass Heading**". For decoding the compass pitch and roll, define a "pitch , roll and heave system" and select driver "**Nortek Aquadopp Compass R-P**". See the appropriate sections in this manual.



3.25.12 OISTAR FieldBus TimeMaster

Input / Output:	Output (two-way)	*Driver class type:*	Interrogated
Executable name:	DrvOistarSynch.exe	*Drivers.io options:*	10 | 13
Last modified:	2000-Mar-07		

Driver Description

Driver for synchronizion of an Oceonics-Intersite Serial-data Timing And Routing (OISTAR) network to the *QINSy* UTC time. When Pulse-Per-Second (PPS) support is used, the timing can be very accurate, although the accuracy is limited to 0.01 second by the number of decimals in the command to set the relative time (2).

The driver can only work properly when the connected OISTAR unit has been configured as “TimeMaster”. The same unit should also be configered as “Controller” (or “Master”) in order to interprete local commands. When the driver is started or reset, the date and time of the real time clock of the OISTAR fieldbus is set approximately to UTC using the local “Set Date” and “Set Time” commands. When the driver is executing, the reply to the local “Request Status” command is used to monitor the difference between OISTAR fieldbus time and *QINSy* UTC time, and the OISTAR time is adjusted using the local “Set Relative Time” command.

Format Description

The local OISTAR status message should always be preceded by an OISTAR header to get the fieldbus time. The status message itself is not decoded. The format of the OISTAR user port output header is given below. All separate messages input to the user port are timestamped on the first incoming byte of a sensor message.

```
~SSTDDMMYYHHMMSSFFLLHH
~0173112992359599900000
0123456789012345678901
```

Item	*Format*	*Description*	*Values,Units*
1	“~”	OISTAR header identifier	“~” (ASCII 0x7E)
2	SS	OISTAR source identifier	hexadecimal ASCII characters
3	T	message type	hexadecimal ASCII character 1 = direct binary copy of source data; 2 = HEX ASCII copy of source data; 3 = IP300 direct copy of source data; 7 = status message; 8 = fieldbus error
4	DDMMYY	date of sensor message	DD = day, MM = month, YY = year
5	HHMMSSFF	time of sensor message	HH = hours, MM = minutes, SS = seconds, FF = hundreds
6	LLHH	length of data to follow (incl. EOL terminators)	hexadecimal ASCII characters length = LL + HH * 256 bytes

Formats of local commands that are used by *QINSy* to set the (internal or relative) time, are given on the next page. Default for the EOM terminater is a <CR> (Carriage Return), but it could be reprogrammed by user.

The “Change (Local) Id” command is not used by *QINSy*. The ID of an OISTAR unit can be programmed by the “OisFace” communication program. See the “*OISTAR Operation and Technical MANUAL”* for details.

(continued on next pages)

```
0001HH:MM:SS.FF<EOM>    example:   000123:59:99.99<CR>
```

Item	Format	Description	Values,Units
1	"0001"	"Time Set" local command	"0001"
2	HH:MM:SS.FF	Time to synchronize real time clock	HH = hours, MM = minutes, SS = seconds, FF = hundreds
3	<EOM>	End-Of-Message terminator	<CR>, <LF> or user defined

```
0002DD-MM-YY<EOM>       example:   000231-12-99<CR>
```

Item	Format	Description	Values,Units
1	"0002"	"Date Set" local command	"0002"
2	DD-MM-YY	Date to synchronize real time clock	DD = day, MM = month, YY = year
3	<EOM>	End-Of-Message terminator	<CR>, <LF> or user defined

```
0003QSS.FF<EOM>         example:   0003+99.99<CR>
```

Item	Format	Description	Values,Units
1	"0003"	"Relative Time Set" local command	"0003"
2	QSS.FF	Delta time to synchronize clock	Q = +/–, SS = seconds, FF = hundreds
3	<EOM>	End-Of-Message terminator	<CR>, <LF> or user defined

```
0004#NN<EOM>            example:   0004#01<CR>
```

Item	Format	Description	Values,Units
1	"0005"	"Change (Local) Id" command	"0005"
2	"#"	"Change Id" command character	"#"
3	NN	New id of connected OISTAR unit	01 to 1E hexadecimal ASCII
4	<EOM>	End-Of-Message terminator	<CR>, <LF> or user defined

```
0005<EOM>               example:   0005<CR>
```

Item	Format	Description	Values,Units
1	"0005"	"Request (Local) Status" command	"0005"
2	<EOM>	End-Of-Message terminator	<CR>, <LF> or user defined

Interfacing Notes

Configure the connected OISTAR unit as "TimeMaster" and "Controller", using the toggle switches on the front panel. Configure the interfacing parameters of the OISTAR unit using the "OisFace" communication program. Set the baud rate as high as possible. Be sure that RS-232 cable wiring to *QINSy* is bi-directional.

Database Setup

See description under "MISCELLANEOUS SYSTEM DRIVERS".

The ***time difference*** between the *QINSy* UTC time and the OISTAR fieldbus time can be monitored online. In order to do so, add a generic observation to the OISTAR system setup. Leave the scale factor to 1. The observation is QPS time minus OISTAR time in seconds. It's ***quality indicator*** is computed as the absolute value of the time difference times 100, i.e. the absolute time difference in units of 10 milliseconds, which is the OISTAR time resolution. A negative value is an indication of a serial error in the previous update cycle.

Controller Setup

The quality indicator of the generic time difference observation can be used online as alert on the OISTAR performance. When online with the Controller, start up (or open) an Alert Display. Add a new “Raw Data Alert” and select the “quality indicator outside limit”. Set lower limit to 0 (a negative value indicates a serial communication error) and upper limit to 2 or 3, when 20 ms (0.020 s), resp. 30 ms (0.030 s), is the maximum allowed time difference. Select OISTAR system and time difference observation and press “Finish” button.

It is also recommended to add an “I/O Alert” in order to check the data transmission between *QINSy* and the OISTAR “TimeMaster” unit. Set the timeout value to at least 10 times the update rate entered in DB Setup plus 1 second, with a minimum of 11 seconds, because of the minimum allowed update rate of 1.0 second.

Drivers.io Options

Command line parameters “10” <LF> or “13” <CR> in the “drivers.io” file can set the EOM terminator.

Additional Information

DrvOistarSynch time tagging

```
// sensor      OISTAR      OISTAR      COM port    driver
// sends       timetags    sends       receives    timetags
// message     message     message     message     message
//
//  |     A     |     B     |     C     |     D     |
//  + - - - - - + - - - - - + - - - - - + - - - - - + - >
//
// DrvOistarSynch assumes that all intervals are constant
// A, B and D are unknown (very small); C can be computed
// using interfacing parameters (latency is not applied).
//
// DrvOistarSynch OISTAR must filter all sensor messages;
// only status messages (and bus error messages) allowed!
```

DrvOistarSynch update rates

If the absolute difference in time between the *QINSy* UTC time and the OISTAR fieldbus time is greater than 0.025 second, the driver update rate is set to the initial OISTAR FieldBus TimeMaster system update rate from DB Setup, with a minimum rate of 1.0 second, in order to not stress the OISTAR “TimeMaster” unit. If the difference is between 0.025 and 0.010 second, the driver update rate is set to 2.5 times the initial update rate. If the difference is less than 0.010 second, the driver update rate is set to 10 times the initial update rate.

If the absolute time difference is greater than 0.0075 second (0.010 seconds is the OISTAR time resolution), a “Relative Time Set” local command is issued, except when the OISTAR fieldbus time within one second from an integral minute, because it has been seen during tests that the OISTAR can set a wrong time then. However, if the time difference is greater than 2.0 seconds, “Date Set” and “Time Set” commands are sent.

All the time tags in the *QINSy* output commands first are corrected for the number of bytes that are sent.

OISTAR “TimeMaster” LED’s

OISTAR LED L5 (bottom LED upper left row) should be red to indicate that OISTAR unit is acting as Time Master. If all is well, i.e. all time differences are below 10 ms, the LED’s to indicate user port data transfer (L1, top LED upper left row, and L2, top LED upper right row) will only flash once every 10 seconds.

3.25.13 Paroscientific SDI-12 Transmitter

Input / Output:	Input (two-way)	*Driver class type:*	Interrogated
Executable name:	DrvParoscientificSDI12.exe	*Drivers.io options:*	*none*
Last modified:	2000-Sep-21		

Driver Description

Driver to decode air pressure and temperature from Paroscientific SDI-12 Digiquartz Precision Pressure transmitter. Driver will interrogate transmitter for pressure and for temperature data at specified intervals.

Format Description

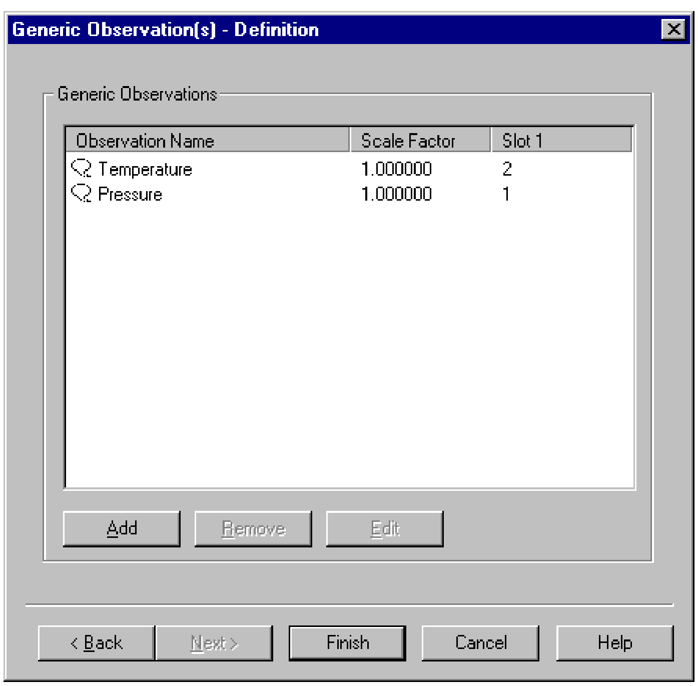
Send the command **`*0M!`** to change the transmitter to pressure mode for channel 0. It will then receive an acknowledgement from the transmitter in the form of **`0M! 00021<cr><lf>`** which means that there is one data value available in 2 seconds. The driver will wait for the amount of seconds (i.e. 2) before sending the request to send the data with the command **`*0D0!`**, after which the transmitter will send an update like **`0D0! 0+1013.23<cr><lf>`**. These steps will be repeated for the temperature with setting the temperature mode with **`*0M1!`**.

Interface notes

For the interfacing from RS232 to the transmitter a level shifter is needed (for details see transmitter manual). The cable running from the shifter to the COM port can be a flatcable or a cable without pin swapping.

Database Setup Notes

Because the transmitter will wait a few seconds before the data is ready to be retrieved the update rate for the Paroscientific SDI-12 transmitter has to be set to 10 seconds minimum to ensure that all the data is recorded in the database. For the slotnumber of the observations see below:



3.25.14 Remote Control - De Beers

Input / Output:	Input	*Driver class type:*	Terminated
Executable name:	DrvRemoteControlSerial.exe	*Drivers.io options:*	none
Last modified:	2004-Sep-03		

Driver Description

Driver can be used to command the controller to start or stop logging. Driver expects an input string from De Beers's software package, this input string should be send with a regular update, e.g. 1 second update rate. The driver will decode the so-called mining flag from the string, if this flag equals to mining (+1) and Controller is not yet recording then recording is started. If flag changes to not_mining (-1) and Controller is logging then it will stop recording. When then the driver commands the controller to start recording it will also dictate the logging database name. The database name is constructed from the various fields contained in the serial string. Note: If a database already exists then it will be overwritten without warning!

Format Description

$DBMMINE,NDEB,-1,000000,000000,A,100,A,1,1,1667,040,1234<CR><LF>

1	$DBMMINE	Header, that is always this text
2	AAAA	Concession code (always 4 characters, alphanumeric)
3	-1	Mining flag (always -1 or +1 with sign)
4	000000	Block Line reference, padded 6 alphanumeric
5	000000	Block Sample reference, padded 6 alphanumeric
6	A	Reclamation ID - any value A to Z only 1 character
7	100	Block size in m padded 3 alphanumeric
8	A	Depligon ID - any value A to Z only 1 character
9	1	Pass integer 1 to 9 and is it always positive
10	1	Current Lane Nr 1 to 9 and is it always positive
11	1667	Lane Width in cm numeric always positive. Max 9999
12	040	Lane direction in degrees (integer 000 to 359) always positive.Padded alphanumeric.
13	1234	Current sweep number for the lane padded 4 numeric always positive

Example:
$DBMMINE,NDEB,-1,000000,000000,A,100,A,1,1,1667,040,1234<CR><LF>

This string creates this db name: NDEB_000000_000000_A_100_A_1_1_1667_040_1234.db

Decoding notes

Driver will only decode successfully if:
- String ends with <CR><LF> pair.
- String starts with $DBMMINE
- String contains 13 fields

Controller Setup

Settings/Session Setup/Storage/"Use Linename" option will be disabled whenever the driver instructs the controller to start recording. The "Use Prefix number" option can still be enabled if necessary. The filename as constructed by the driver will then be expanded with a prefix that is automatically incremented when logging is stopped.

Database Setup

See description under "MISCELLANEOUS DRIVERS".
It is not necessary to define any generic observations when using this driver

3.25.15 RWS Directional Waverider

Input / Output:	Input (one-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvDirWaverider.exe	*Drivers.io options:*	*none*
Last modified:	2000-Aug-09		

Driver Description

Driver to decode vertical and horizontal wave displacements and inclination from a directional waverider. The horizontal displacement is also calculated as a vector.

Format Description

The format is standard RMI:

```
[LF]STD1D1D1D1STD2D2D2D2STD3D3D3D3STD4D4D4D4STD5D5D5D5[CR]

LF       Linefeed
S        Status sign:
         ' ' = Data OK
         'A' = Bad data
         'B' = Low battery
         'C'  = 'A' and 'B'
T        Sign : + / -

D1D1D1D1 Vertical displacement in cm
D2D2D2D2 Horizontal displacement N/S in cm
D3D3D3D3 Horizontal displacement E/W in cm
D4D4D4D4 Not used
D5D5D5D5 Inclination angle of earth gravity in 0.01 deg

Error codes for D1D1D1D1 to D5D5D5D5
      9990 = Data rejected
      9995 = No data
      9999 = Sync error or parity error

CR    Carriage return
```

Format Example

```
 -0004 -0111 +0005 +0000A+9990
 +0007 -0098 -0004 +0000A+9990
```

Decoding Notes

The vertical and horizontal displacement are converted to meters, the inclination is converted to degrees.
If one of the error codes is encountered the value will be theis error code (i.e. 9990). If there is no eroor code the quality indicator is set to '1', if there is an error code it will be set to '-1'.
The horizontal displacement vector is calculated from the two directioanl horizontal displacements and the values are meters for the length and degrees for the direction. If one of the directional horizontal displacements have an error code the value of the vector values becomes 9990.

Interfacing Notes

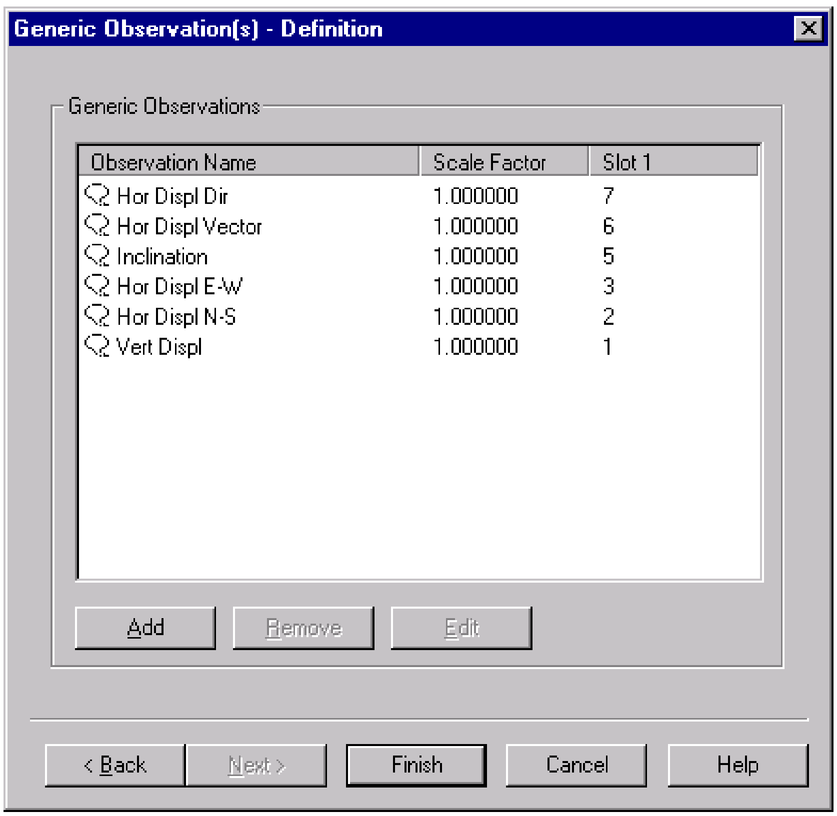
Type of cable wiring (one-way or two-way).

DB-25 Sensor		DB-9 COM	DB-25 COM
Pin 2 RXD	-----------------	Pin 3 TXD	Pin 2 TXD
Pin 3 TXD	-----------------	Pin 2 RXD	Pin 3 RXD
Pin 7 SG	-----------------	Pin 5 SG	Pin 7 SG

Database Setup

See description under “MISCELLANEOUS SYSTEM DRIVERS”.

When adding observations to the systems the following slotnumbers should be used:
Slotnumbers 1 – 5 are based on the data string, slotnumber 6 and 7 are calculated internally.



3.25.16 Standard RMI (1 observation)

Input / Output:	Input	*Driver class type:*	Terminated <CR>
Executable name:	DrvStandardRMI.exe	*Drivers.io options:*	*none*
Last modified:	2000-Sep-26		

Driver Description

Driver for decoding RMI values from systems that output in standard RMI

Format Description

`<LF>STDDDD<CR>`

Item	*Format*	*Description*	*Values, Units*
1	<LF>	Line feed	ASCII 10
2	S	Status	Space = OK, A = no valid data
3	T	Sign	+ or -
4	DDDD	Data value	
5	<CR>	Carriage return	ASCII 13

Decoding Notes

In case of no valid data the output string is <LF>A+9999<CR>. When this happens the quality indicator is set to '-1', otherwise it is 1.

Interfacing Notes

A simple one-way wired RS-232 cable is enough. However, a bi-directional cables is more practical.

Database Setup

See description under "MISCELLANEOUS SYSTEM DRIVERS".

3.25.17 Stappenbaak (RWS)

Input / Output:	Input (one-way)	*Driver class type:*	Counted
Executable name:	DrvStappenbaak.exe	*Drivers.io options:*	STD | FILE
Last modified:	2001-Nov-23		

Driver Description

Driver to decode wave height from Marine 300 stappenbaak. There are two versions for the driver. The first (Stappenbaak (RWS)) will decode the electrode value and multiply it with 5 cm to get the NAP height. This driver assumes that the bottom of the "baak" is positioned at 0.00 NAP. The seconds version (Stappenbaak (RWS, User NAP file)) will lookup the decode electrode in a user defined file. The file should be called DrvStappenbaak.txt and should have the following format:

```
;Configuration file for RWS Stappenbaak
;Filename: DrvStappenbaak.txt
;Format: Element,NAP value (m)<CRLF>
1,-1.50
2,-1.45
```

Lines starting with ";" are seen as comments.

Format Description

Protocol: 2 Bytes (1 Start, 7 Data, Even Parity, 1 Stop bits each)

Byte 1: [Strt]["0"][b0][b1][b2][b3][b4][b5][P][Stop]
Byte 2: [Strt]["1"][b6][b7][b8][St][n0][n1][P][Stop]

Strt	Start bit ("0")
b0 - b8	0 - 240 binary highest "wet" electrode or error condition
St	Status: "0" normal, "1" voltage <= 10V or error
n0 - n1	0 - 3 binary number of wrong electrodes
P	Even parity bit
Stop	Stop bit ["1"]

Format Example

```
03 74
```

Interfacing Notes

Type of cable wiring (one-way or two-way).

DB-25 Sensor		DB-9 COM	DB-25 COM
Pin 2 RXD	-----------------	Pin 3 TXD	Pin 2 TXD
Pin 3 TXD	-----------------	Pin 2 RXD	Pin 3 RXD
Pin 7 SG	-----------------	Pin 5 SG	Pin 7 SG

Database Setup

See description under "MISCELLANEOUS DRIVERS".

Add an observation for the wave height.

3.25.18 Seatools Grab Excavation System

Input / Output:	Input (one-way)	*Driver class type:*	Terminated <LF>
Executable name:	DrvSeaToolsGrab.exe	*Drivers.io options:*	*NOCS*
Last modified:	2002-April-02		

Driver Description

The driver wit User Interface will decode Joystick commands; grab parameters, wire length and forces from a Seatools PSTSUR string. Decoded fields are made available through generic observations. Joystick commands are used to modify mainline structure in the controller.

Format Description

Data format as defined by document "Grab Excavation System – Serial Protocol description PR0073".

Default Data transmission protocol via RS-232:
- Baudrate: 9600
- Data bits: 8
- Parity: None
- Stop bits: 1

All messages are fixed length strings, i.e.:
- Fields include sign when applicable, e.g. `±xxx` = `–100` or `+100`
- Fields include leading zeroes when applicable, e.g. `xxx` = `001` or `010`
- Fields include trailing zeroes when applicable, e.g. `xx.xx` = `01.00` or `10.00`

Updating (hexadecimal) status information:
- Data = invalid: reset corresponding status bit and repeat last valid data (with increased latency when applicable)

Field	***Description***	***Units***	***# chars***
`$`	Start of sentence delimiter (hex 24)		1
`P`	Proprietary sentence specifier		1
`STSUR`	Manufacturer's mnemonic code		5
`hh`	Hexadecimal status information (ASCII coded): • Bit 1 (0x01) = Valid joystick X and Y • Bit 2 (0x02) = Valid opening angle grab • Bit 3 (0x04) = Valid excavated volume • Bit 4 (0x08) = Valid forces X and Y • Bit 5 (0x10) = Valid wire length		2
`±xxx`	Joystick X	%	4
`±yyy`	Joystick Y	%	4
`aaa`	Opening angle grab	°	3
`vv.v`	Grab volume	m^3	4
`vv.v`	Excavated volume	m^3	4
`xxxx`	Force X hoisting winch fore	kN	4
`yyyy`	Force Y hoisting winch fore	kN	4
`llll.l`	Wire length hoisting winch fore	m	6
`xxxx`	Force X hoisting winch aft	kN	4
`yyyy`	Force Y hoisting winch aft	kN	4

llll.l	Wire length hoisting winch aft	m	6
xxxx	Force X umbilical winch	kN	4
yyyy	Force Y umbilical winch	kN	4
llll.l	Wire length umbilical winch	m	6
*	Checksum delimiter (hex 2A)		1
hh	Hexadecimal checksum (NMEA like, 1 byte ASCII coded)		2
<CR><LF>	End of sentence delimiter (hex 0D 0A)		2
		Total:	**75**
	Field delimiters		+15

Joystick functionality:

- Coarse target selection: fixed −200 or +200 (X: West or East, Y: South or North)
- Fine target selection: proportional between −100 and +100

Format Example

```
$PSTSUR,00,+024,+024,024,00.0,00.0,0000,0000,0000.0,0024,0024,0000.0,0000,0000,0000.0*07

$PSTSUR,1F,+000,+200,000,10.0,07.4,0300,0400,0333.3,0100,0200,0222.2,0500,0600,0444.4*71

$PSTSUR,1F,050,+000,000,10.0,07.4,0300,0400,0333.3,0100,0200,0222.2,0500,0600,0444.4*70
```

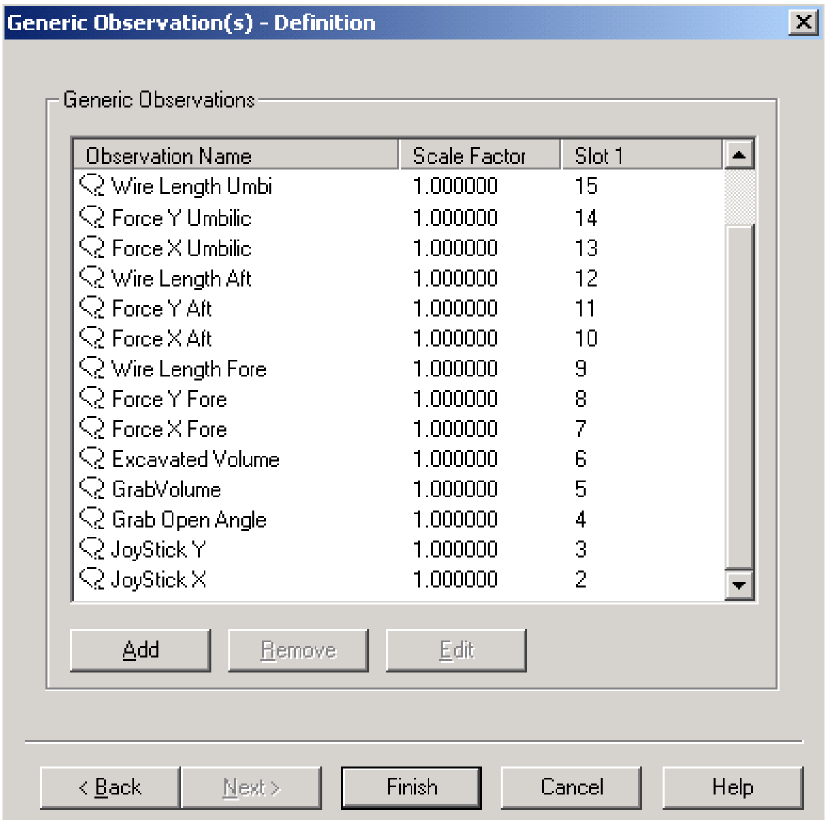
Decoding Notes

Status Information is stored as an observations' Quality Indicator. If the Indicator is zero, it means it's valid, -1 indicates invalid data.

By default, the driver will only decode the received string if the NMEA checksum is valid. Command line parameter *NOCS* can be used to overrule the checking.

Database Setup

For decoding all fields, define a “miscellaneous system” and select driver “**Seatools Grab Excavation System”**. Add generic observations using the slot numbers below. Note that slot numbers match the position of the field in the string, with field “1” being the $PSTSUR header.



The driver can interpret the joystick X and Y fields as commands that will alter the position of the currently selected Mainline. The driver sends remote commands to the controller to change the position of the mainline. In order to do this, generic observations “JoyStickX” and “JoyStickY” must be decoded from the string (see above).

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3.26 GENERIC INPUT/OUTPUT DRIVERS

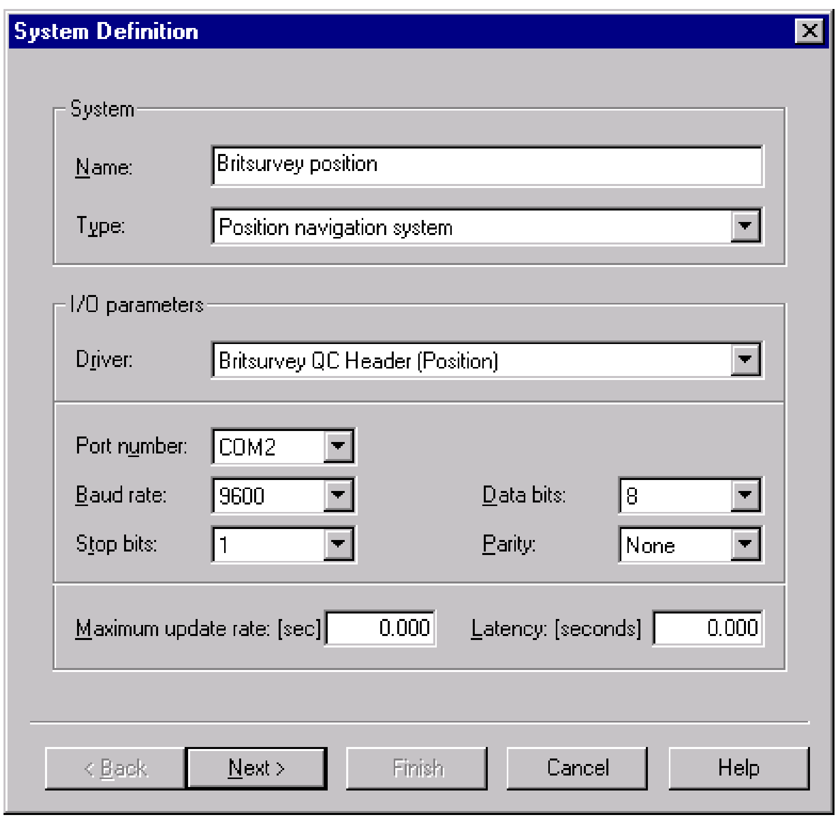
Overview

The generic drivers use a "driver configuration file (*.ini)" for decoding or encoding a datastring. The configuration files are stored in the \Ini files directory of the *QINSy* directory (e.g. C:\Program Files\QPS\Ini Files\). The files can be edited manually or (preferable) with the use of the utility "IniFileEditor.exe". With the IniFile editor you can create a new, or edit an existing configuration file.

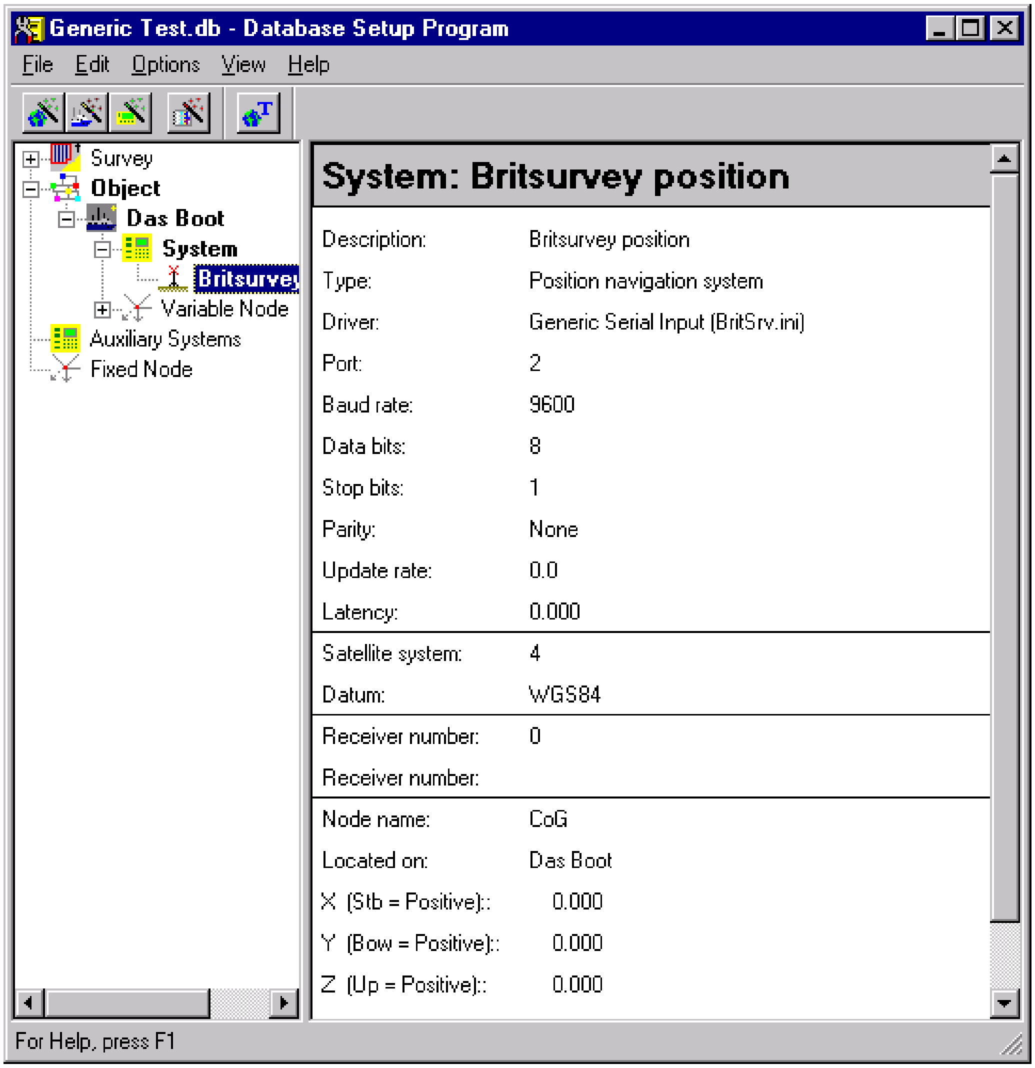
If a configuration file is edited manually, the tables at the end of this chapter describe how to set the keys in the configuration file. These tables are also referred to in the description of the IniFile editor.

Database Setup

A generic driver works just like the other drivers, instead of selecting a specific driver you'll select an configuration file. When adding a generic driver to the database you will see the descriptions of the driver configuration files in the driver selection combobox (depending on the system type). Only those files which are found in the *QINSy* Driver directory, are added. For more information on how to set up a system in DbSetup please see the appropriate sections in this document.



If you want to use a generic driver just select the description of the configuration file in the driver combobox and the generic driver will be selected automatically. In the main view of the database setup program you will see in the right pane which generic driver is used with the selected configuration file.
For the generic eventing driver you should select an Eventing System in DbSetup. The driver combobox will then show all configuration files for eventing systems.



3.26.1 Generic Serial Input Driver

Input / Output:	Input (one-way)	*Driver class type:*	Terminated
Executable name:	DrvInputSerial.exe	*Drivers.io options:*	*none*
Last modified:	2000-Feb-07		

Driver Configuration File

The configuration file for a generic serial input driver is conform the following layout:

```
[General]
Revision=File format revision
Version=Ini file version
Description=Driver name as displayed in DbSetup
Name=Driver name without spaces (used internally)
Type=System types under which driver will be displayed in DbSetup        (Table 1)
Executable=Driver executable name that should be used
Slots=Slotcount defined per system
[String]
StartChars=Fixed string that should be present at start of each update
TerminationChar=decimal ASCII character that terminates each update      (Table 2)
SeparationChar=decimal ASCII character that separates each field         (Table 2)
MinimumLengthFlag=Minimum length check enabled flag
MaximumLengthFlag=Maximum length check enabled flag
MinimumLength=Minimum length of each update
MaximumLength=Maximum length of each update
NumberOfItems=Number of fields decode from the string
[Checksum]
Enable=Checksum computation enabled flag
Method=Methode used to compute checksum                                  (Table 3)
StartAt=Location to start checksum computation
StopAt=Location to stop checksum computation
Position=Location of checksum in the update
Length=Length of checksum information
Encoding=Encoding method of checksum                                     (Table 4)
[Time tag]
ApplyGPS2UTC=Correct time for GPS-UTC time offset
UseSystemDate=Use system date for time tag
[Item 1]
SystemId=System tye
Record=IPC record                                                        (Table 1)
Field=IPC field                                                          (Table 5)
Encoding=Encoding method used                                            (Table 6)
Mask=Mask used during encoding                                           (Table 7)
Position=Position of item in update
Length=Length of item in update
Factor=Multiplication factor
MinimumValueFlag=Minimum length check enabled flag
MaximumValueFlag=Maximum length check enabled flag
MinimumValue=Minimum length of each update
MaximumValue=Maximum length of each update
Slotnumber=Automaticaly generated
Obsname=User defined observation name
```

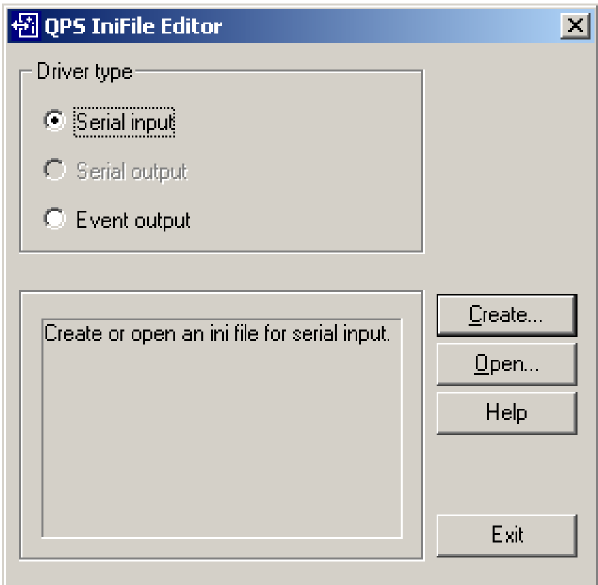
At the moment of writing the checksum operations are not implemented.

Driver Configuration File Editor

Creating a driver configuration file for the Generic Serial Input Driver using the IniFile Editor is explained step-by-step on the following pages.

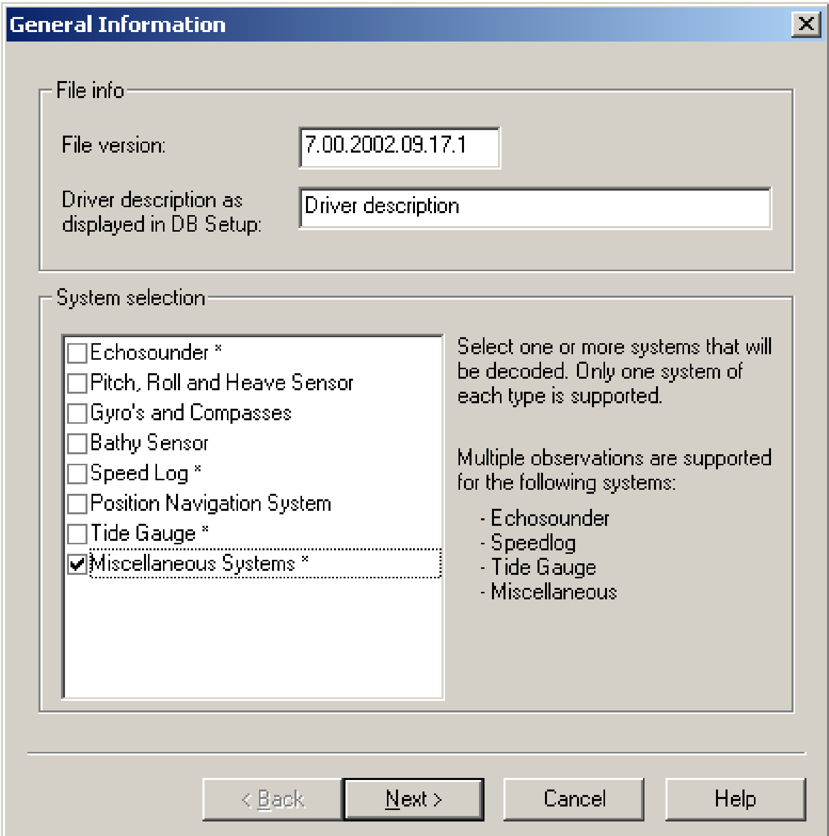
Driver Configuration File Editor

Start-up screen



At the start-up screen you can select if you want to create a new, or open an existing 'ini'-file for editing. The pages that will show in the wizard depend on the type of generic driver that is selected.

General information wizard page

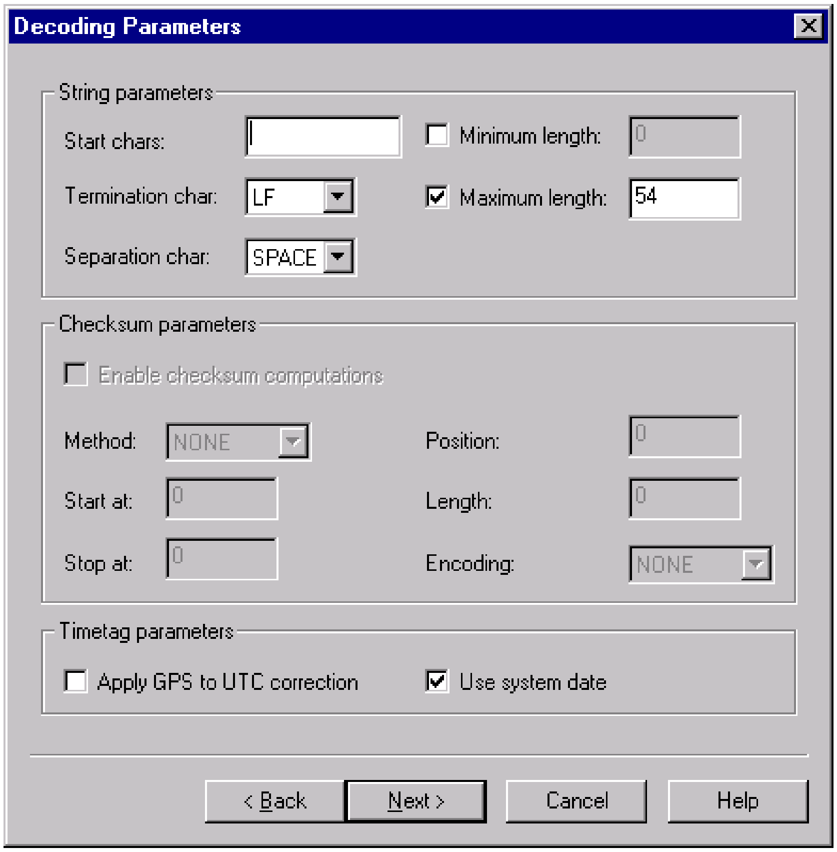


This will appear in the 'ini'-file as follows:

```
[General]
Revision=2
Version=7.00.2002.09.07.1
Description=Driver description
Name=Driverdescription
Type=23
Executable=DrvInputSerial.exe
Slots=2
```

The "driver description" will appear in the driver combobox in the system definition page in DbSetup. The description will be stripped from spaces and will be used to name the 'ini'-file. The system type is converted to the internal numerical value used throughout *QINSy* (see Table 1).

Decoding parameters wizard page



This will appear in the configuration file as follows:

```
[String]
StartChars=
TerminationChar=10
SeparationChar=32
MinimumLengthFlag=0
MaximumLengthFlag=1
MinimumLength=0
MaximumLength=54
NumberOfItems=2
[Checksum]
Enable=0
Method=NONE
StartAt=0
StopAt=0
Position=0
Length=0
Encoding=NONE
[Time tag]
ApplyGPS2UTC=0
UseSystemDate=1
```

String parameters

The startcharacters can be anything (like $GPGGA). The termination and separation characters can be one of the characters from Table 2. If the minimum and / or maximum length flags are set the driver will validate the data with the filled in values. For all options set the driver will validate the data and will not decode if this validation fails. The number of items is used internally.

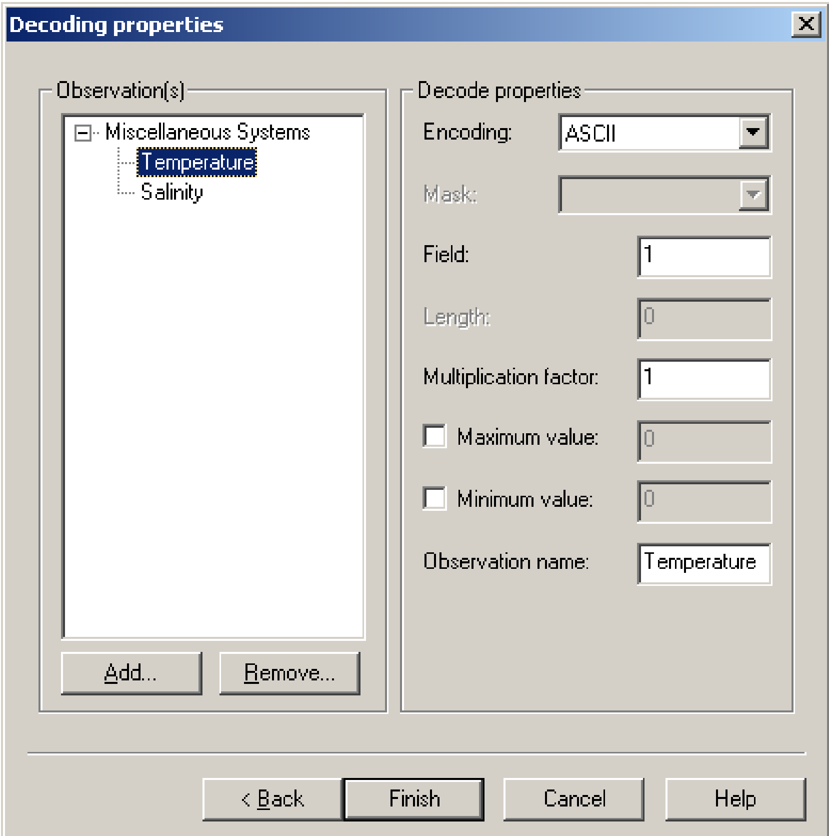
Checksum parameters (not implemented yet)

For the checksum computation method see Table 3. The StartAt and StopAt indicate from where to where in the datastring the checksum is computed. Position and length determine where in the datastring the checksum value is located and how long it is. For the encoding method see Table 4. The encoding method is how the checksum value is visible in the datastring.

Timetag parameters

You can correct the time for GPS-UTC time offset. If “use system date” is not checked it is possible to decode the date from the string itself (you’ll get the option to select the system date in the next wizard page), otherwise the systemdate is used.

Decoding properties wizard page



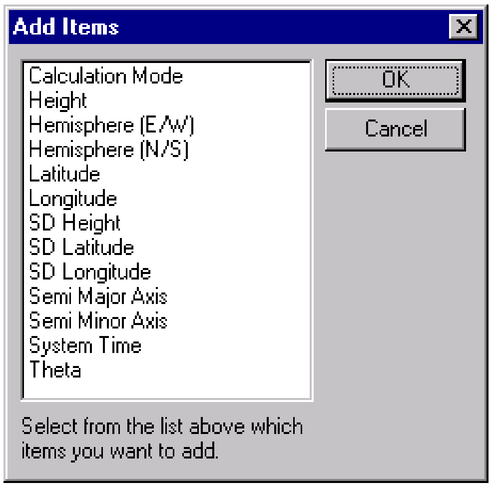
This will appear in the 'ini'-file as follows:

```
[Item 1]
SystemId=23
Record=sNavBufEntry
Field=Value
Encoding=ASCII
Mask=NONE
Position=1
Length=0
Factor=1.000
MinimumValueFlag=0
MaximumValueFlag=0
MinimumValue=0.000
MaximumValue=0.000
SlotNumber=0
ObsName=Temperature
[Item 2]
SystemId=23
Record=sNavBufEntry
Field=Value
Encoding=ASCII
Mask=NONE
Position=2
Length=0
Factor=1.000
MinimumValueFlag=0
MaximumValueFlag=0
MinimumValue=0.000
MaximumValue=0.000
```

```
SlotNumber=1
ObsName=Salinity
```

On this page you see the items which have been selected for decoding.
Here you can add or remove items with the following dialogs.

Add / remove items dialogboxes



The selection depends on the type of system you have selected (see Table 5).
Item encoding is according to Table 6. now only possible in ASCII format.

For the items “System Time”, “System Date”, “Latitude” and “Longitude” it is possible to define a mask. For the available masks (see Table 7).
For the latitude & longitude the value can be signed or unsigned. If the value is signed the sign will be used to determine on which hemisphere the value is (“+” will be N or E, “-“ will be S or W). If the value is unsigned a hemisphere field should be defined (N/S or E/W).

If a separation character is selected in the *Decoding parameters wizard page* then you can set for each item the field in the datastring, which represents the item value. If no separation character is selected you’ll have to set a startposition (same editbox as the field editbox), where the first character in the string is at position ‘1’, and a length for the part of the datastring which represents the data.

In the last three fields you can set a multiplication factor for the item value and a minimum and maximum range. If a range is set the data will be validated and rejected if the value is outside that range.

When pressing Finish a new ‘ini’-file will be created or an existing ‘ini’-file will be updated.

3.26.2 Generic Eventing Driver

Input / Output: Output
Executable name: DrvOutputEvent.exe
Last modified: 2002-Feb-01
Driver class type: Output
Drivers.io options:

Driver Configuration File

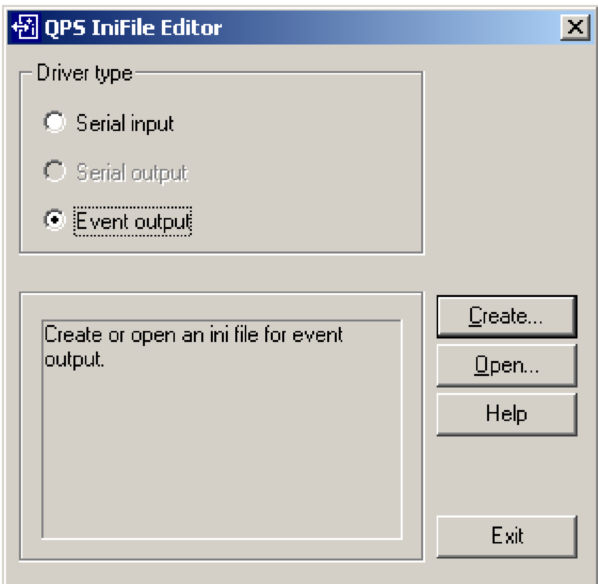
The configuration file for a generic serial input driver is conform the following layout:

```
[General]
Revision=1
Version=1.00
Description=EMC Eventing
Name=EMCEventing
Type=28
Executable=DrvOutputEvent.exe
[EventInfo]
NumberOfClasses=4
NumberOfEvents=5
[Class 1]
Id=1
Code=DB
Name=Debris
Icon=C:\Temp\Event Icons\boulder.ico
[Class 2]
Id=2
Code=EF
Name=Engineering Features
Icon=C:\Temp\Event Icons\platform.ico
[Class 3]
Id=3
Code=AS
Name=Anode Status
Icon=C:\Temp\Event Icons\anode.ico
[Class 4]
Id=4
Code=FS
Name=Freespan
Icon=C:\Temp\Event Icons\freespan.ico
[Event 1]
Id=1
Class=1
EventCode=BD
Abbreviation=Boulder
Description=Boulder
Icon=C:\Temp\Event Icons\boulder.ico
Type=48
[Event 2]
Id=2
Class=1
EventCode=FN
Abbreviation=Fishnet
Description=Fishing Net
Icon=C:\Temp\Event Icons\fishingnet.ico
Type=128
[Event 3]
Id=3
Class=3
EventCode=ANM
Abbreviation=ASMed
Description=Medium
Icon=C:\Temp\Event Icons\fieldjoint.ico
Type=1
[Event 4]
Id=4
Class=4
EventCode=SU
Abbreviation=FSStart
Description=Freespan Start
```

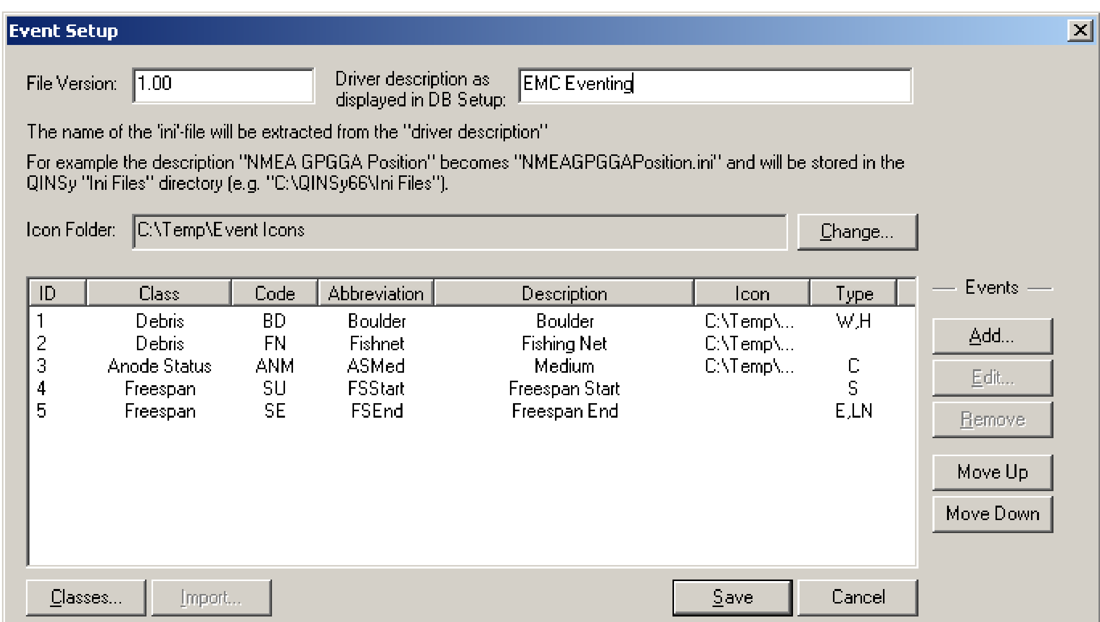
```
Icon=
Type=2
[Event 5]
Id=5
Class=4
EventCode=SE
Abbreviation=FSEnd
Description=Freespan End
Icon=
Type=12
```

Driver Configuration File Editor

Creating a driver configuration file for the Generic Event Output Driver using the IniFile Editor is explained step-by-step on the following pages.

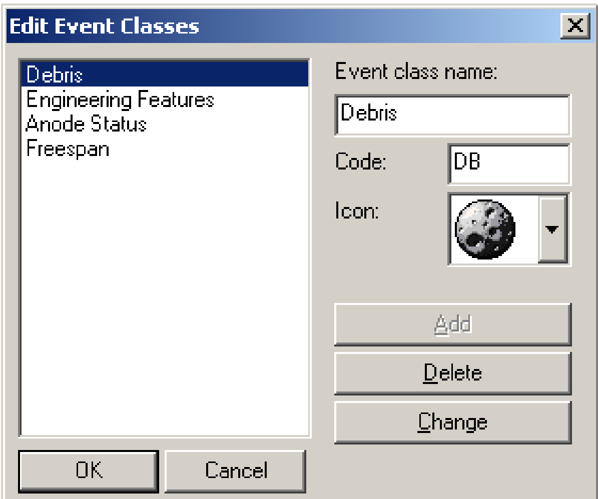


When creating a new or opening an existing configuration file the following dialog appears:



Each event belongs to a class (for example the event Boulder belongs to the class Debris). For each class and event an icon can be defined. The icons should be located in the selected Icon Folder. Icons should be standard Windows Icons (32x32 pixels, 16 colors).

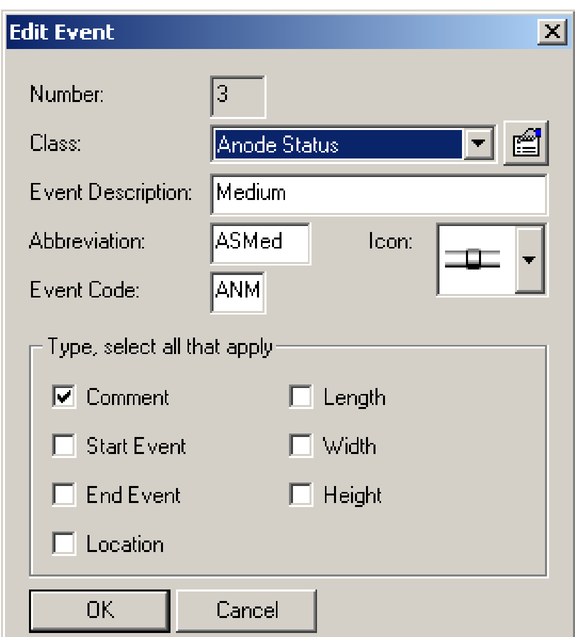
Classes can be defined by pressing the Classes button. The next dialog will appear:



Here you can add, edit and remove classes.

Events can be added by pressing the Add button, edited by pressing the Edit button or double clicking the event, or Removed.

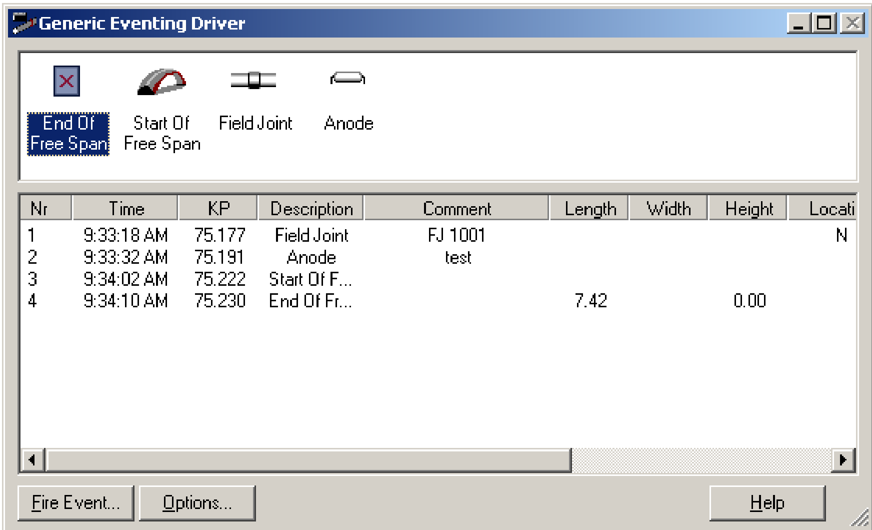
When adding (or editing) an event the next dialog appears:



Here you can change the class for the event, the event description, abbreviation (max 7 chars) and event code. It is also possible to add new classes from here by pressing the button next to the classes combobox. When the event type includes an end event the length type is automatically enabled. Online the length will be calculated between a start event and the associated end event.

Online

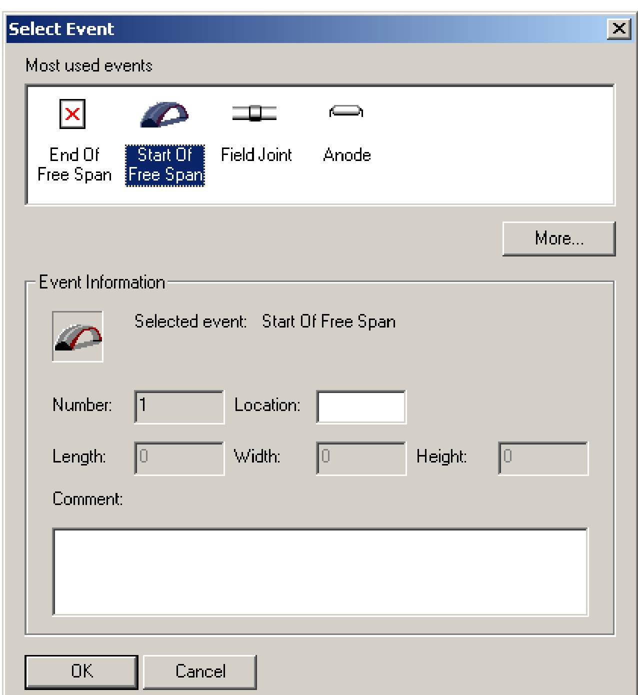
When you go online with a database which has an eventing system defined the next driver is started:



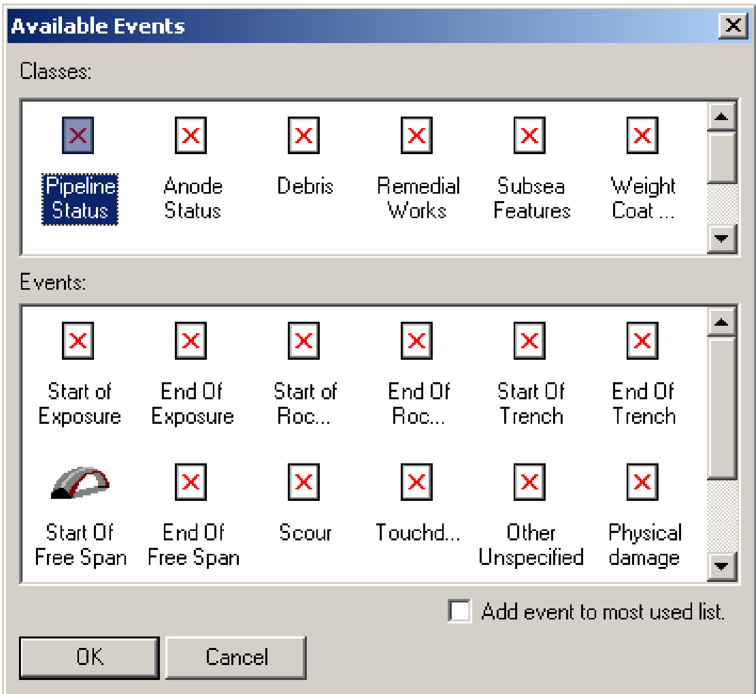
At the top you'll see a list with the "most used" events. They can be added by right clicking on one of the events. This will display a menu where you can add an event. Right clicking in the most used list gives you the option to remove events. Double-clicking on one of these events will fire it. You can also use the button "Fire Event" to fire an event or use the Insert key.

In the bottom list you'll see the events which have been fired. Events can only be fired when recording is enabled.

When an event is fired user input is required and the following dialog will popup:

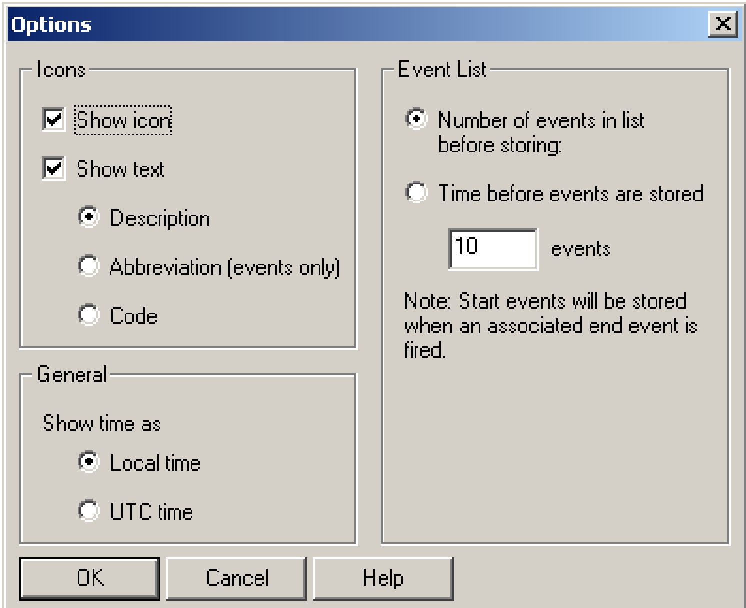


The time of the event is stored the moment the event is fired. So the time spent in this dialog has no influence on the event time. When the user presses the OK button, the event is stored in the database.
If an event occurs which is not in the most used list the user can press the “More” button to show all available events:



By selecting an event and checking the checkbox the event can be added to the most used list.

The following options can be set in the driver.



Icons: Change the appearance of the icons and text.
General: You can show the event time/ date in local and UTC format.
Event list: Determines how many events are kept in the list before they are stored in the database.

When recording is stopped and there are still events in the list they will NOT be stored in the database. You can force this by pressing the "Save All" button before recording is stopped.

Notes:

The KP, DOL, easting and northing are calculated using the selected steered node.
The dialog can be resized, the top two list controls stay fixed in height.

3.26.3 Generic Driver Tables

Table 1 – System types

1	Single beam echosounders
3	Pitch, roll & heave sensors
5	Gyro's and compasses
10	Surface navigation systems
12	Positioning systems
22	Tide gauges
23	Miscellaneous systems

Table 2 – ASCII characters

Description	*Character*	*Decimal ASCII value*
Start of header	SOH	01
Start of text	STX	02
End of text	ETX	03
Linefeed	LF	10
Carriage return	CR	13
Space		32
Exclamation mark	!	33
Number sign	#	35
Dollar	$	36
Percentage	%	37
Ampersand	&	38
Asterisk	*	42
Comma	,	44
Point	.	46
Slash	/	47
Colon	:	58
Semi colon	;	59
Question mark	?	63
Backslash	\	92
Underscore	_	95

Table 3 – Checksum computation methods

Computation methods
XOR
NMEA

Table 4 – Checksum encoding methods

Encoding methods
ASCII
HEX
HEXASCII

Table 5 – Available items

Gyro's, Surface Navigation Systems, Tide Gauges, Miscellaneous Systems (sNavBufEntry)

Value
Quality Indicator

Pitch, Roll & Heave Sensors (sVRUBufEntry)

Heave Value
Pitch Value
Roll Value
Quality Indicator Heave
Quality Indicator Pitch
Quality Indicator Roll

Single Beam Echosounders (sEchosounderBufEntry)

Depth
Signal quality

Positioning Systems (sPosBufEntry)

Calculation Mode
Easting
Hemisphere (E/W)
Height
Latitude
Longitude
Northing
Hemisphere (N/S)
SD Height
SD Latitude
SD Longitude
Semi Major Axis
Semi Minor Axis
Theta

All above mentioned systems

System Time
System Date

Table 6 – Item decoding methods

Decoding methods
ASCII
Sine of Angle

Table 7 – Item decoding masks

Mask	*Example*	*Comments*
System Time		
HHMMSS.nxs	235959.99	any number of decimals
HHMMSSnxs	23595999	any number of decimals
HHMM.nxm	2359.99	any number of decimals
HHMMnxm	235999	any number of decimals
HH.nxh	23.99	any number of decimals
HHnxh	2399	any number of decimals
HH:MM:SS.nxs	23:59:59.99	any number of decimals
HH:MM:SSnxs	23:59:5999	any number of decimals
HH:MM.nxm	23:59.99	any number of decimals
HH:MMnxm	23:5999	any number of decimals
System Date		
DDMMYY	070200	‘00’ will be 2000
YYMMDD	000207	‘00’ will be 2000
DDMMYYYY	07022000	
YYYYMMDD	20000207	
DD/MM/YY	07/02/00	‘00’ will be 2000
YY/MM/DD	00/02/07	‘00’ will be 2000
DD/MM/YYYY	07/02/2000	
DD-MM-YY	07-02-00	‘00’ will be 2000
DD-MM-YYYY	07-02-2000	
MMDDYY	020700	‘00’ will be 2000
MM/DD/YY	02/07/00	‘00’ will be 2000
MM-DD-YY	02-07-00	‘00’ will be 2000
MMDDYYYY	02072000	
MM/DD/YYYY	02/07/2000	
MM-DD-YYYY	02-07-2000	
YY-MM-DD	00-02-07	‘00’ will be 2000
YYDDMM	000702	‘00’ will be 2000
YY/DD/MM	00/07/02	‘00’ will be 2000
YY-DD-MM	00-07-02	‘00’ will be 2000
YYYY-MM-DD	2000-02-07	
YYYYDDMM	20000702	
YYYY/DD/MM	2000/07/02	
YYYY-DD-MM	2000-07-02	
YYYY/MM/DD	2000/02/07	
Latitude		
DDMMSS.nxs	-895959.99	any number of decimals
DDMMSSnxs	-89595999	any number of decimals
DDMM.nxm	-8959.99	any number of decimals
DDMMnxm	-895999	any number of decimals
DD.nxd	-89.99	any number of decimals
DDnxd	-8999	any number of decimals

Longitude		
DDDMMSS.nxs	-1795959.99	any number of decimals
DDDMMSSnxs	-179595999	any number of decimals
DDDMM.nxm	-17959.99	any number of decimals
DDDMMnxm	-1795999	any number of decimals
DDD.nxd	-179.99	any number of decimals
DDDnxd	-17999	any number of decimals

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3.27 DRIVER DESCRIPTION TEMPLATE FORM

3.27.1 DB Setup Name

Input / Output: Input (two-way)
Executable name: DrvExample.exe
Last modified: 1999-Sep-03

Driver class type: Terminated <LF>
Drivers.io options: *none* OPT1 | OPT2

Driver Description

Driver description. Sensor types and formats. Observation types. Other particularities.

Format Description

Format types and description. Number of bytes. Refer to manual or project if possible.

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ<CR><LF>
12345678901234567890123456
```

Field	*Format*	*Description*	*Values, Range, Units*

Format Example

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ<CR><LF>
ABCDEFGHIJKLMNOPQRSTUVWXYZ<CR><LF>
```

Decoding Notes

Format fields not decoded. Unit conversions applied by driver. Data validation and quality indicators.

System Configuration

Prescribed or preferred sensor settings. How to change sensor settings. Baud rates as high as possible.

Interfacing Notes

Type of cable wiring (one-way or two-way). Cable wiring diagrams.

DB-25 Sensor		**DB-9 COM**	**DB-25 COM**
Pin 2 RXD	-----------------	Pin 3 TXD	Pin 2 TXD
Pin 3 TXD	-----------------	Pin 2 RXD	Pin 3 RXD
Pin 7 SG	-----------------	Pin 5 SG	Pin 7 SG

(continued on next page)

Interfacing Notes (continued)

Continue section started on previous page.

<u>Setup.</u>
Subsection with more detailed information.

<u>Note.</u> Important notes. Possible alternatives.

Database Setup

See description under “BLABLA SYSTEM DRIVERS”.

Additional setup notes. Observations. Observation slots.

 button.  button.

Controller Setup

First time online, select computation and node for output driver.

Drivers.io Options

Command line parameter description for “drivers.io” file.

Additional Information

Everything you always wanted to know about this sensor.

APPENDIX A: RS-232 Connector Pin Assignments

RS-232	**DB-25**	**Connector Pin Assignments**	**DTE**
Pin	***Function***	***Description***	***Direction***
Shell	GND	Chassis Ground	N/A
2	TXD	Transmitted Data	Output
3	RXD	Received Data	Input
4	RTS	Request To Send	Output
5	CTS	Clear To Send	Input
6	DSR	Data Set Ready	Input
7	SG	Signal Ground	*Reference*
8	DCD	Data Carrier Detect	Input
20	DTR	Data Terminal Ready	Output
22	RI	Ring Indicator	Input

RS-232 DB-25 Connector Pin Assignments (DTE Wiring)

RS-232	**DB-9**	**Connector Pin Assignments**	**DTE**
Pin	***Function***	***Description***	***Direction***
Shell	GND	Chassis Ground	N/A
1	DCD	Data Carrier Detect	Input
2	RXD	Received Data	Input
3	TXD	Transmitted Data	Output
4	DTR	Data Terminal Ready	Output
5	SG	Signal Ground	*Reference*
6	DSR	Data Set Ready	Input
7	RTS	Request To Send	Output
8	CTS	Clear To Send	Input
9	RI	Ring Indicator	Input

RS-232 DB-9 Connector Pin Assignments (DTE Wiring)

RS-232C	**DB-9**	**Connector Pin Assignments**	**Sercel**
Pin	***Function***	***Description***	***Direction***
Shell	GND	Chassis Ground	N/A
1	EVT	External Event Input	Input
2	TXD	Transmitted Data	Output
3	RXD	Received Data	Input
5	SG	Signal Ground (0V)	*Reference*
7	CTS	Clear To Send	Input
8	RTS	Request To Send	Output

RS-232C DB-9 Connector Pin Assignments (Sercel NR103/NR203)

APPENDIX B: RS-422 Connector Pin Assignments

RS-422	DB-25	Connector Pin Assignments	DTE
Pin	***Function***	***Description***	***Direction***
Shell	GND	Chassis Ground	N/A
1	GND	Chassis Ground	N/A
2	TXD+	Transmitted Data (+)	Output
3	RXD+	Received Data (+)	Input
4	RTS+	Request To Send (+)	Output
5	CTS+	Clear To Send (+)	Input
7	GND	Chassis Ground	N/A
13	CTS–	Clear To Send (–)	Input
14	TXD–	Transmitted Data (–)	Output
16	RXD–	Received Data (–)	Input
19	RTS–	Request To Send (–)	Output

RS-422 DB-25 Connector Pin Assignments (DTE Wiring)

RS-422	DB-9	Connector Pin Assignments	DTE
Pin	***Function***	***Description***	***Direction***
Shell	GND	Chassis Ground	N/A
2	RTS+	Request To Send (+)	Output
3	RTS–	Request To Send (–)	Output
4	CTS+	Clear To Send (+)	Input
5	CTS–	Clear To Send (–)	Input
6	RXD+	Received Data (+)	Input
7	RXD–	Received Data (–)	Input
8	TXD+	Transmitted Data (+)	Output
9	TXD–	Transmitted Data (–)	Output

RS-422 DB-9 Connector Pin Assignments (DTE Wiring)