RT3005_Operators_Manual_v0711

Dynascan Operator's Manual

Dynascan
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1.1 Manual Revision History:

DATE	INITIALS	ISSUE	Comments
20 Mar 2011	MB	1	Initial version
	MB	2	

2 Introduction

Dynascan is a portable and easy to use laser scanning system, with the laser scanning module, GNSS receiver, motion sensor and RTK radio all combined in one small pod. The offsets between these individual units are fixed and each system is factory calibrated for pitch and roll.

If you are using a Dynascan system which uses GNSS heading you will have to calibrate the heading if you move the system from one platform to another.

2.1 Scope

This document is intended to enable the user to install, set-up and use the Dynascan system in as fast a time as possible and provides a detailed explanation of the system and how to modify various system parameters.

If you are required to update QPS QINSy software you need to visit the QPS website and log on using the

username: **webqinsy**

password: **beta_220**

3 Glossary of Terms

The following table explains some of the acronyms and expressions used in this manual.

3.1 Acronym table

Acronym	Description	Comments
CMR+	Type of Message used for RTK corrections	Data protocol for GNSS correction message
DONGLE	Security device for computers	
FOG	Fibre Optic Gyro	
GLONASS	Russian GNSS system	
GNSS	Global Navigation Satellite System	Covers GPS, GLONASS and future GALILEO
IA	Interface Adapter	Used on the Dynascan system
INS	Inertial Navigation System	
IP	Internet Protocol	
LED	Light Emitting Diode	
MB	Multi Beam	Type of Echo Sounder
RMS	Root Mean Square	
RTK	Real Time Kinematic	
SBAS	Satellite Based Augmentation System	e.g. Fugro OmniSTAR HP
VDC	Volts Direct Current	Voltage used by Dynascan
VRS	Virtual Reference Station	GNSS corrections using mobile phone technology

4 Product Specification

4.1 Dynascan General Specifications

Laser Scanner

- Class 1 eye safe (FDA / IEC)
- Maximum range 150 metres (500 metre version also available)
- Accuracy ± 5cm (2")
- Range resolution 1cm (0.4")
- Scanner field of view 360
- Scanner angle resolution 0.01
- Scanner rate 10 Hz (600 rpm)
- Measurement rate 36,000 points per second

Inertial Sensor

- Velocity Accuracy 0.05km/h RMS
- Acceleration
  - -bias 10mm/s^2
  - -Linearity 0.01%
  - -Scale Factor 0.1%
  - -Range 100m/s^2
- Angular Rate
  - -Bias 0.01^0/s
  - -Scale Factor 0.1%
  - -Range 100^0/s
- Track (at 50km/h) 0.07^0 RMS

Attitude Accuracy

- Azimuth 0.05 RMS or better (dependant on GNSS antenna separation)
- Roll 0.03 RMS
- Pitch 0.03 RMS

Horizontal Position Accuracy (RMS)

- SBAS 0.6 metre

- OMNISTAR® HP (SBAS) 0.1 metre
- RT-2 1cm + 1ppm

Environmental

- Operating temperature -20 to +60 C (14 F to 140 F)
- Storage temperature -20 C to +70 C (14 F to 158 F)
- Water and dust resistant to IP 67

Power and Dimensions (single head)

- Power 10 to 36 Volts DC @ 25 Watts
- Weight 12 kgs (26lbs)
- Size L 595mm x W 240mm x H 255mm (L 23" x W 9.5" x H 10")

5 Laser Safety Information

The SLM is supplied with the standard laser module described below which has an integrated red-dot laser pointer.

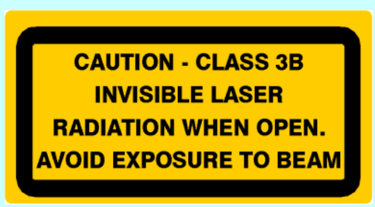
5.1 SLM Laser Module with Red-Dot Pointer Option

The laser classification of the SLM is a Class 2 laser product in compliance with the IEC 60825-1:2001/07 / EN 60825-1:2001/07.

WARNING –Visible and invisible laser radiation. Do not stare into the beam.

CAUTION –Use of controls or adjustments or performance of procedures other that those specified herein may result in hazardous radiation exposure.

WARNING – Opening the protective housing may result in exposure to Class 3B radiation.



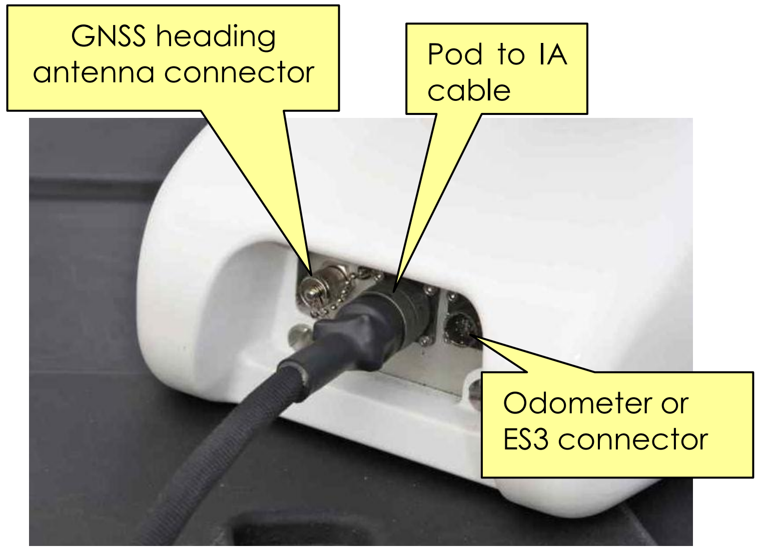
Only qualified and trained persons should be assigned to operate the SLM with red-dot laser pointer. When not in use the laser should be stored in a location where unauthorized personnel cannot gain access.

We recommend that the instrument is not directly pointed at people's eyes, especially if they are using binoculars. Do not unnecessarily look into the transmitter lens of the SLM laser module.

6 System Components

The complete Dynascan system is made up of the following components, which are explained below.

6.1 Dynascan pod



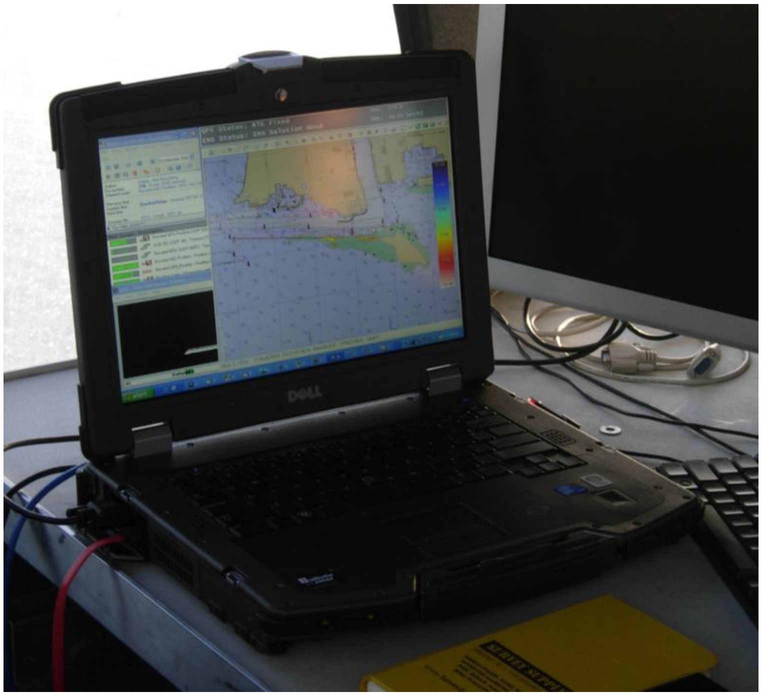
The Dynascan pod provides a weatherproof toughened plastic housing, which is attached to a rigid metal base with fixing holes for mounting. The following items are fitted inside the pod:

- An MDL Laser scanning module providing full 360^0 coverage
- GNSS receiver capable of receiving RTK, VRS or SBAS correction signals
- Motion sensor providing pitch, roll and heading information as well as an INS function
- Radio module (and antenna) capable of receiving RTK corrections. The radio module is either fitted separately from the GNSS receiver or inside the GNSS receiver, as an option.

An external GNSS antenna (secondary antenna) is fitted forward of the pod, which connects to the pod and provides heading information. There is also a connector, which can be used for either an odometer or multibeam echo sounder.

6.2 Laptop computer

A ruggedised laptop computer is supplied with each Dynascan and is loaded with QPS QINSy and QLOUD software. The laptop has bright screen technology and a security dongle is also supplied which enables secure use of the QPS software. A copy of the laptop hard disc information, prior to shipment, is maintained at the MDL Houston factory. This information can be made available to the customer if difficulties occur when the system is in use. Details are given in Section 9.2 Laptop Recovery, below.



6.3 Interface Adapter (IA)

The MDL Interface Adapter (IA) provides a stabilised D.C. voltage to the pod components as well as acting as the interface for the system cables. The IA is fitted with an ON/OFF switch, which powers the pod and is reverse polarity protected. When the IA is switched on a green LED will illuminate to indicate that the pod is powered up. The input power requirement for the IA is 10 – 36 VDC and system power consumption is approximately 25 Watts, for the single laser head version.

6.4 Interconnecting cables

The following cables are supplied with every Dynascan system:

- Dynascan Pod to IA cable CBL 8301A 10009
- ******IA power cable******* (terminated with cigarette lighter connector) CBL 8302A 10009
- *****IA RTK cable***** (also used for programming the pod radio) CBL 8303A 10009
- IA VRS cable (set for CMR+ input at 115200 baud rate – 8 N 1) CBL 8304A 10009
- IA to laptop Ethernet cable CBL 8305A 10009

The first part of the cable number is the type number and the second part is the serial number. You should ensure the serial number of the set of cables in use is the same for all cables and match the serial number of the pod.

***N.B. This cable must remain connected to the IA during survey work to allow RTK corrections to be maintained (even though the other end remains unterminated).If the GNSS receiver includes the option of a fitted RTK radio module this cable is not required as the radio is programmed through the GNSS receiver software.**

****N.B. The power cable cigarette lighter connector is fused and the IA is reverse polarity protected**

CBL 8301A 10009

CBL 8302A 10009

CBL 8303A 10009

CBL 8304A 10009

CBL 8305A 10009

6.4.1 Optional cables

Some systems are integrated with external equipment such as Odometers or echo sounders. These systems have cables, which connect to the pod and are labelled accordingly.

7 Installation

This section contains the information necessary to install, power up and initialise the system ready to start surveying.

7.1 Pod installation

The Dynascan pod should be mounted securely using four bolts passing through the holes of the pod mounting bracket. The pod must be mounted clear of any metal obstructions close to and above the GNSS antennas, which may cause multipath effects.

N.B. It is important for the pod to be mounted on a flat surface and that no distortion of the pod base takes place when the bolts are tightened. If distortion of the base plate occurs it will affect the calibration of the pitch and roll values.

When the system is vehicle mounted a roof rack and ladder can be used to provide a reasonably rigid, cost effective, platform on which to mount the Dynascan pod and secondary GNSS antenna. This has the added advantage of not having to re-calibrate the heading if the same fixing holes are used for the pod and GNSS antenna. It is recommended that a flat metal base plate be fixed to the ladder, which will provide an even flat surface for the Dynascan pod. The pod should be fixed so that the laser beam clears the back of the vehicle, including any tow ball.

When using a second GNSS antenna, for heading, the pod and antenna should both be mounted along the centreline of the vehicle with the antennas at the same height. The distance between the antennas should be ideally 1.0 to 1.5 metres (do not exceed 2 metres).

Examples of vehicle and vessel mounting are shown below.

It is important to line up the pod and secondary GNSS antenna along the centreline of the vehicle (see photo below). Try to fabricate brackets / fixing holes for the pod and secondary antenna so that the system can be re-installed in the same place. This will save time, as you will not need to re-calibrate the heading.

The ideal distance between the antennas is 2.5 metres

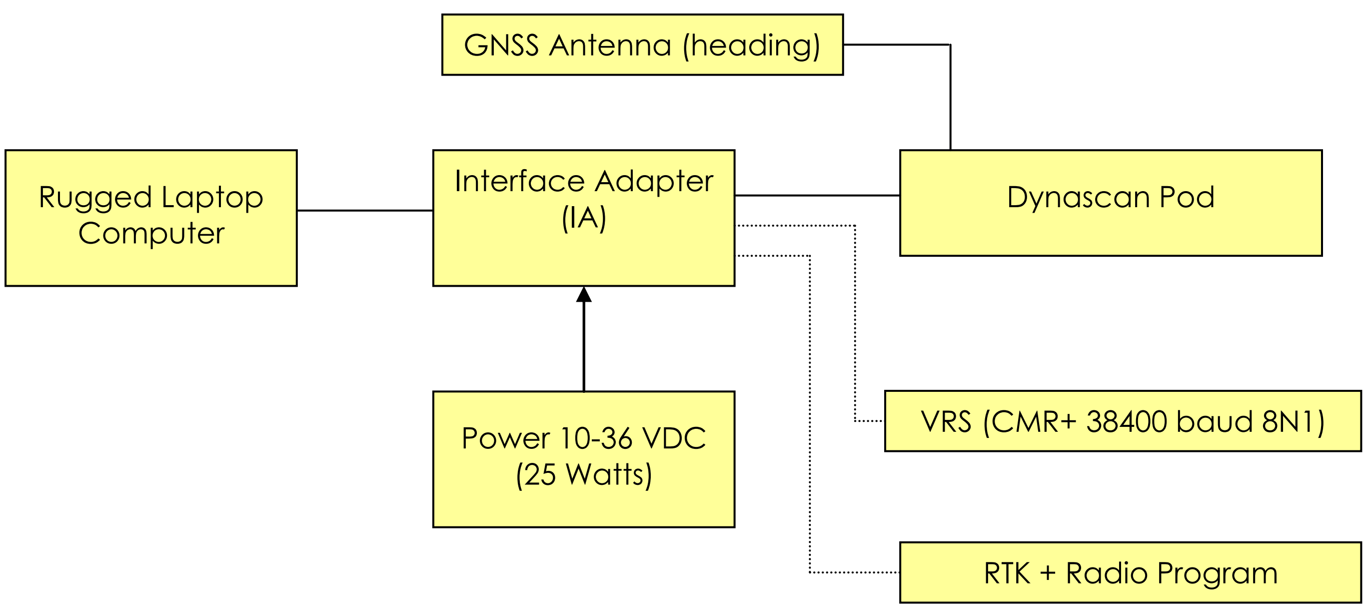
7.2 Equipment Interconnection

Equipment interconnection cables are supplied which enable connection between the pod, GNSS secondary antenna, IA, Laptop and peripheral equipment such as an optional VRS input. Care should be taken when running the cables, especially between the pod and IA, to avoid damage from doors being slammed. When fitting equipment to vessels care should be taken to avoid running cables close to transmitter feeder cables or hot surfaces. An interconnection diagram is shown below.

N.B. 1. Ensure the IA power switch is turned off before connecting any of the cables.

2. There are two different cables, which fit the same RTK correction socket on the IA. One is for RTK use, when using the pod radio receiver, and the other is for VRS use or external mobile RTK radio. You must choose the correct one according to your choice of GNSS correction input. You do not need to use the RTK cable if the GNSS receiver is fitted with an internal RTK radio module.

3. The GNSS antennas must be oriented the same way with the cable exiting from each antenna in the same direction.



The system requires an input voltage between 10 – 36 VDC rated at 25 Watts and the Interface Adapter is reverse polarity protected. A cigarette lighter connection is supplied for convenience but if the system is permanently fitted it is recommended to remove the connector and terminate directly to a power supply or battery. The cigarette lighter connector shows a red LED when power is available at the socket.

The laptop can run for approximately 4 hours on its internal battery. If this is insufficient an inverter can be used, connected to the vehicle / vessel battery, or a suitable power supply installed, to power the computer.

7.3 RTK / VRS corrections

RTK or VRS corrections can be sent to the pod GNSS receiver via the radio inside the pod or via the VRS cable supplied with the Dynascan system.

7.3.1 RTK radio inside pod

If using RTK corrections you will need to set up the RTK base station and Dynascan pod radio to be compatible with one another. You can program the Pod radio from the laptop computer, as shown in section 10.2 RTK Radio programming. Remember to leave the RTK cable connected to the IA when working even though it is not terminated at the other end.

7.3.2 RTK radio built into GNSS receiver

When using a GNSS receiver with combined RTK radio module you do not need to use the RTK cable at all. The internal radio is programmed through the GNSS software and the RTK cable is not required (see section **Error! Reference source not found. Error! Reference source not found.**).

7.3.3 VRS corrections

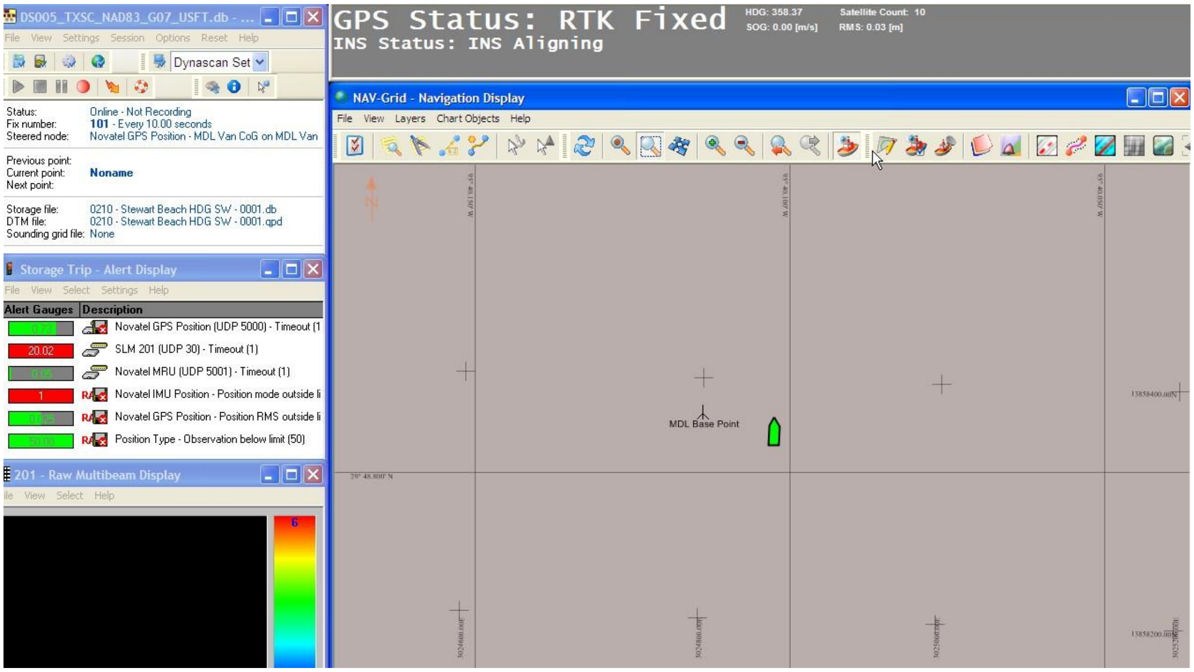
If using VRS corrections you must set up the mobile VRS equipment to provide a CMR+ message at 38400 baud with 8 data bits NO parity and 1 stop bit. The 9 pin D type connector on the end of the VRS cable, which is connected to the IA, should be connected to the output of the VRS equipment. When using your own RTK mobile radio receiver, instead of the internal pod radio, you should also use the VRS cable. Some Dynascan systems may offer the choice of changing the parameters for this input by using the LEMO serial input on the GNSS software (see section **Error! Reference source not found. Error! Reference source not found.**).

7.4 Powering up

Before applying power to the system ensure the pod is in a position to receive adequate satellites, in a relatively clear sky area. When the cables are connected, and you are ready to use the system, start the vehicle engine before switching on the power to the IA and ensure the green LED illuminates. The reason for starting the engine first is that the starter motor will cause the voltage to drop, which will have an adverse effect on the system.

Next ensure the QINSy dongle is inserted in the laptop USB socket and power up the laptop computer. Check the computer time is set to local time before starting the QINSy application. After clicking on the 'online' icon you should display a screen similar to the one below with the alerts shown in the bottom left of the screen.

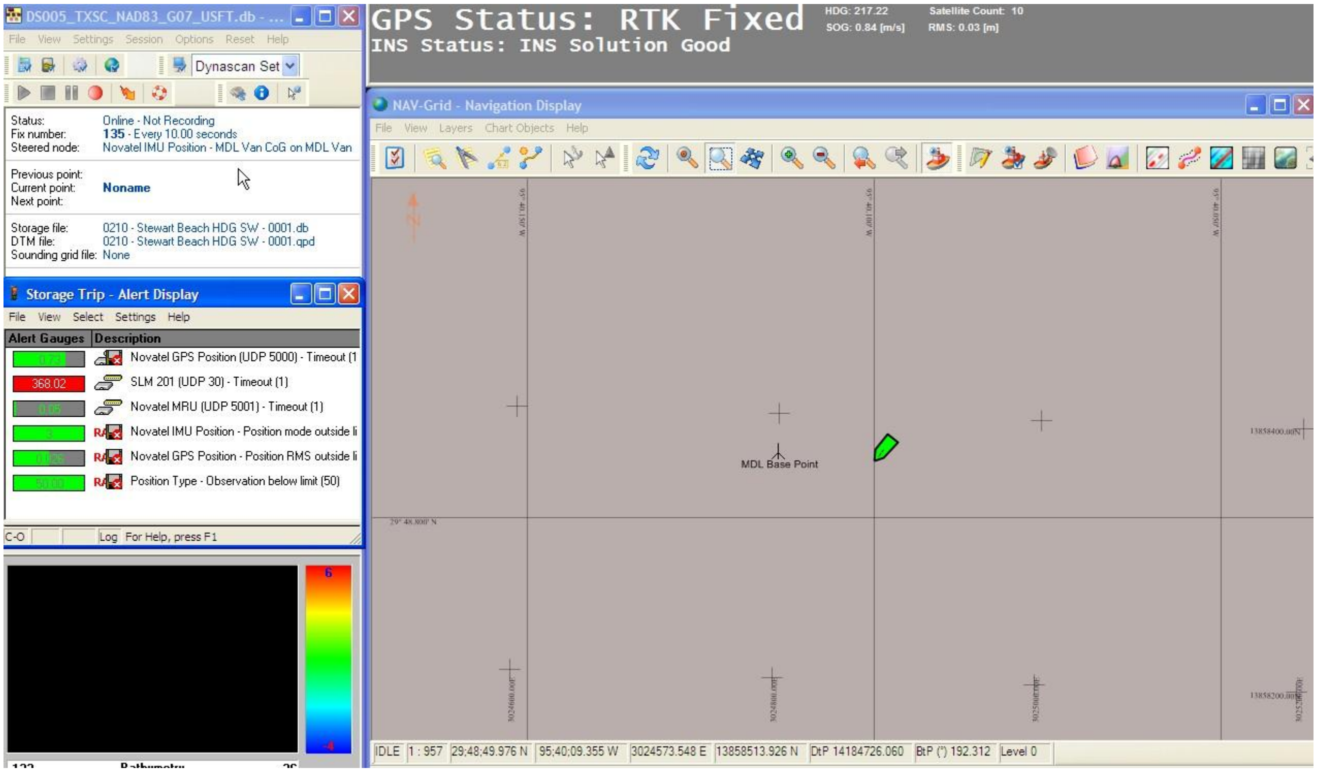
Check the computer clock is set to local time.



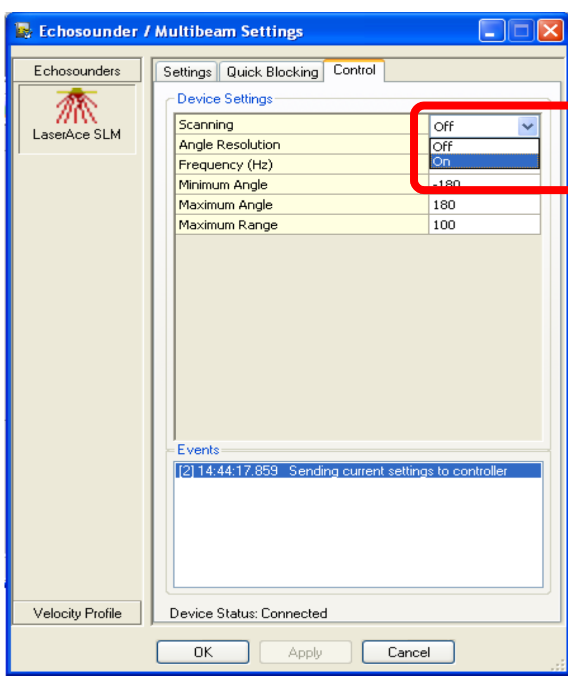
7.5 System initialisation

In order to enable a useable output from the motion sensor it is necessary to start the vehicle or vessel moving for approximately 1 minute. Ideally a figure of eight track should be driven at slow speed (approximately 15-20 KPH) and you will see the appropriate alert display change from red to green plus the status window will show the INS status when the system is initialised (see screenshot below).

N.B. It is important to only move in a forward direction whilst initialising the system



You should now only have one red alert in the Alert Display, which is the Laser alert (SLM). Click on 'settings' and select echo sounder settings then click the control tab and switch on the laser next to the scanning box.



Click on the settings tab to control the filters (as per section 13.2.10 SLM Settings).

All of the alerts should now be green and the system is ready for entry of survey parameters and data acquisition. If this is the first time the Vehicle / Vessel has been fitted you will need to calibrate the heading, which is shown in Section 13.1 Calibrating Pitch, Roll and Heading. You will not need to calibrate the roll or pitch as these values are applied in the factory and will not change when the equipment is transferred from vehicle to vehicle, or vessel to vessel.

The reason you need to calibrate the heading is that the relationship between the primary and secondary GNSS antennas will change slightly between each installation. If you use a ladder with brackets to fix the pod and GNSS secondary GNSS antenna you will only need to calibrate the heading once and if you re-use the same fixing holes in future you will not need to re-calibrate.

N.B. You can check power is being supplied to the pod by:

- **Checking the red dot pointer on the laser, which will illuminate for 5 seconds after the Interface Adapter is switched on**
- **Pinging the laser IP address to check for a response – see below**

There are 3 power indicators for the system, which should all be checked in the event of power up problems.

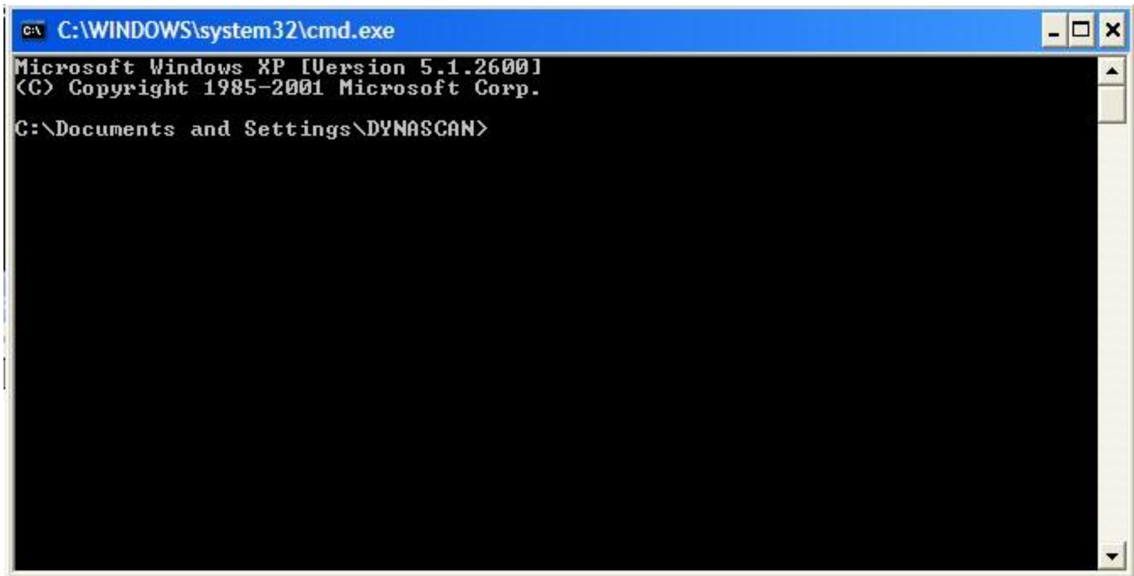
1. The red LED on the cigarette lighter connector must be illuminated
2. The green LED on the Interface Adapter must be illuminated
3. The red dot pointer on the laser must illuminate for the first 5 seconds after the Interface Adapter is switched on

If the system is running without the vehicle engine being started you may experience problems when the engine is started due to the voltage being pulled down (by the starter motor). You should switch off all equipment and start again with the engine running.

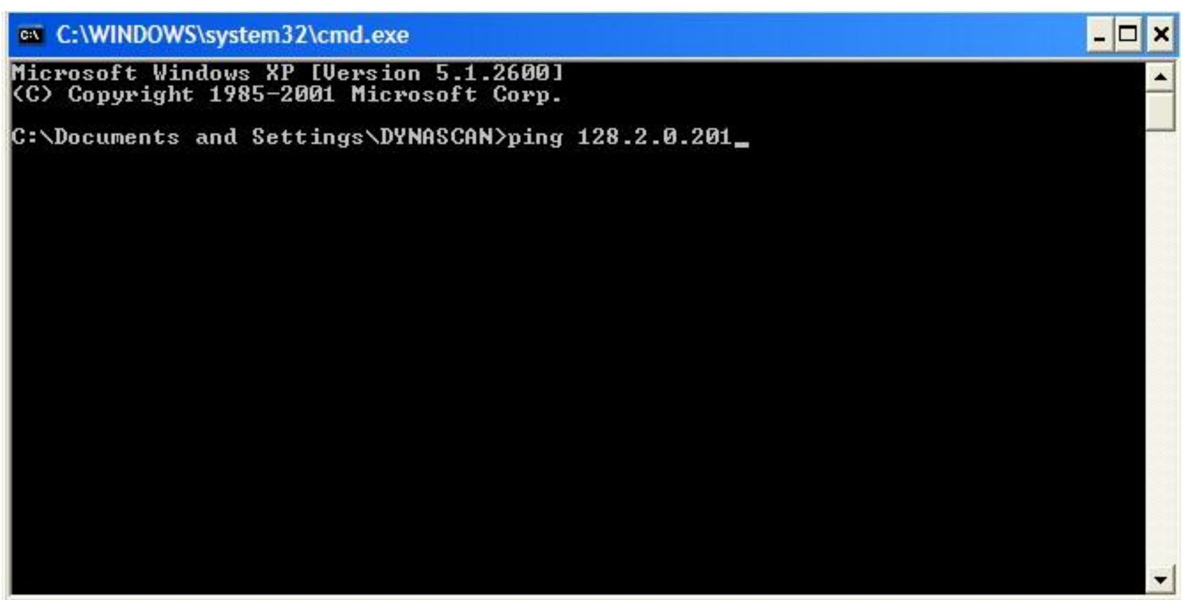
7.6 Pinging the laser

You can ping the laser by opening the command software. To do this click start / programs / accessories and command prompt.

You will then see a screen similar to that below.



Ensure the IA is switched on before typing **ping 128.2.0.201** and then enter (using the IP address of the Dynascan unit, which is on a label underneath the unit and also shown on the QINSy setup page).



If the system is working OK and you successfully communicate with the Laser the screen should look similar to that shown below.

```
C:\WINDOWS\system32\cmd.exe

Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\DYNASCAN>ping 128.2.0.201

Pinging 128.2.0.201 with 32 bytes of data:

Reply from 128.2.0.201: bytes=32 time<1ms TTL=128
Reply from 128.2.0.201: bytes=32 time<1ms TTL=128
Reply from 128.2.0.201: bytes=32 time=1ms TTL=128
Reply from 128.2.0.201: bytes=32 time<1ms TTL=128

Ping statistics for 128.2.0.201:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\Documents and Settings\DYNASCAN>_
```

If communication with the laser fails you will see a screen similar to that shown below.

```
C:\WINDOWS\system32\cmd.exe

Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\DYNASCAN>ping 128.2.2.201

Pinging 128.2.2.201 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 128.2.2.201:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\Documents and Settings\DYNASCAN>
```

8 Quick Start Guide

The following instructions allow the user to get up and running quickly. The appropriate section of this manual is referenced if more detailed information is required. Each Dynascan system leaves the factory fully calibrated and does not need further calibration, except for heading when using GNSS antenna heading.

1. Install the Dynascan pod and GNSS secondary antenna on a vessel or vehicle (Section 7.1 Pod installation)
2. Ensure the Interface Adapter (IA) is switched off and connect the following cables:
   - Pod to IA cable
   - Pod to secondary GNSS antenna
   - Power to IA cable and connect to a cigarette lighter socket
   - IA to laptop Ethernet cable
   - Either the RTK cable or VRS cable (dependant on correction signals used)
3. Ensure the RTK base station signals are compatible with the Pod RTK radio (Section 10.2 RTK Radio programming) or if using VRS set up the VRS mobile equipment to give CMR+ output at 38400 baud 8 N 1
4. If using your own RTK mobile radio receiver you must use the VRS cable and connect the 9 pin D type connector to your radio output, which must be set to CMR+ at 38400 baud 8 N 1.
5. Insert the QINSy dongle (security device) into a USB port on the laptop and switch on the laptop
6. Ensure the pod is in clear view of satellites and check the laptop computer time is correct then open QINSy
7. Ensure the engine is running before switching on the IA as the voltage will drop when the starter motor is used and cause power problems
8. Switch on the IA and check the green light illuminates
9. Switch on the laptop and open RTconfig software and setup sensor offsets for the vehicle in use (Section 11 INS Sensor Setup Parameters
10. On the laptop QINSy console click on the '**set-up**' icon and set your survey parameters
11. Go back to the QINSy console and set up a project (Section 13.2.1 Manage Projects)
12. Go back to the QINSy console and click the '**online**' icon
13. Click '**settings**' and select echo sounder settings to switch on the laser (Section 13.2.10 SLM Settings)

14. Click the control tab and switch on the laser next to the scanning box
15. Initialise the sensor by driving slowly, in a forward direction, for approximately 1 minute
16. When the INS status indicates the INS is working OK the system is ready for heading calibration before use (Section 13.1 Calibrating Pitch, Roll and Heading). **Do not calibrate pitch and roll as these are factory set and will not change**.

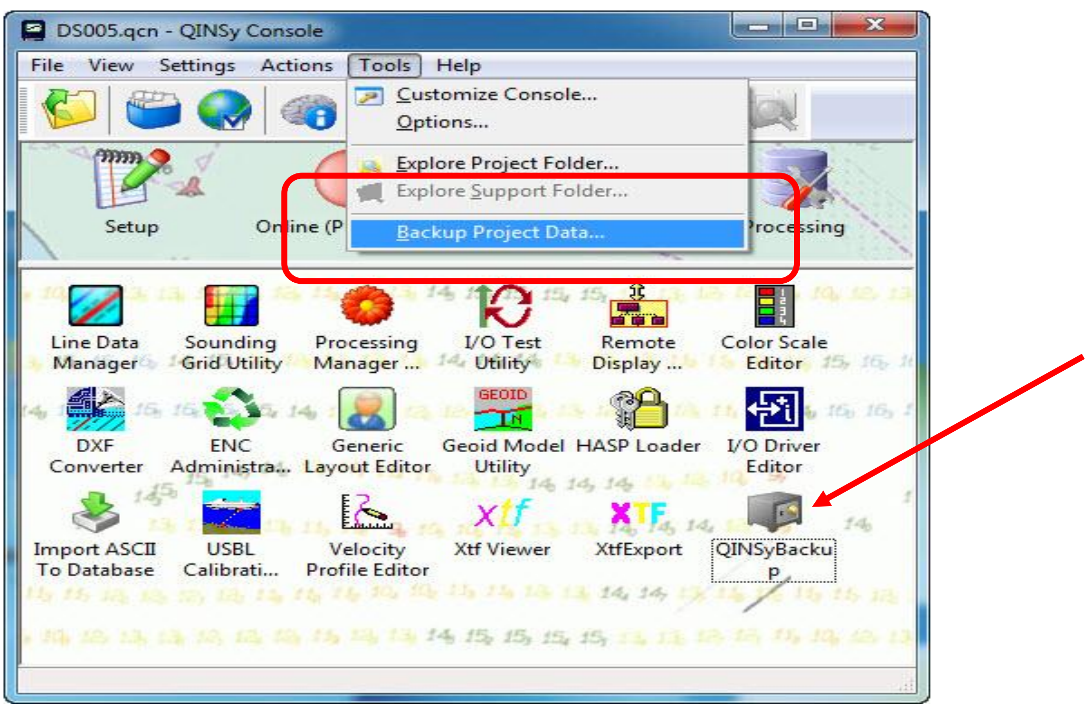
8.1 Restoring Dynascan factory settings

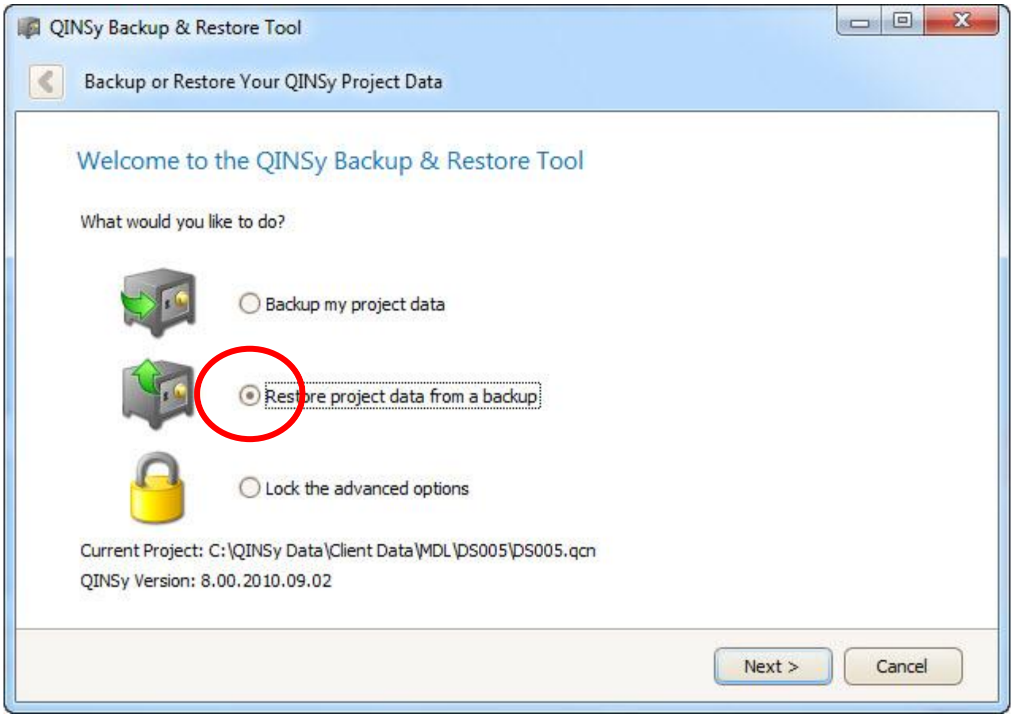
The following information provides a means of re-setting the system back to the MDL factory parameters, which were originally programmed into the computer and also how to use the QINSy restore function.

8.1.1 QINSy restore

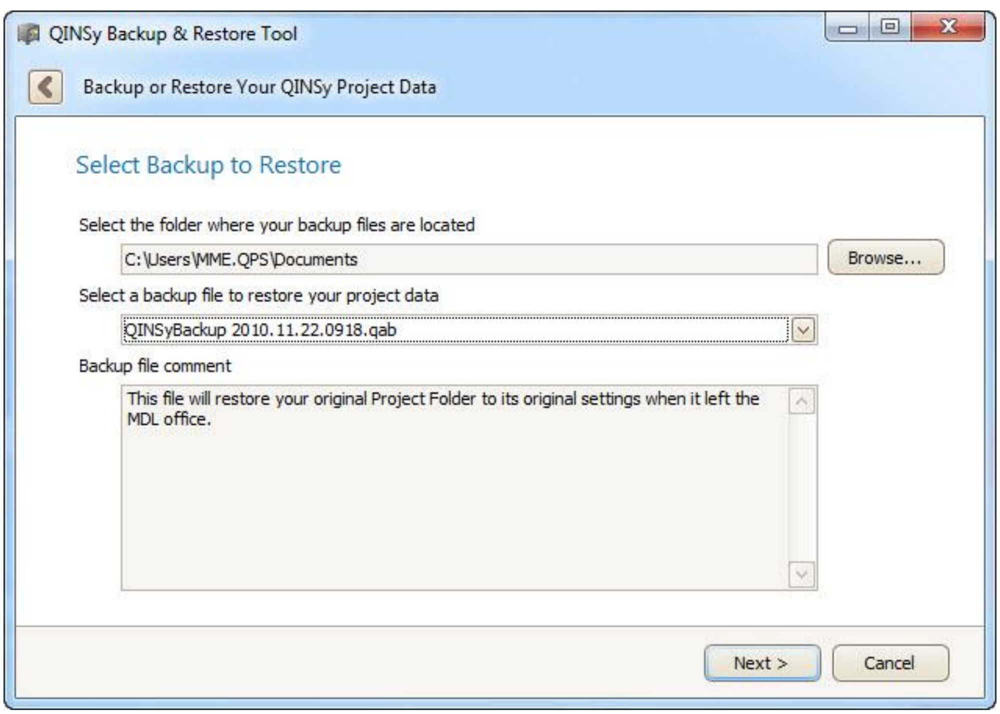
There is a facility to restore the MDL factory settings used in QINSy, which will re-set all QINSy parameters to the original factory settings. You can also create your own restore point for a particular project.

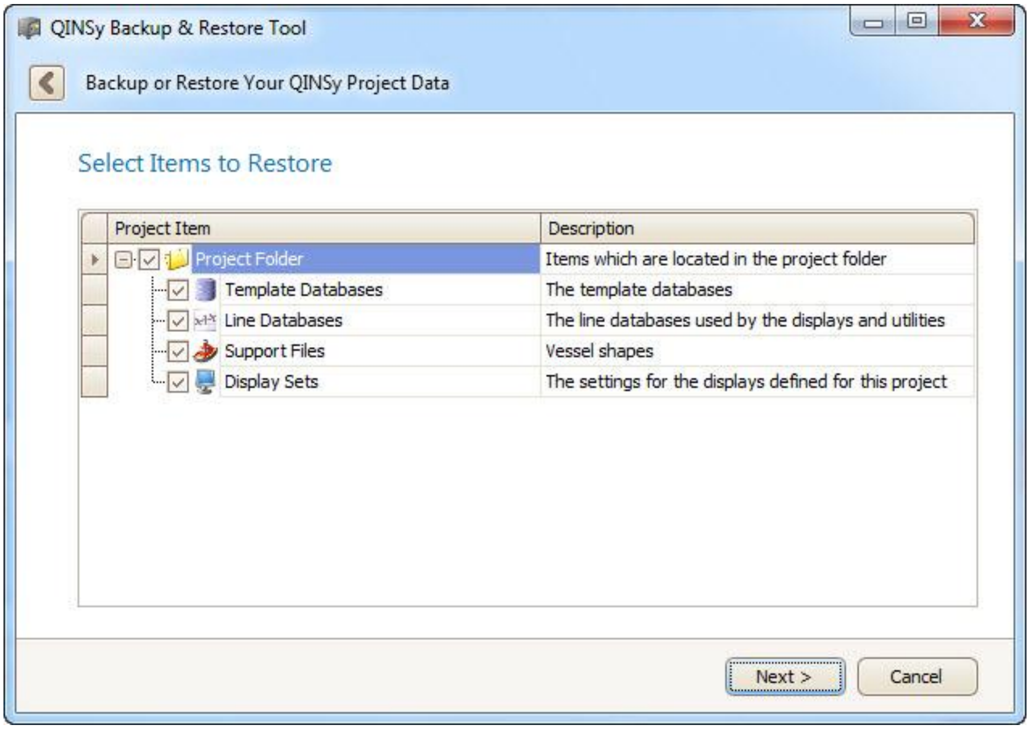
To utilise this function open the QINSy console and click on Tools then select backup project, or click on QINSy Backup icon.



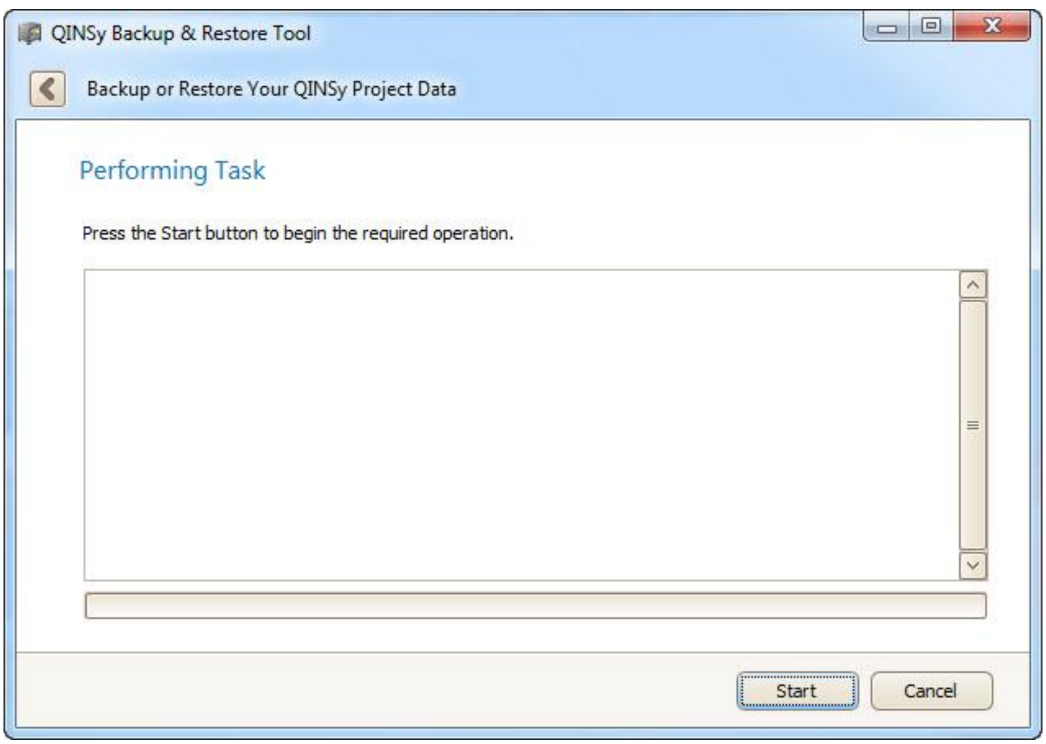


Ensure the Restore project data from backup box is ticked and click next. The file name should show the QINSy factory backup date for the system you have – click next.

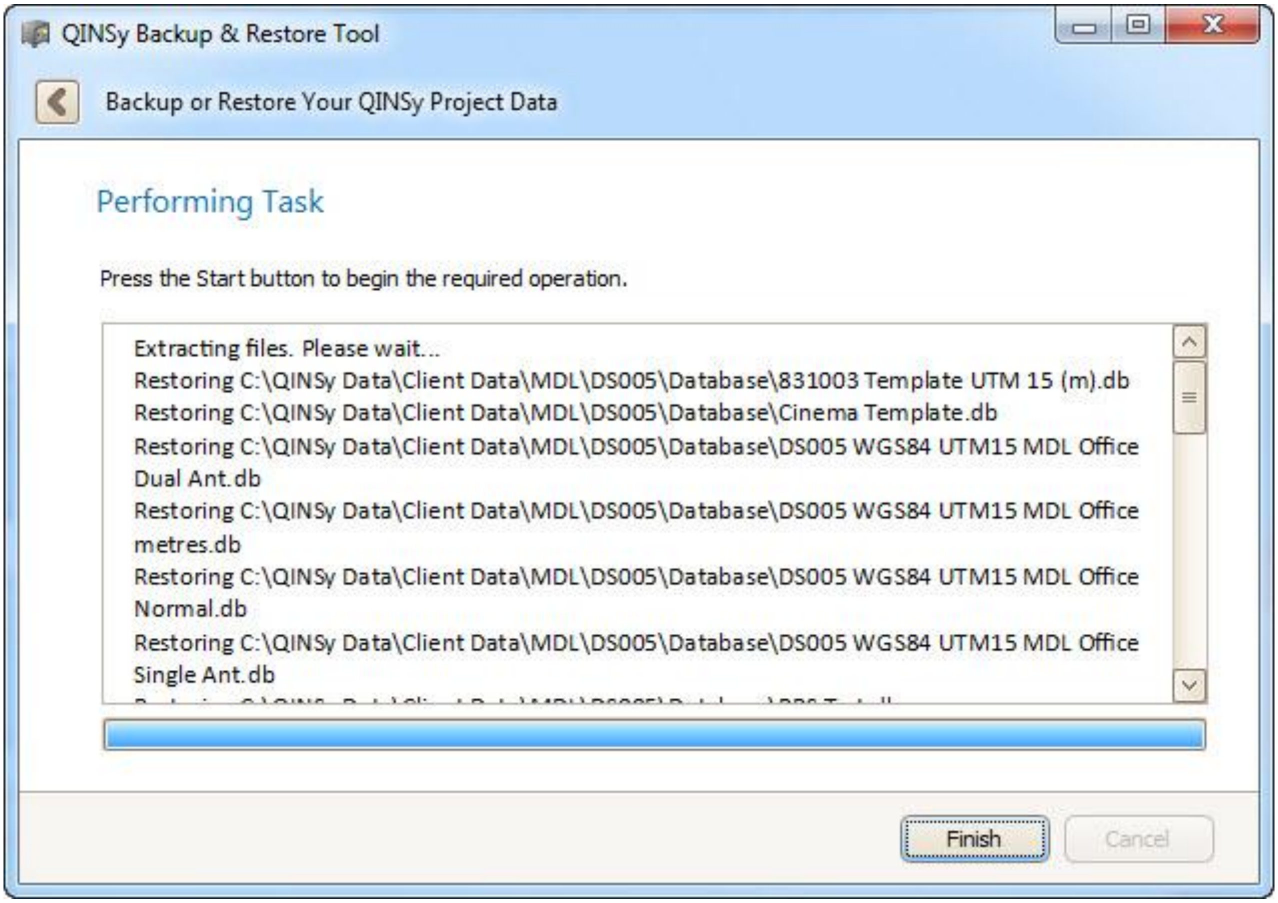




The Project Folder boxes should all be ticked then select next.



Click the start button to begin the re-store operation.



Click the Finish button to complete the QINSy restore.

9 MDL Support

9.1 Teamviewer

MDL can support your system remotely by the use of Teamviewer remote access software. If you require any technical assistance you must call the number below (MDL Houston) and they will talk you through the process.

If your laptop is not already loaded with Teamviewer software you will need to do this before contacting Houston.

9.2 Laptop Recovery

If a major problem with the laptop occurs contact the MDL office in Houston and quote the serial number of the Dynascan system. The MDL Houston office maintains copies of the hard disc setup of each laptop prior to customer shipment and our technical staff will help you to recover the original set-up status.

Contact Tel: **+1 281 646 0050**

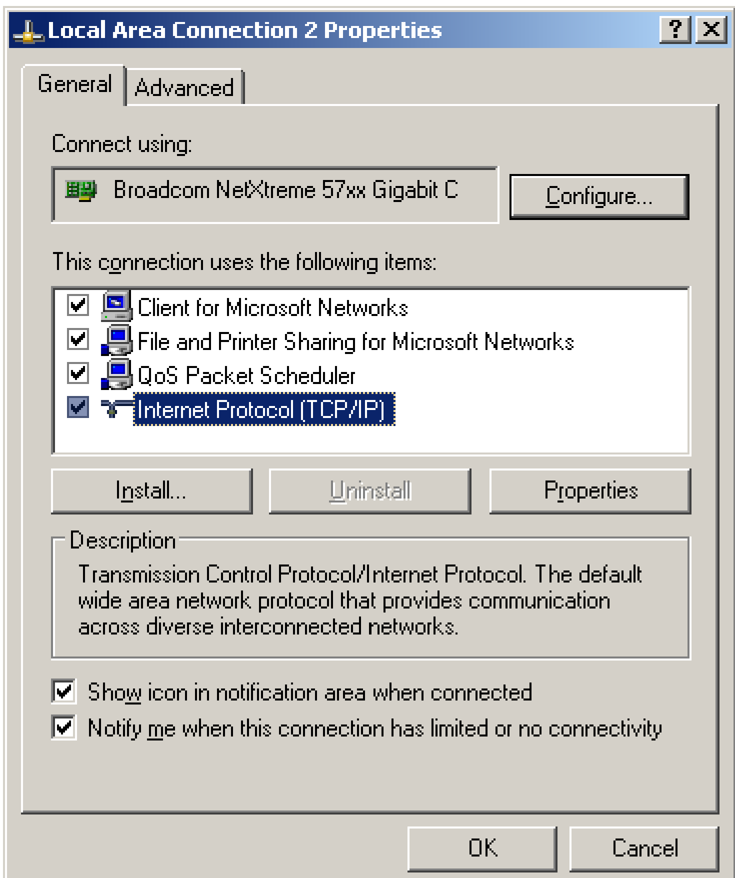
10 Laptop Settings

The laptop supplied with the Dynascan system is set up ready for use with the following IP settings.

10.1 Laser IP Address settings

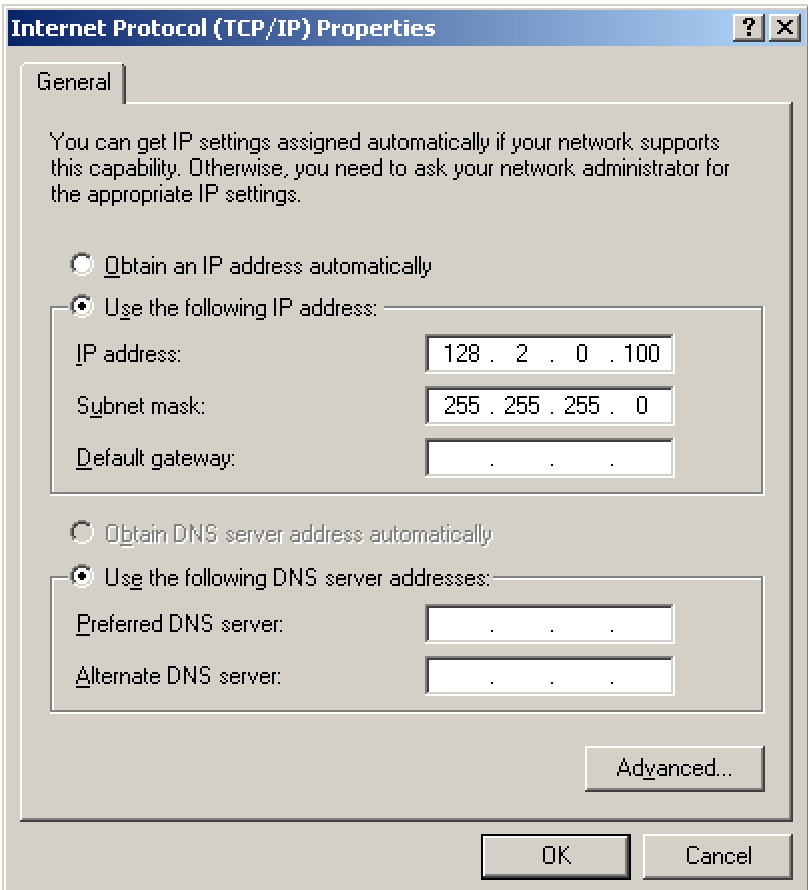
The IP address of the Dynascan laser is written on a label attached to the underside of the pod and is also entered on the setup page of QINSy. A typical example of the IP address used by MDL for the laser is 128.2.0.201.

The laptop is also setup to use a fixed IP address, which can be checked by opening the Local Area Connection, on the laptop, and selecting Internet Protocol (TCP/IP). Click on the Properties button and you will see that the Use the following IP address button is ticked.



The IP address entered here is slightly different than the laser IP address, an example of which is shown below. The system will not work if this number is exactly the same as the laser IP address.

N.B. You must type in the full Subnet mask also 255.255.255.0

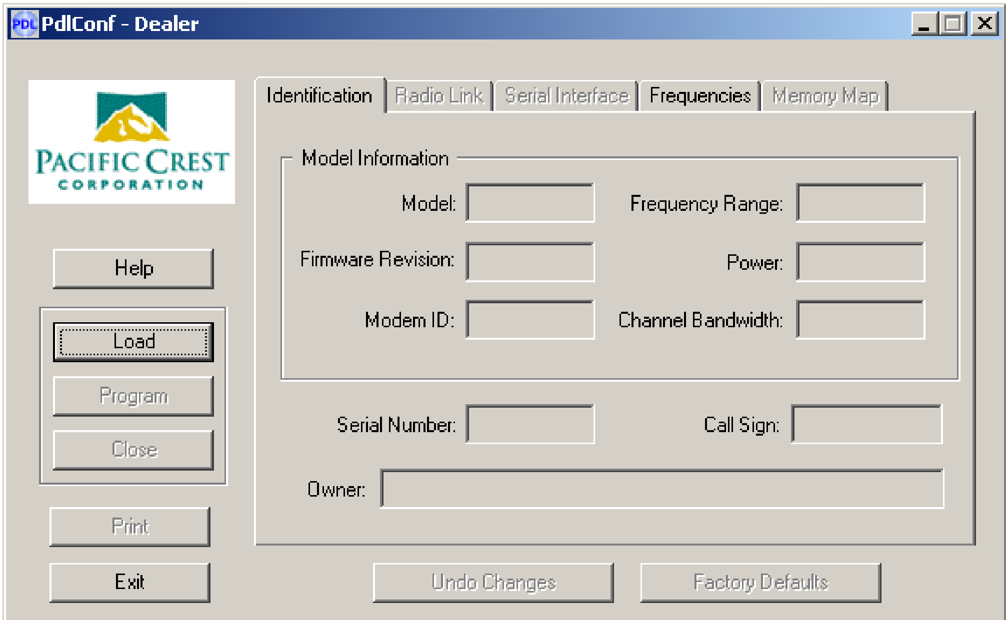


10.2 RTK Radio programming

You may need to change the Pod radio settings in order to receive base RTK radio signals. The laptop is loaded with Pacific Crest PDL or ADL software, which can be opened by clicking on the desktop icon.

Before using the software you should connect the RTK cable (from the IA unit) to the laptop by adding the serial to USB adaptor cable, supplied by MDL. When you click on the PDL or ADL icon you will see a screen similar to the one below.

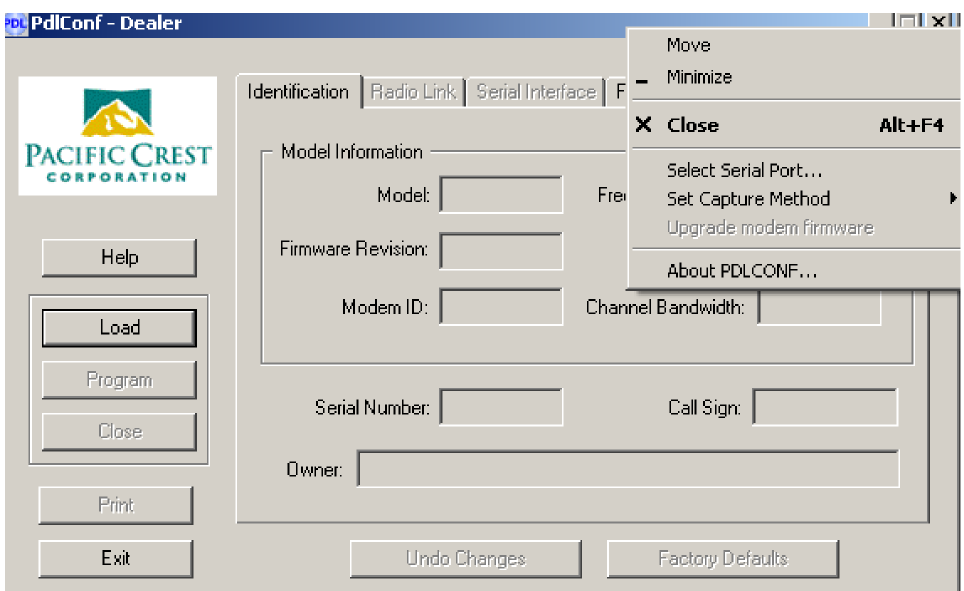
N.B. If the Pod contains an ADL radio you must set the sensitivity to low (base) for the radio to work correctly (it is factory set to low)



Right click on the blue task bar at the top of the window to view **Select Serial Port** and **Set Capture Method** (see below)

10.2.1 Select Serial Port

Click on select serial port to set up the port you will use for programming the radio. If you are not sure which port you are using open control panel and select the system icon then click the hardware tab. Next click the device manager button then the + next to ports. This will show the port in use.



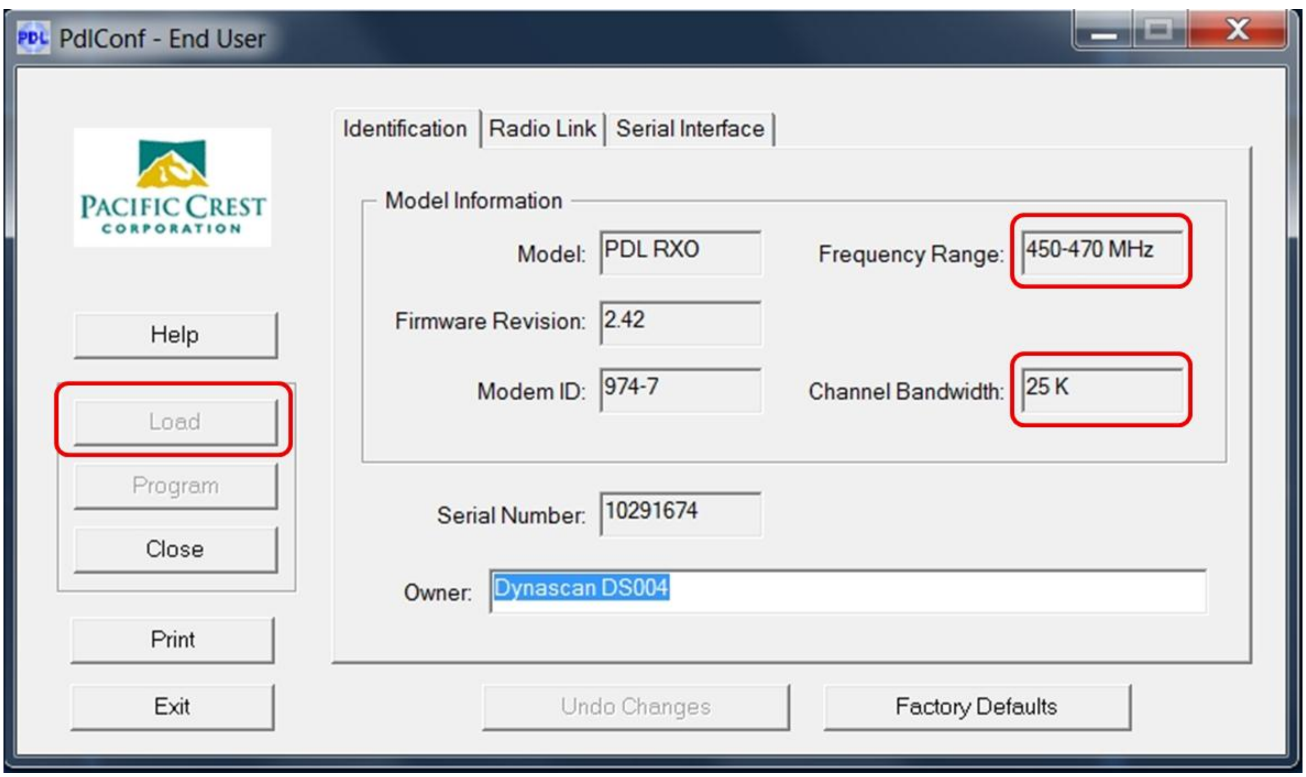
10.2.2 Set Capture Method

There are two choices of capture method. It is best to select soft break and then with the Dynascan system powered up click the **Load** button and the software will automatically scroll through the baud rates until it communicates with the radio and downloads the settings.

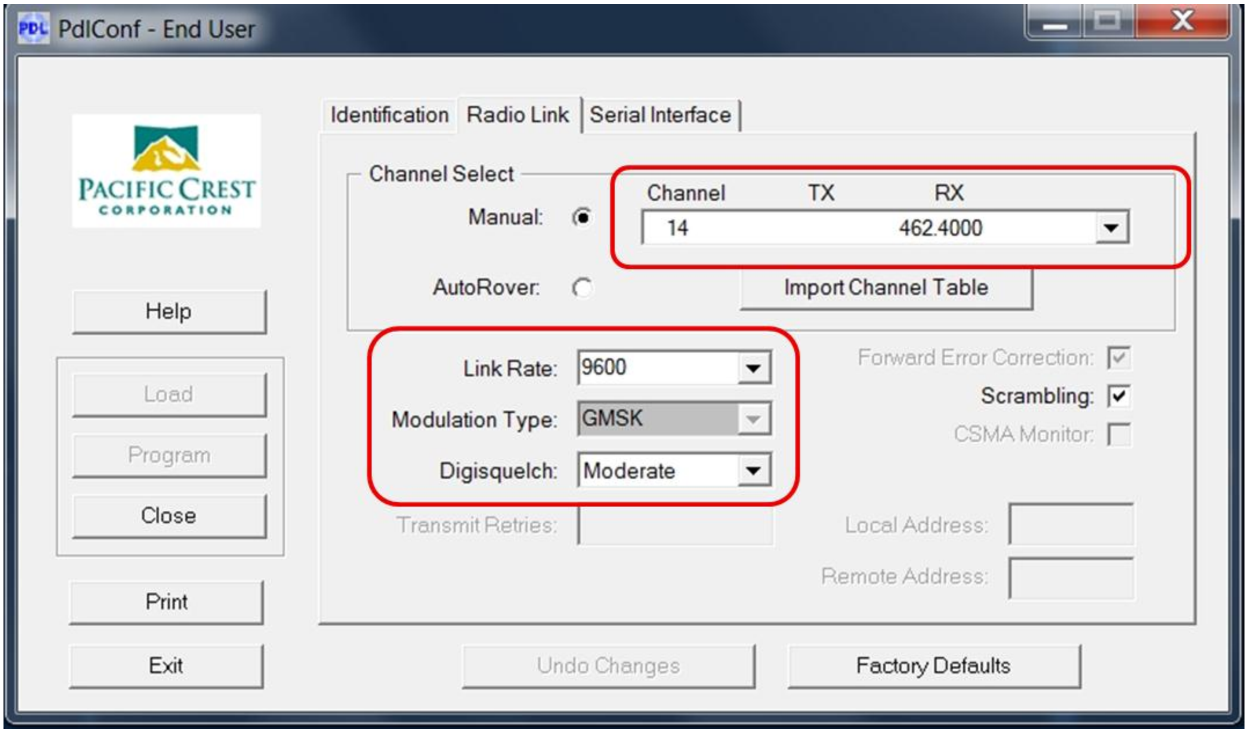
If this method fails you can select the power on capture method which means you will have to power up the system then disconnect the RTK cable before clicking on the **Load** button. You will then have 10 seconds to connect the cable and the software will load the radio settings.

Once you have loaded the radio settings you can change them to ensure they are compatible with the RTK base station setup.

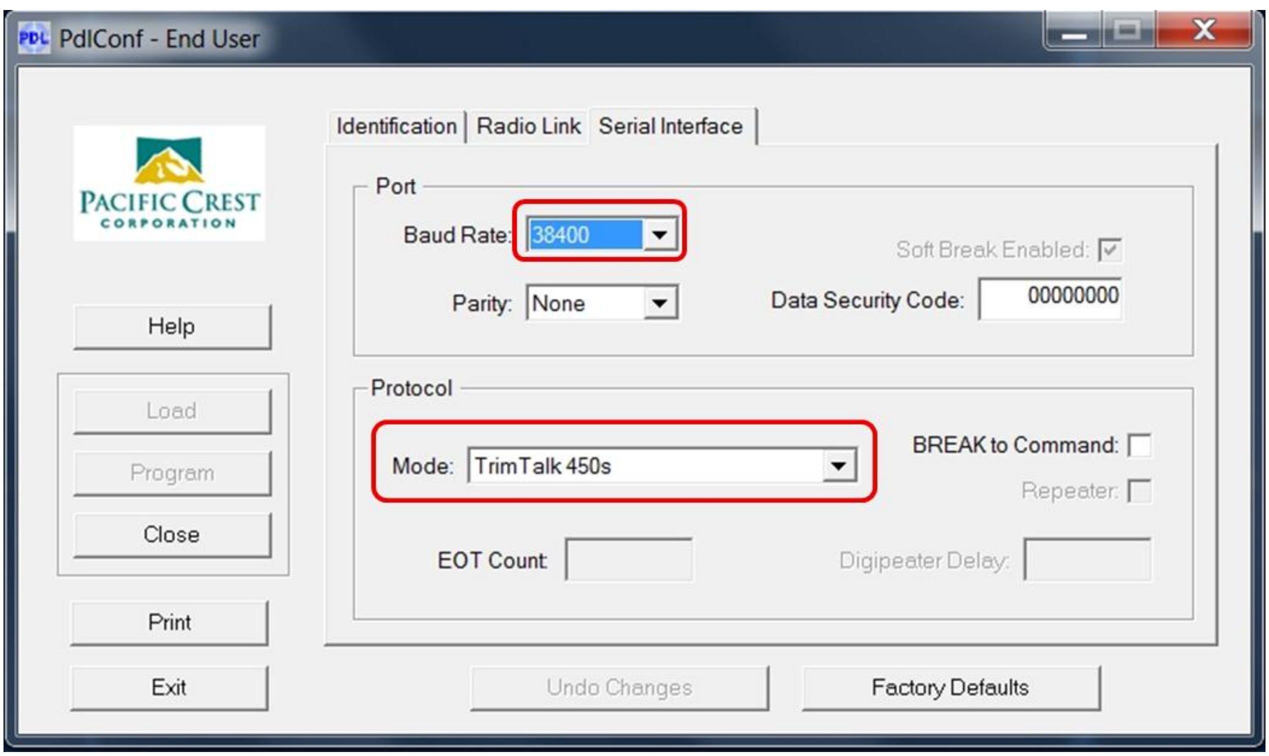
Please note the normal Pacific Crest PDL radios have a bandwidth of 25KHz, which cannot be changed.



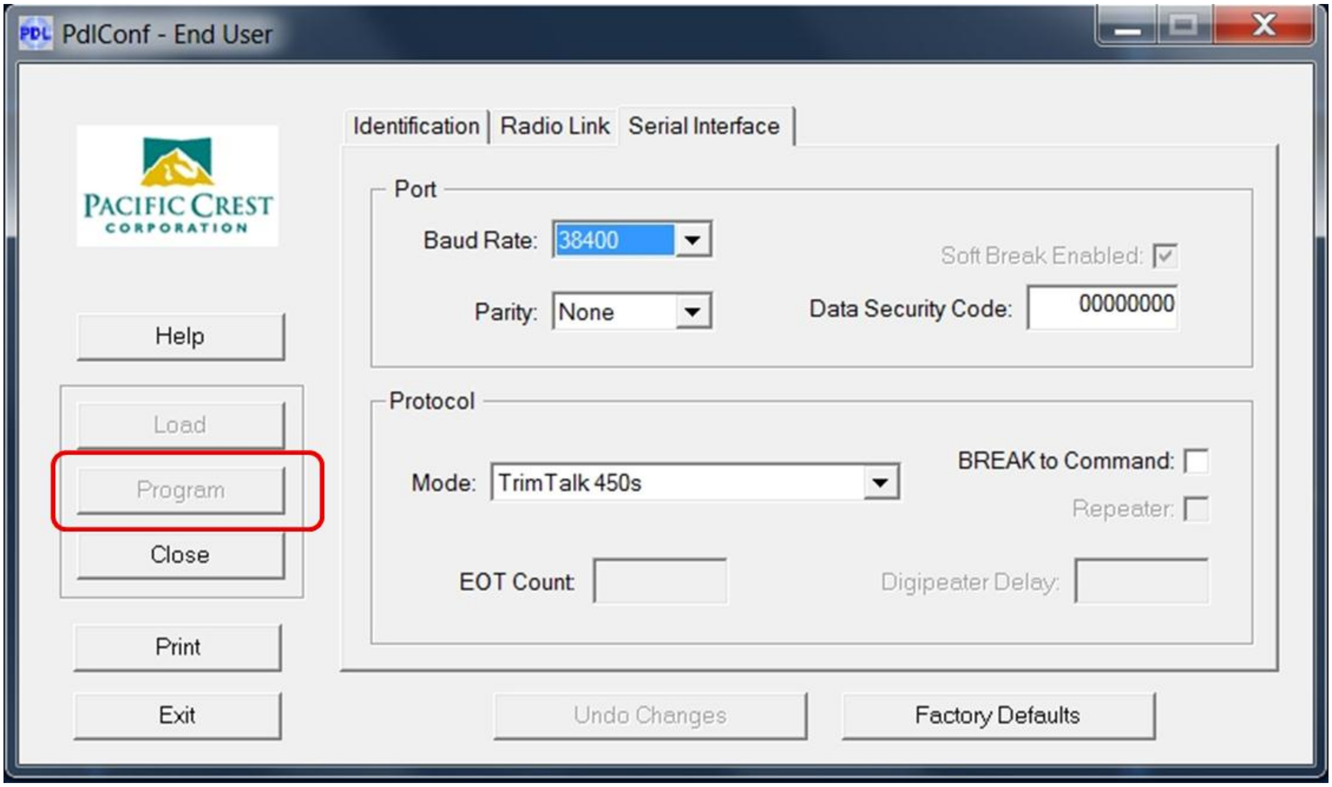
Once you have loaded the Radio settings confirm that the Frequency Range and Channel Bandwidth are compatible with your GPS RTK Base Station.



Confirm that the Radio Frequency, Link Rate and Modulation Type are compatible with your GPS RTK Base Station.



Confirm that the radio serial output is set to 38400, 8,N,1 to match the internal GPS receiver and that the RTK message protocol matches the RTK GPS Base Station.



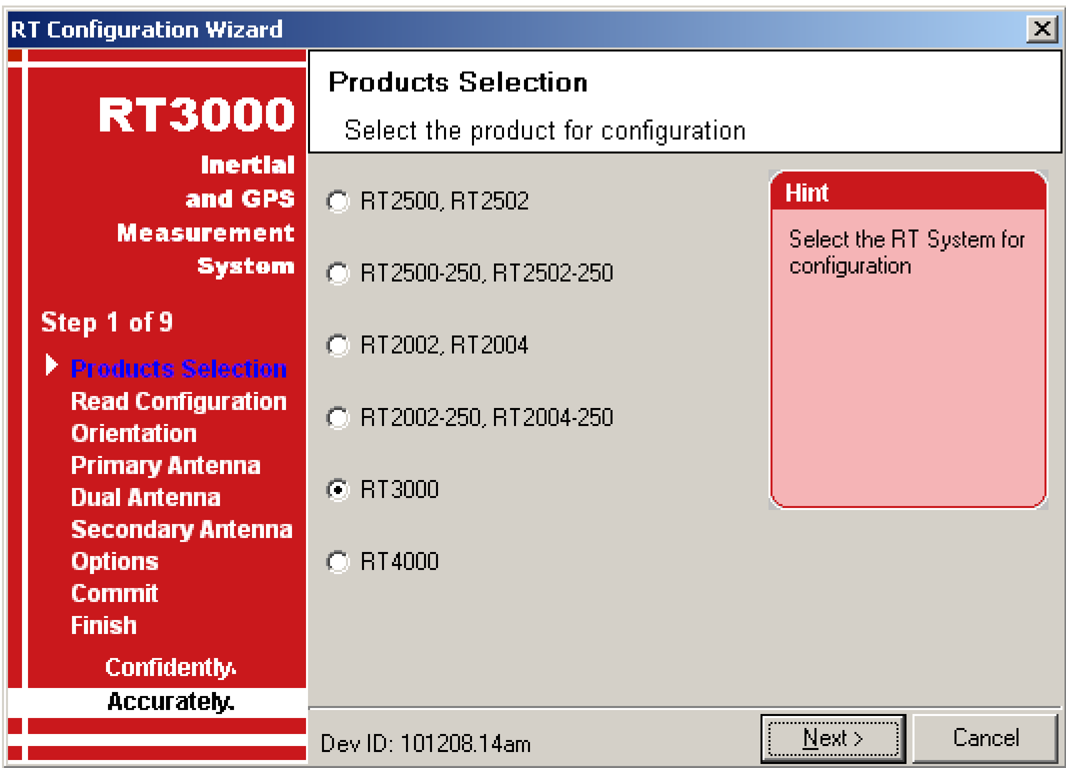
Once you have confirmed that all of the Radio settings are set properly, re-program the Radio with the new settings.

11 INS Sensor Setup Parameters

The Dynascan INS sensor is set up in the factory and the only screens the user should change are the GNSS secondary antenna offsets, RTK baud rate and odometer sensor information (if this option is purchased).

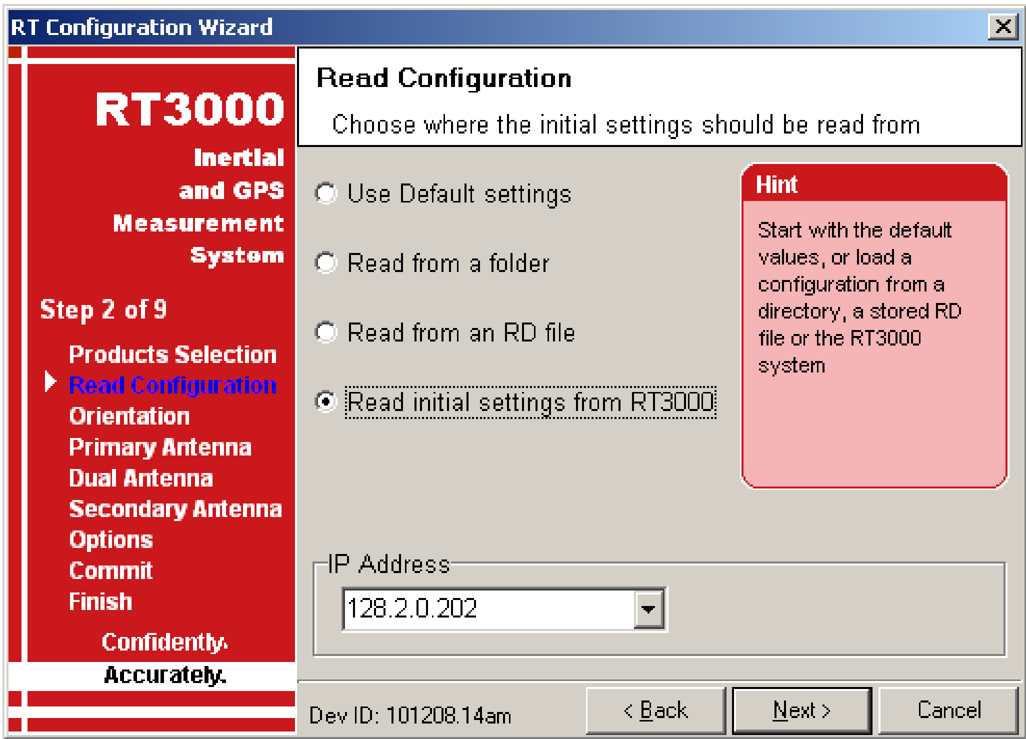
11.1 Using setup software (RT3005G)

Open RT Config software and select RT 3000

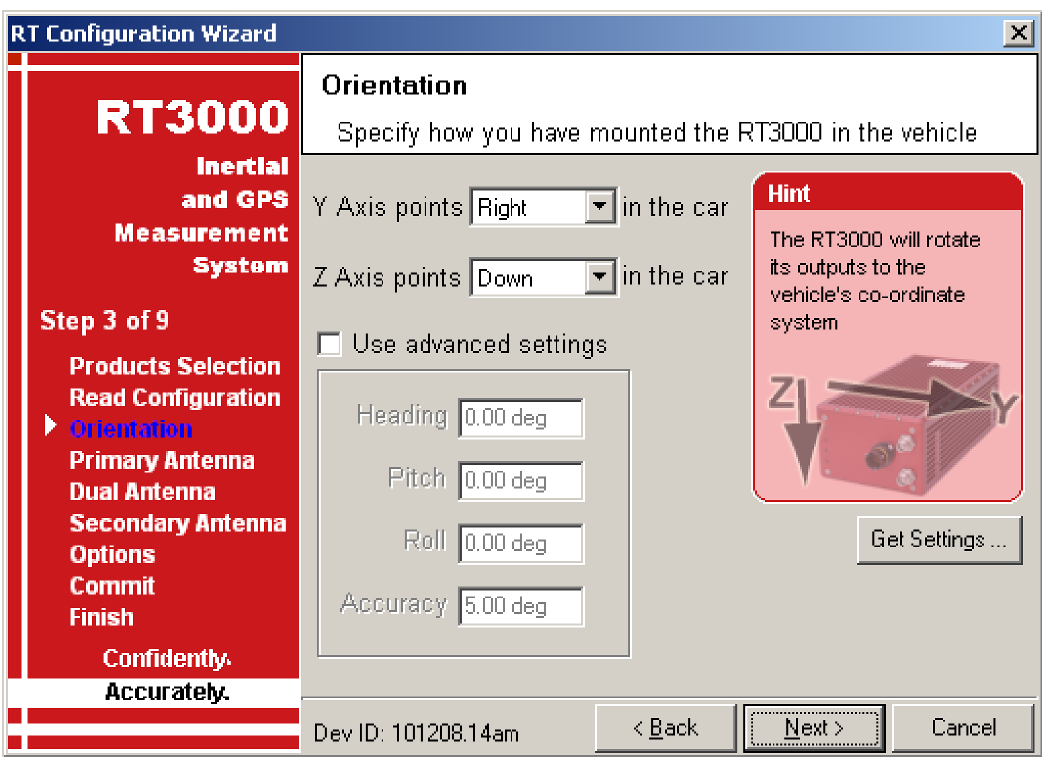


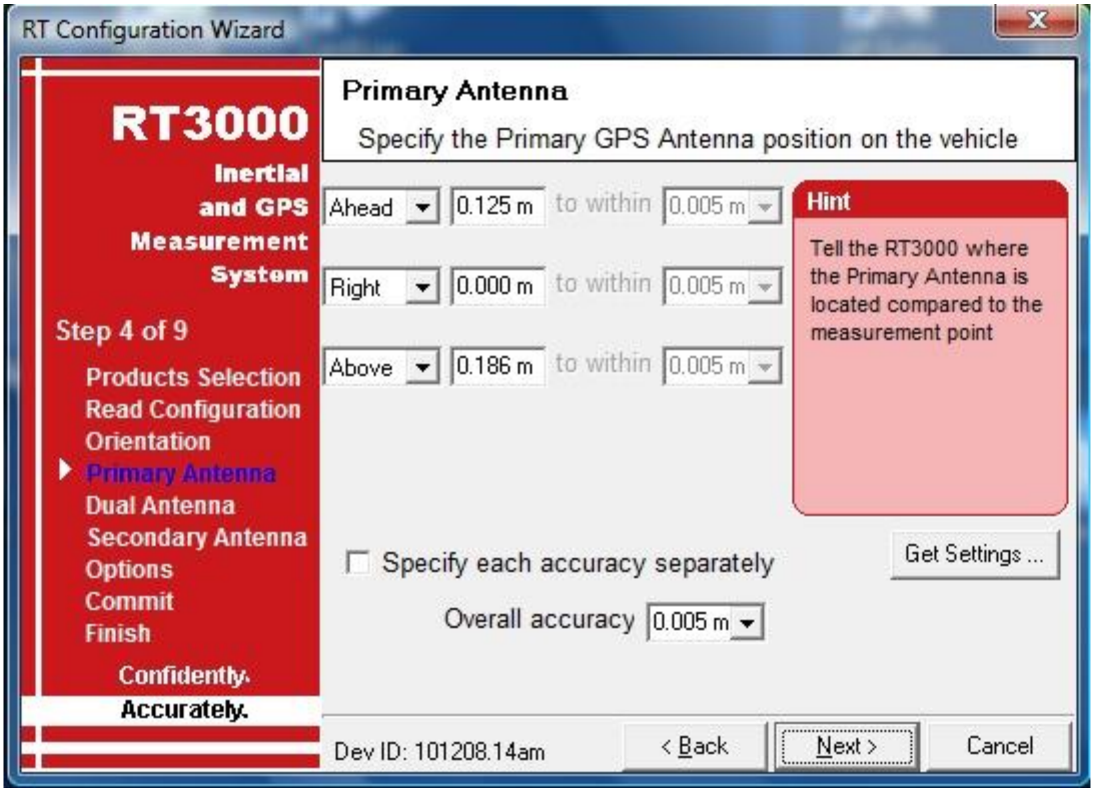
Select Read from RT3000 and click Next

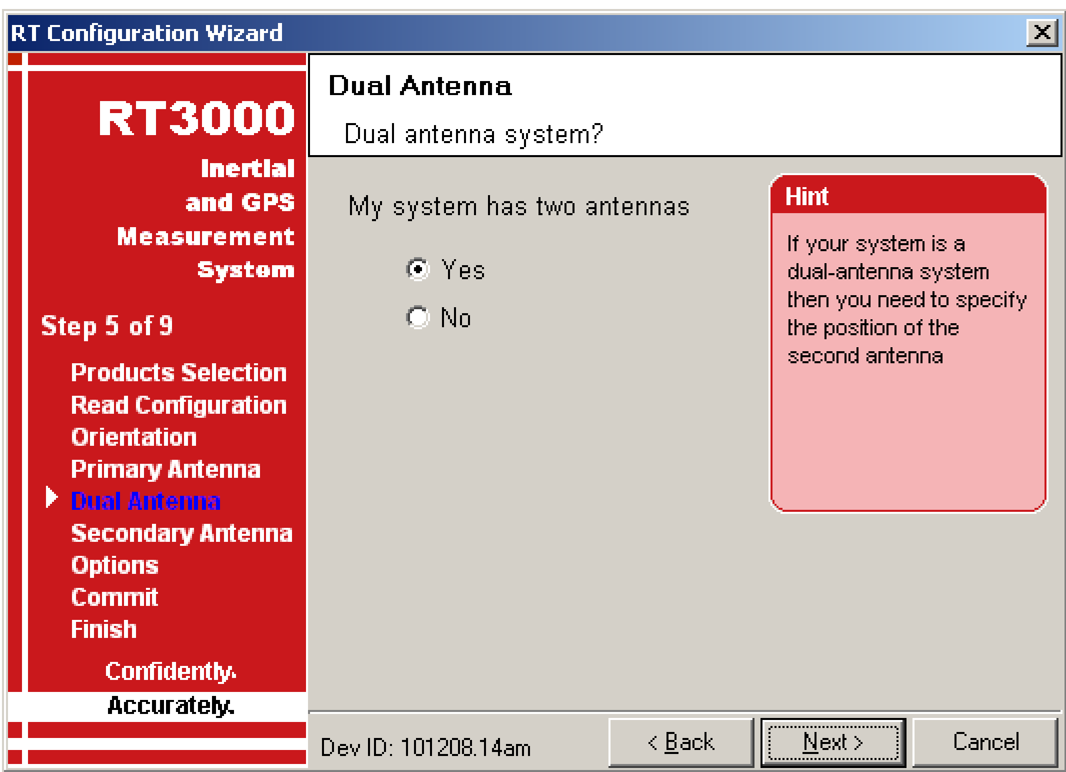
Continue to click Next as you go through the various set up screens.



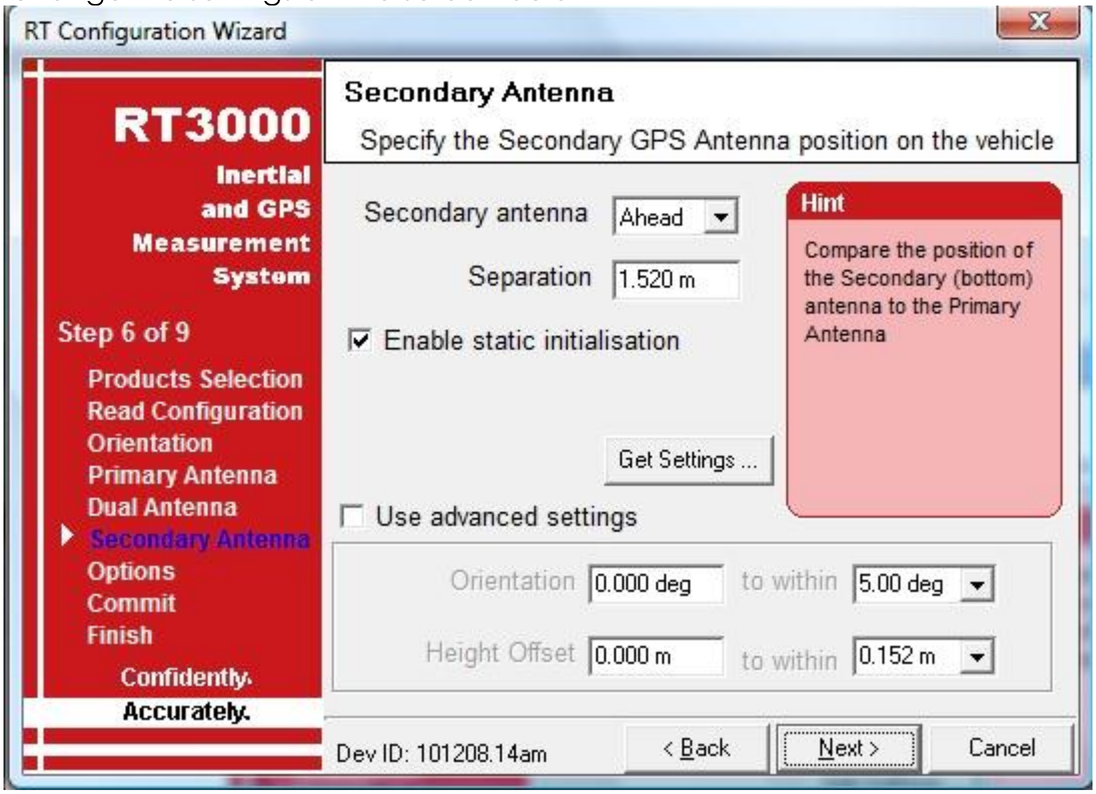
WARNING :- Selecting "Use Default Settings" will return the RT3000 to its original factory settings and all special Dynascan configurations will be lost.



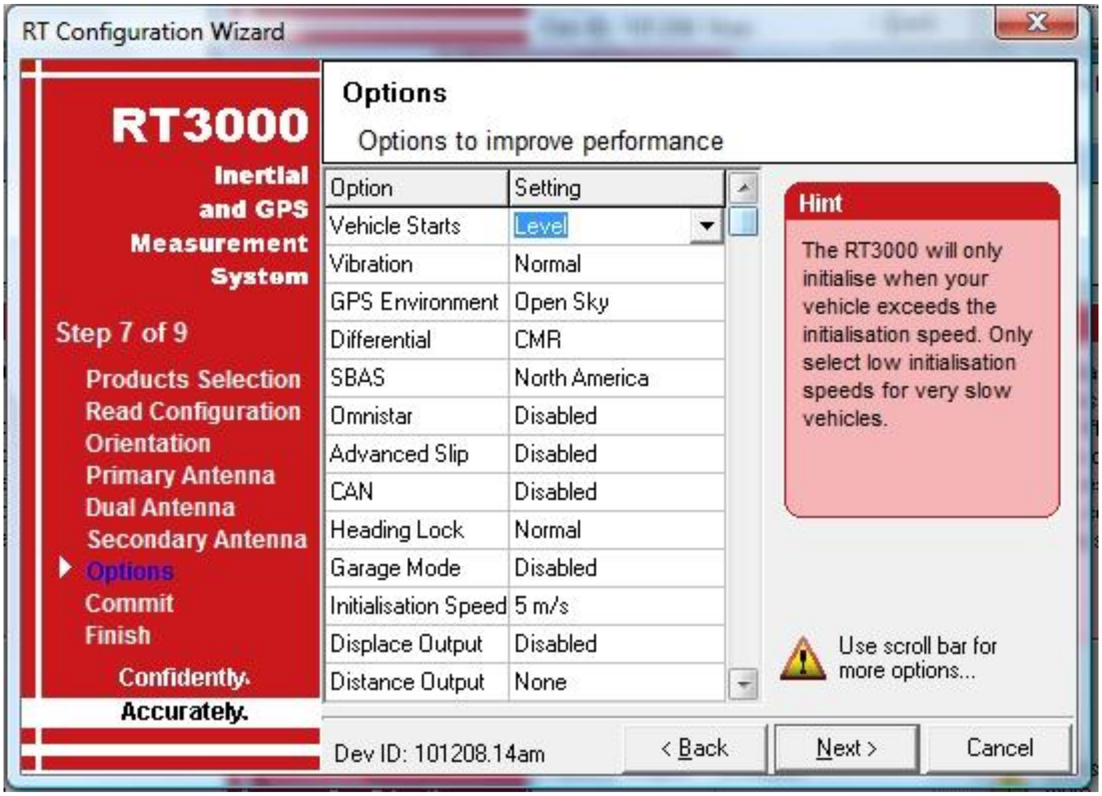

RT Configuration Wizard
RT3000
Inertial and GPS Measurement System
Step 4 of 9
Products Selection
Read Configuration
Orientation
Primary Antenna
Dual Antenna
Secondary Antenna
Options
Commit
Finish
Confidently.
Accurately.
Primary Antenna
Specify the Primary GPS Antenna position on the vehicle
Ahead 0.125 m to within 0.005 m
Right 0.000 m to within 0.005 m
Above 0.186 m to within 0.005 m
Hint
Tell the RT3000 where the Primary Antenna is located compared to the measurement point
Specify each accuracy separately
Get Settings ...
Overall accuracy 0.005 m
Dev ID: 101208.14am
< Back
Next >
Cancel


RT Configuration Wizard
RT3000
Inertial and GPS Measurement System
Step 5 of 9
Products Selection
Read Configuration
Orientation
Primary Antenna
Dual Antenna
Secondary Antenna
Options
Commit
Finish
Confidently.
Accurately.
Dual Antenna
Dual antenna system?
My system has two antennas
Yes
No
Hint
If your system is a dual-antenna system then you need to specify the position of the second antenna
Dev ID: 101208.14am
< Back
Next >
Cancel

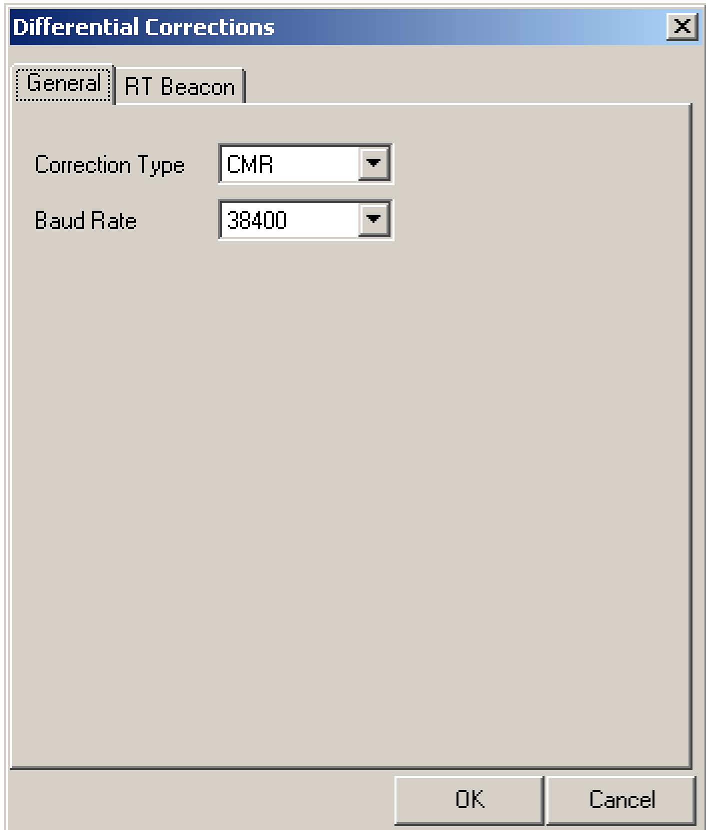
You can change the settings on the screen below



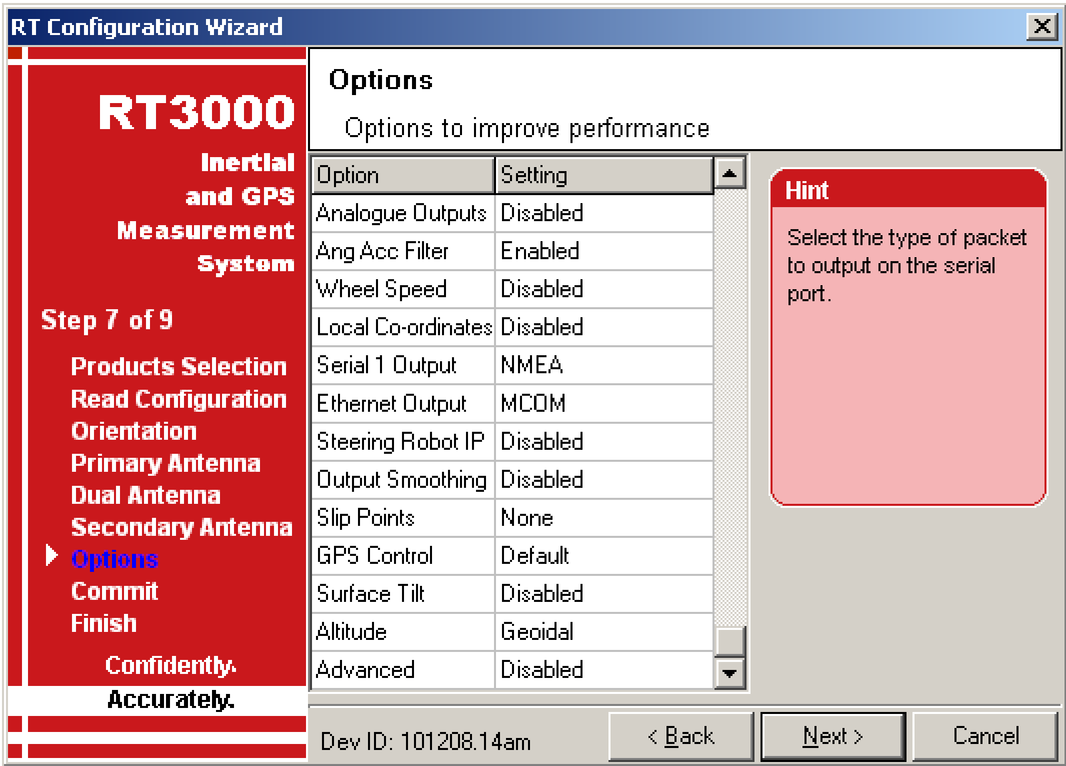
The screen below shows the options – you can change the differential setting by double clicking on CMR

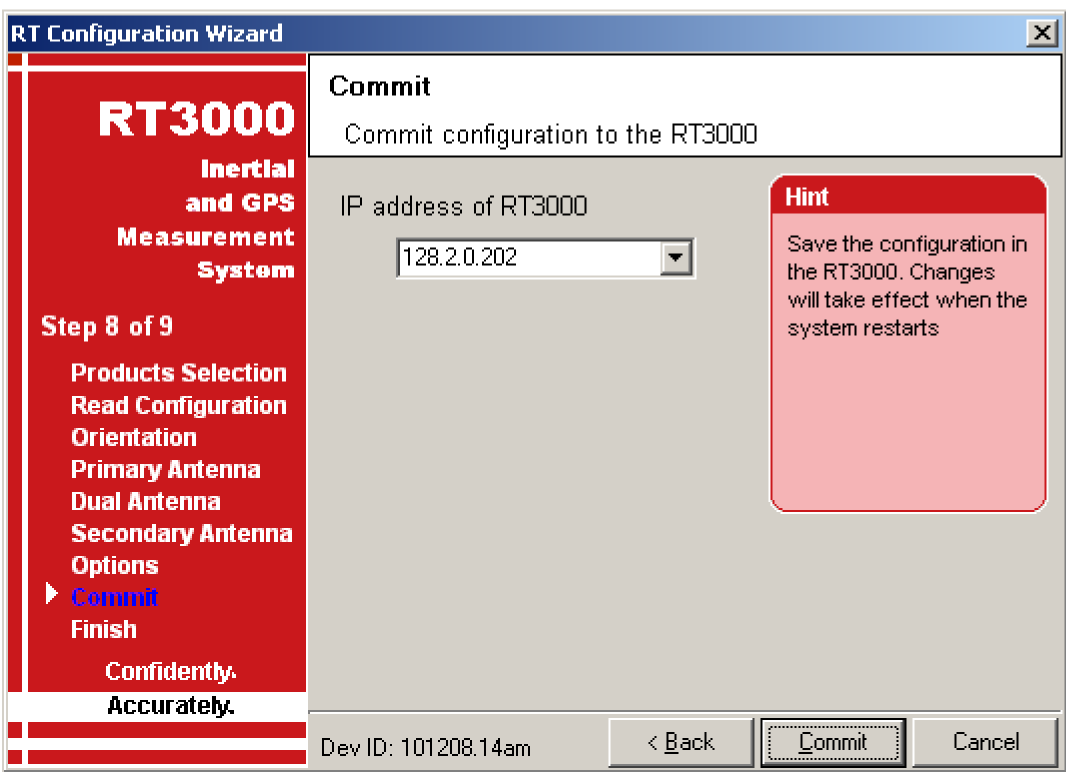


You will see the CMR message and baud rate for the RTK or VRS input. You can change the baud rate here.

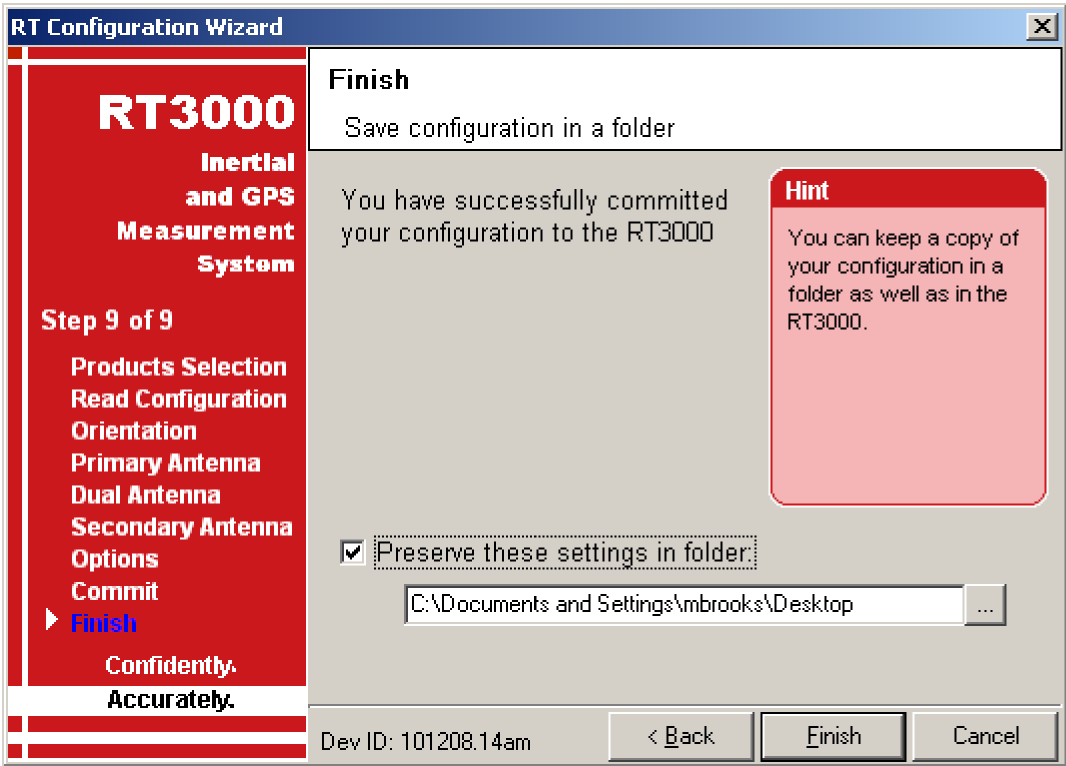


Further options are shown at the bottom of this page


RT Configuration Wizard
RT3000
Inertial and GPS Measurement System
Step 7 of 9
Products Selection
Read Configuration
Orientation
Primary Antenna
Dual Antenna
Secondary Antenna
Options
Commit
Finish
Confidently.
Accurately.
Options
Options to improve performance
Option | Setting
Analogue Outputs | Disabled
Ang Acc Filter | Enabled
Wheel Speed | Disabled
Local Co-ordinates | Disabled
Serial 1 Output | NMEA
Ethernet Output | MCOM
Steering Robot IP | Disabled
Output Smoothing | Disabled
Slip Points | None
GPS Control | Default
Surface Tilt | Disabled
Altitude | Geoidal
Advanced | Disabled
Hint
Select the type of packet to output on the serial port.
Dev ID: 101208.14am
< Back
Next >
Cancel


RT Configuration Wizard
RT3000
Inertial and GPS Measurement System
Step 8 of 9
Products Selection
Read Configuration
Orientation
Primary Antenna
Dual Antenna
Secondary Antenna
Options
Commit
Finish
Confidently.
Accurately.
Commit
Commit configuration to the RT3000
IP address of RT3000
128.2.0.202
Hint
Save the configuration in the RT3000. Changes will take effect when the system restarts
Dev ID: 101208.14am
< Back
Commit
Cancel

Below shows you can save the settings in the folder of your choice. You can then recover them in the future, if required.



12 Pod Offsets

The pod offsets vary from pod to pod and are shown below.

12.1 Offset table

Description	X (metres)	Y (metres)	Z (metres)
Jan 2010 to July 2010 units			
IMU to GPS	0.02535	0.1920	0.15887
IMU to SLM	0.02535	-0.3530	0.05060
Production Single Head (Novatel)			
IMU to GPS	0.03085	0.09545	0.18187
IMU to SLM	0.03085	-0.45135	0.05160
Production Twin Head (Novatel)			
IMU to GPS	0.03085	0.09545	0.18187
IMU to Port Laser	-0.12196	-0.56063	0.11321
IMU to Starboard Laser	0.18366	-0.56063	0.11321

Description	X (metres)	Y (metres)	Z (metres)
Production single head (OXTS)			
IMU to GPS	0.00	0.125	**0.186 ***
IMU to SLM (500m)	0.00	-0.429	0.050
IMU to SLM (150m)	0.00	-0.419	0.050

**** Add 19mm if the white spacer is fitted under the GPS Antenna***

Production Twin Head (OXTS)	**X (metres)**	**Y (metres)**	**Z (metres)**
IMU to GPS	0.00	0.125	**0.186 ***
IMU to Port Laser	-0.153	-0.536	0.112
IMU to Starboard Laser	0.153	-0.536	0.112

***** *Add 19mm if the white spacer is fitted under the GPS Antenna***

The version below was introduced in March 2011

Description	**X (metres)**	**Y (metres)**	**Z (metres)**
Production single head twin modules at 10 degrees (OXTS)			
IMU to GPS	0.00	0.126	0.194
IMU to SLM 1 (150m)	0.00	-0.439	0.0505
IMU to SLM 2 (150m)	0.00	-0.452	0.0505

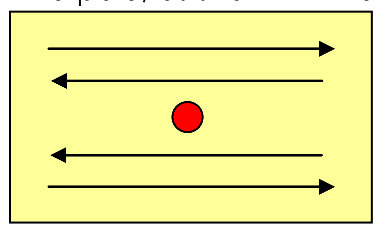
13 QINSy Software

13.1 Calibrating Pitch, Roll and Heading

The Dynascan comes ready calibrated for Roll and Pitch and these two values **do not need changing**. The heading will vary between installations and should be calibrated for each different vehicle or vessel used (heading starts at step 22 below).

I. You need to find a flat area, such as a car park, with a tall lamppost or vertical pole in a clear area with good GPS coverage. The flat surface will be used to calibrate roll and the vertical pole for pitch and heading.

2. Record four separate QINSy files by driving **slowly** (2-3 KPH) past the pole in each direction (approx 10-20 metres away) and on opposite sides of the pole, as shown in the plan view diagram below.

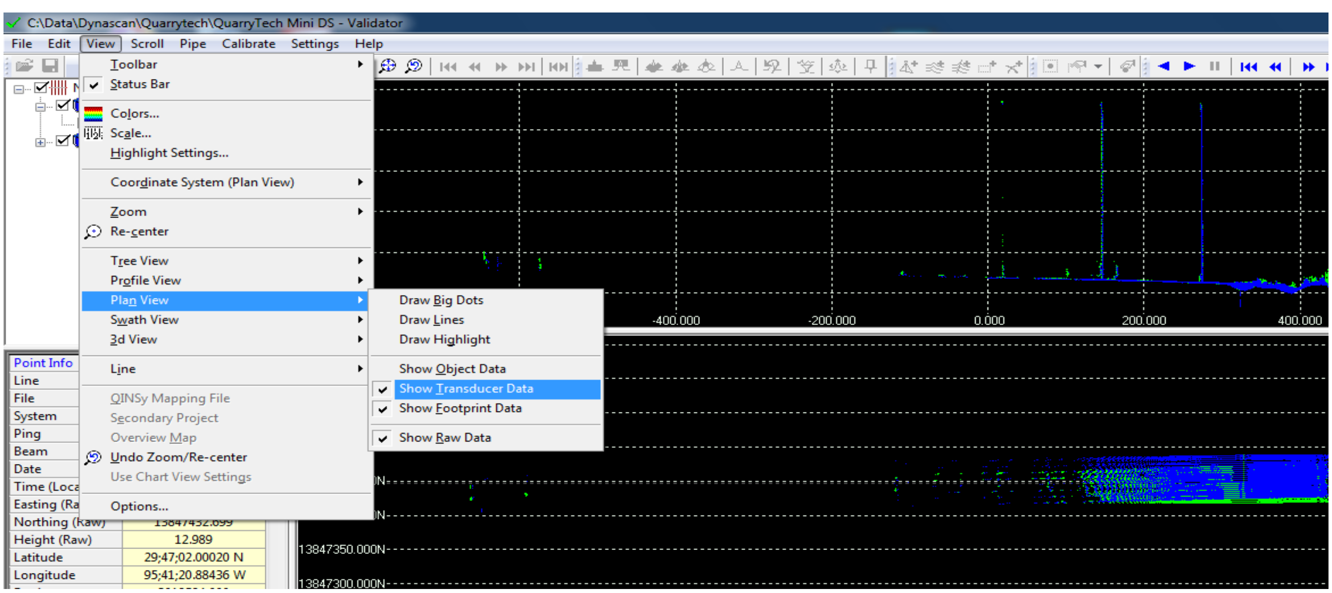


3. Ideally you should drive in a straight line and when travelling in the opposite direction come back along the same line. Give logical file names to the 4 files (e.g. south of pole going West).

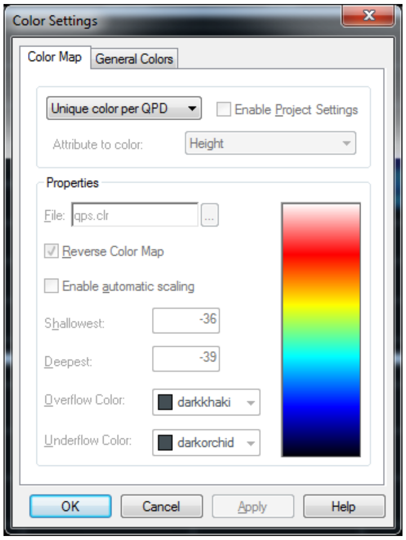
4. When you have recorded the four files go to the QINSy console, open the processing icon and import the four files.

5. Start by calibrating the Roll and select two files from two different directions and then clicking on the validator icon.

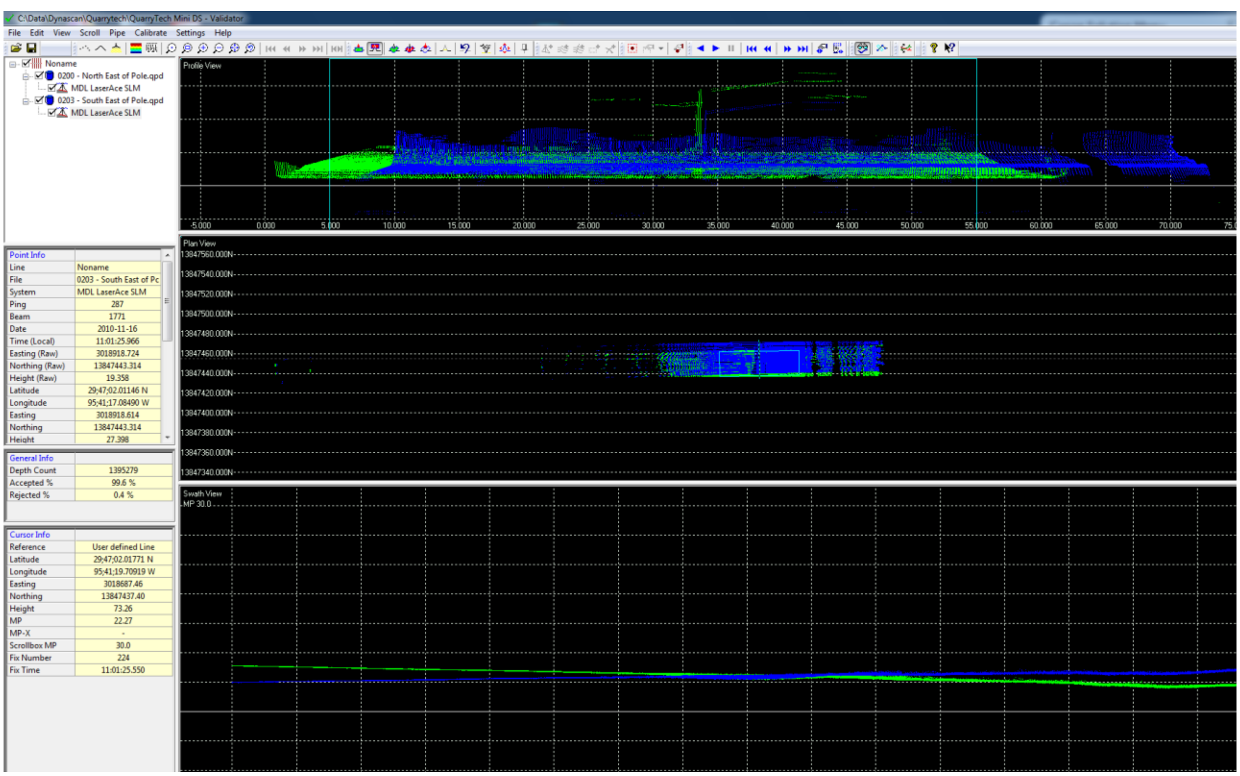
6. Select View, Plan View and tick the 'Show Transducer Data' box (this will show a fine line on the plan view of the vehicle track)



7. Click the colour icon and select ‘Unique Colour Per QPD’ then click the user defined line and draw a line in the direction of vehicle travel on the Plan View screen (as per 6 above).

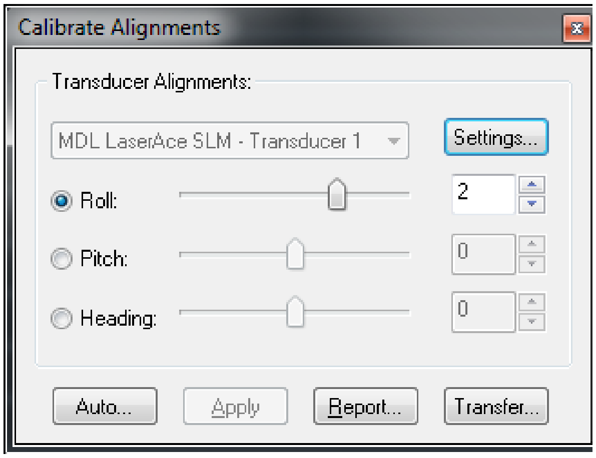


8. Click the View=Validate icon and use the clip icons to remove any obstacles in the swathe view. What you see in the swathe view will be used for the roll calibration so remove items such as the pole, trees etc.

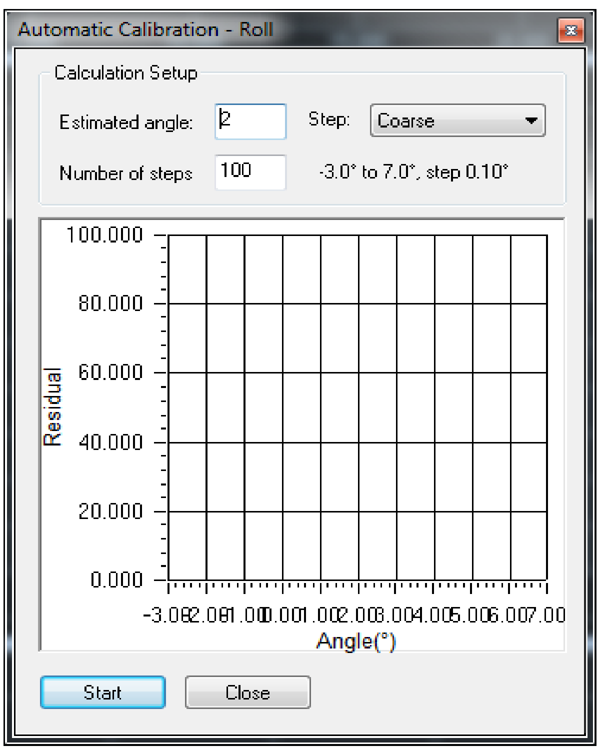


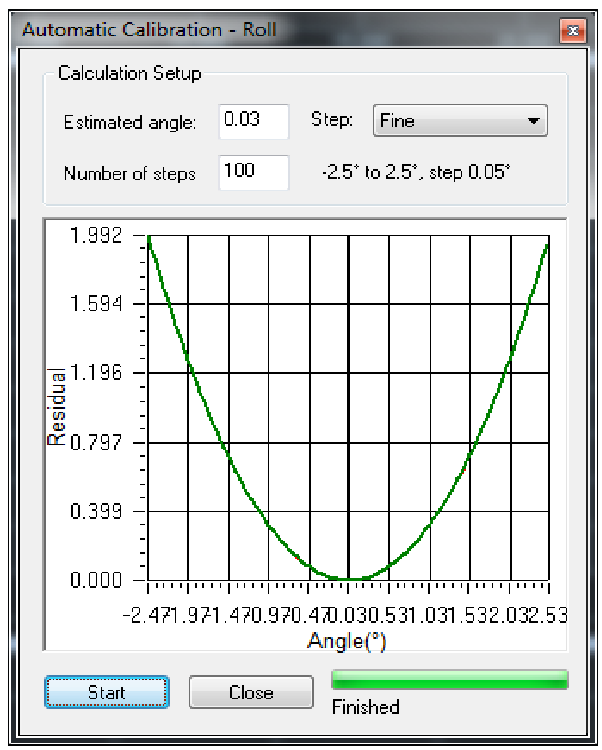
9. Make the slice box fit the flat area where the two files were recorded.

10. Click the Calibrate Alignment icon to bring up the roll, pitch & heading value box then select Roll and click Auto

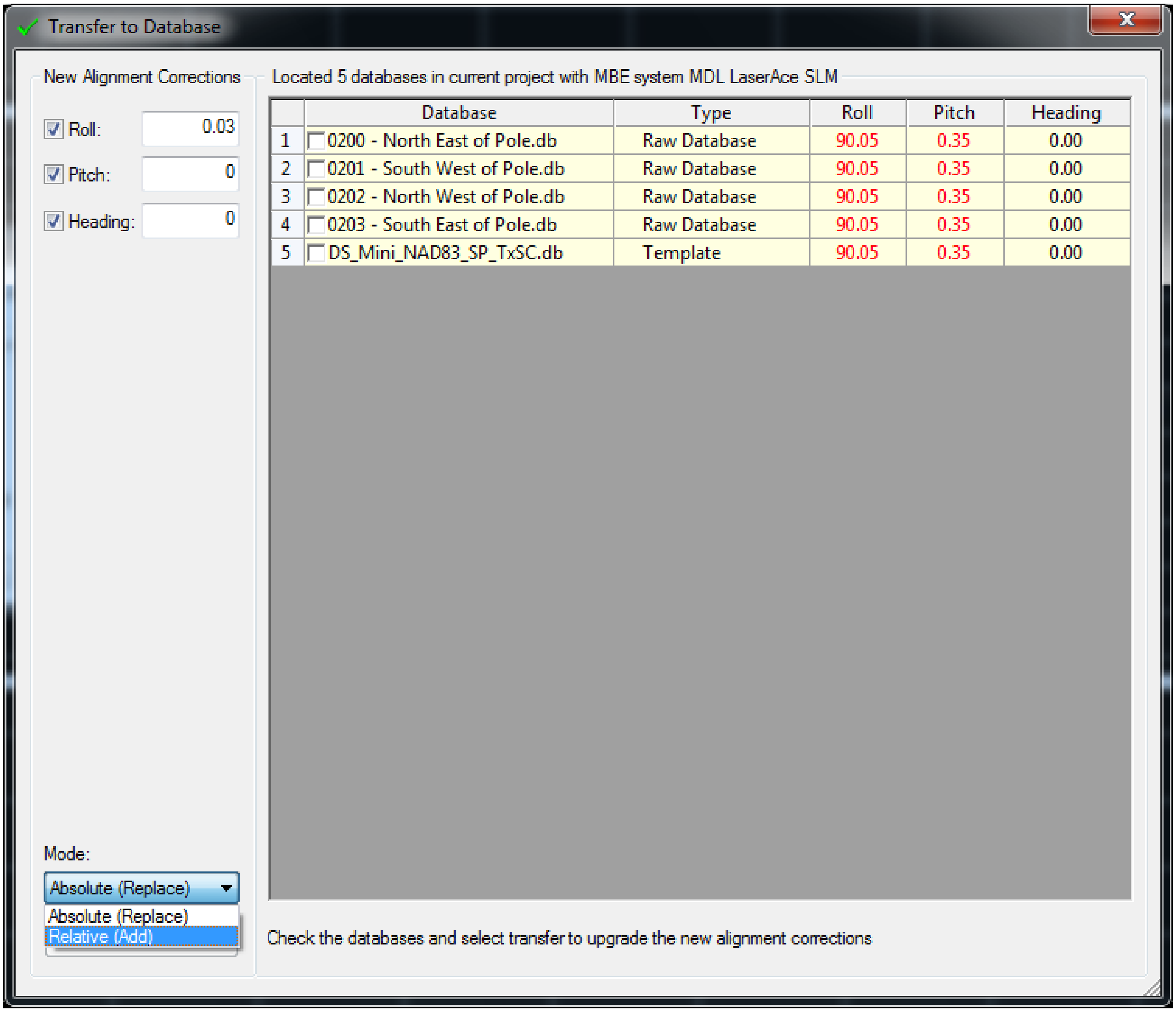


11. Start with the coarse setting and click Start. When graph is finished go to fine and click Start again.

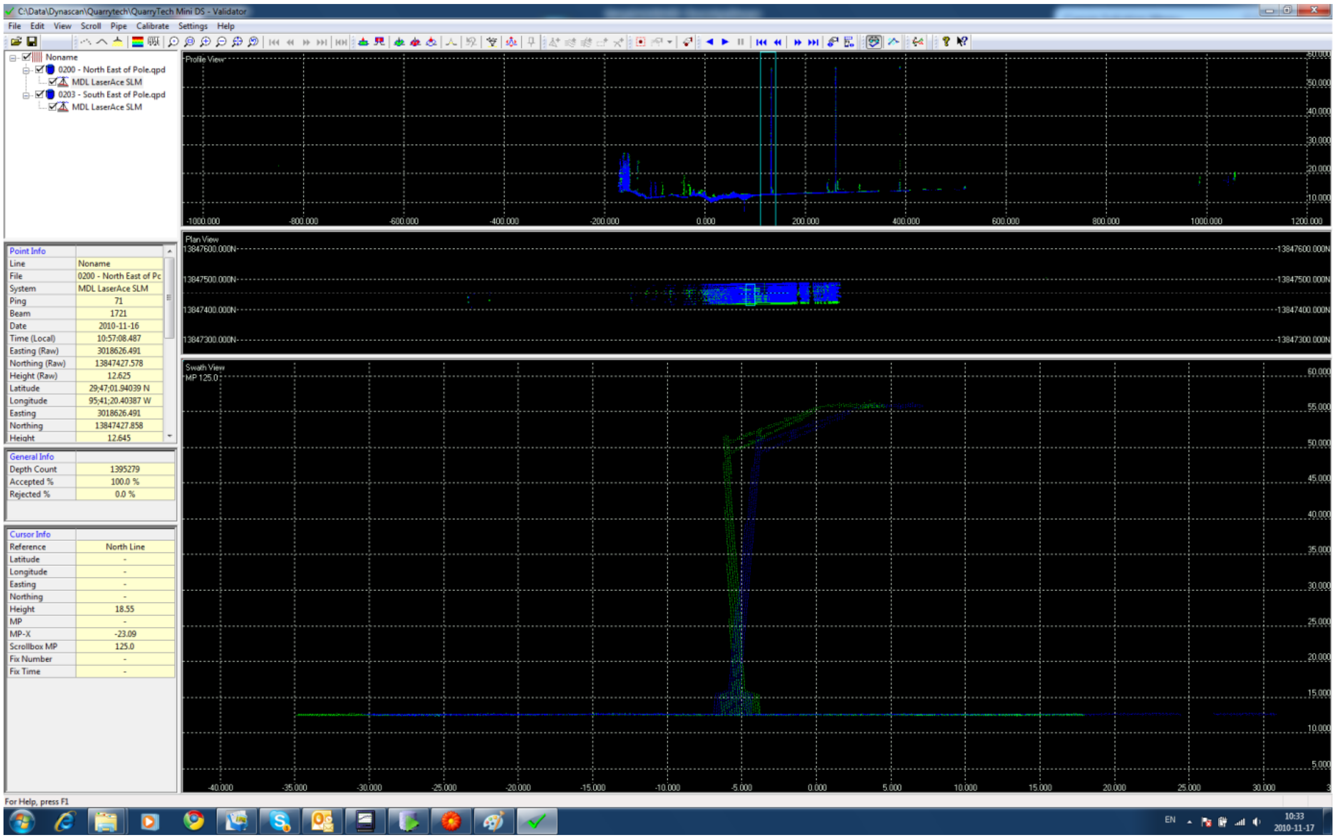




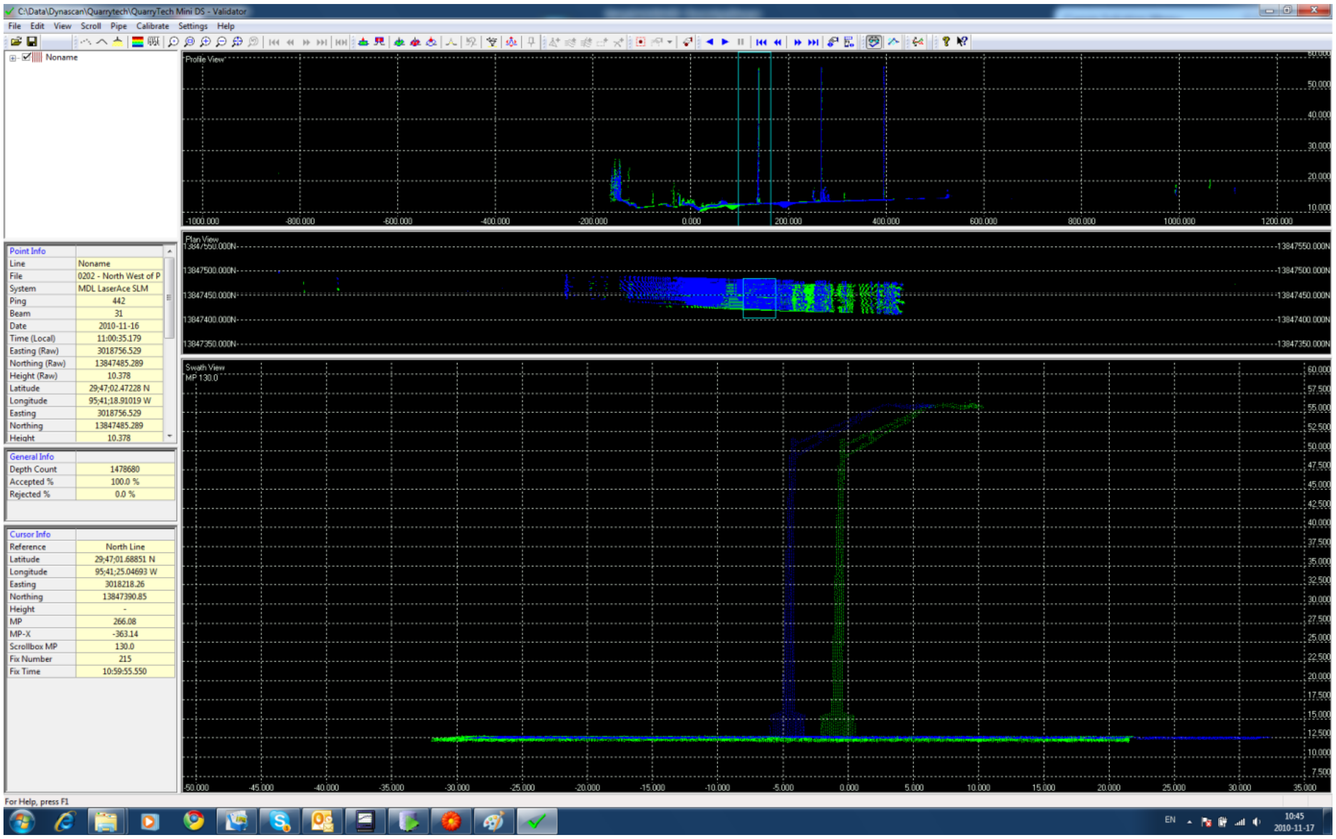
12. Click Close then Transfer and select the template plus all files and use Relative (Add) from the dropdown menu.



13. Click on the Transfer button to transfer the data to the setup menu. The transfer button will appear when you select the files.
14. Replay all four files before starting on the pitch calibration (see Section 13.2.4 Replay function).
15. When calibrating pitch choose two files on the same side of the pole but in different directions and then select the validator icon.
16. Follow steps 7 and 8 above but this time create a user defined line at 90 to the roll line.
17. Make the slice box fit the poles and you should see two images in the swathe view, at an angle to one another.



18. You will see that the two images are not parallel and so you must click the View=Validate icon and then the Calibrate Alignment icon to bring up the values box.
19. Select Pitch and manually enter values in the settings box until the images are parallel. Use small values to start (e.g. 1) and after entering the value click on roll and then back to pitch for the change to take effect.
20. When you are happy with the value click transfer and then select the template plus all files and use Relative (Add) from the dropdown menu.
21. Repeat steps 13 and 14 before starting on the Heading calibration.
22. When calibrating Heading choose two files on either side of the pole but in the same direction and then select the validator icon.
23. Follow steps 7 and 8 above and create a user defined line the same as for Pitch (at 90 to the roll line)
24. Make the slice box fit the poles and you should see two images in the swathe view.

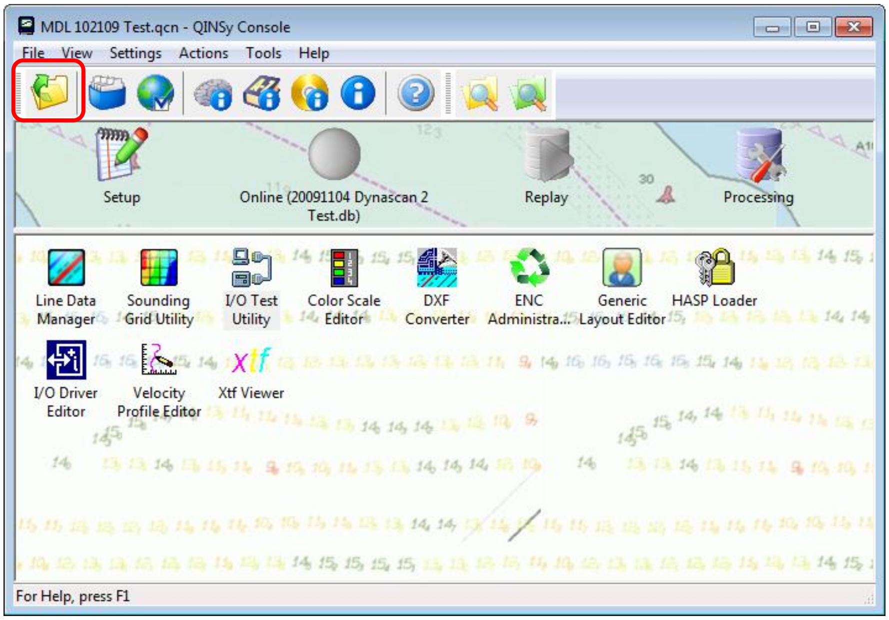


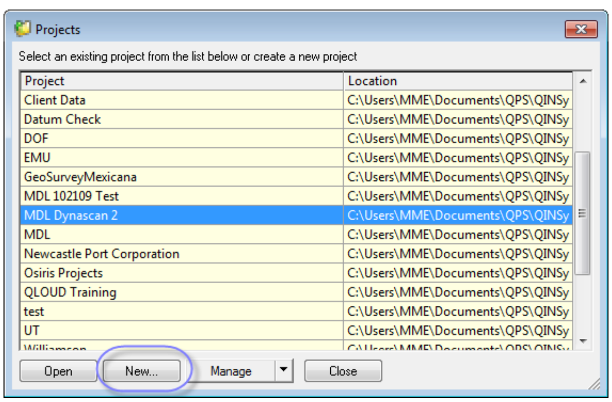
25. You will see that the two images are parallel but not aligned and so you must click the View=Validate icon and then the Calibrate Alignment icon to bring up the values box.
26. Select Heading and manually enter values in the settings box until the images are parallel. Use small values to start (e.g. 1) and after entering the value click on roll and then back to Heading for the change to take effect.
27. Repeat steps 19 and 20 and then open QLOUD.
28. Use QLOUD to visually QC the calibration data by viewing all four files by different colour and checking the alignment of the data.
29. The Calibration is now complete.

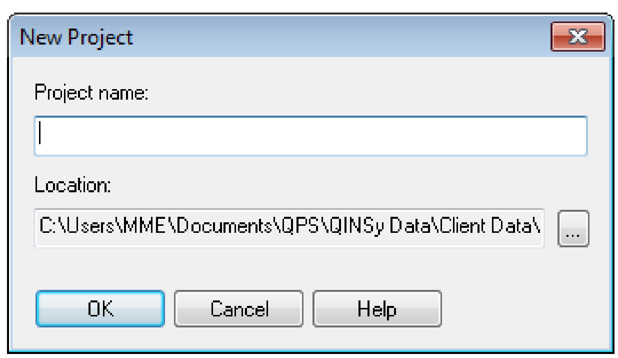
13.2 QINSy General Guide

The following screenshots show the basic functions when operating QINSy software. Screenshots are shown to outline the steps needed to enable laser control, create sounding grids and export the laser data.

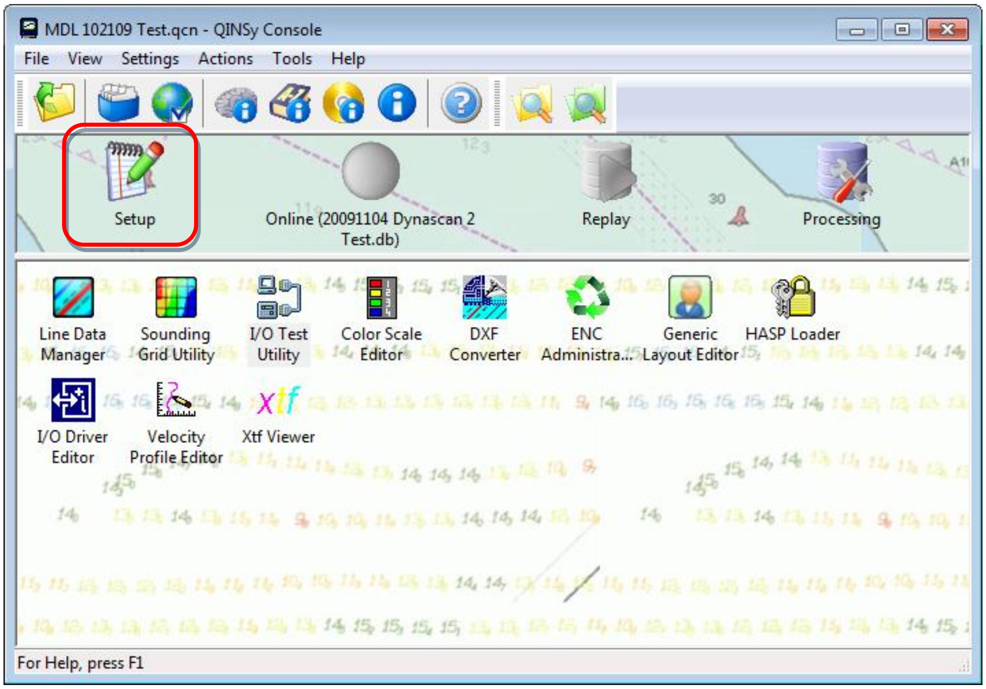
13.2.1 Manage Projects

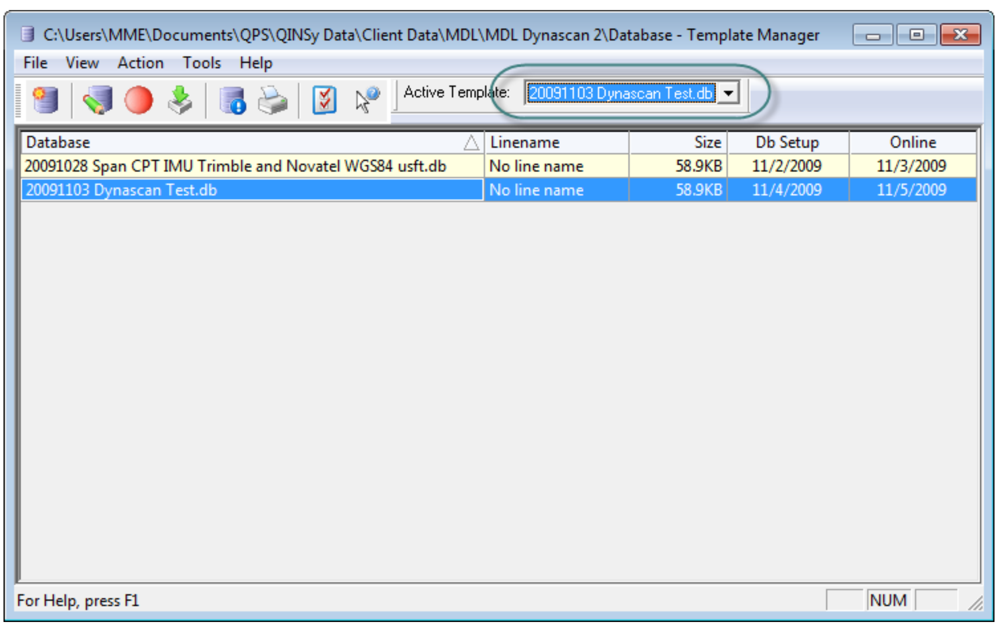


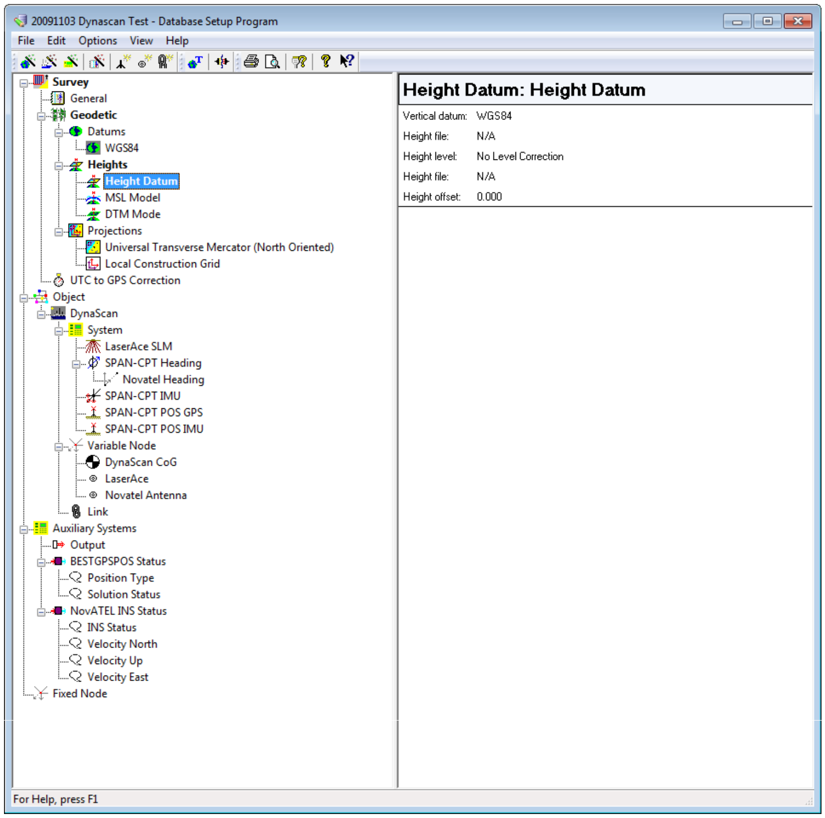


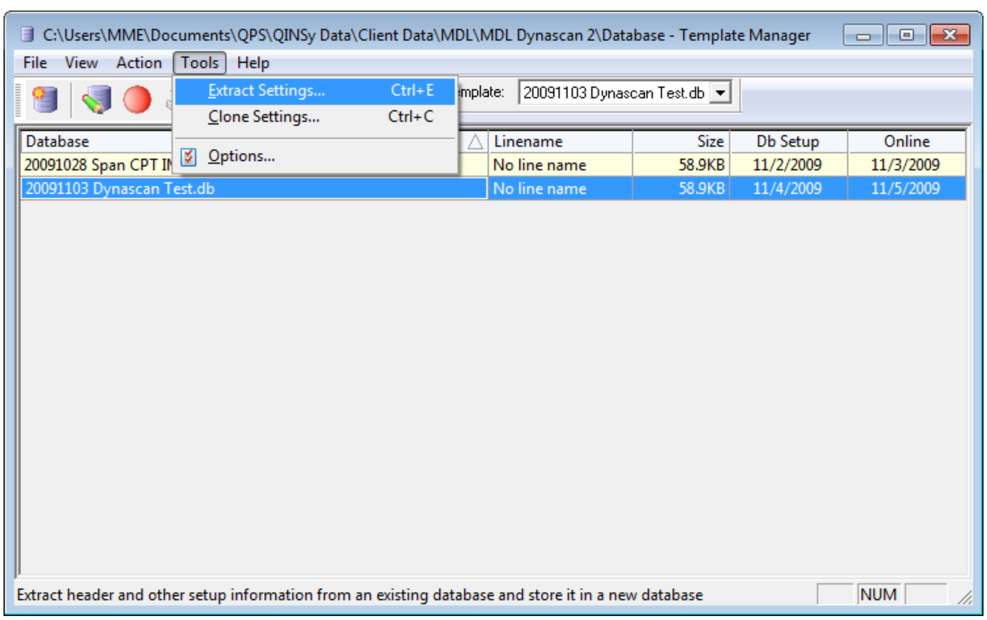


13.2.2 Database Setup

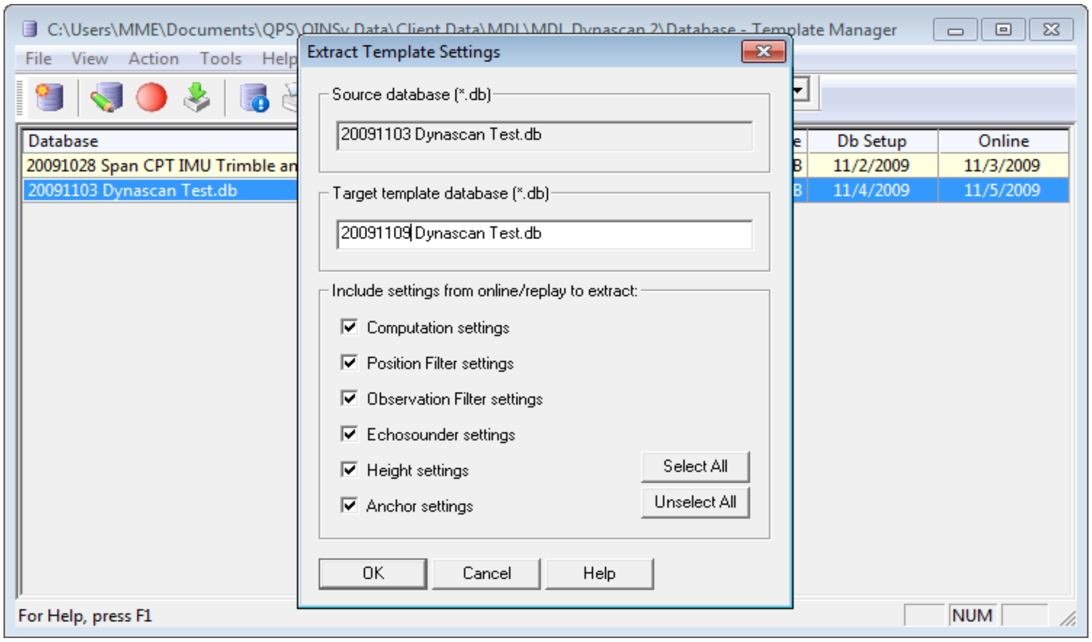




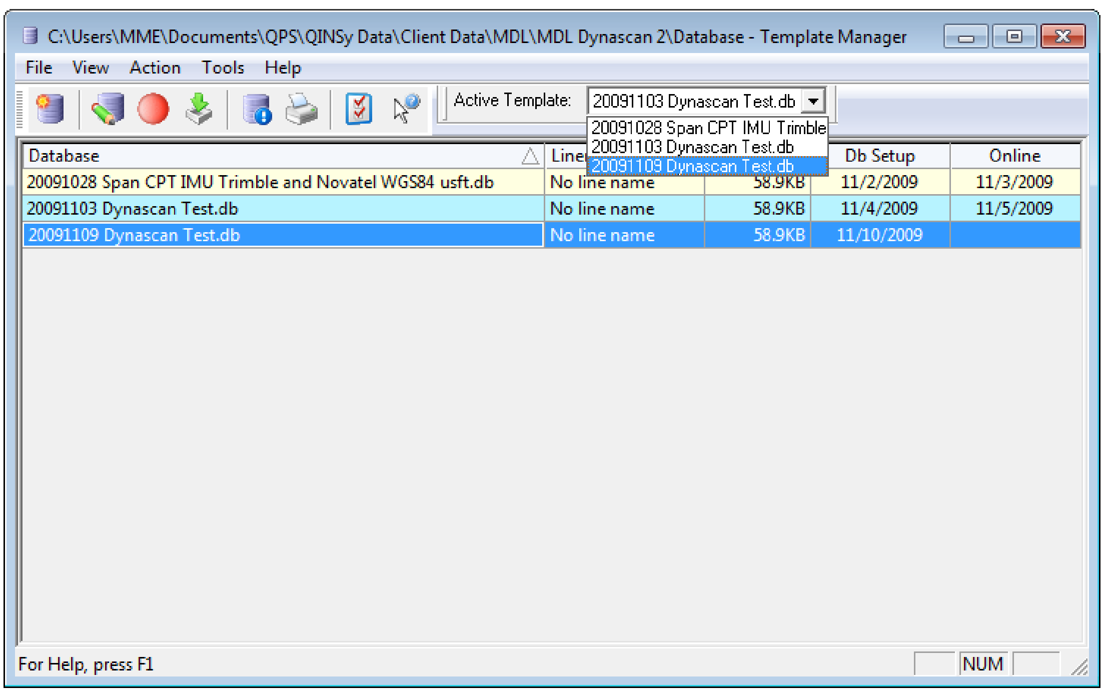




Copy Database Settings

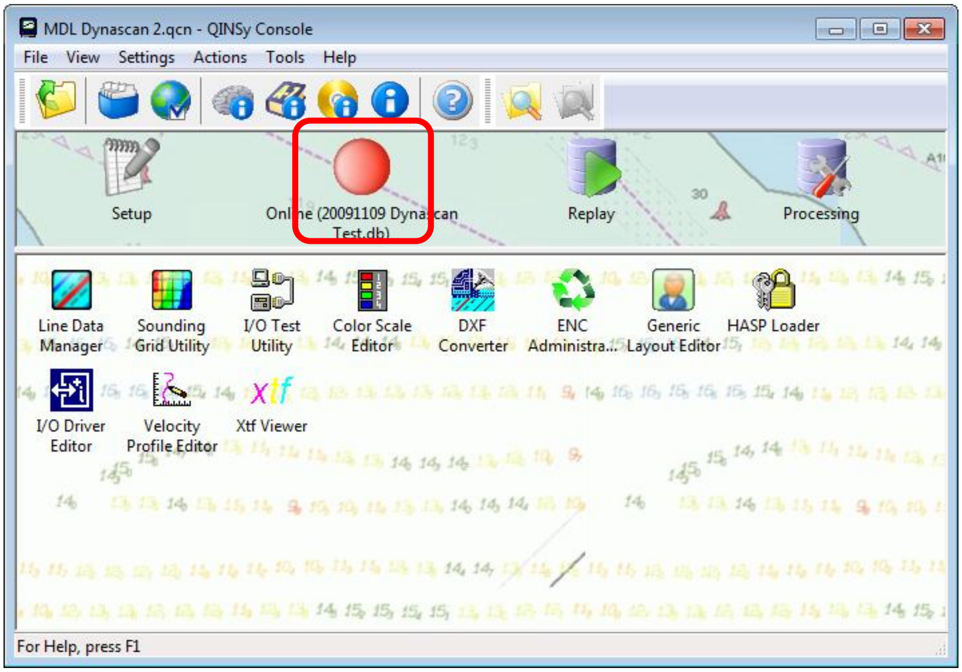


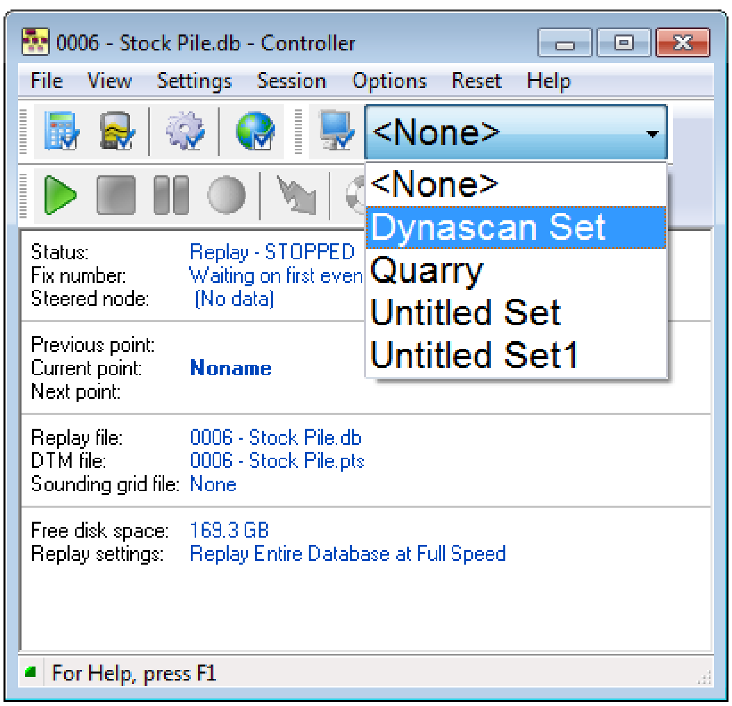
New Database



Set Active Template

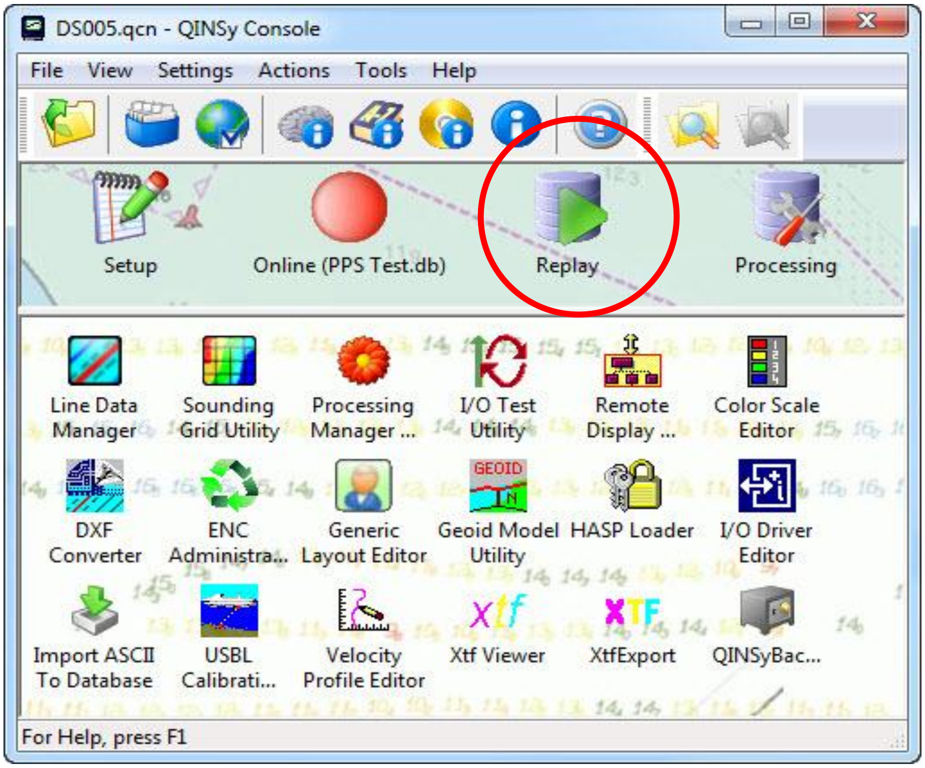
13.2.3 Online Settings



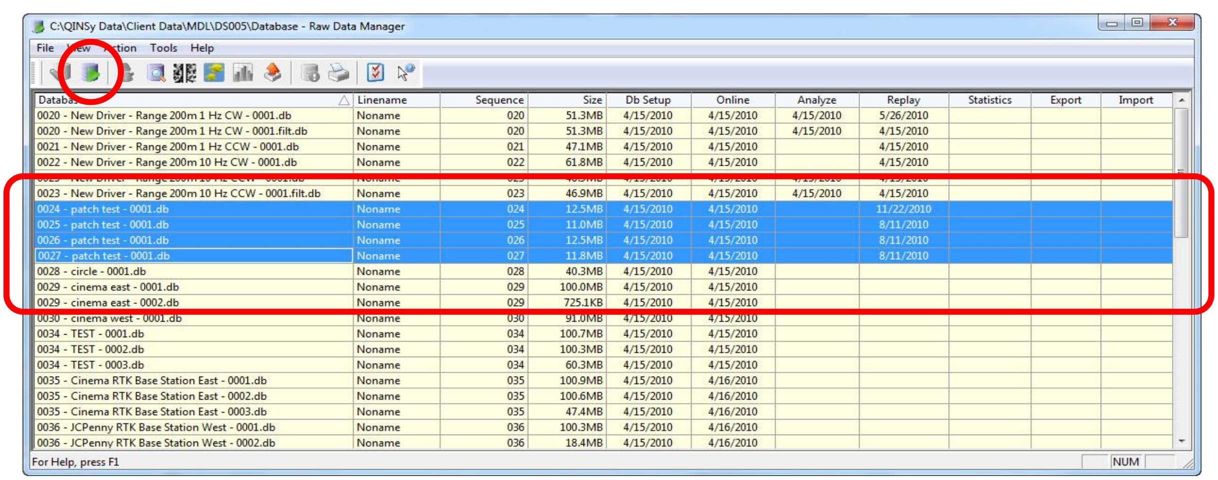


13.2.4 Replay function

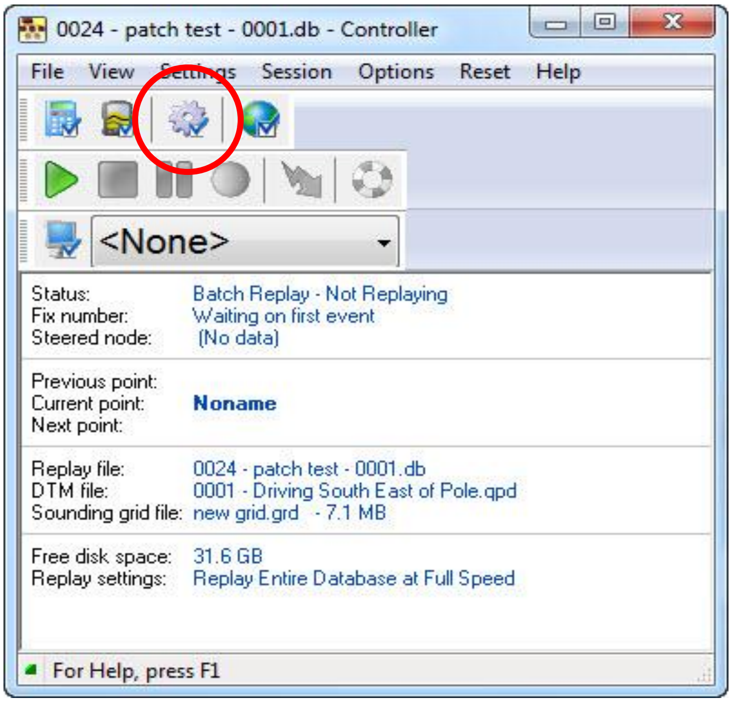
The replay function can be used to replay data, after changes have been made, without losing the original 'raw' data. From the QINSy console click on the replay button.



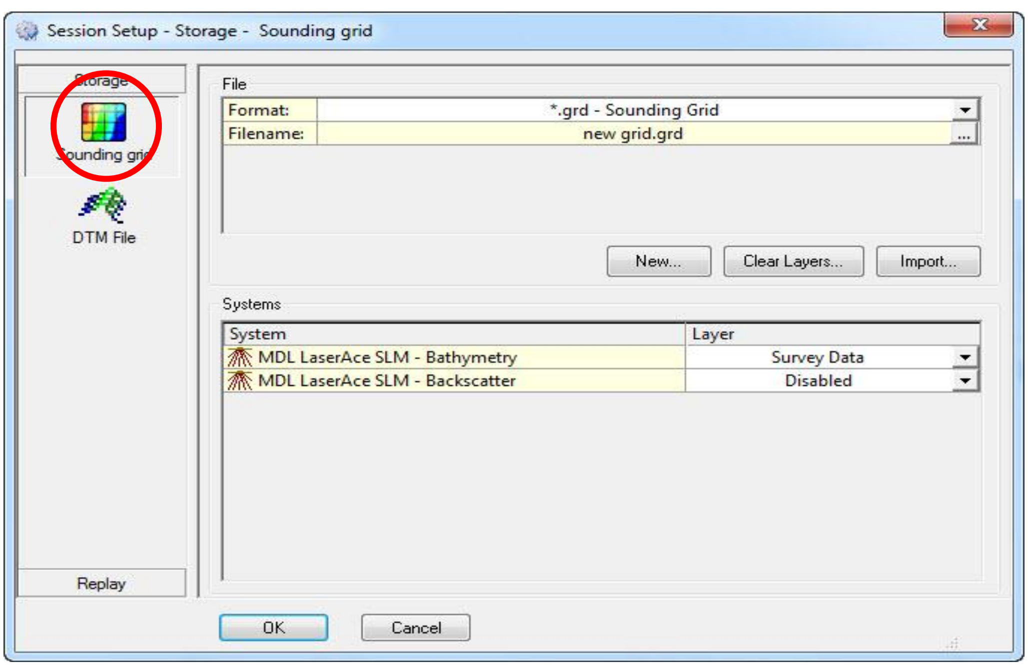
You must then select the file(s) you wish to replay by highlighting them and then click on the replay icon (see below).



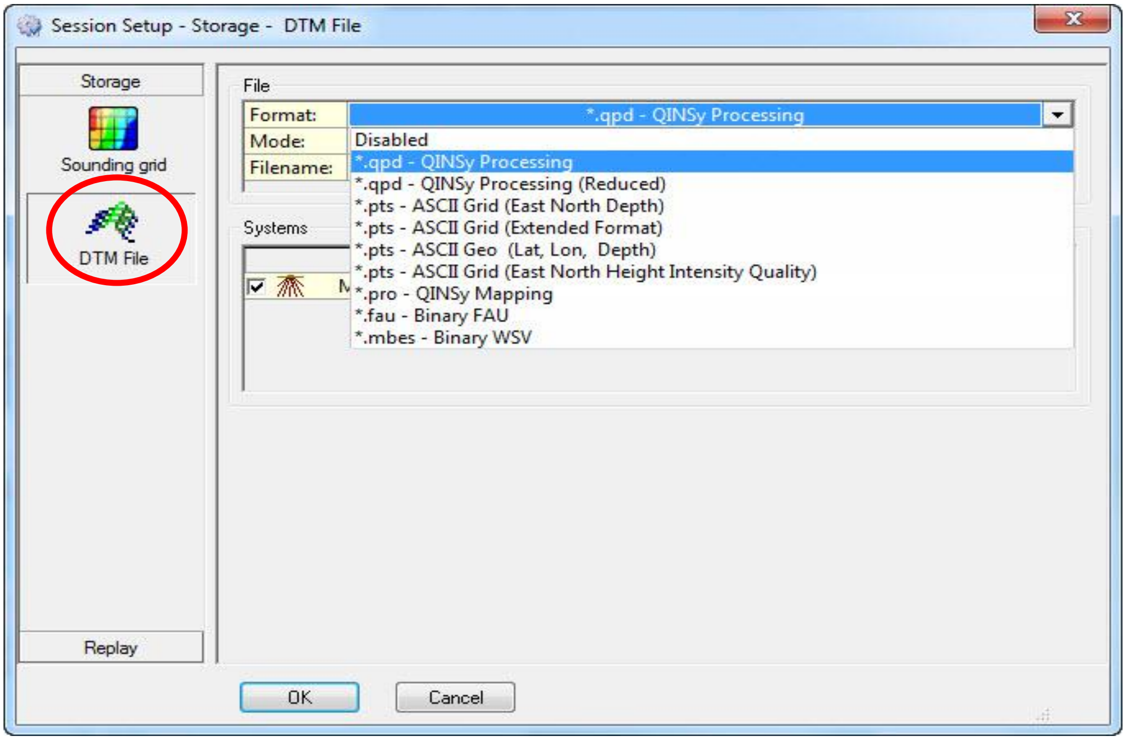
You will then see a screen similar to the one below. Click on the session set-up icon to get to the next screen.



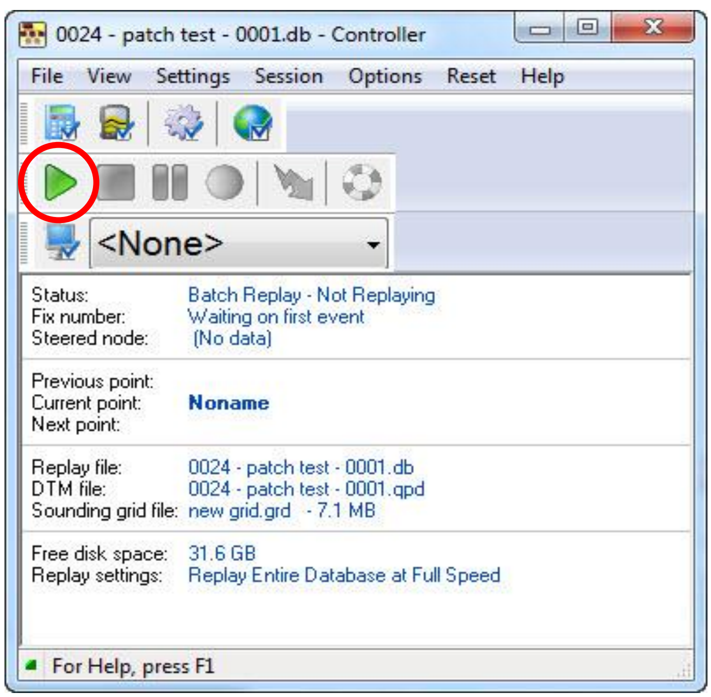
Select sounding grid and modify any settings, as required and then click on the DTM File button.



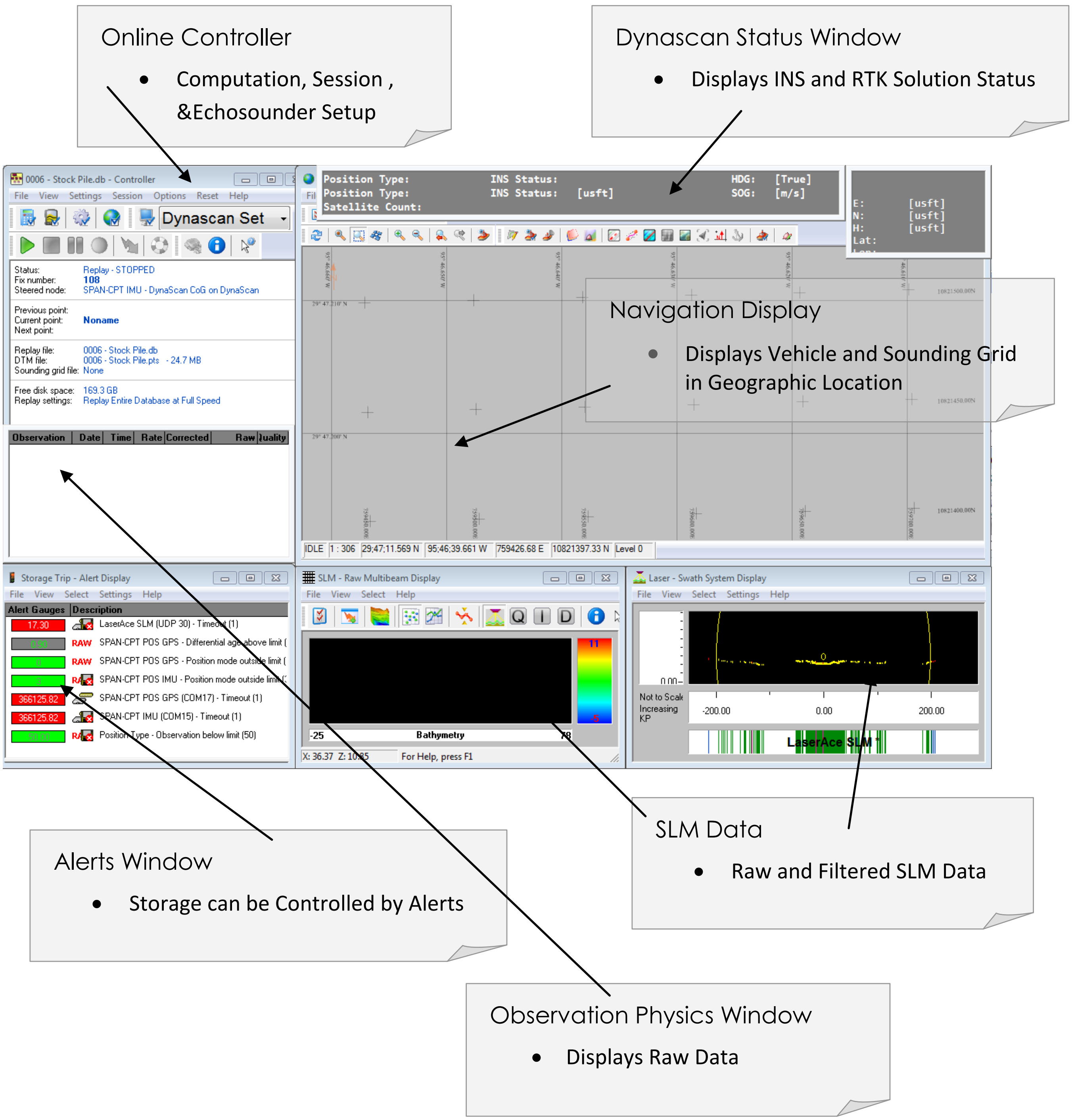
Select the options required for replaying the data and then click OK.



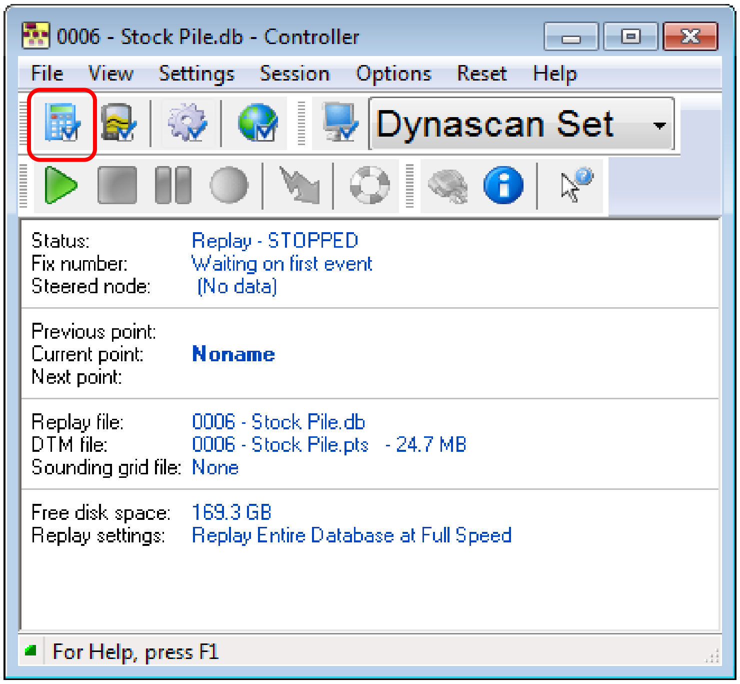
Click on the play button, which will enable the files to be replayed.

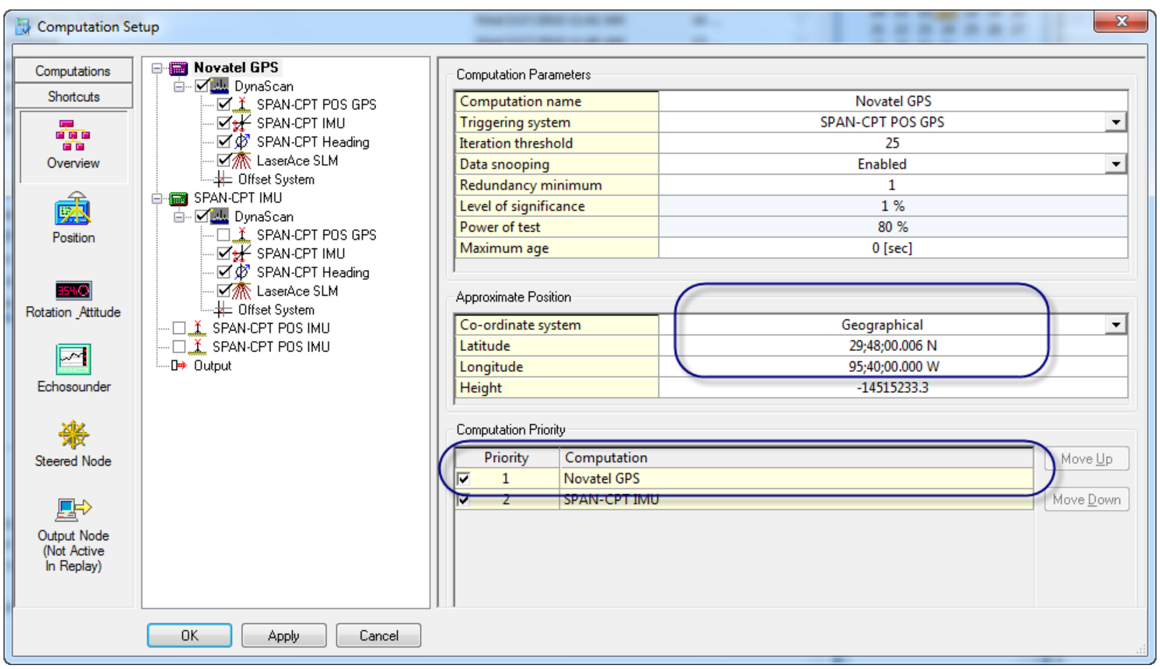


13.2.5 Dynascan Displays



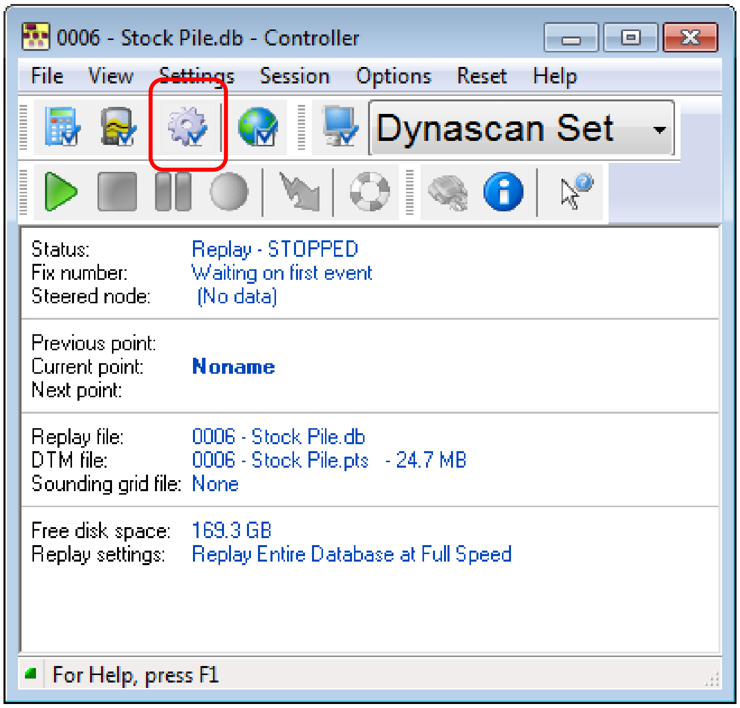
13.2.6 Computation Setup

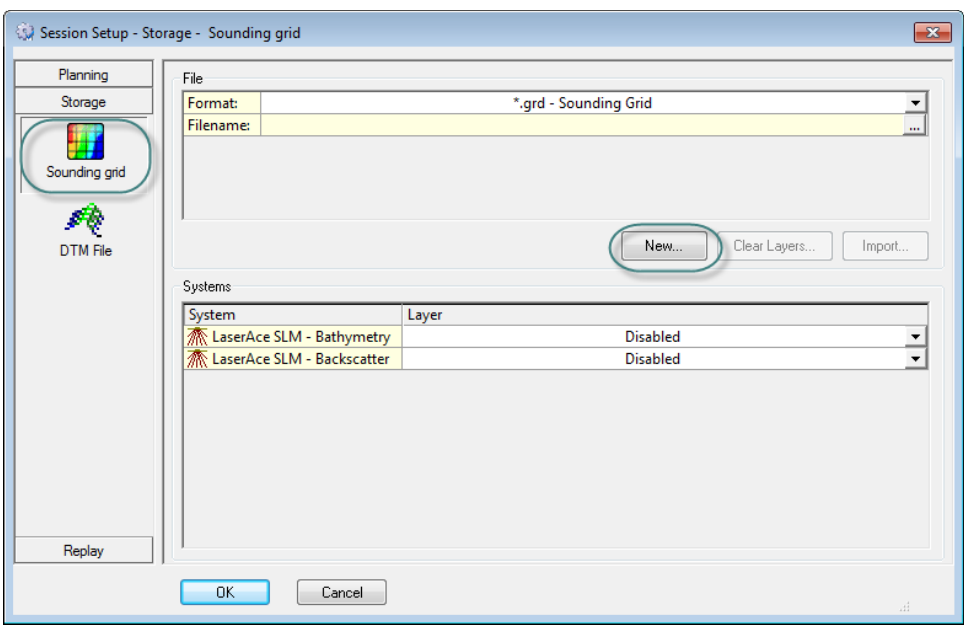




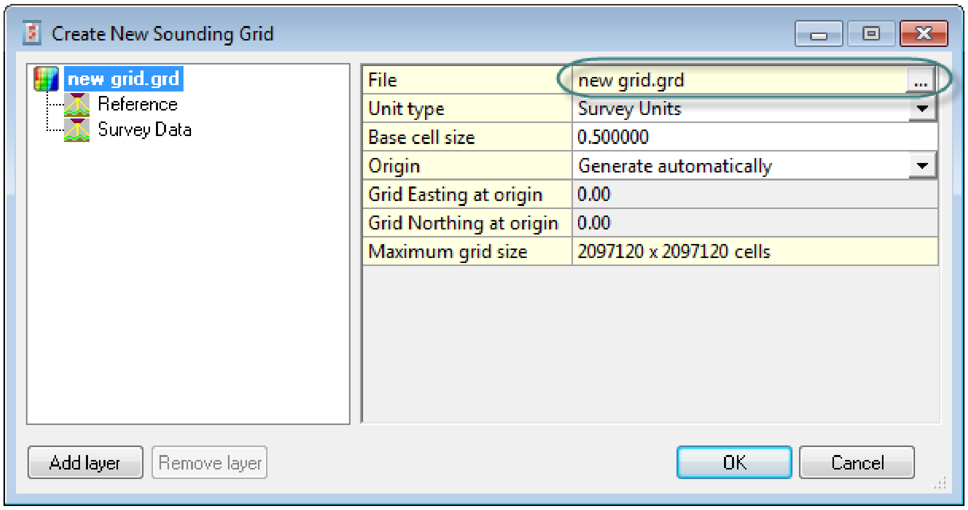
N.B. Enter Approximate Location (to ensure footprint on Nav screen)

13.2.7 Session Setup – Sounding grid

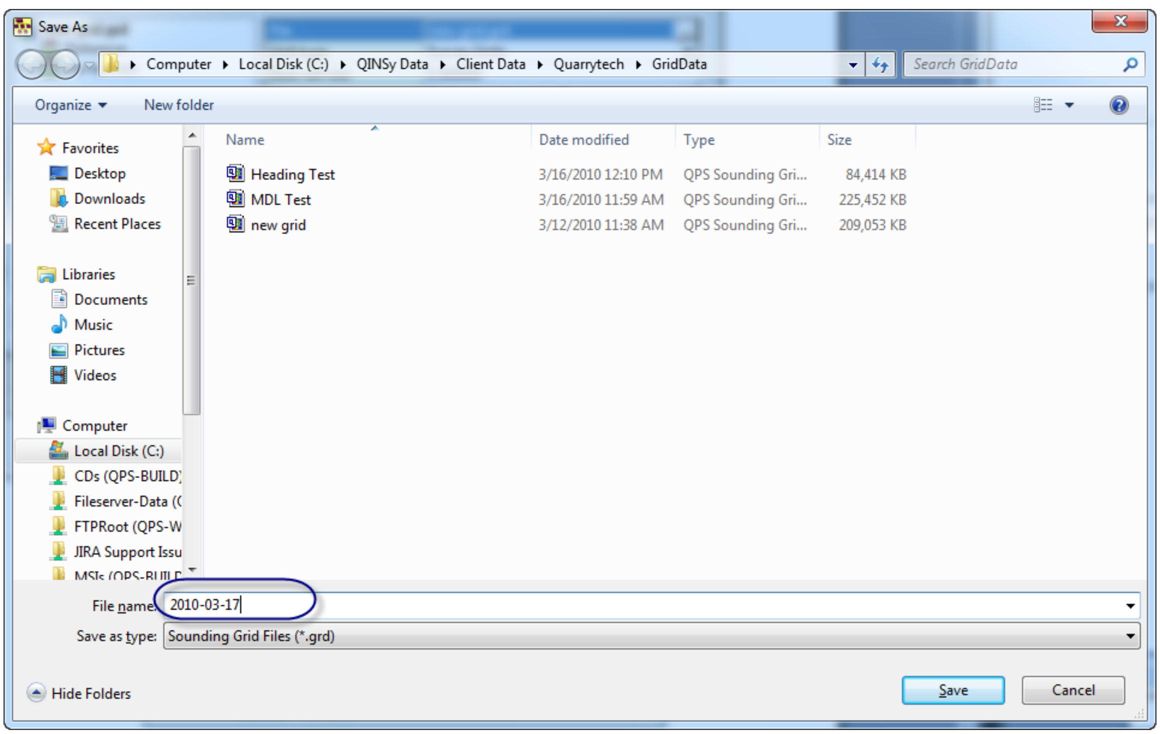


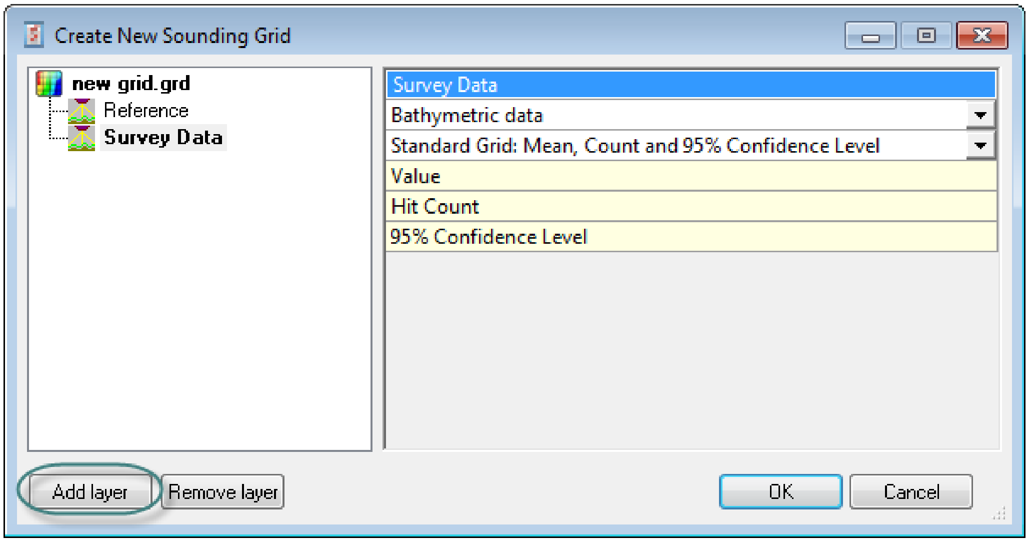


Sounding grid Storage

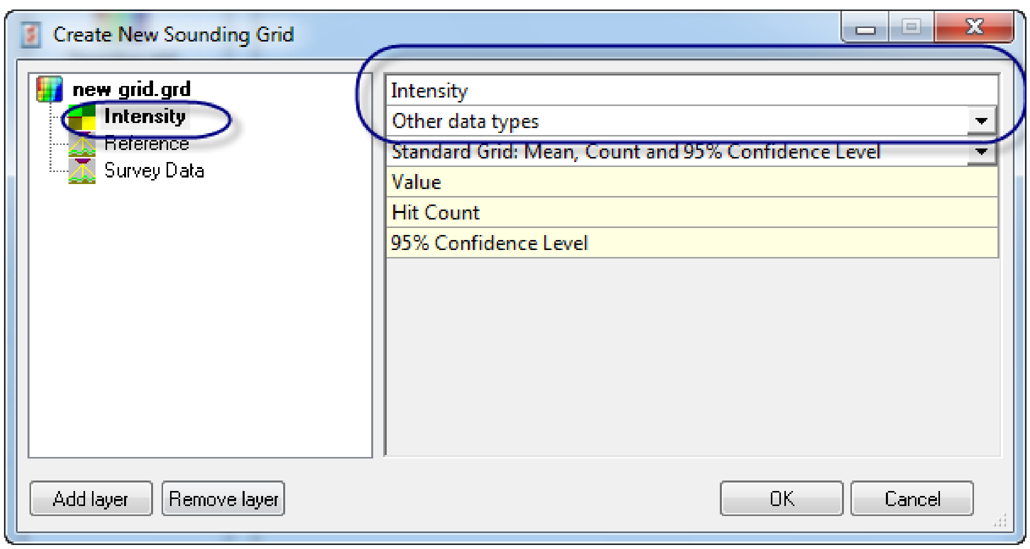


Create New Sounding Grid

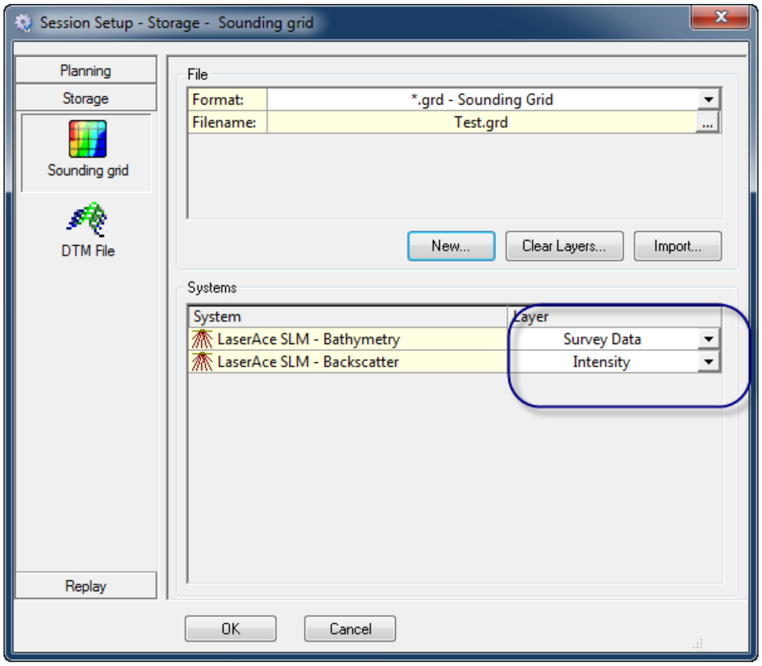




Add a New Layer to the Sounding Grid

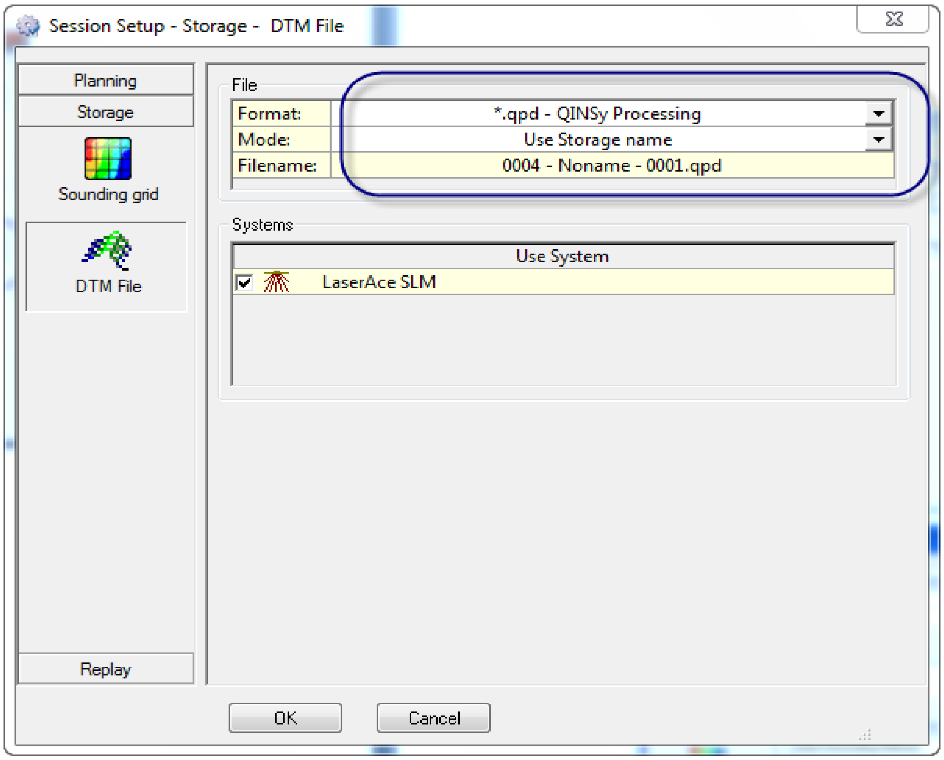


Add Intensity to Sounding grid

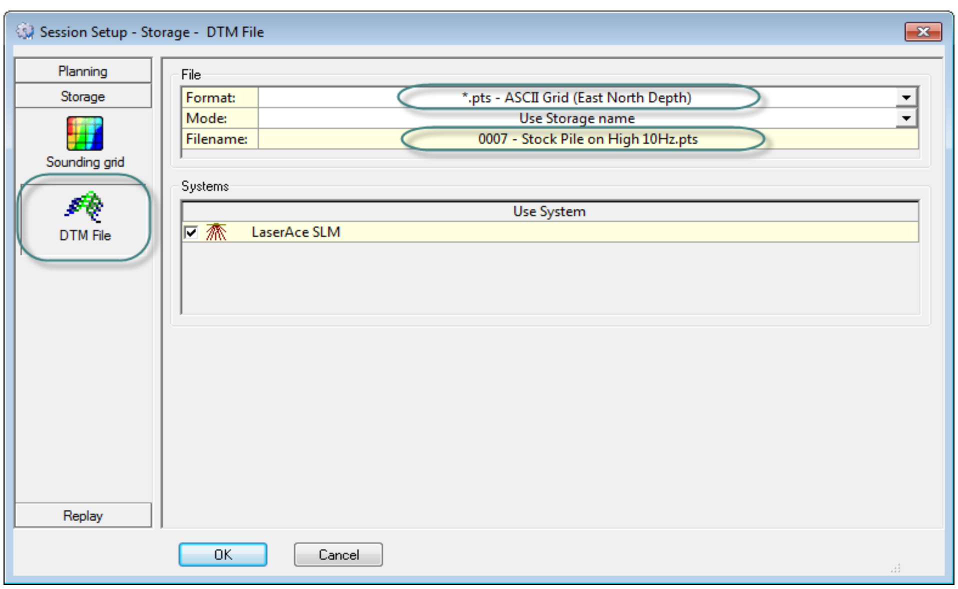


Select the Correct Layer

13.2.8 Session Setup – DTM Storage

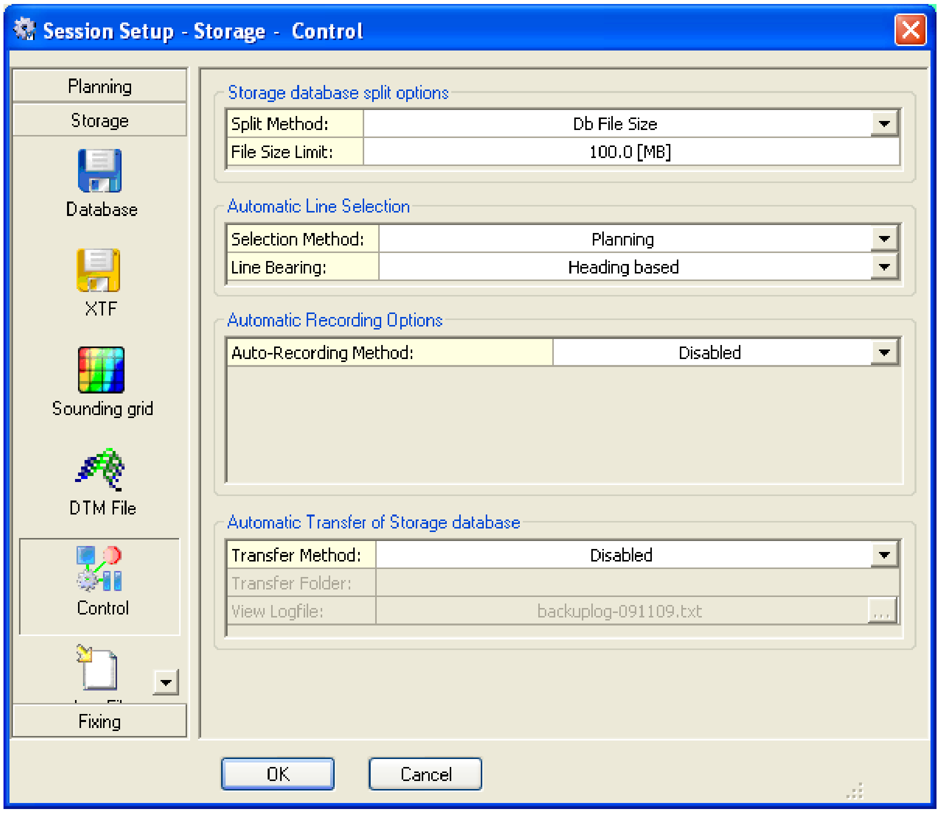


Select Point Storage – QINSy Processing File

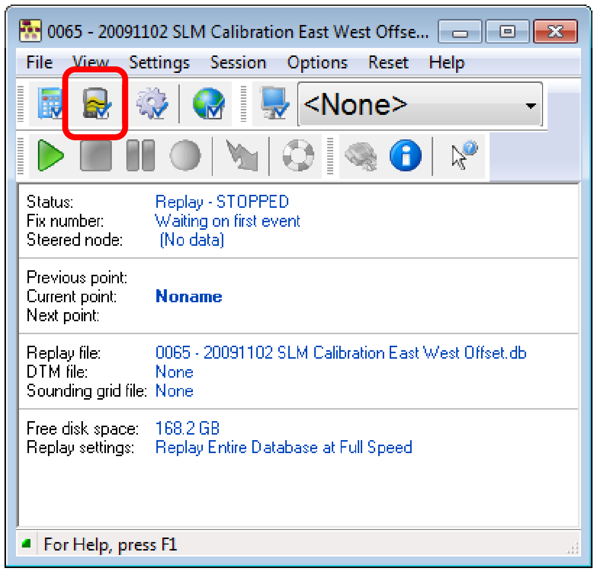


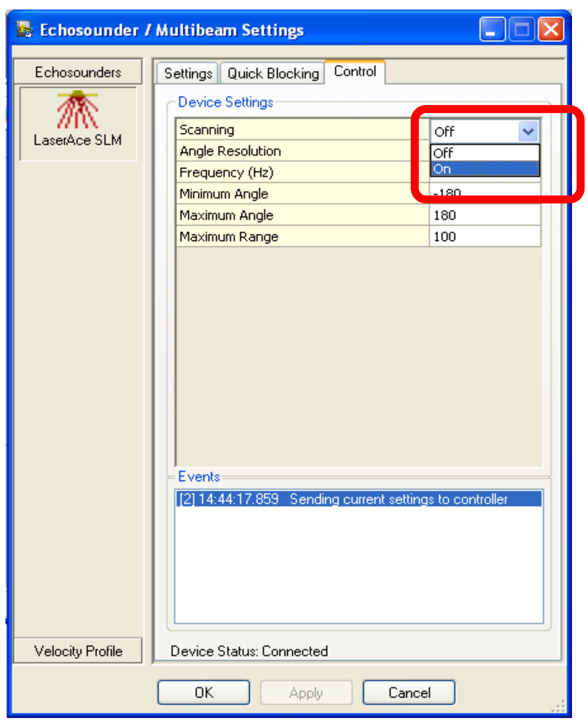
Select Point Storage – ASCII Easting, Northing & Height – Only Use for Direct Export

13.2.9 Session Setup - Control

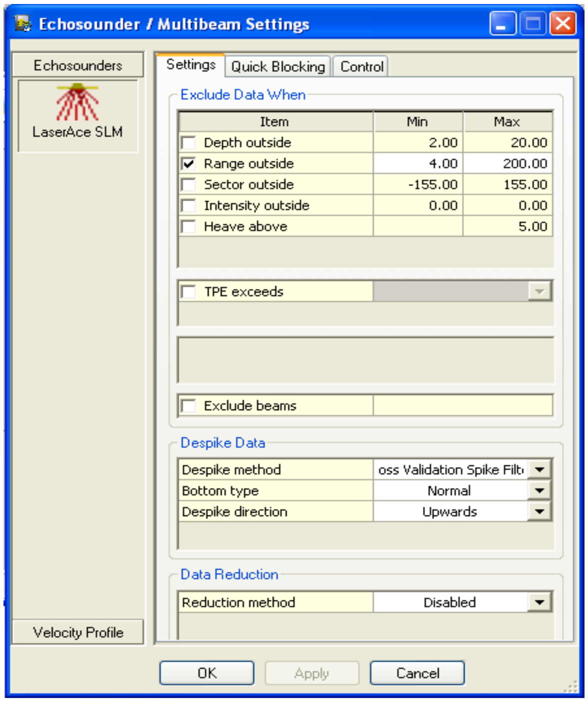


13.2.10 SLM Settings

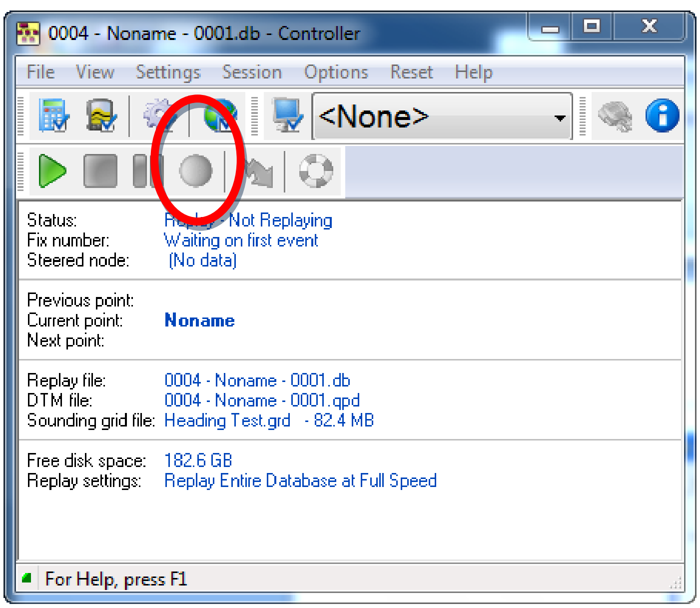


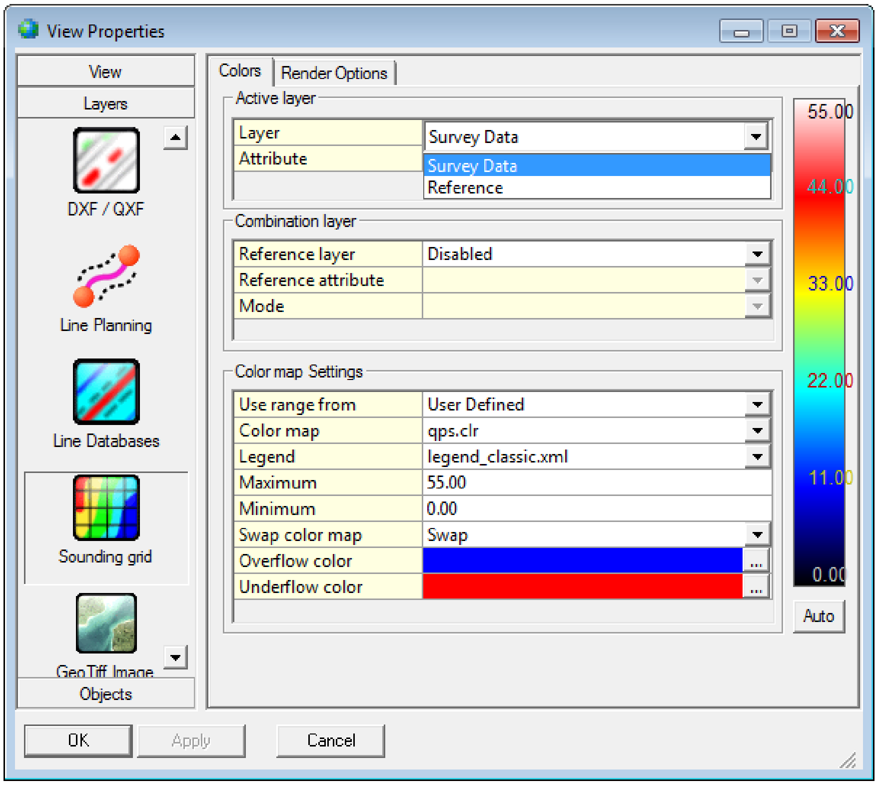


Laser control ON / OFF Frequency Selection



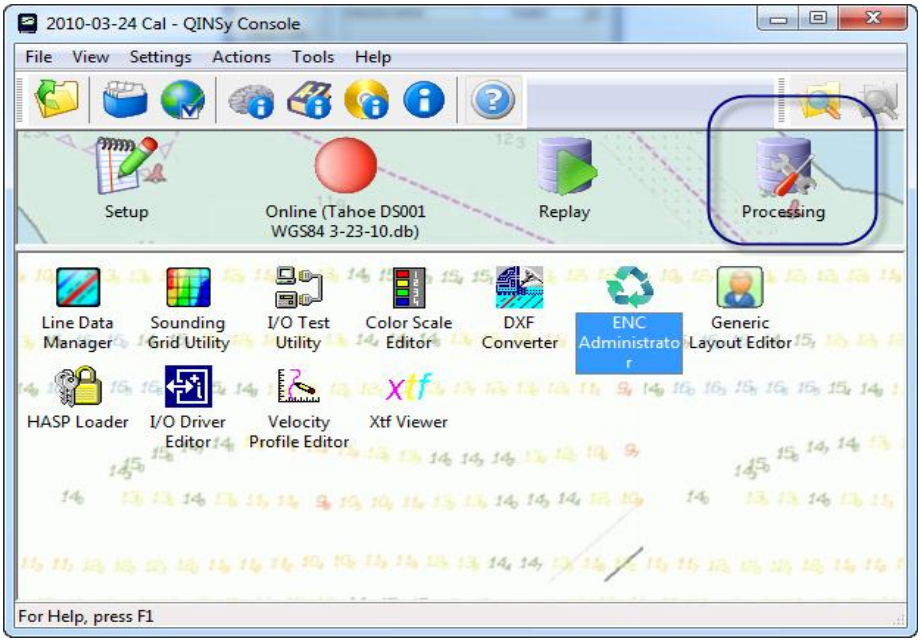
Laser Filter Settings

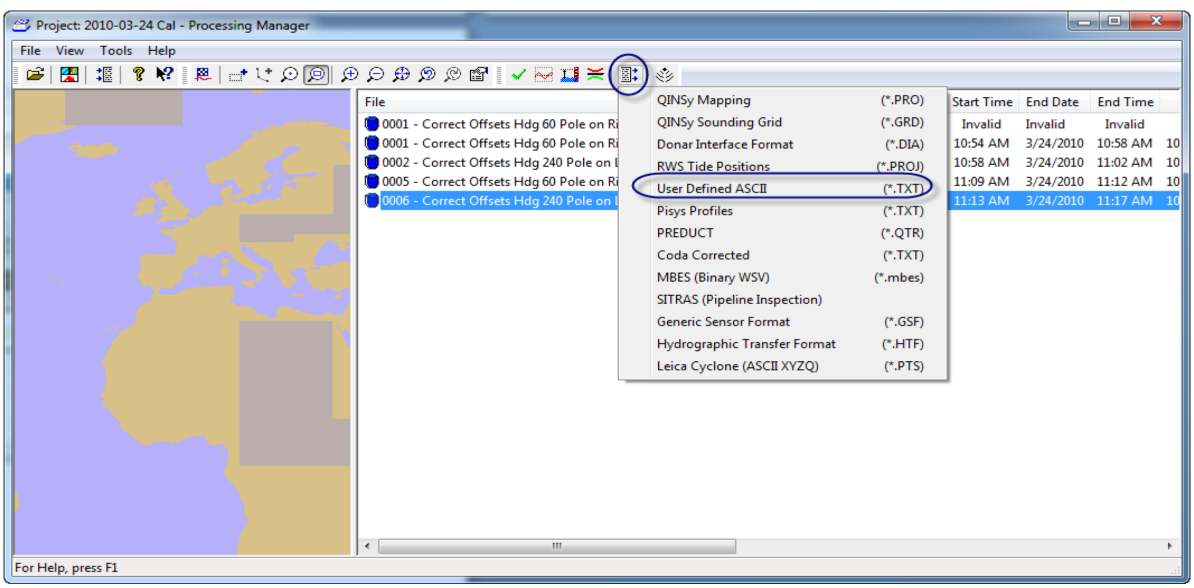


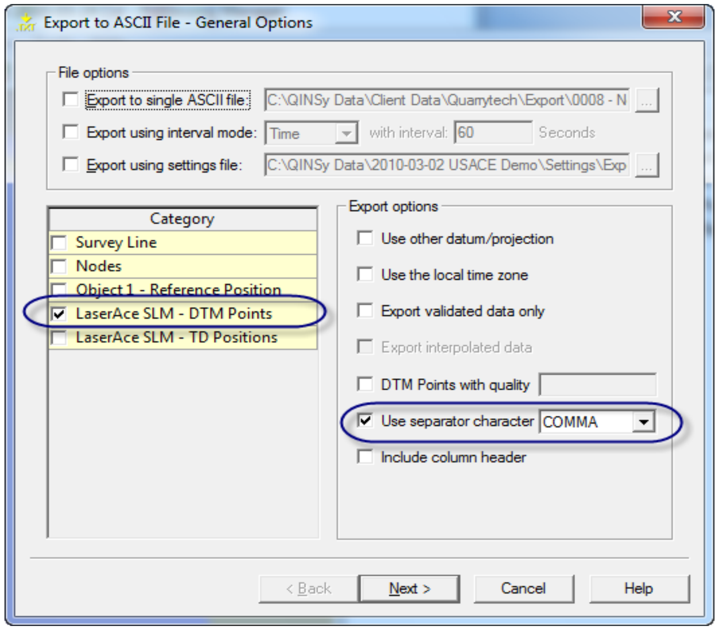


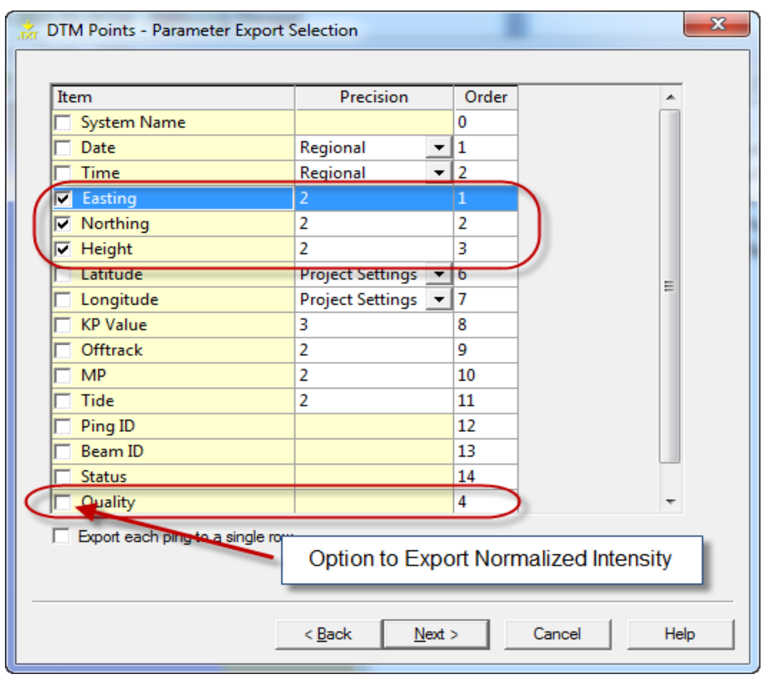
Sounding Grid Properties for Navigation Display – Click Auto for Best Results

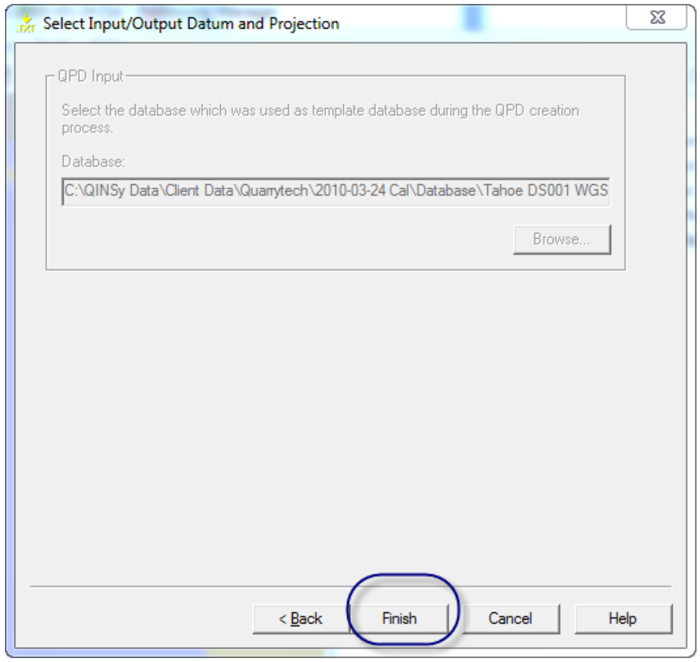
13.2.11 Data Export settings






Export to ASCII File - General Options
File options
Export to single ASCII file:
C:\QINSy Data\Client Data\Quarrytech\Export\0008 - N
Export using interval mode:
Time
with interval:
60
Seconds
Export using settings file:
C:\QINSy Data\2010-03-02 USACE Demo\Settings\Exp
Category
Survey Line
Nodes
Object 1 - Reference Position
LaserAce SLM - DTM Points
LaserAce SLM - TD Positions
Export options
Use other datum/projection
Use the local time zone
Export validated data only
Export interpolated data
DTM Points with quality
Use separator character
COMMA
Include column header
< Back
Next >
Cancel
Help


DTM Points - Parameter Export Selection
Item
Precision
Order
System Name
0
Date
Regional
1
Time
Regional
2
Easting
2
1
Northing
2
2
Height
2
3
Latitude
Project Settings
6
Longitude
Project Settings
7
KP Value
3
8
Offtrack
2
9
MP
2
10
Tide
2
11
Ping ID
12
Beam ID
13
Status
14
Quality
4
Option to Export Normalized Intensity
< Back
Next >
Cancel
Help


Select Input/Output Datum and Projection
QPD Input
Select the database which was used as template database during the QPD creation process.
Database:
C:\QINSy Data\Client Data\Quarrytech\2010-03-24 Cal\Database\Tahoe DS001 WGS
Browse...
< Back
Finish
Cancel
Help

14 Maintenance and Care

14.1 General

Dismantling or attempting the repair of a Dynascan system, and associated equipment, by unauthorised personnel can be hazardous and costly. Maintenance carried out by the operator, therefore, should be restricted to the cleaning and inspection of external surfaces, lenses, operating controls etc.

14.2 Preventative Maintenance

The preventative maintenance to be carried out by the operator should include:

14.2.1 In Use

- Avoid directing the laser towards the sun or other high power, infrared light source
- Avoid mechanical shock
- Do not use paint solvents to clean the instrument; use mild detergent applied using a cloth
- Clean and dry the equipment before, during and after use

14.2.2 In storage

- Dry the system thoroughly before storing
- Correctly pack the equipment in the transit / storage case provided.
- Ensure the transit /storage case is kept dry inside
- Store within the environmental temperature limits of -25°C to +70°C

14.2.3 In transportation

- Correctly pack the equipment in the supplied transit case for transportation
- Do not allow the equipment to slide around inside transport vehicles or containers

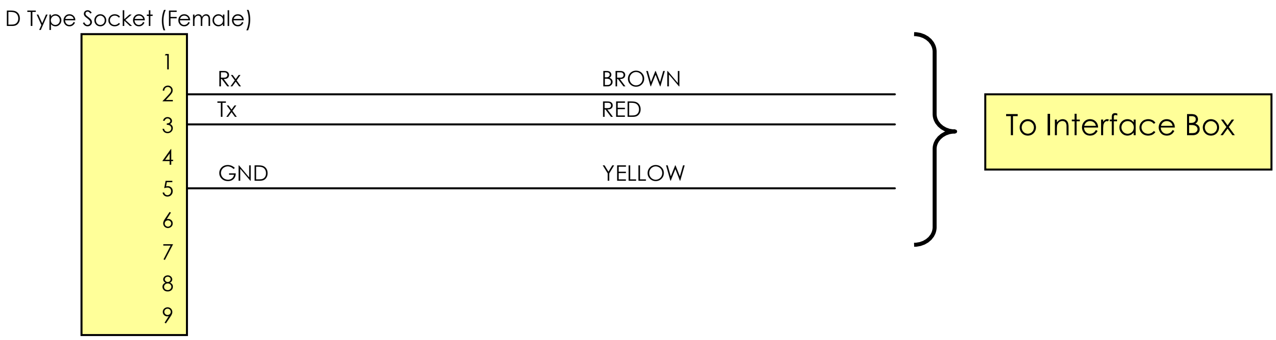
14.2.4 General

- Carry out regular functional testing of the system
- Detect and report damage, malfunctions and poor performance
- Arrange a yearly calibration: contact MDL or your local service and support centre for details

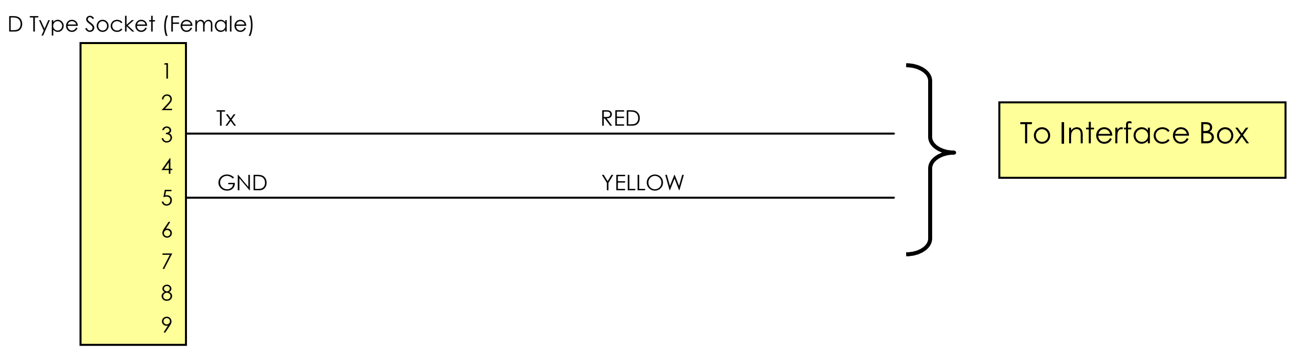
15 Cable connector information

Information on the system external cable connectors for RTK / VRS and the power functions are available below.

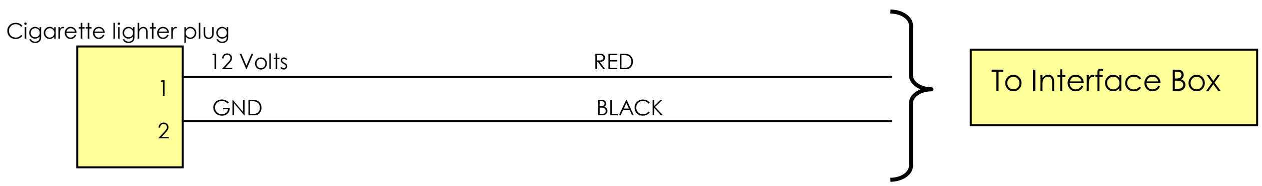
15.1 RTK Cable (8303A)



15.2 VRS Cable (8304A)



15.3 Power Cable (8302A)



16 Frequently Asked Questions

What if my frequency band for the RTK radio is different than the pod radio?

You can request the correct frequency band radio when ordering a new Dynascan system to be compatible with your existing equipment. Alternatively you can use your own base RTK radio and also your own mobile radio. You must then use the VRS cable connected to the IA and attach the 9 pin D type end of the cable to the output of your radio. Your radio output (serial interface settings) must be set to provide a CMR+ message at 115200 baud 8 N 1, as this will feed directly into the GPS receiver inside the pod, which is also set to these parameters.

I am having problems getting the base RTK link data through to the pod and QINSy software

Check the following:

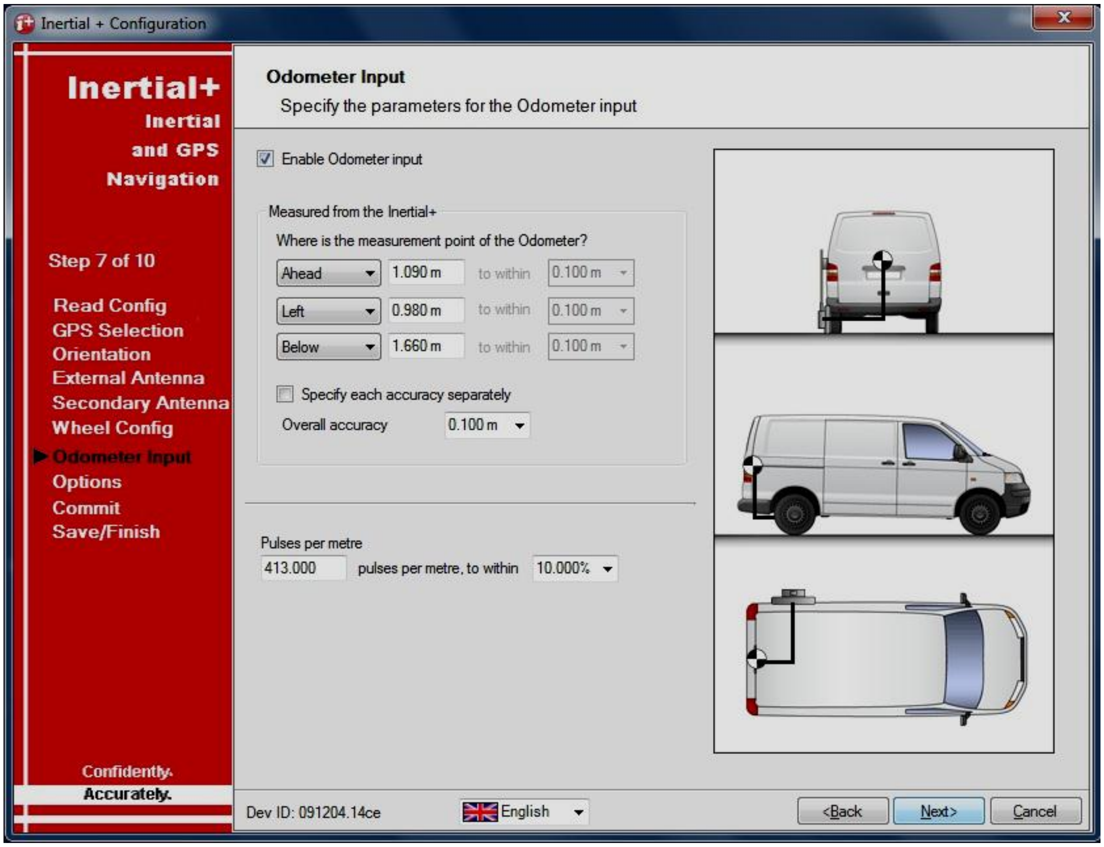
- The base radio is compatible with the frequency band of the pod radio (e.g. 430-470MHz)
- The base radio and pod radio are set to the same bandwidth and same radio link baud rate (e.g. 25KHz and 9600 baud)
- Check the RTK base station GPS receiver output is set to the same baud rate as the serial interface baud rate in the base station RTK radio
- Check the pod radio serial interface baud rate is set to the same baud rate as the pod GPS receiver (MDL pod is factory set to 38400)
- Check the other radio parameters are the same for both the base and mobile radios. Print out a copy for each radio and compare the information
- If using a GNSS receiver with internal radio you must use the GNSS software to program the radio and the RTK cable is not required

Why don't I need to use the QPS 1 PPS interface box to provide a 1 PPS input to the laptop?

This box is no longer required as we now feed the 1 PPS from the GPS receiver directly into the laser to produce time tagged data on a single Ethernet cable from the pod. This simplifies the cable requirements from the pod and also at the computer. The latest version of QINSy is now compatible with this revised setup used in Dynascan.

17 Appendix 1 Odometer Option

When using an Odometer the INS set up page should be selected (see below) and the cable connected between the pod and odometer.



17.1 Pulses per metre

The pulses per metre information can be worked out as below, if you know the pulses per revolution. The Pegasem Odometer outputs 1024 pulses per revolution and the Corrsys-Datron outputs 1000 pulses per revolution.

17.1.1 Example - Pegasem Odometer

Pulses/revolution = 1024

Wheel diameter = 79cm

Therefore the wheel circumference = 79 x π which is 2.48 metres for each revolution

Therefore the pulses/metre = 1024/2.48 which is 413

17.1.2 Example - Corrsys-Datron Odometer

Pulses/revolution = 1000

Wheel diameter = 79cm

Therefore the wheel circumference = 79 x π which is 2.48 metres for each revolution

Therefore the pulses/metre = 1000/2.48 which is 403

N.B. Check the wheel diameter before entering this information

18 Appendix 2 Camera Option

18.1 Nikon D90

If you intend to use the same vehicle repeatedly for Survey work, with Dynascan and cameras, it is best to manufacture a bracket, which rigidly supports the cameras either side of the pod. This will also speed up the process of setting up the cameras as you can design the bracket to mount the cameras in exactly the same position each time they are fitted.

Suction caps are provided which can be used to mount the cameras but the surface must be clean and flat for these devices to work properly.

N.B. If using suction caps use a lanyard, or the camera strap, to tie the camera to the roof rack as a precaution against the camera falling.

You should try to mount each camera to be perpendicular to the Z and Y axes, of the pod, and once the cameras are mounted they should be connected to the QINSy laptop, by USB cables.

The picture below shows the camera mounted close to the Dynascan pod and perpendicular to the Z and Y axes.

The picture below shows the USB cable connected between the camera and laptop computer running QINSy. USB extension cables will be required to extend the Nikon supplied cables.

18.2 MDL integrated pod cameras

MDL are undergoing trials of an internal camera system mounted inside the pod, which will be available in Q3 of 2011.

19 Appendix 3 Multibeam Option

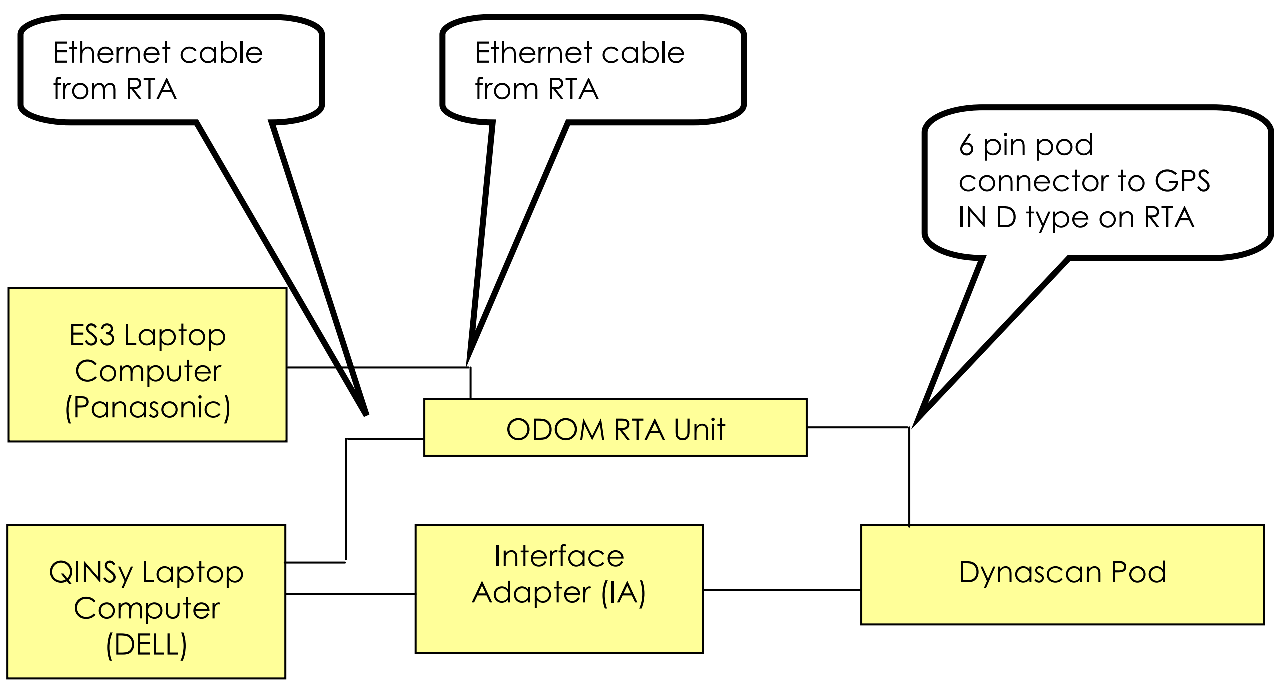
There are many different types of multibeam echo sounder equipment available and it is best to refer to the manufacturer's manual for details of the equipment operation.

Sometimes the multibeam echo sounder requires a connection to the Dynascan system to obtain 1PPS and an NMEA message. Information on this connection is supplied below.

19.1 Teledyne ODOM ES3

The ES3 requires a cable from the Dynascan pod to the RTA unit in order to provide time tagged data to QINSy. This cable connects to the same connector as the Odometer cable, on the pod and to the GPS IN connector on the back of the RTA unit.

When using the ES3 and Dynascan simultaneously you must use the D Link card supplied, which fits in the PCMCIA slot on the laptop. The RTA Ethernet cable connects to this card and the Dynascan cable fits directly to the computer.



19.1.1 ES3 and Velocimeter transducer mounting

The ES3 transducer and velocimeter transducer are fitted to the pole as per the photographs below. Both cables from these sensors connect to the rear of the RTA unit.

END OF DOCUMENT