KONGSBERG

APOS Survey Installation Manual

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Revision:	G
Status:	This document is under configuration control at Kongsberg Maritime.

Document history

Revision	Description of change
A	First Issue
B	Minor updates to procedures. New screen dumps with revised UI.
C	Updated the name from Survey APOS to APOS Survey.
D	Added cabling information.
E	Updated hardware procedure and added details to other procedures
F	Added reference to backup procedure 437333
G	Added a references table Consistent use of *vessel system* instead of *onboard system or main system.* Added information on APOS Survey version versus APOS version on the *vessel HiPAP system.* Added RS422 cable for use with HSC1 vessel APOS computer, and pinout for the RS422 cables. Added information on Time Synch

References

Revision	Doc. no.	Description
1	MP5810 Win10 Backup/Restore	437333
2	Backup and restore for HSC1	476331
3		
4		

Disclaimer

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Table of Contents

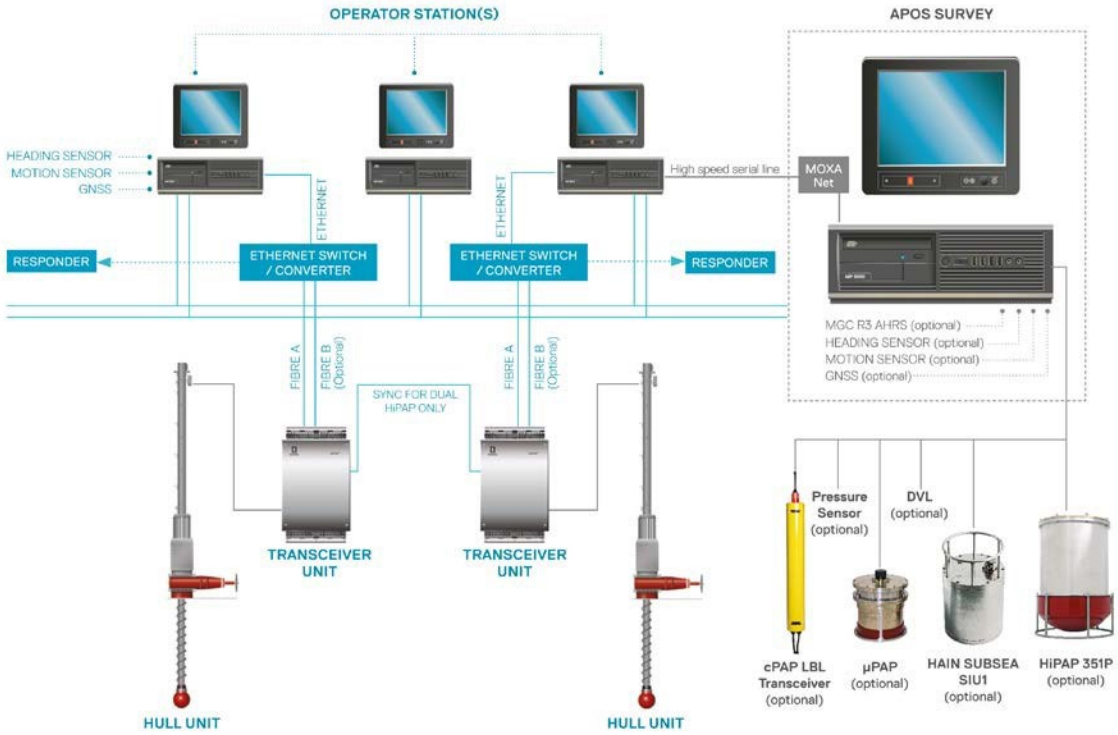
1 ABBREVIATIONS AND DEFINITIONS

ASI	APOS Survey Interface
NPort	MOXA serial line server

2 INTRODUCTION

This manual describes how to connect and configure APOS Survey to an existing vessel APOS/HiPAP system.

Note! *APOS Survey requires HiPAP System 501 or newer transceivers running HiPAP SW version 2 or newer on the vessel system.*
The vessel system must run APOS version 4 or newer.
The APOS version on the APOS Survey computer must be at least the same version or newer as the APOS version on the vessel system.



The interface between APOS Survey and vessel APOS is normally a high-speed serial line with a galvanic isolated connection.

APOS Survey is delivered with a MOXA Ethernet to 4 port serial unit for this purpose.
A small program called ASI (APOS Survey Interface) must run on the existing vessels APOS system and on the APOS Survey system to keep the communication between the two systems. The ASI program will transfer settings from the vessel system to the APOS Survey, but not the other way. In addition, it will enable the APOS Survey to communicate with the vessel HiPAP System transceivers.

3 HARDWARE INSTALLATION

3.1 Preparation

Caution! *If the system is used for rental purpose, it shall be reset before next use. This is done by re-installing the software according to backup procedure 476331 or 437333 depending on the type of APOS Survey computer in use.*

3.2 Cabling

No.	Cable type	Length	Item no
1	Ethernet cable	5 m (Note 1)	719-077276
2	Serial RS-422 (for APC1x and MPxxxx vessel systems)	2 m (Note 2, 3)	403527
3	Serial Null-Modem RS-232	1.8 m	365886
4	Serial RS-422 (for HSC1 vessel system)	2 m (Note 2,3)	481948

Note 1: Cable 1 can be replaced by a longer cable if needed.

Note 2: Cable 2, 3 and 4 have fixed lengths. Use cable 2 or 4 for RS-422 interface and cable 3 for RS-232 interface.

Note 3: The supplied high-quality RS-232 cable should not be replaced by other cables.

Note 3: Cable 2 is not delivered with APOS Survey systems with HSC1 computer, and cable 4 is not delivered with APOS Survey systems with MPxxxx types of computers.

3.3 RS232 and RS422 cable pinout

In case you must make a new cable if the appropriate serial cable is not delivered or lost, the termination for the above listed serial cables is given here.

RS232 cable from NPort 5450 to any computer. This is a standard RS232 Null modem cable.

RS422 cables:

No1, Item 403527: A is the NPort side, and B is the VesselAPCxx or MPxxxx computer side

Wiring Diagram			
A	B	*Wire Color*	Nport / APOS OS
1	4	Orange	TxD- / Rx-
2	1	Orange/White	TxD+ / Rx+
3	2	Green	RxD+ / Tx+
4	3	Green/White	RxD- / Tx-
5	5	Brown	GND
-	6		nc
-	7		nc
-	8		nc
-	9		nc

No4, Item 481948: A is the NPort side, and B is the VesselHSC1 computer side

Wiring Diagram			
A	B	*Wire Color*	Nport / APOS OS
1	4	Orange	TxD- / RxD-
2	3	Orange/White	TxD+ / RxD+
3	2	Green	RxD+ / TxD+
4	1	Green/White	RxD- / TxD-
5	5	Brown	GND
-	6		nc
-	7		nc
-	8		nc
-	9		nc

3.4 Where to connect the cables

1. Connect the MOXA NPort unit to the Ethernet RJ45 connector marked NPort on the survey computer. The MOXA NPort Serial ports can be configured individually as RS-232 or RS-422.
2. Connect one of the RS-232/422 ports on the MOXA NPort unit to an unused serial port on the vessel APOS computer. Normally the 4 lower COM-ports (labelled Port 1-4) are RS-232, and the 4 upper COM ports (labelled Port 5-8) are RS-422.
   It is recommended to connect to the vessel APOS computer that is mainly used.
3. Two serial cables are supplied, one for RS-232 and the other for RS-422 connection.
   The RS422 cable item 481948 is delivered with APOS Survey computers of the HSC-1 type and the cable item 403527 was delivered with the APOS Survey computers of the MP8300/MP5800 types. If the RS-422 connection is used, the cable must be connected the correct way as the pinout on the MOXA NPort unit might be different from the serial ports on the vessel APOS computer (see 3.3 RS232 and RS422 cable pinout).
4. Ensure that NPort software is installed on the Survey computer. Check that the MOXA NPort unit is detected, and the serial ports are mapped. The serial port number for the MOXA port the cable is connected to can also be checked and type adjusted if needed. If NPort is not installed the installer can be found in the c:\install folder.
5. The APOS Survey computer is normally configured with a loopback adapter for the Net_A. This will make the adapters labelled Net_A and Net_B free for other use. The Net_A loopback adapter must be configured with IP 172.21.2.81, subnet mask 255.255.0.0.

4 SOFTWARE INSTALLATION

Note! *If APOS version is below 4 and/or HiPAP version is below 2 the vessel's systems need to be upgraded to be compatible.*

The vessel system must have a program called ASI (APOS Survey Interface) running to enable the communication with the APOS Survey. The ASI has been included with APOS installations since APOS version 4.27.1, APOS version 5.4.0 and all APOS 6.x.x versions, but on older APOS versions the ASI must be installed unless the vessel APOS is upgraded.
The ASI program is supplied on a USB memory stick delivered with the APOS Survey system and is also included in the APOS SW installation package. ASI sw can be installed while the current APOS/HIPAP is running, and it can be installed on any of the vessel APOS computers, but it is recommended to install the ASI on the computer that is normally used as the vessel APOS computer.

ASI shall not be reinstalled if it is already installed as part of the APOS installation.

- Insert the memory stick with the ASI sw and run the file called ASI-x.xx.x.xx.exe.
- When the program is installed, it will add a Start ASI entry to the menu. It will also be added to the list of programs that starts automatically when the system is turned on.

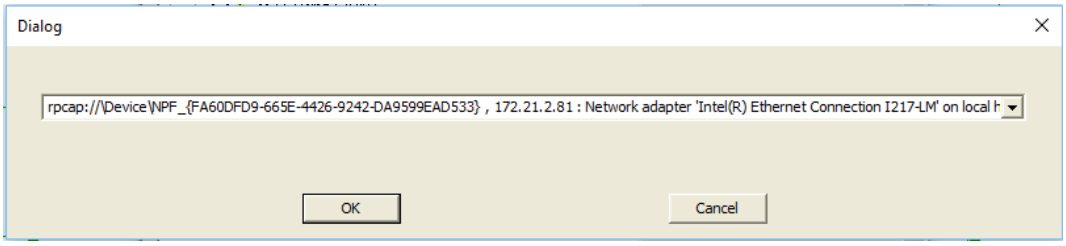
5 SOFTWARE CONFIGURATION

The ASI program must be configured on both the vessel system and at the APOS Survey system.

5.1 ASI on the vessel APOS computer

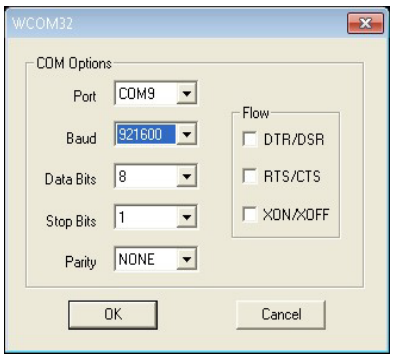
It is recommended to activate and configure the ASI on the computer that is normally used as the vessel APOS computer, and the serial line to the NPort must be connected to the same computer. The ASI program will not alter the current vessel APOS/HiPAP installation.

1. Log on as Service in APOS (password 1997).
2. Start the ASI program on the vessel APOS from the Configure/User Options menu.
3. Open the ASI Configure menu and select Configure Net Card. The following dialog will be displayed.



4. From the pull-down list, select the item with the IP address that matches the Net A address on the vessel APOS computer. This address normally starts with 172.21.x.x (or 157.237.x.x on older systems)
   If the wrong network adapter is selected APOS Survey will not be able to contact the HiPAP nor receive sensor data from the HiPAP.
5. Press OK.
6. Open the configure menu again and choose Configure serial Port.
7. Select the COM port that is connected between the vessel APOS computer and the NPort for the APOS Survey.

8. Select the highest baud rate available:

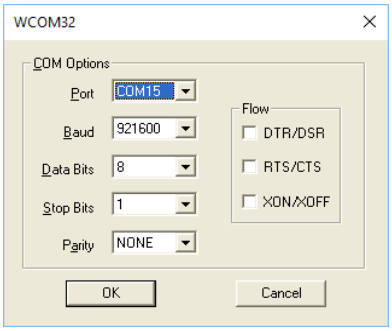


9. Next time the Vessel APOS is started two buttons will be added to the APOS toolbar, ASI On and Off buttons which can be used to stop ASI if the Vessel operations require full control over the HiPAP system.

5.2 ASI on APOS Survey computer

The correct serial line must be configured in the ASI program on APOS Survey computer.

1. Select the NPort COM port that is connected to the vessel APOS computer.
   The COM port number is most likely not the same as used on the vessel ASI.



2. Select the same baud rate as selected on the vessel ASI:

The two systems should now be able to communicate. The state indicators show the state of the vessel APOS (green when running), the communication link (green when communication is OK) and the Survey APOS (green when running).

The Synch Time indicator indicates how well the clocks are synchronized between the APOS Survey and the vessel APOS system:

- Green means better than 100ms.
- Yellow means better than 1 sec.

- Red means that the clock difference between the vessel system and the APOS Survey is more than one second.

5.3 Time synchronisation

ASI does not perform any clock synchronisation, and the timing between the systems does not need to be synchronised for them to function. If one or both systems are not synchronised to a time source the ASI Synch Time indicator can be disregarded.

The indicator is a QC tool in the case that both systems are synchronised to a local time source. It provides an easy way to see when the clocks are synchronized or if there is an issue with the configuration. Each system uses their local clock independent of the other system.

5.3.1 APOS Survey time

The APOS Survey computer may use any NTP server, a local APOS IOServer or the Vessel IOServer for time synchronisation.

Note! *Use only one of the above methods of time sync. Else you may risk time jittering.*

The NTP server will not be explained as we assume the reader is familiar with its use.

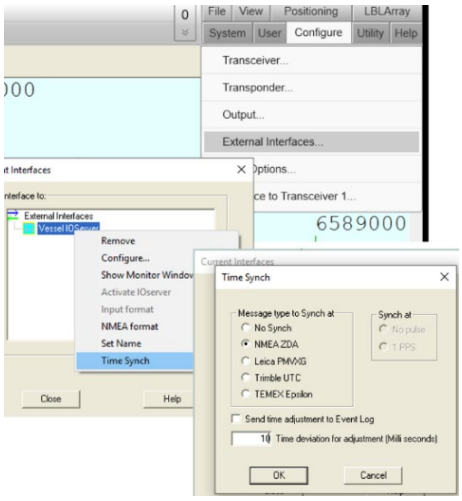
A local APOS IOServer:

- Will adjust the computer clock when the time deviates with10ms or more (adjustable) compared to the received ZDA time.
- It can use various time sentences with or without 1PPS as input for time adjustments.
- Most common is the ZDA sentence with or without the 1PPS.
- See the APOS Help for details on the setup.

The Vessel APOS IOServer (on APOS Survey)

- Will adjust the computer clock when the time deviates with 10ms or more (adjustable) compared to the received time sentence.
- It can use various time sentences but without 1PPS as input for time adjustments.
- Most common is the ZDA sentence.
- How to select time synch:
    1. On APOS Survey, open APOS menu Configure/External Interfaces/.

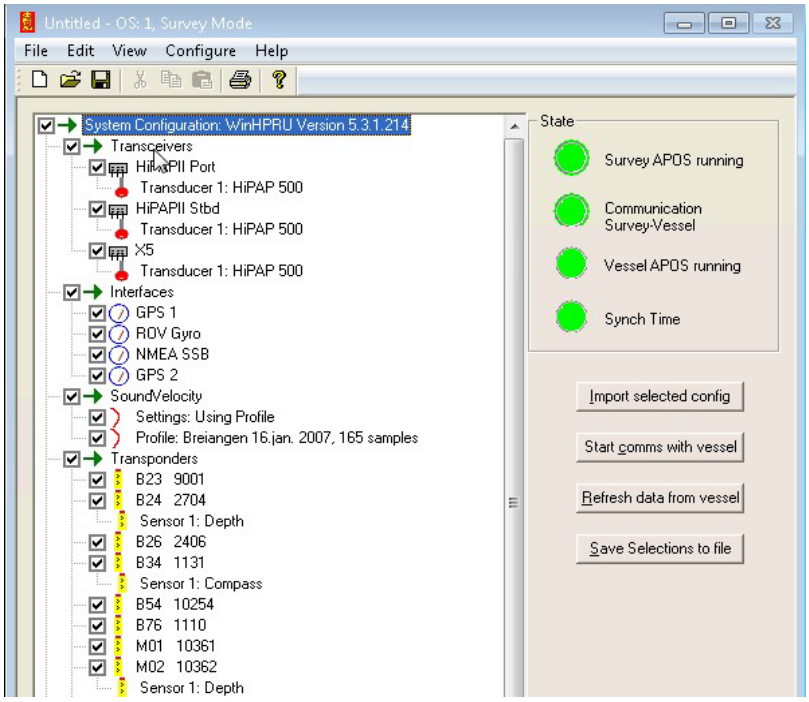
2. Highlight and right click on the Vessel interface that has the time sentence (shown here with name Vessel IOServer).



3. Select Time Synch
4. Then select the type of time sentence and Time deviation for adjustment (min 10ms).
5. Within a few minutes the Synch Time indicator should become green.

5.3.2 Vessel APOS time

The vessel APOS computer will normally use OSK Time Synch for time adjustments, its own IOServer or if it is a single APOS computer it might be left free running timing wise.
In some cases, the NTP is used for time adjustments of the vessel APOS system.
The Time Synchronisation of the vessel system will not be discussed any further in this document.



6 APOS SURVEY SETUP ARRIVING ON A VESSEL

Selected settings are transferred from the vessel system to the APOS Survey when setting up the APOS Survey on a new vessel and connecting it to the existing APOS/HiPAP system. After transfer of settings from the vessel APOS, the APOS Survey may be modified without any settings being copied back to the vessel system.

The ASI program will show a list of items available on the vessel APOS. On the APOS Survey the survey operator can select which items are required and needs to be transferred to the APOS Survey. The available items are:

- Transceivers including VRU and Gyro.
- External interfaces such as GNSS, depth sensors etc.
- Sound velocity settings, including current sound profile.
- Transponders.
- Positioning items, both SSBL and LBL.
- LBL calibration data.

It is advisable to exclude the transponders/positioning items used for dynamic positioning in the transfer. If the vessel system has two or more HiPAP transceivers, one transceiver may be excluded from Survey access and be reserved for DP usage only.

Before transferring data to the APOS Survey, it should be agreed which transceivers and transponders are reserved for DP usage.

Procedure to be performed on the APOS Survey computer:

1. Make sure the vessel APOS is running.
2. Make sure that the APOS Survey is stopped.
3. Start ASI from the Start ASI shortcut on the Windows Desktop.
4. Wait until the list is populated with the available items.
5. Select which items to transfer and press the “Import selected config” button.
   Ensure that the vessel positioning object is imported from the vessel system. The correct vessel is essential to APOS function.
   A warning dialog will pop up and warn about erasing and overwriting your current settings. If you answer yes, the selected settings will be copied into the settings database of the APOS Survey.
6. Stop the ASI
7. Start APOS Survey
8. Select all items on the ASI.
9. Press the Start Comms with vessel on ASI.
10. Now the Transceiver status and any IOServers should show the same status as on the vessel APOS on the transferred Transceivers and IOServers.
    If not try to press the Refresh data from vessel.

This operation is normally a onetime operation when starting a new job on a new vessel.

The APOS Survey may use its own setting for sound velocity, lever arm offsets etc. The APOS Survey may also use a separate GNSS/Gyro/VRU/attitude sensor and additional transceivers.

7 START PROCEDURE FOR APOS SURVEY

The current version of APOS Survey and the ASI program works best if operated using the following procedure assuming parapgraph 6 APOS Survey setup arriving on a vessel is already performed:

1. On the vessel system, start APOS if not running.
2. Start ASI on the vessel system.
3. Start APOS on APOS Survey computer.

If the transceiver status on the APOS Survey stays offline (red), try the following procedure:

- Stop the ASI program on both systems by the Stop button on the Toolbar:

- Start ASI again by Start ASI button shown above, first on Vessel system then on APOS Survey system.
- Repeat the selections on the Survey ASI (do not import)
- Press Start comms with vessel.

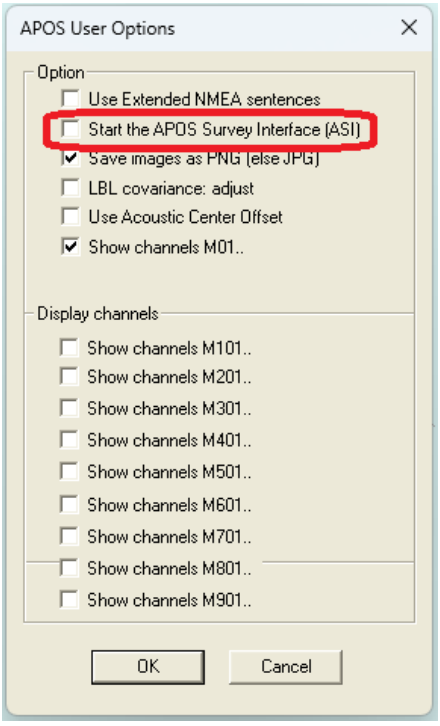
If the settings of the vessel APOS is changed, it is possible to resynchronize the APOS Survey with the vessel APOS.

1. Press the “Refresh data from vessel” button. The ASI program on the vessel APOS will read the settings again and transfer them to the ASI on the survey system.
2. The operator must reselect which items that shall be transferred into the survey system.

Note! *This will possibly overwrite local settings on the APOS Survey*

8 AUTOSTART OF THE ASI PROGRAM ON VESSEL APOS.

It is possible to configure vessel APOS so that the ASI program is started automatically. Log on as Service (password 1997), then enter the Configure -> User options menu in APOS. Enable the option "Start the APOS Survey Interface (ASI)".



9 LOCAL SENSORS, INCLINATIONS AND OFFSETS ON APOS SURVEY

The ASI program on the APOS Survey computer will automatically remove any offsets/inclinations applied by the vessel system and apply the new local offsets/inclinations.
This makes it possible to use:

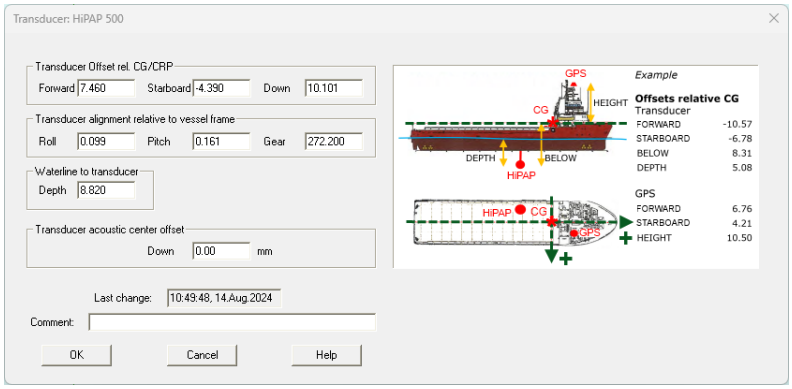
- Different lever arms for GNSS and the HiPAP Transducers than the Vessel System is using.
- Local sensors like GNSS, Gyro and VRS sensors.
  These sensors can be used for both local transceiver and/or the vessel transceivers(s).

Note! *A local Gyro/VRS shall always be configured after data transfer from the vessel system has taken place. The data transfer will overwrite any local configured Gyro/VRS settings.*

9.1 Transducer setup

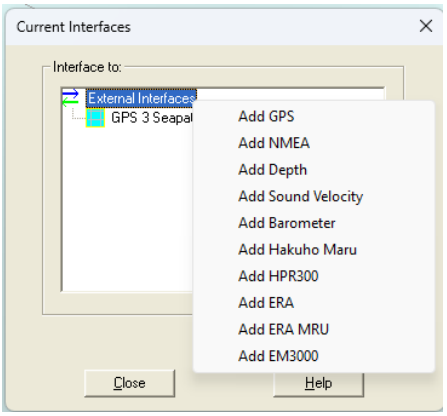
1. Enter the Configure → Transceiver menu and select the transceiver to change.
2. In the Transducer section, click the Configure button.

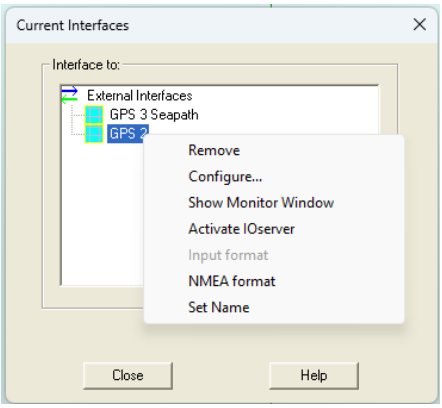
3. Enter required offset and inclinations values for the transducers if different from the vessel system.



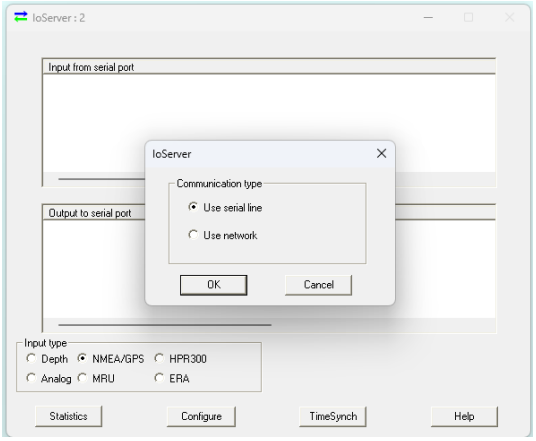
9.2 GNSS setup

1. Enter the Configure → External Interfaces menu.
2. Highlight the External Interfaces line, then right click and select Add GPS.
3. Highlight the GPS line, then right click and select Activate IOserver.





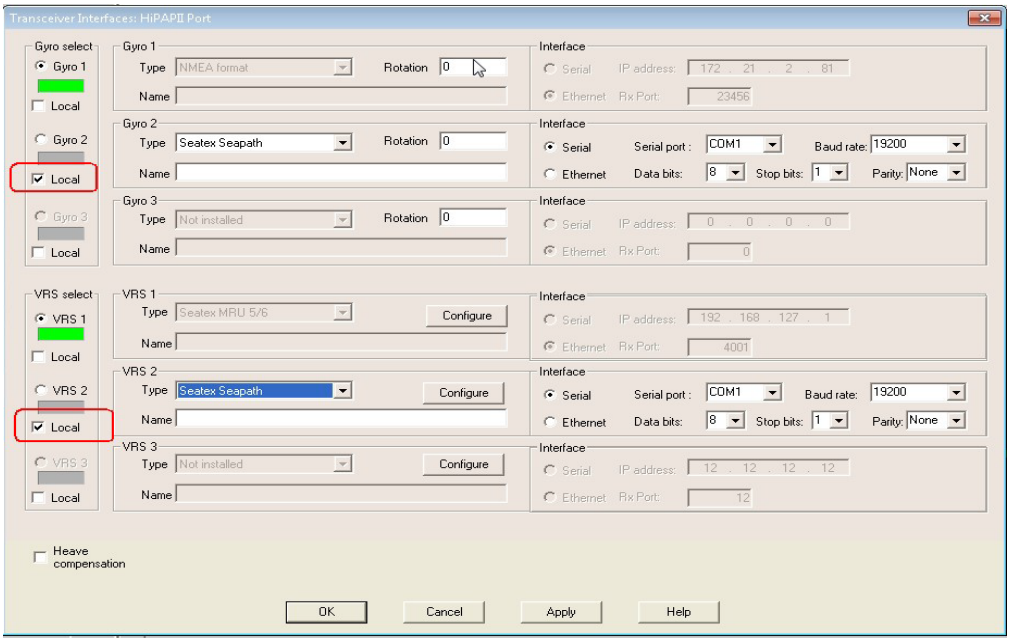
4. Click on Configure and select Use Serial line or Use network. Configure serial or network according to the source.



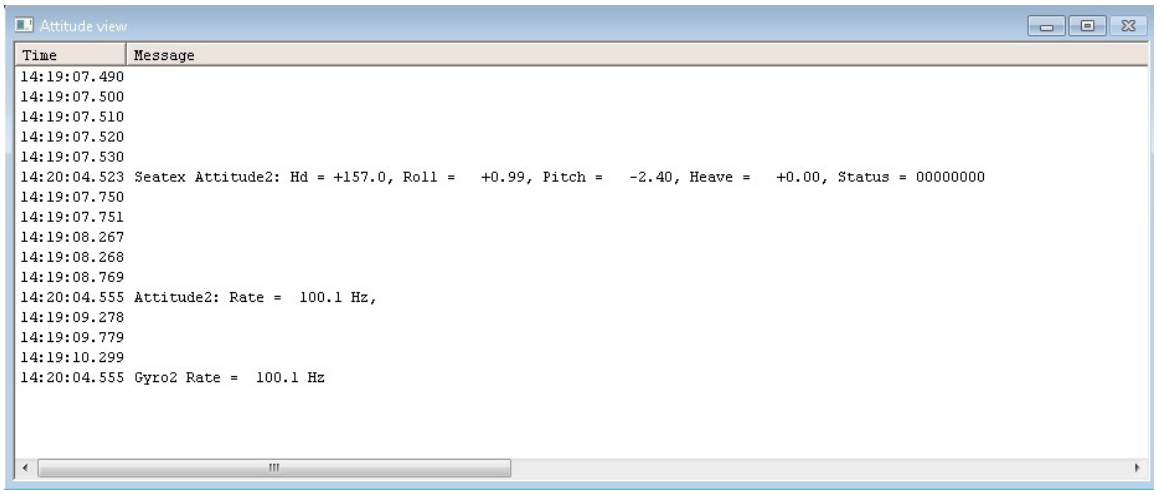
9.3 Gyro and Attitude sensor setup

1. Enter the Configure → Transceiver menu and select the transceiver to change.

2. The attitude dialog has a “Local” selection on the APOS Survey. When this local check box is ticked, a local attitude input can be configured for this Gyro/VRS. This can be used as replacement for the attitude sensor that the vessel APOS is using.
   The range of sensor types are the same as for the vessel HiPAP. You can select between serial port and Ethernet UDP input.

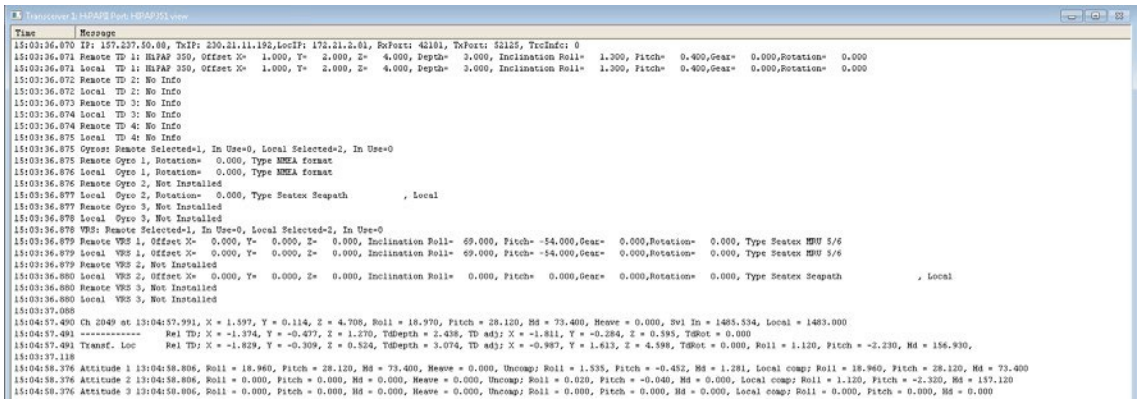


3. The status of the local attitude inputs can be monitored by selecting View and then Local Attitude Status in the ASI program. This window displays the current data from local attitudes and the measured update rate. The window has identical information as the attitude window in the HiPAP program:



4. Double click on the transceiver in the ASI program to monitor of the data messages from the vessel APOS/HiPAP to the APOS Survey:

A new window is then displayed:

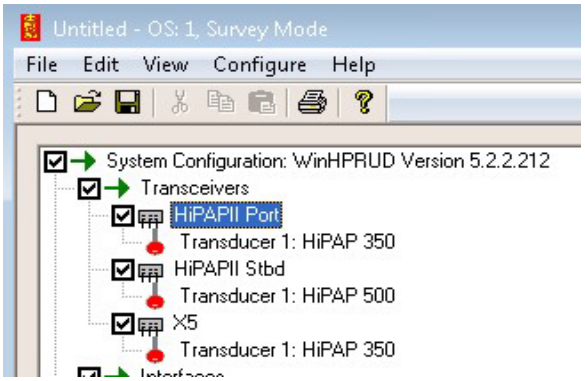


This window displays the settings on the APOS Survey) and the Vessel APOS. You can also monitor conversion from one set of inclinations/offsets to local settings and replacement of vessel attitude values with data from a local attitude source.

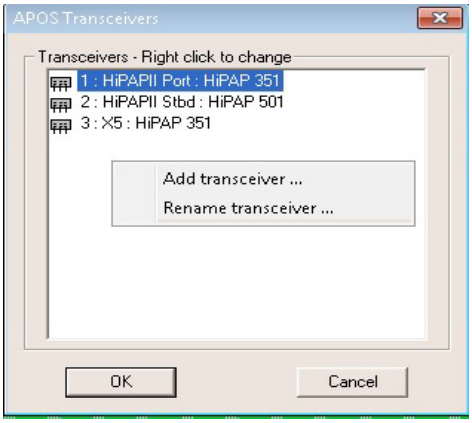
10 LOCAL TRANSCEIVERS

Portable transceivers (HiPAP351P/352P, µPAP or cPAP) can be added.

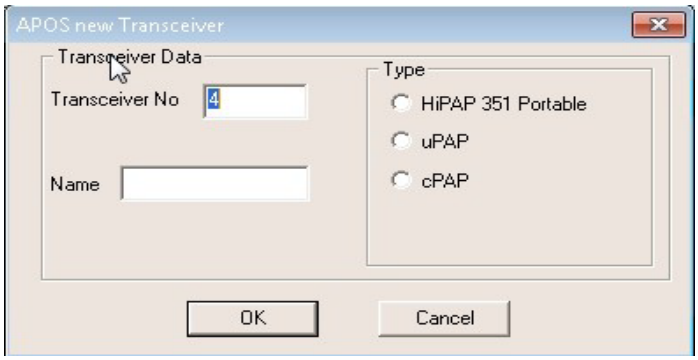
1. Enter the Configure and then Transceiver menu.



2. Press the Edit button and the following dialog will be displayed:



3. Right click in the view for adding a local transceiver.
4. Select the transceiver type and give it a name.



5. After adding a local transceiver, you must configure Gyro/VRS, offsets and inclinations for this transceiver (see paragraph 9.1 and 9.3)

Portable transceivers can be selected between the types shown in the previous dialog box. A local transceiver can also be removed by selecting it and choose Remove transceiver from the menu.

Note! *A local transceiver should always be added after data transfer from the vessel system has taken place. The data transfer may overwrite any local transceivers.*

Note! *The current APOS Survey version requires that the HiPAP SW must be installed and configured manually on the survey system when a HiPAP 351/352 portable or a µPAP system shall be used.*

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11 OPERATION

The APOS Survey may be operated as any other APOS. See the online help for more information.

Operators should be aware of the following:

- The same transponder can be used by both the vessel system and the APOS Survey at the same time. This is convenient for example when calibrating a transducer and monitoring the ROV position etc. This transponder must be activated on both APOS systems. HiPAP will use the parameters from the last activation. This means that if the vessel APOS is used for activation of a transponder with 3 second update rate, HiPAP will start using that. If the APOS Survey then activates the same transponder with 2 second update rate, the HiPAP will switch to use this rate. It will still be active on the vessel APOS, but the update rate will be higher, and this change will not be shown in the Transponder properties on the Vessel APOS.
  - Deactivating a Transponder active on both Vessel and Survey system:
    - If done from APOS Survey, it will only be deactivated on APOS Survey and continue to be active on the Vessel system.
    - If done for the Vessel system, it will be deactivated on both Vessel and Survey systems. On the APOS Survey this will not be shown, except that Transponder positioning is lost, and there will be an alarm after some time. (This behaviour may be changed in a future version of the software).
- APOS Survey can use options such as Cymbal and LBL without the vessel system having the same options. You do not need to upgrade the vessel system to support Survey options.

12 AUTOMATIC STOP OF ALL POSITIONING ON APOS SURVEY

The ASI program keeps track of all positioning activated from the APOS Survey. When the ASI program is stopped on the vessel APOS, it will automatically disable all positioning activated from the APOS Survey. The same will happen if the communication between the vessel APOS and the APOS Survey stops. This means that a quick way to disable/stop all APOS Survey activity is to stop the ASI program on the vessel system. This could be used as an “emergency” stop for a DPO to block all APOS Survey operations on the vessel system.

13 TROUBLESHOOTING

13.1 Cannot connect to the vessel system.

Go through the installation steps and ensure that both the cabling and software configuration are correct.

13.2 Vessel Transceiver(s) offline on APOS Survey

If all remote Transceivers are offline and the 3 topmost status indicators on the Survey ASI are green:

1. In Survey ASI, select all items, then click Start comms with vessel.
2. If still offline, then shut down APOS on Survey computer. Start ASI on Survey computer, then select all the items you want to import from Vessel system then click on the Import selected items. Right click on one of the Transceiver names in the ASI programme.
   A monitor window will pop up, and if you see data coming in here, things should be OK. Stop ASI and start APOS Survey.
3. If no data is seen in the above monitor window, then the issue is probably on the Vessel system. Verify that Net_A is working on the Vessel system computer that runs the Vessel ASI. If Net_A is OK, try to restart Vessel ASI, then go back to APOS Survey computer and perform step 2 again.

If one remote Transceiver is in Navigation and one or more of the others are indicated Offline on APOS survey, but OK on the Vessel system:

1. The issue might be with Net_A network on the computer that is connected to the Transceiver being offline. Verify that Net_A is OK on this/those computer(s).

Note! *As the ASI is not working on Net_AB, a missing Net_A may cause issues with Transceivers being offline on APOS Survey, but in Navigation on the Vessel System.*

13.3 Sensor data issues

Note! *For local Gyro/VRS there is no alarm on the APOS Survey, but the numeric view will turn red when attitude data is lost.*

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1. On the vessel system ensure that the sensor data is received.
   - For HiPAP attitude sensors ensure the system is active and values are present in the numeric view.
   - For GPS and other external sensors open Configure, External Interfaces.
   - Right click on the sensor and click on show monitor window.
   - Messages should display as data enters the system.
2. In Survey ASI press start coms with vessel.
   - Ensure that the 3 upper status lights are green.
   - For Attitude sensors, double left clicks on the Transceiver name will open a monitor window.
   - This monitor window will show attitude and Transducer installation parameters and the attitude values.
   - For GPS and other external sensors open Configure, External Interfaces.
   - Right click on the sensor and click on show monitor window.
   - Messages should display as data enters the system.

3A. If no sensor data is received in Survey ASI.

   - Two right clicks the sensor in the vessel AS will open a monitor window.
   - If no messages are visible.

- Rerun the setup steps in section 5.2 ASI on APOS Survey computer to ensure the correct adapter is selected.
- If data is still not sent.
  - Open IpConf on the Vessel APOS computer
  - Ensure the Net A address is set to 172.21.x.x (or 157.237.x.x on older systems)
    Ensure that the multicast address for Net A is 230.21.0.0 and for Net B 230.22.0.0.

3B. If sensor data is received by survey ASI

- Check the sensor data in the same manner as was performed on the vessel system either through numeric view or external interfaces.
- If data is still not received, open IpConf on APOS Survey.
  In the Bootptab section, ensure that:
  - Net A address is set to172.21.x.x (or 157.237.x.x on older systems)
  - Multicast address for Net A is 230.21.0.0 and for Net B 230.22.0.0.
- If data is received but not being accepted check the configuration on the sensor and the enabled sensor formats.
- If the data has a time stamp check the system clock. Sensor data with a significant difference in time will be rejected. See the Time synchronisation from GPS. Section of the APOS help file to setup time synchronisation.

4. If GPS data is received but the Global position remains at 0.
   - Open System, Geographic positioning setup.
   - Right click on the WGS84 option and set as presented.
     This occurs when the position is outside the valid bounds for the current geodesy.