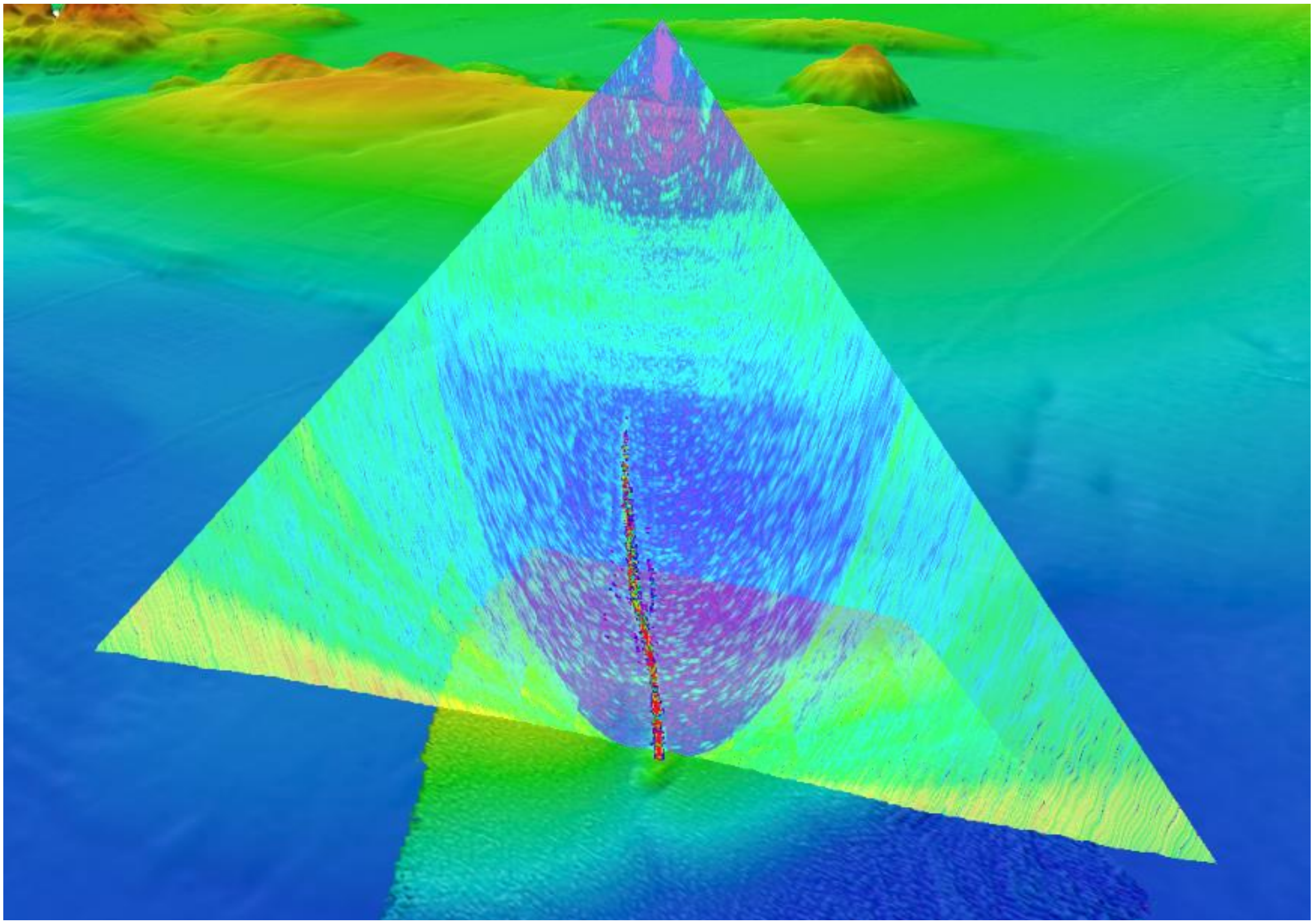
R/V *Sikuliaq*
EM302 & EM710
Multibeam Echosounder System Calibration
March 7-12, 2016



Report prepared by:

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Cover image: Multibeam observations of a plume of presumed methane gas bubbles rising from a seep site in the San Diego Trough during SKQ201602S. Seep site bathymetry is R/V Sikuliaq EM710 data gridded at 15 m (color scale 1015-1060 m depth) overlain on background bathymetry from R/V Melville (USGS cruise MV1316) gridded at 25 m (color scale 500-1200 m depth). The plume shown here includes refraction-corrected midwater data from multiple pings collected with the EM302 aboard R/V Sikuliaq, with one transparent swath view for context. Vertical scale of the scene is 3X.

Introduction

The R/V *Sikuliaq* is equipped with Kongsberg Maritime (KM) EM302 (30 kHz) and EM710 (70-100 kHz) multibeam echosounders and a Seapath 320 positioning and attitude system with C-NAV DGNSS auxiliary input. These systems were reviewed by the Multibeam Advisory Committee (MAC) and personnel from NOAA, the University of Alaska Fairbanks (UAF), and Kongsberg Maritime (KM) during sea acceptance trials (SAT) in August 2014. No major modifications were made to the multibeam systems following the SAT until a drydock period in early 2016, during which the Seapath 320 GPS antenna separation was increased to approximately 2.5 m to better satisfy KM installation suggestions. The C-NAV GCGPS antenna was also relocated from a lower position to between the Seapath antennas to improve its sky view.

The MAC was requested to review the modified system configuration and perform geometric calibrations ('patch tests') of the multibeam systems during a coring shakedown cruise northwest of San Diego. This report describes the procedures and results of the calibrations conducted during cruise SKQ201602S (March 9-12, 2016) in order to verify functionality following the antenna relocation. In addition to geometric calibrations, transmitter element impedance measurements were collected for both systems to identify early warning signs for any possible transducer degradation. Swath coverage versus depth was examined for both echosounders using data collected throughout transits and surveys of opportunity for other activities during SKQ201602S in depths of 10-2,000 m.

Overview of System Geometry

In this report, we use the term 'system geometry' to mean the reference frame(s) of the vessel and the linear and angular offsets of the primary components of the multibeam mapping systems, including the TX arrays, RX arrays, and motion sensors. These parameters are critical for data collection in an unbiased and repeatable manner. Table 1 provides a chronological outline of available documentation describing the system geometry.

Table 1. System geometry documentation

Date	Location	Event	References
2013-10-28		IMTEC survey to establish vessel reference frame and offsets of EM302/EM710 arrays, Seapath MRU-5, and GPS antennas; survey report in KM convention with origin at granite block	IMTEC survey report provided by R/V *Sikuliaq*
2014-09-02	Woods Hole, MA	Sea acceptance trials; calibration of EM302 and EM710	R/V *Sikuliaq* SAT report (http://mac.unols.org)
2016-03-05	San Diego, CA	IMTEC survey of relocated Seapath 320 GPS and C-NAV antennas	IMTEC survey report (rev. 2) provided by R/V *Sikuliaq*
2016-03-12	San Diego, CA	Calibration of EM302 and EM710	This document

Pre-SKQ201602S Geometry Review and Seapath Modification

The 2013 (Rev. 1) IMTEC survey report established the primary reference frame used by the multibeam echosounders and ancillary sensors. This is a right-handed coordinate system with its origin at the granite block, with the X axis positive toward the bow, Y axis positive toward starboard, and Z axis positive downward. The granite block is also used as the origin for SIS configuration and as the Navigation Reference Point for the Seapath to ensure consistency among all sensor reference frames used on board and the locations at which position/attitude data are valid. Angles are provided in the IMTEC report using descriptions rather than a given sign convention. These angles were translated during the initial installation according to the Kongsberg Maritime sign convention, with pitch positive with bow up (right-hand rule about the +Y axis), roll positive with port side up (right-hand rule about the +X axis), and yaw positive with bow movement toward starboard (compass convention). Review of the SIS and Seapath 320 configurations prior to SKQ201602S revealed no modifications from the original post-SAT configuration.

IMTEC provided an updated survey report (Rev. 2) after surveying the relocated antennas in San Diego, immediately prior to cruise SKQ201602S. Comparison of the two revisions confirmed that only the Seapath and C-NAV antenna offsets were modified in the IMTEC report. The Seapath configuration was updated to reflect the new position of the primary (aft) antenna and the heading offset to the secondary (forward) antenna; the Calibration Wizard was then run to calculate antenna separation while the vessel was secured alongside the B Street Pier. The resulting secondary primary antenna location calculated by the Calibration Wizard agreed to within 9 mm of the surveyed location.

Geometric Calibration

After review and confirmation of all linear offsets, both the EM302 and EM710 multibeam systems were calibrated for residual angular offsets of the MRU-5 in the multibeam reference frames. Tables 2-4 in the Calibration Results section provide summaries of the linear and angular post-SKQ201602S for the EM302, EM710, and Seapath 320.

Site Selection

Figure 1 shows the line plan and calibration area northwest of San Diego including prominent features for pitch and yaw calibration with slopes of 20-30° and relatively flat seafloor for roll calibration. The depth range of approximately 525-700 m was selected so as to allow simultaneous calibration of the EM302 and EM710 systems. Motion sensor angular offsets in SIS were left untouched from the pre-SKQ201602S values prior to calibration, as no changes to the MRU installation had been noted. Residual angular offsets were determined in the order of pitch first, roll second, and yaw third. To minimize coupling of angular offsets in the calibration results, each angular offset was updated in SIS after completion of its respective calibration procedure and before the start of survey data collection for the following offset calibration. The procedure was then repeated after initial calibration to verify the angular offset results in SIS and make final adjustments as necessary.

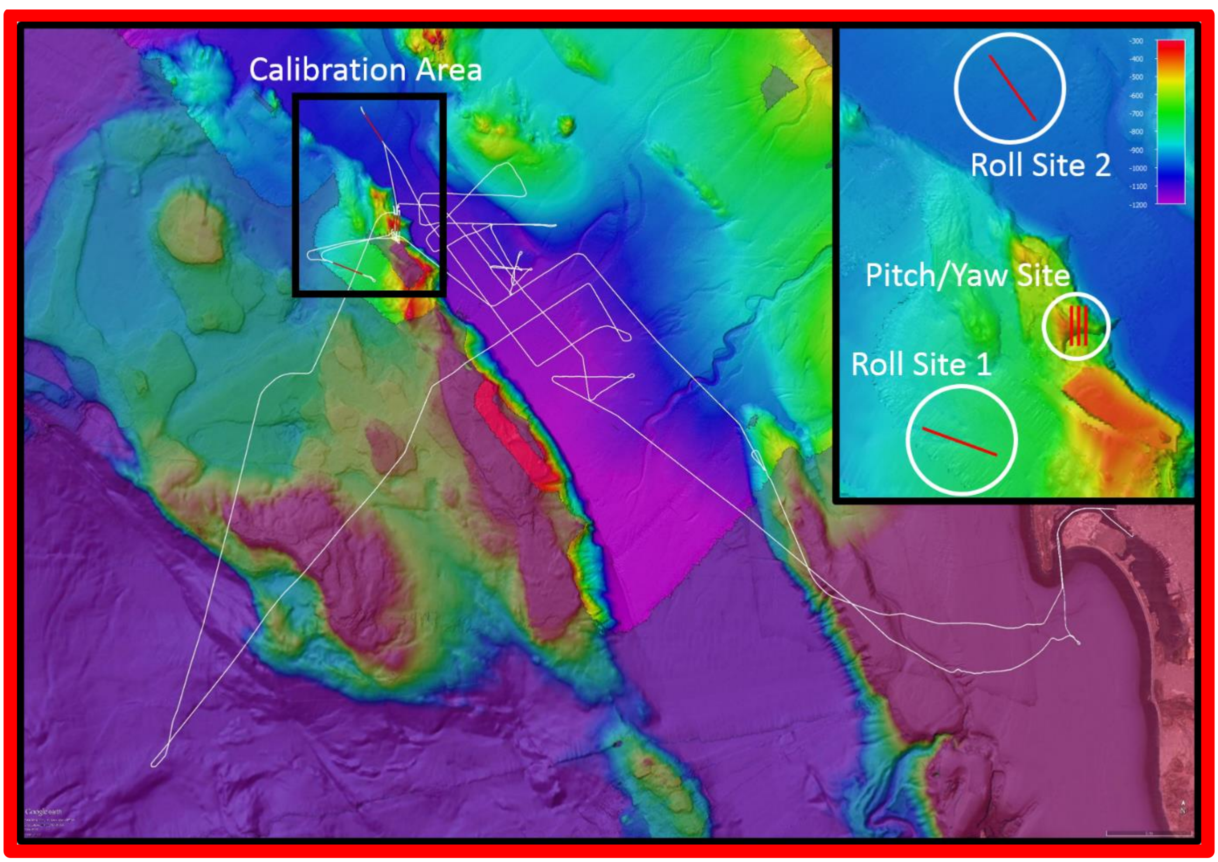


Figure 1. Calibration survey plans (red lines, inset) and transit tracklines (white lines) northwest of San Diego, CA. These sites were selected based on availability of suitable seafloor features in the operational depth ranges of the EM302 and EM710 multibeam echosounders. Swath coverage (acoustic extinction) data were collected over depths of 10-2000 m during transits from San Diego to the calibration and coring sites.

Sound speed profiles were acquired with Sippican T-7 expendable bathythermographs (XBTs) and applied in SIS prior to the calibration and verification lines. All XBTs throughout SKQ201602S were processed with SVP Editor to remove spurious sound velocities, apply salinity data from the World Ocean Atlas, and prepare the profile for SIS. To achieve high ping rate and sounding density, the ship was operated at 6-7 kts for all calibration lines; speeds were slightly higher during the verification lines due to time constraints.

The EM302 and EM710 were configured as follows for all calibration data collection:

Depth mode:	Auto
Dual-swath mode:	Dynamic
Transmit mode:	FM enabled
Yaw stabilization:	Enabled (rel. mean heading) during pitch and roll lines; disabled during yaw lines
Pitch stabilization:	Enabled
Beam spacing:	High density equidistant
Swath width:	Pitch: 15°/15° port/stbd
	Roll: 70°/70° port/stbd
	Yaw: 15°/55° and 55°/15° port/stbd

Calibration Results and Current Configuration

Calibration tools in SIS and QPS Qimera were used separately to evaluate each set of calibration lines for both echosounders. Examinations of each set of calibration lines by Jerram, Steve Roberts (UAF), and Steven Hartz (UAF) were discussed and collectively agreed upon before modification of residual angular offsets in SIS. Only the EM302 MRU pitch and roll values required modification during the initial calibration; the EM302 yaw and all EM710 angular offsets were left unmodified. The EM302 MRU pitch and roll modifications were verified by repeating the pitch and roll calibration lines with the initial calibration values applied in SIS. Because the initial roll calibration site depth (~700 m) is on the shallow end of the intended operational range for the EM302 and no EM710 roll verification was necessary, a slightly deeper roll verification site (~1000 m) site was selected based on transit time available between coring operations. No further modifications were made to the EM302 during verification. Furthermore, no apparent latency effects were visible during SKQ201602S, and no latency test was performed.

Tables 2-4 summarize the post-SKQ201602S configurations for the multibeam echosounders and motion sensor. These results are based on the up-to-date vessel survey documentation and calibration results; accordingly, these values are to be applied until sensors are modified or another calibration becomes necessary. To demonstrate the calibration results, Figures 2-7 depict transects of the roll, pitch, and yaw calibration data sets in the QPS Qimera Patch Test Tool with the final angular offsets applied. (Note that the value applied in the calibration tool is only the *final* adjustment made during calibration or verification, not the offset recorded in the corresponding table of offsets or SIS. In these examples, zero is applied in the calibration tool for all subsets.)

Table 2. EM302 sensor offsets after system geometry review and calibration during SKQ201602S. Pre-SKQ201602S values are shown in parentheses where changes were made. Only the MRU pitch and roll (Attitude 1) were modified from the pre-SKQ201602S configuration for the EM302. The EM302 TX and RX array Z values reflect the 2013 IMTEC report value after compensation for the ice window thickness; see the 2014 MAC SAT report for additional details. (Note that the array angular offsets reported in the initial survey and applied during installation include decimal places beyond the accuracy of the measurement.)

EM302 Origin at Granite Block	X	Y	Z	Pitch	Roll	Yaw
	BOW +	STBD +	DOWN +	BOW UP +	PORT UP +	COMPASS +
EM302 TX Array	28.601	2.122	5.240	-0.00033	-0.13588	0.02177
EM302 RX Array	23.826	2.078	5.243	-0.18122	0.00460	359.838
Pos, COM1 (Seapath 320)	0.00	0.00	0.00	-	-	-
Attitude 1, COM2/UDP5 (Seapath 320)	0.00	0.00	0.00	-0.10 (-0.15)	0.14 (0.17)	-0.11
Waterline	-	-	0.06	-	-	-

Table 3. EM710 sensor offsets after system geometry review and calibration during SKQ201602S. No modifications were made from the pre-SKQ201602S configuration for the EM710.

EM710 Origin at Granite Block	X	Y	Z	Pitch	Roll	Yaw
	BOW +	STBD +	DOWN +	BOW UP +	PORT UP +	COMPASS +
EM710 TX Array	25.360	1.141	6.041	0.04516	0.03240	0.17085
EM710 RX Array	24.540	2.015	6.042	0.13700	-0.02500	359.748
Pos, COM1 (Seapath 320)	0.00	0.00	0.00	-	-	-
Attitude 1, COM2/UDP5 (Seapath 320)	0.00	0.00	0.00	-0.05	0.20	-0.08
Waterline	-	-	0.06	-	-	-

Table 4. Seapath 320 sensor offsets after system geometry review, antenna location updates, and antenna separation calibration during SKQ201602S. Note that the secondary (forward) antenna location calculated by the Calibration Wizard is within 9 mm of the IMTEC surveyed location and maintains the antenna baseline heading offset of -0.04° (from primary to secondary in the vessel reference frame).

Seapath 320 Nav. Ref. Point at Granite Block	X	Y	Z	Pitch	Roll	Yaw
	BOW +	STBD +	DOWN +	BOW UP +	PORT UP +	COMPASS +
GPS Antenna 1 (Aft)	12.821	2.064	-30.521	-	-	-
GPS Antenna 2 (Fwd)	15.309	2.082	-30.537	-	-	-
MRU-5 Center Top	25.459	2.122	-0.884	0.729	-0.151	1.168
Nav. Ref. Point (Granite Block)	0.00	0.00	0.00	-	-	-

EM302 with Seapath 320

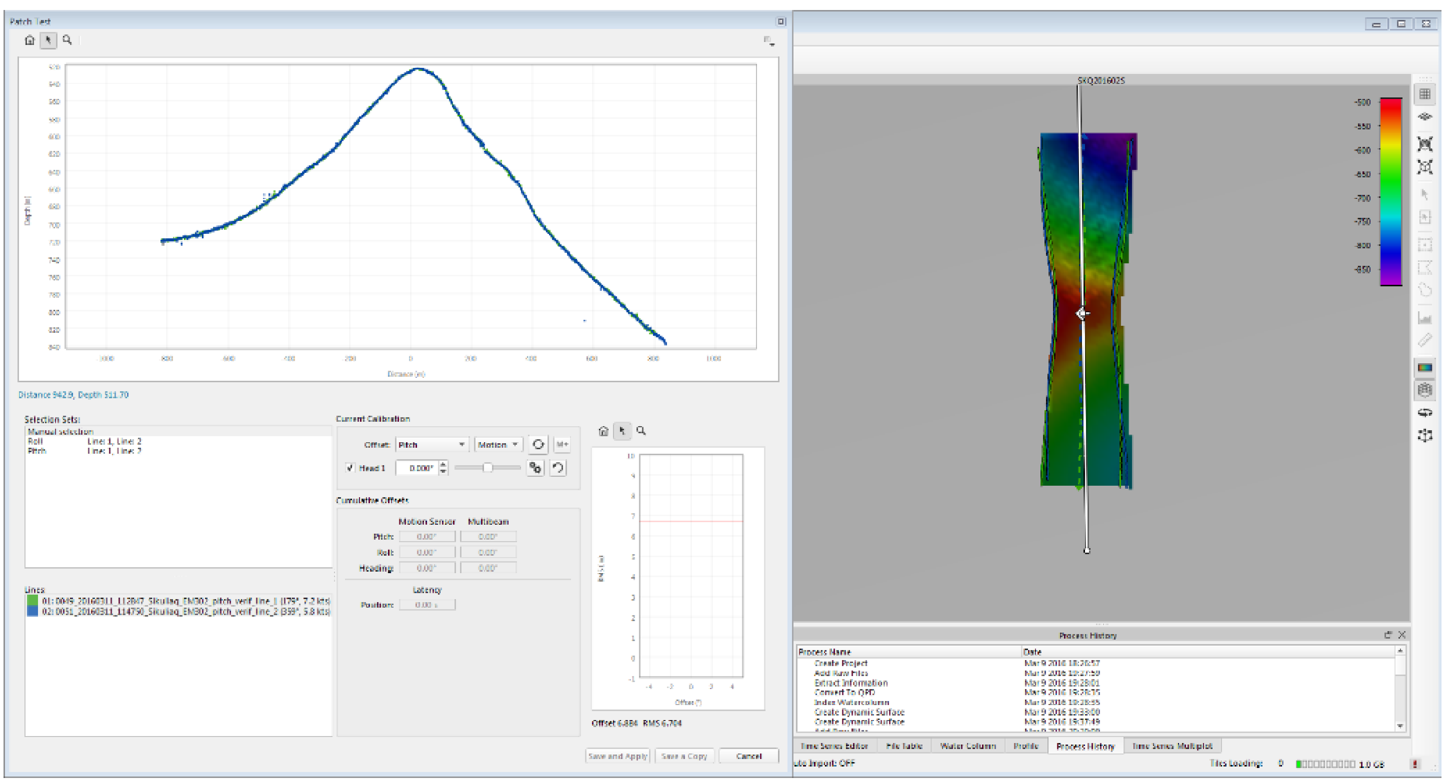


Figure 2. EM302 / Seapath pitch verification in Qimera, applying an adjustment of 0.00° to the initial result for a final offset of -0.10° in SIS.

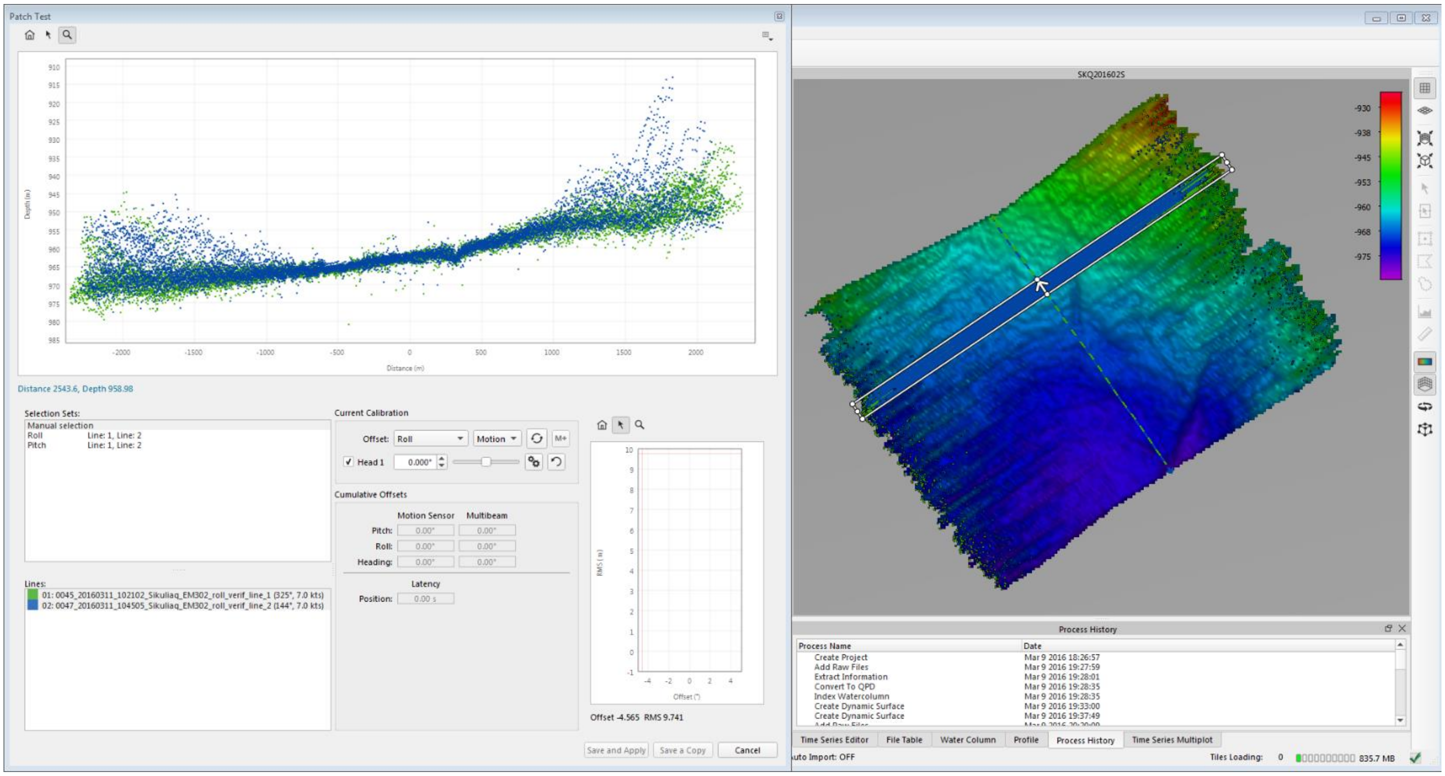


Figure 3. EM302 / Seapath roll verification in Qimera, applying an adjustment of 0.00° to the initial result for a final offset of +0.14° in SIS.

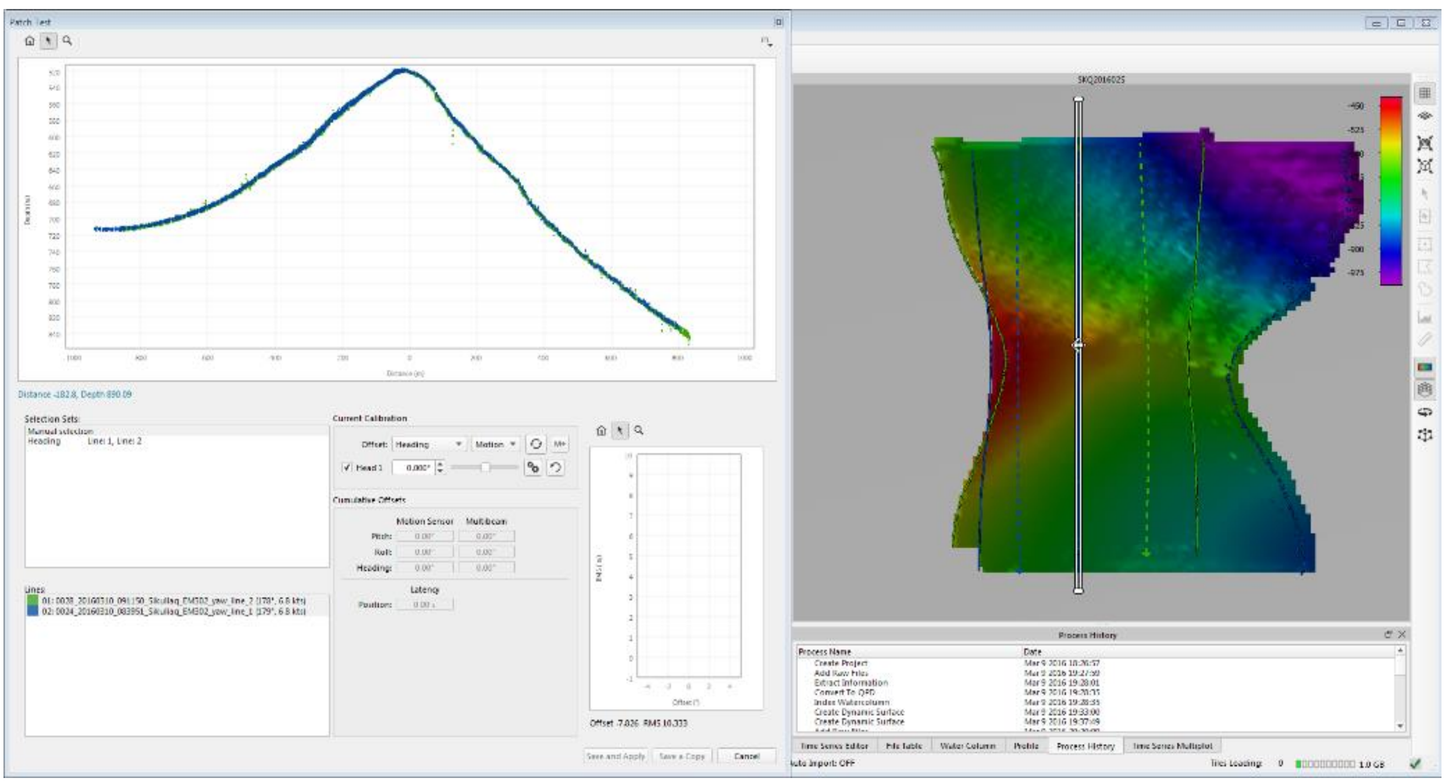


Figure 4. EM302 / Seapath yaw calibration in Qimera, applying an adjustment of 0.00° to the original value for a final offset of -0.11° in SIS.

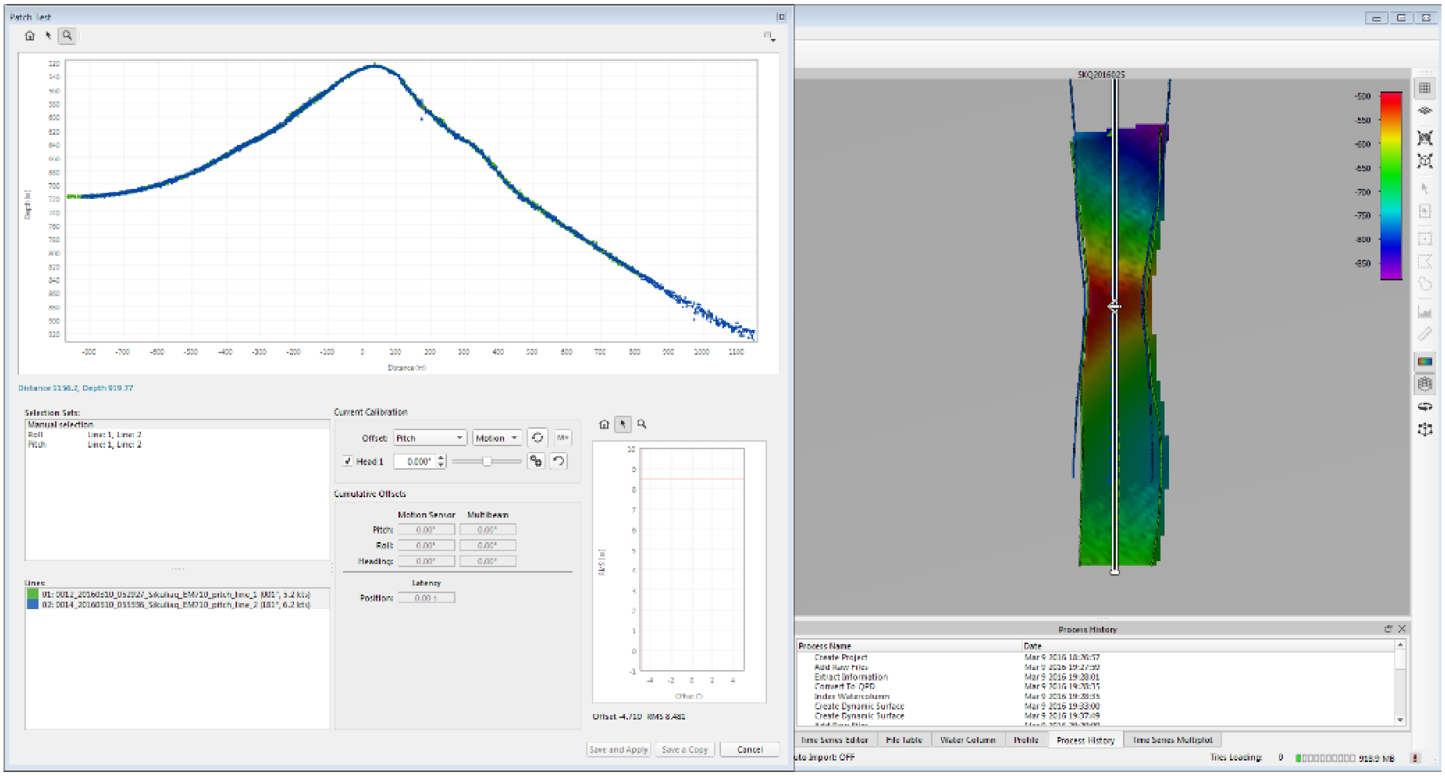


Figure 5. EM710 / Seapath pitch calibration in Qimera, applying an adjustment of 0.00° to the original value for a final offset of -0.05° in SIS.

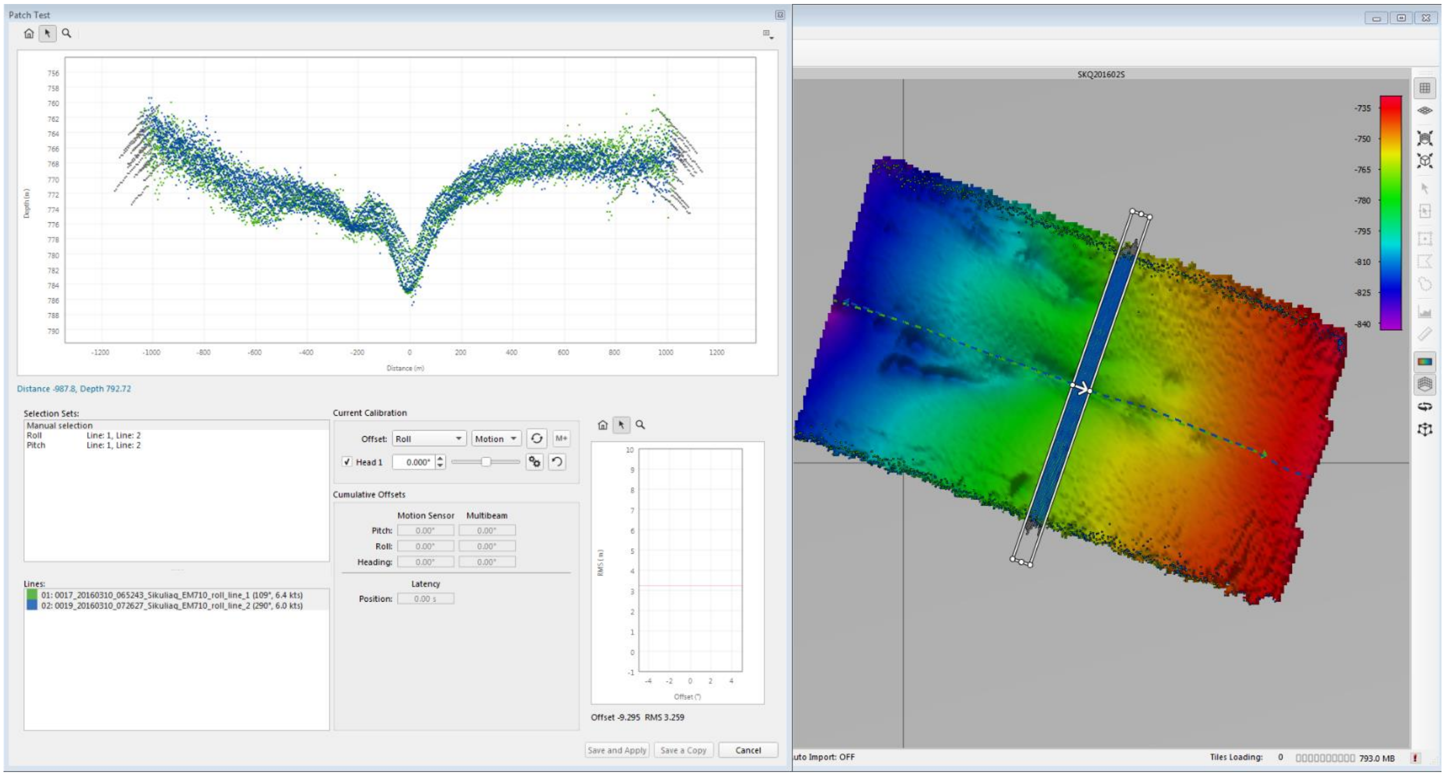


Figure 6. EM710 / Seapath roll calibration in Qimera, applying an adjustment of 0.00° to the original value for a final offset of +0.20° in SIS.

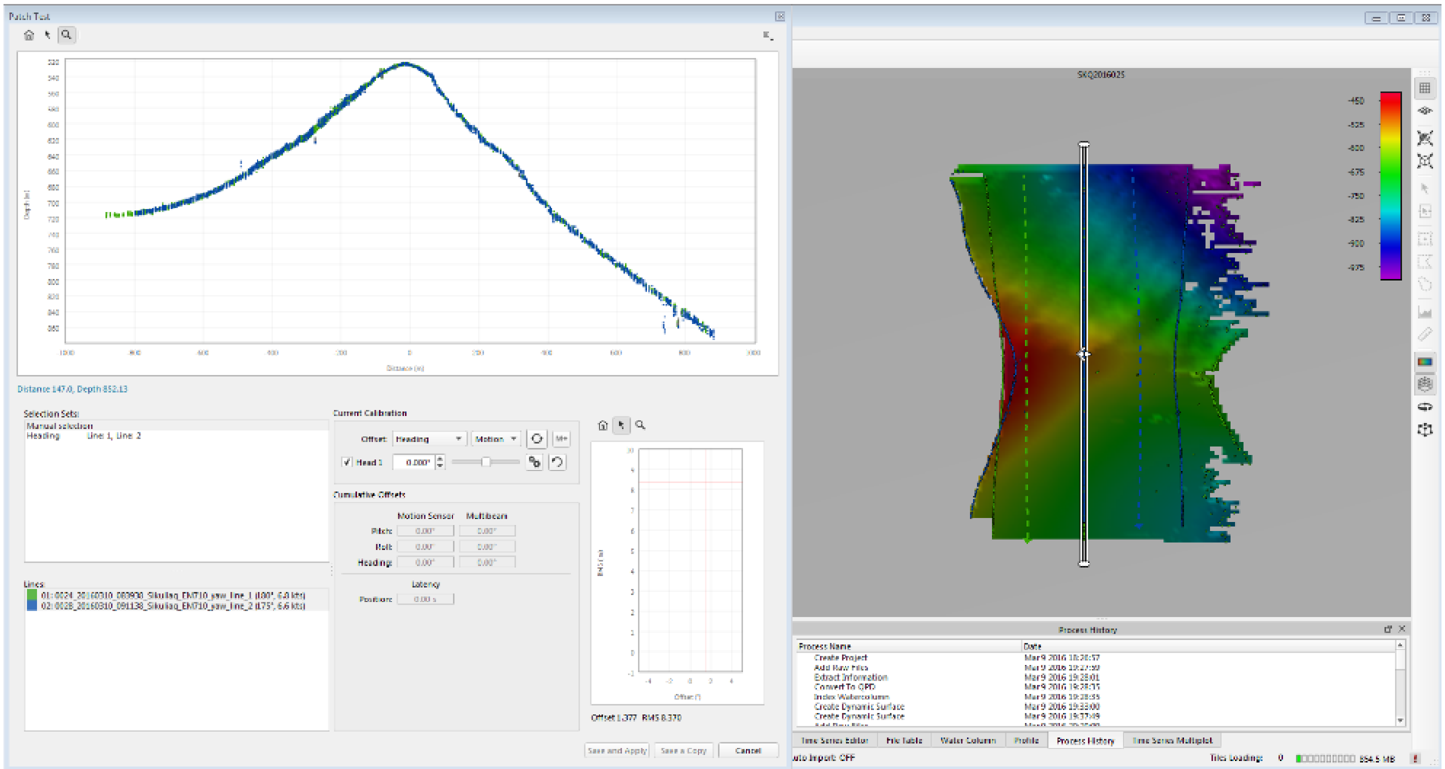


Figure 7. EM710 / Seapath yaw calibration in Qimera, applying an adjustment of 0.00° to the original value for a final offset of -0.08° in SIS.

Transducer and System Health

A full Built-In Self-Test (BIST) diagnostic routine was run through the SIS acquisition software prior to departure from San Diego with both systems passing all tests. Additionally, a transmitter impedance BIST was run through a telnet session. As has been mentioned in previous reports, the BIST provides the ability to perform impedance measurements of the transmitter elements, receiver array modules, and receiver. These tests are useful in establishing the health of system as a whole, especially with regard to the transmitter elements as these components have been known to degrade over time with normal use. It is important to note that the BIST impedance measurements do not provide a full characterization of transducer properties as a function of frequency. However, the BISTs provide useful indicators of overall transducer health over their lifetime, especially when conducted on a routine basis.

The overall TX impedance patterns (Figure 8-9) are similar to those collected during the 2014 SAT, showing acceptably small changes in transmitter array health for both systems. Two EM302 transmitter elements now show high impedance (Slot 10/Channel 23 and Slot 12/Channel 26), in addition to the seven high impedance channels documented in 2014. The EM710 transmitter impedance values show no appreciable change from 2014 and no failed elements.

Receiver and receiver module impedance measurements (Figures 10-13) show minimal variation from the 2014 SAT values, with the exception of a marked increase across all EM710 receiver modules. The 2016 values for this test follow almost exactly the same trends across modules as the 2014 data, with an offset of roughly 100 ohms. The root of this offset is unclear; however, the consistency in trends across modules from 2014 to 2016 (with the exception of module 112) suggest no worrisome degradation of any particular parts of the array.

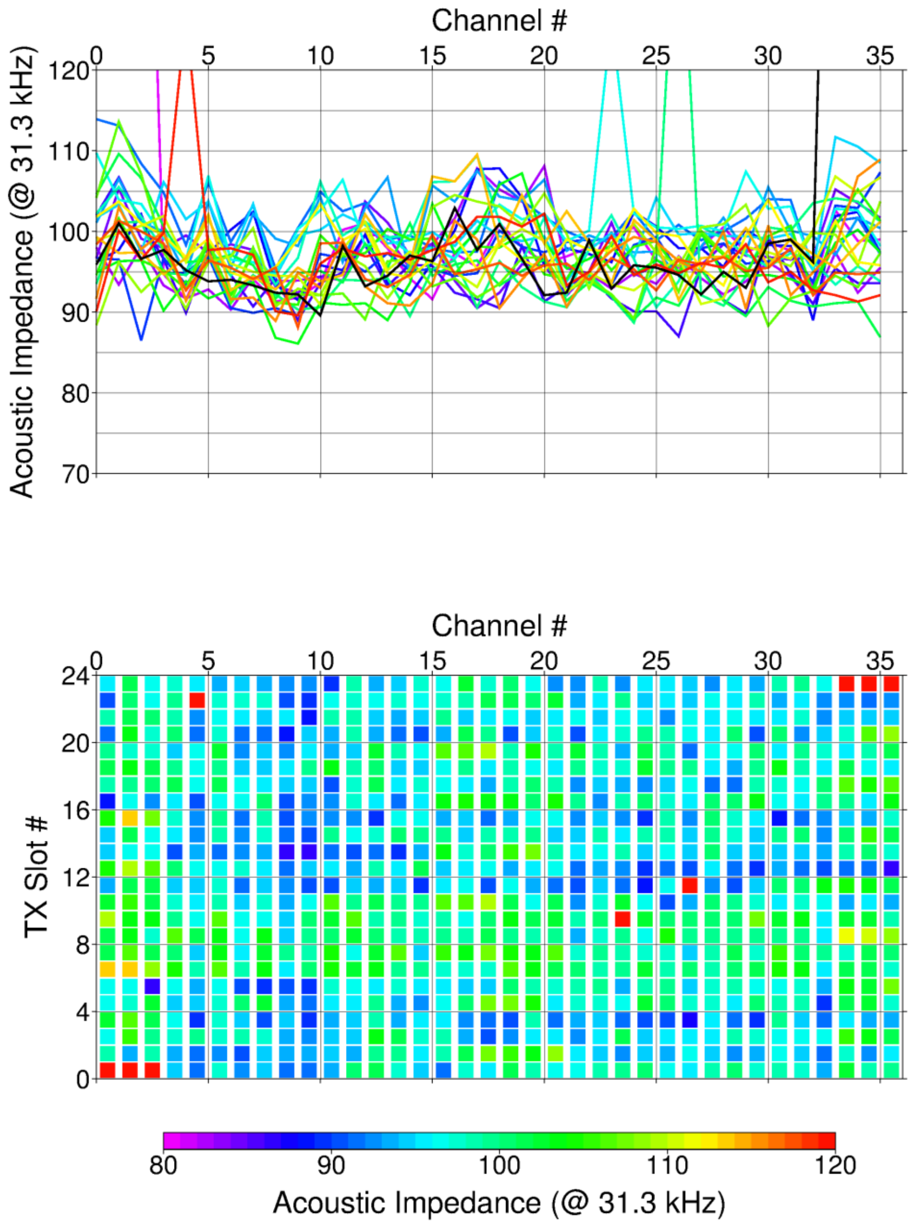


Figure 8. EM302 transmitter channel impedance during SKQ201602S, as measured by BIST through the system electronics.

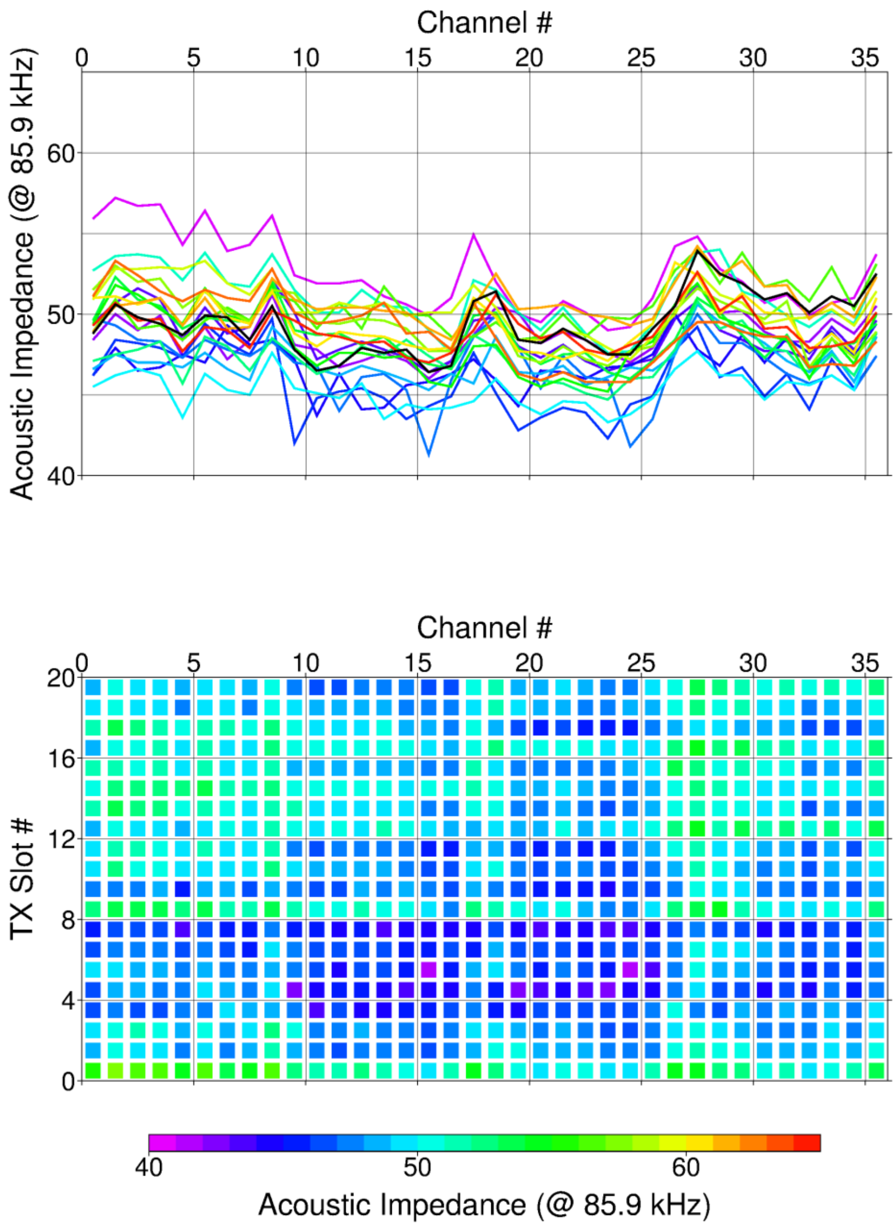


Figure 9. EM710 transmitter channel impedance during SKQ201602S, as measured by BIST through the system electronics.

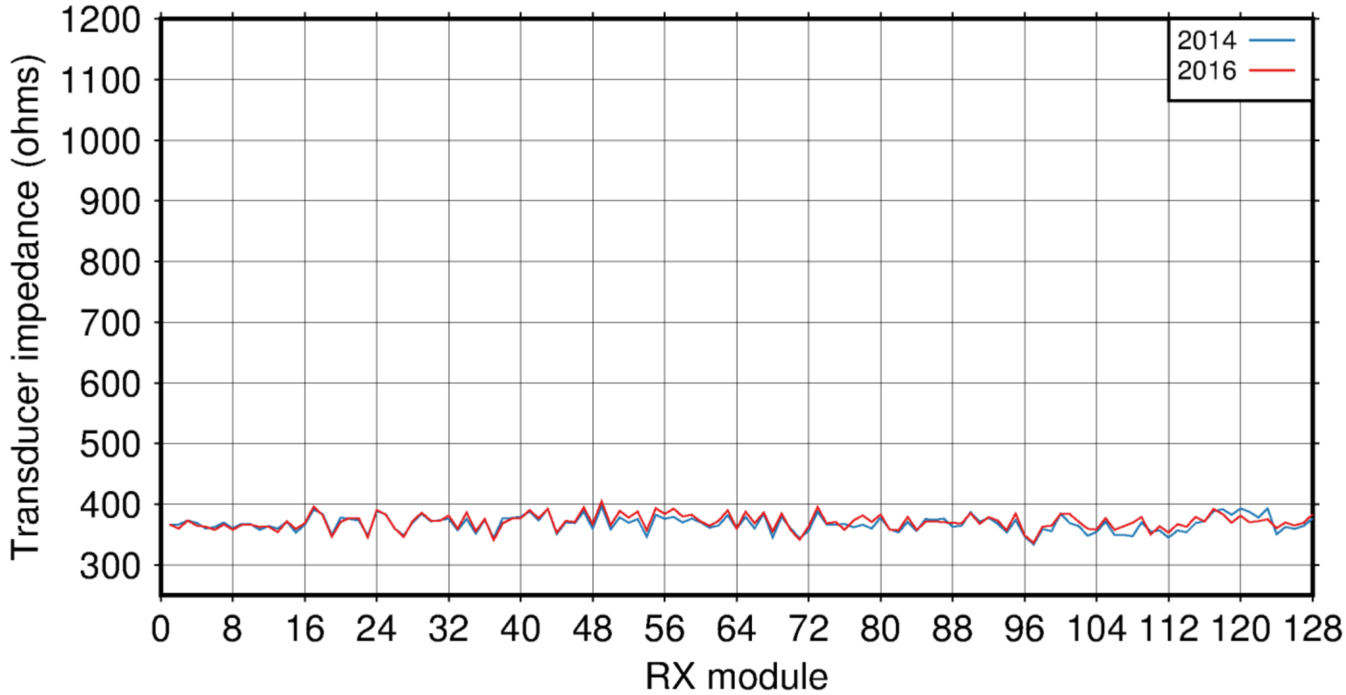


Figure 10. EM302 receiver transducer impedance measured during SKQ201602S (red) and the 2014 SAT (blue).

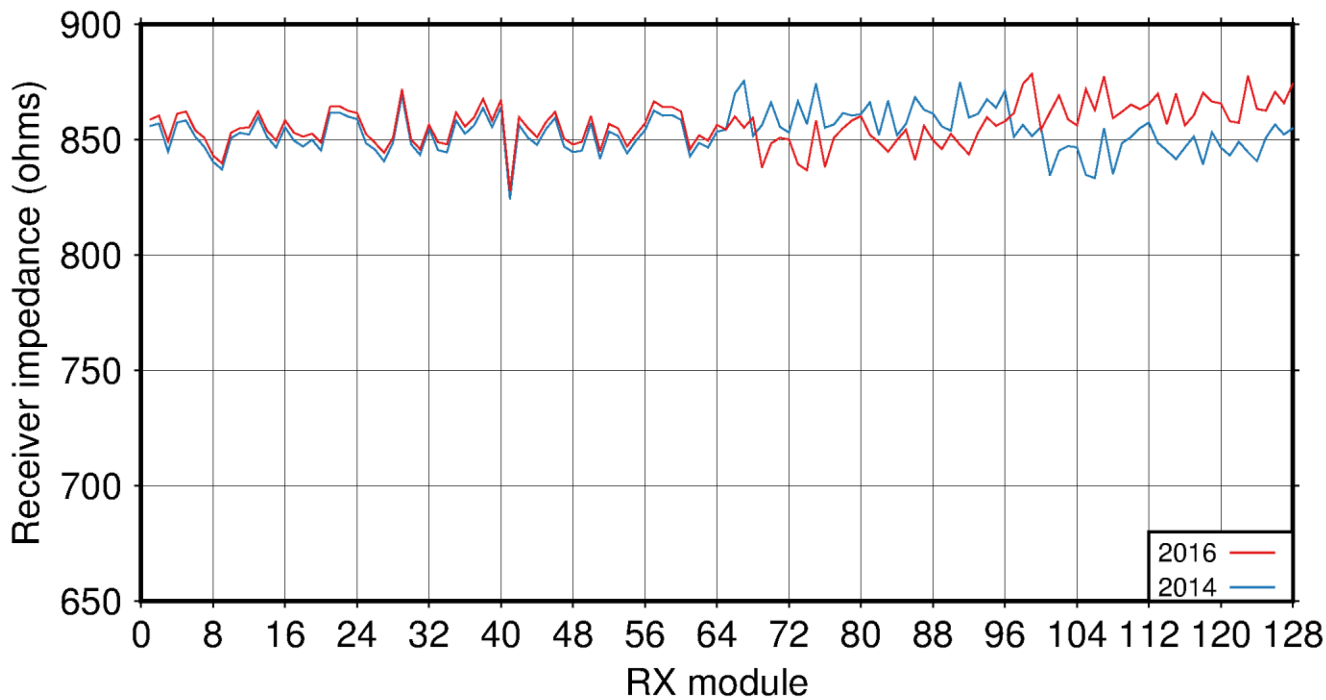


Figure 11. EM302 receiver impedance measured during SKQ201602S (red) and the 2014 SAT (blue).

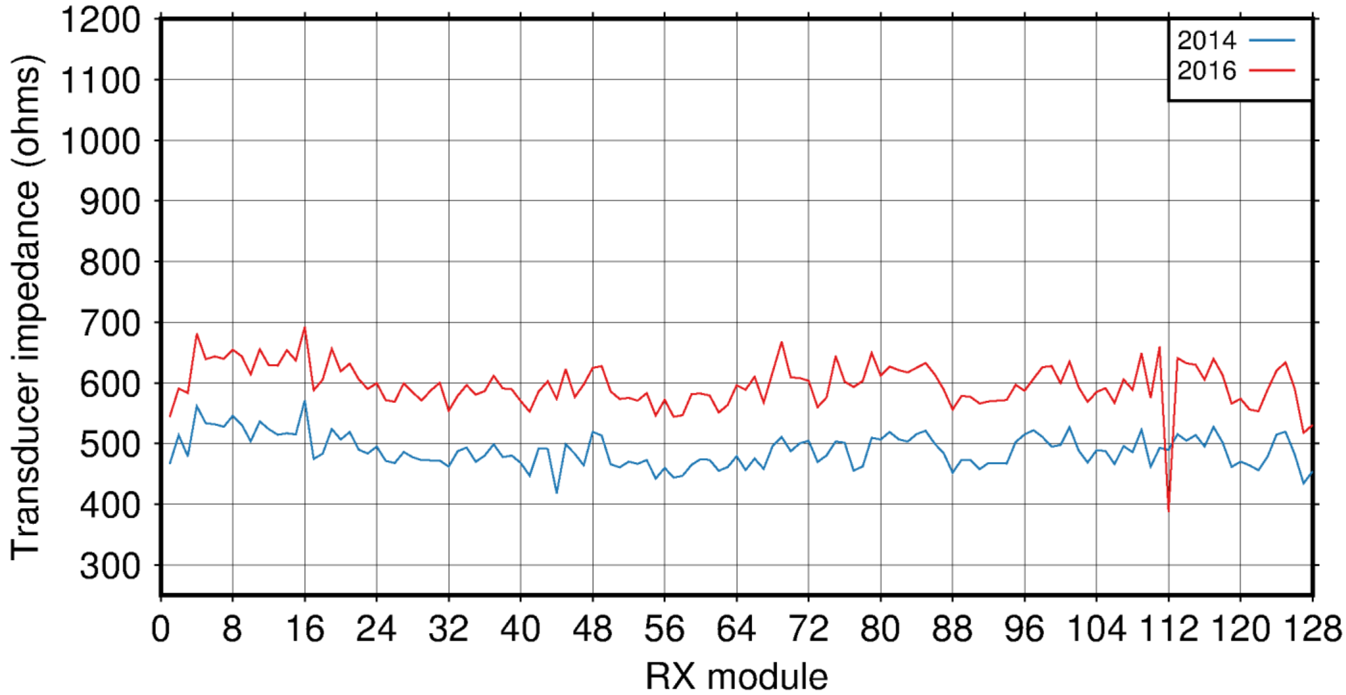


Figure 12. EM710 receiver transducer mpedance during SKQ201602S (red) and the 2014 SAT (blue). The root cause of the bulk shift from 2014 to 2016 is unclear at present.

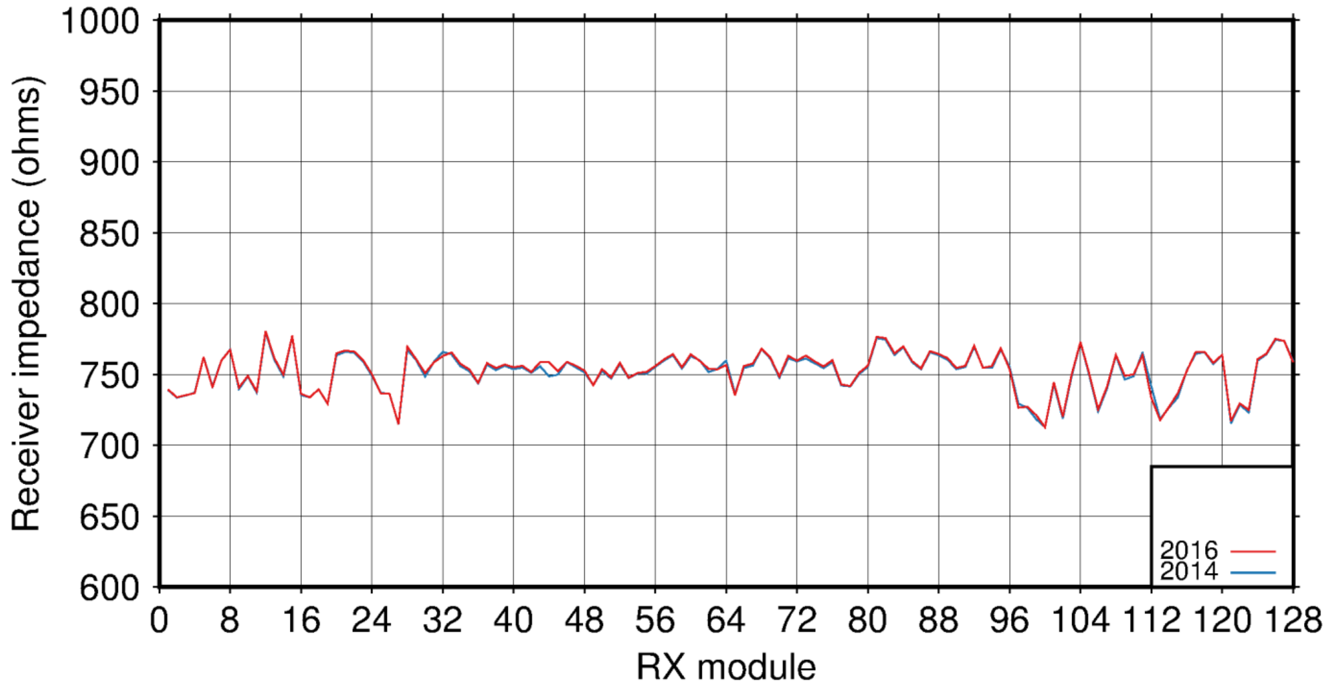


Figure 13. EM710 receiver impedance during SKQ201602S (red) and the 2014 SAT (blue).

Swath Coverage Performance

Overview

Figure 1 depicts all tracklines for SKQ201602S, during which the EM302 and EM710 were both operated for all transits among San Diego, coring sites, patch test sites, and survey sites for subbottom profiling (a separate cruise activity). Both the EM710 and EM302 were run with the depth mode set to automatic, in which the system chooses the proper depth mode automatically based on water depth observed, and with runtime parameters set to maximum angular coverage (+/- 75° for both the EM302 and EM710) and to maximum swath distance (+/-5000 m for the EM302 and +/-2000 m for the EM710). Both MBES systems were synchronized via the Kongsberg K-Sync unit with the EM302 set as the master sonar. This was done to avoid ping timing problems in depths beyond the EM710 capability, which would otherwise cause the EM710 to continuously seek bottom and interfere with the EM302.

The transit lines were run at speeds of 8-10 kts and cover depths of approximately 10-2,000 m, providing an opportunity to examine the achieved swath coverage as a function of depth for each system in the survey mode automatically selected for each depth range. Naturally, there are many factors at play in the achieved swath coverage for each system and bubble sweep-down along the hull and over the ends of the EM302 RX array is believed to be a significant complication for this system. The EM710 RX array is shorter in the athwartship direction and is apparently affected much less severely by bubble sweep along its port and starboard edges.

EM302 Swath Coverage

Figure 14 shows the EM302 data used to calculate the swath coverage performance curve shown in Figure 15. In general, the swath coverage achieved during SKQ201602S corresponded with that during the 2014 SAT over the depth ranges covered and demonstrates that the system is working to its expected coverage performance.

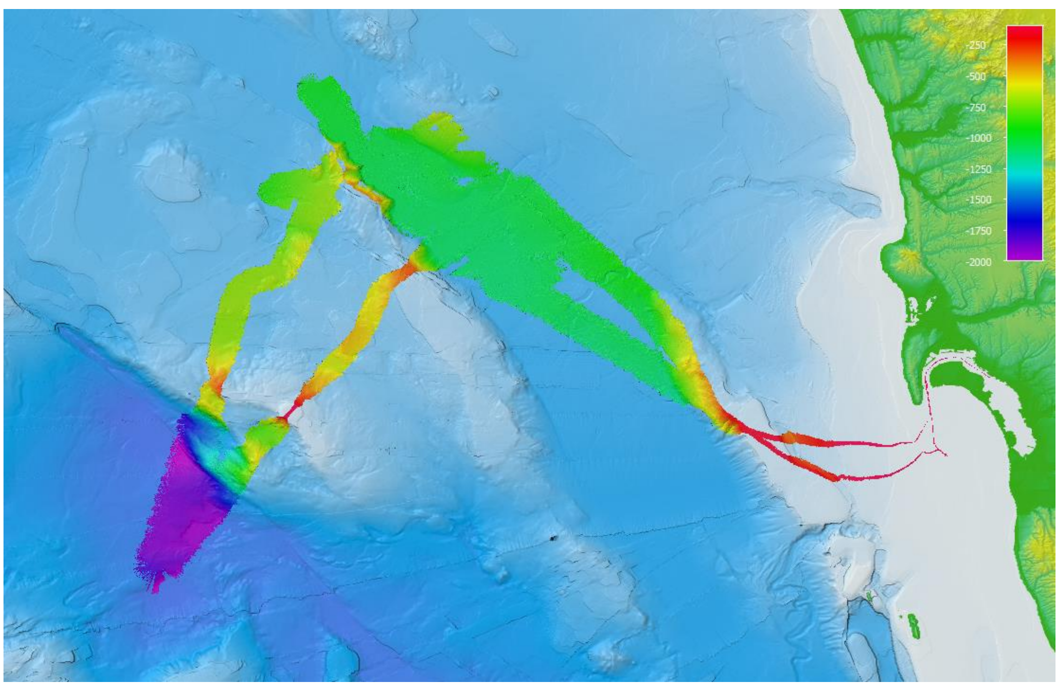


Figure 14. EM302 data contributing to the swath coverage curves below. The depth color scale is 100 m (red) to 2000 m (purple).

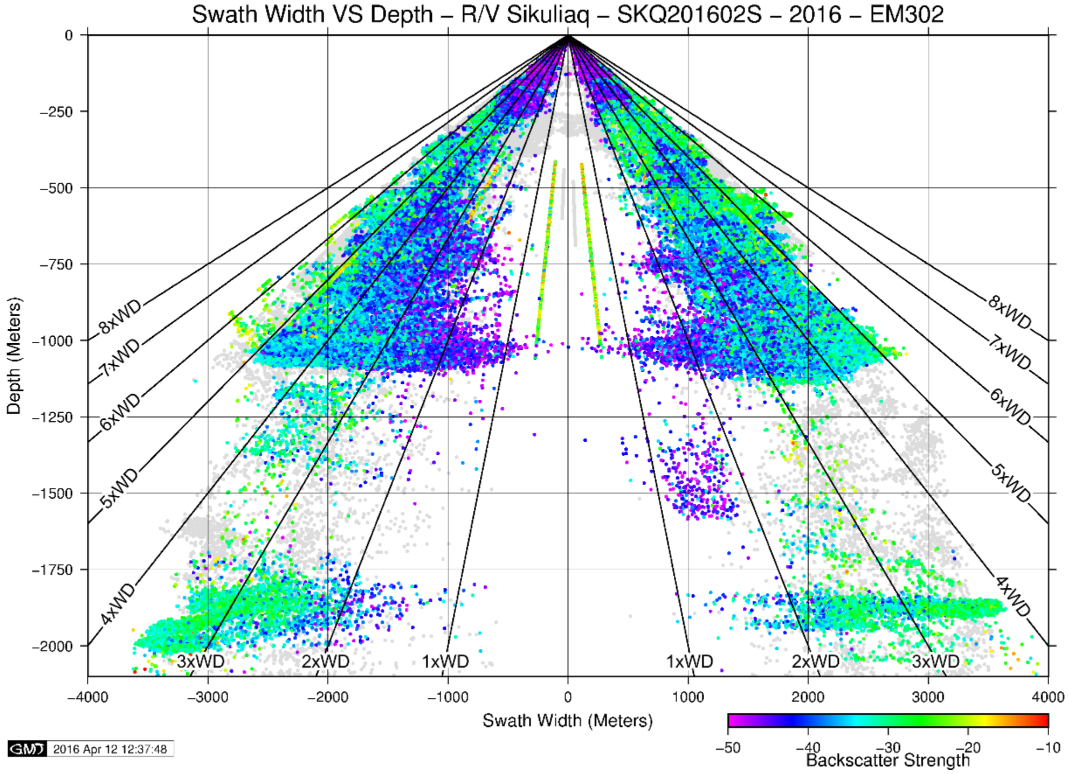


Figure 15. EM302 swath coverage performance during SKQ201602S plotted over 2014 SAT coverage (gray points).

EM710 Swath Coverage

Figure 16 shows the EM710 data used to calculate the swath coverage performance curve shown in figure 17. As with the EM302, the EM710 achieved swath coverage matching the 2014 performance down to 2000 m, beyond which the system rapidly reaches full acoustic attenuation and swath width goes to zero.

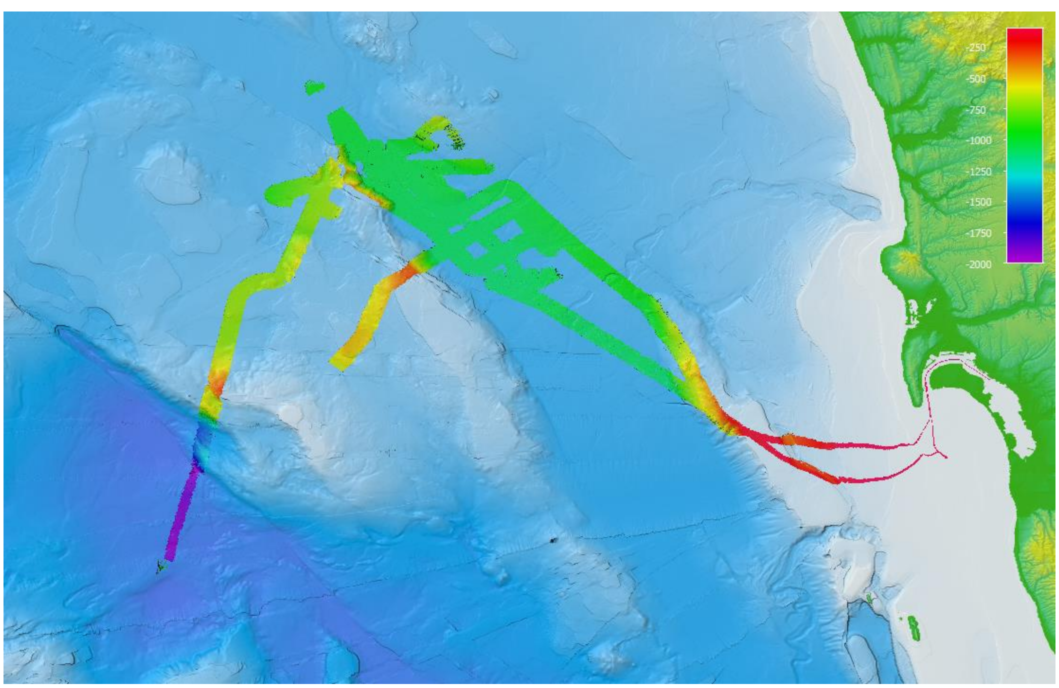


Figure 16. EM710 data contributing to the swath coverage curves below. The depth color scale is 100 m (red) to 2000 m (purple).

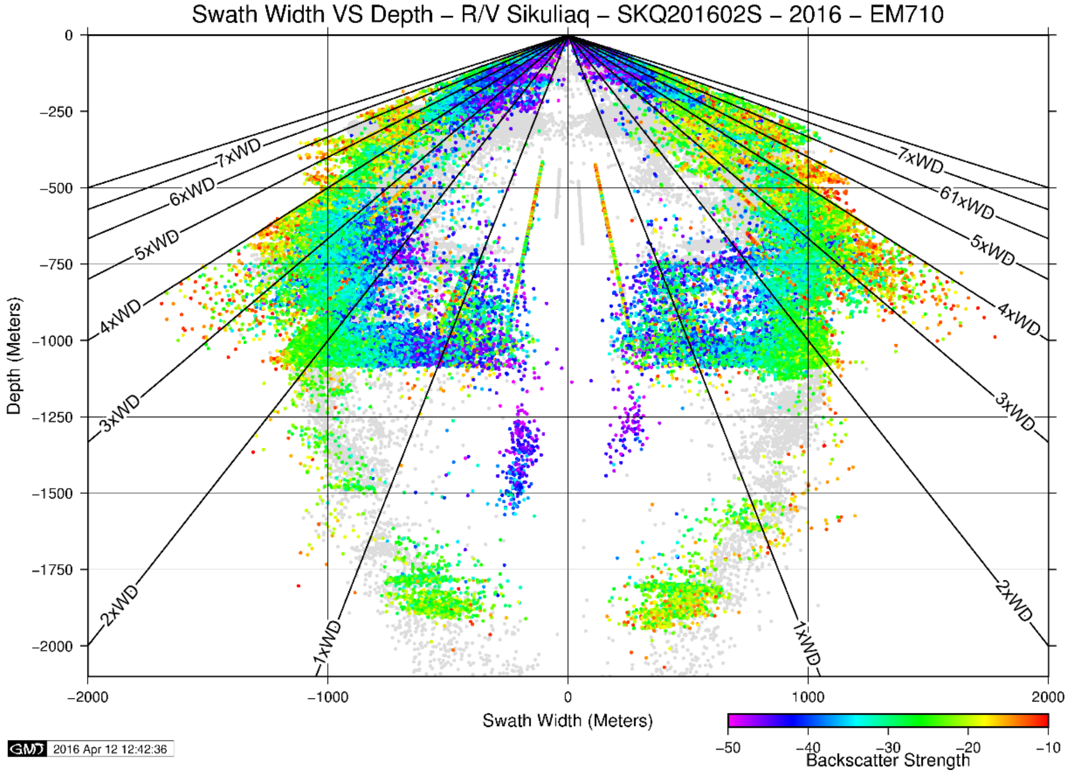


Figure 17. EM710 swath coverage achieved during SKQ201602S plotted over 2014 SAT coverage (gray points).

Principal Findings & Recommendations

- The EM302 and EM710 were successfully calibrated and verified using the new Seapath GPS antenna configuration. The angular offset corrections that were applied to two of the six total possible parameters (EM302 pitch and roll) are sufficiently small to fall within routine patch test results; of particular note, the EM710 configuration required zero adjustment. The systems have been updated with the new calibration results to be used until another calibration is performed. Post-SKQ201602S SIS configurations have been stored under SIS\common\pu_params for each machine and are available from the MAC if necessary.

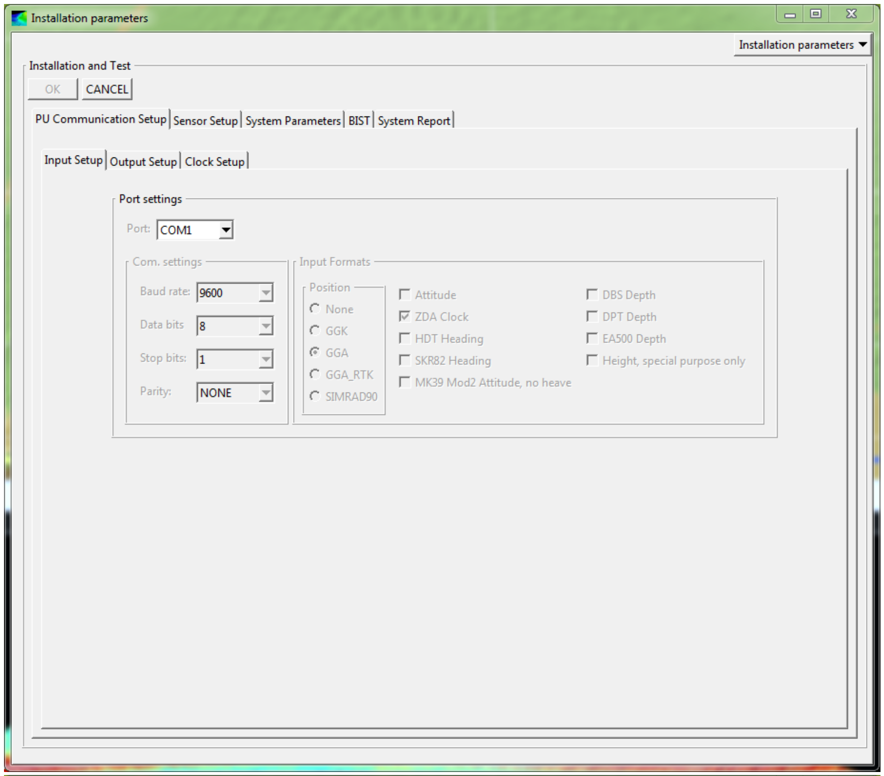
- The Seapath 320 configuration was successfully updated and calibrated using the new GPS antenna locations. The calculated secondary antenna location agreed to within 9 mm with the surveyed location, indicating a high quality survey and correct implementation within the Seapath software. The post-SKQ201602S Seapath configuration was stored on the local machine and is available from the MAC if necessary.

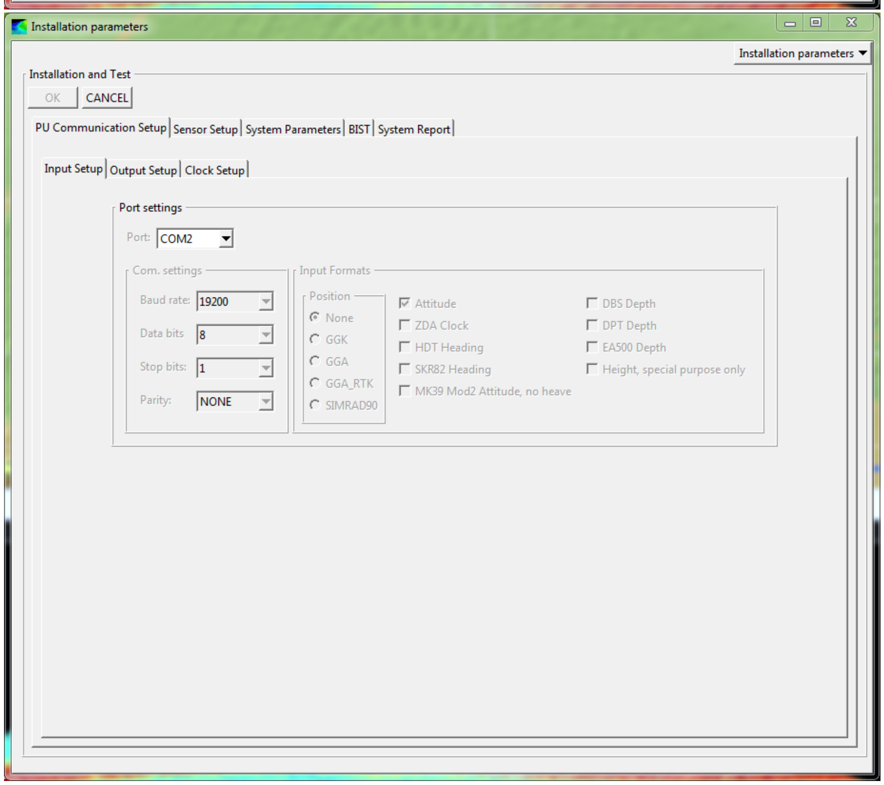
- The transmit transducer impedances are similar to baseline measurements taken in 2014, with an increase in the number of 'high impedance' elements (from 7 to 9) reported for the EM302 and no change in the number of 'high impedance' elements (from 0 to 0) reported for the EM710. Transmitter conditions, based on these tests, are acceptable for both systems and should be monitored on a routine basis using the TX BIST routine outlined in the appendix.

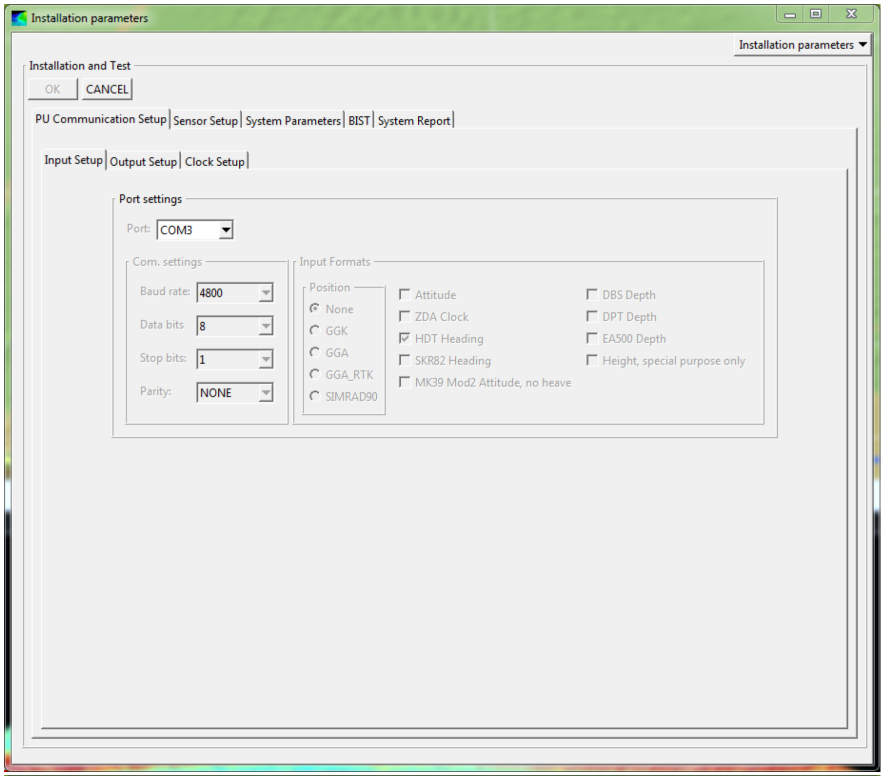
- Receiver and receiver array impedance values measured in 2016 generally followed the trends observed in 2014, with the exception of a bulk offset for the EM710 receiver array. The origin of this offset has not been determined, but the consistency in trends across channels between the two years suggest a measurement error and no significant degradation of the receiver array impedance.
- Both multibeam systems provide bathymetric measurements that are in agreement with their expected performances and that are consistent with examination in 2014 and operator experience on board. Though bubble sweep-down along the EM302 RX array remains an issue that severely affects data quality heading into a swell, there is no apparent evidence of degradation of sensor performance since the 2014 SAT.
- Because SKQ201602S was limited to depths of approximately 2,000 m, it would be ideal to include a deeper reference site (~4,500 m) during the next system evaluation to perform a deep roll verification and test the EM302's ability to accurately map at a typical deep ocean depth.
- As a whole, the two multibeam systems are in satisfactory working condition (with regard given to the limitations of an icebreaking hull on the EM302 RX array configuration) and we do not anticipate any obvious issues with either system for the 2016 mapping season.
- The survey reports documenting system offsets and angles should be maintained and updated carefully as sensor configurations change, in tandem with documentation for future patch tests and SIS modifications.
- NOTE: After the MAC visit, the EM302 suffered power module failures on April 6, 2016. Kongsberg replaced both the 6-Volt and 12-Volt power supplies during a visit to the ship on April 17-18, 2016. The root cause(s) of the failures is/are unknown at present.

Appendix

EM302 SIS Configuration



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SKR82 Heading
MK39 Mod2 Attitude, no heave
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DPT Depth
EA500 Depth
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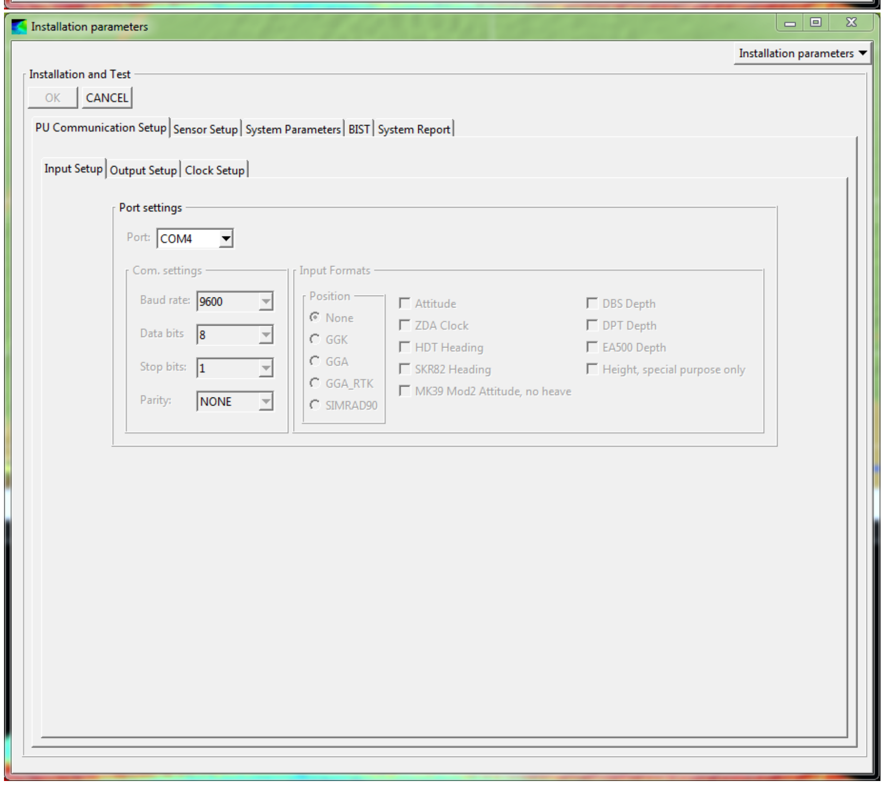
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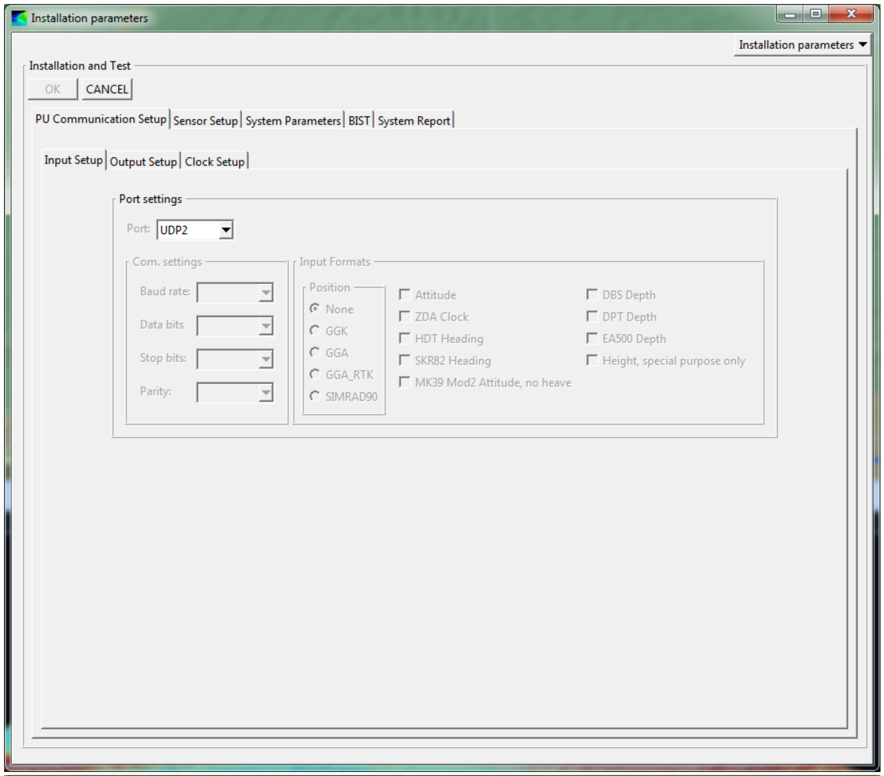
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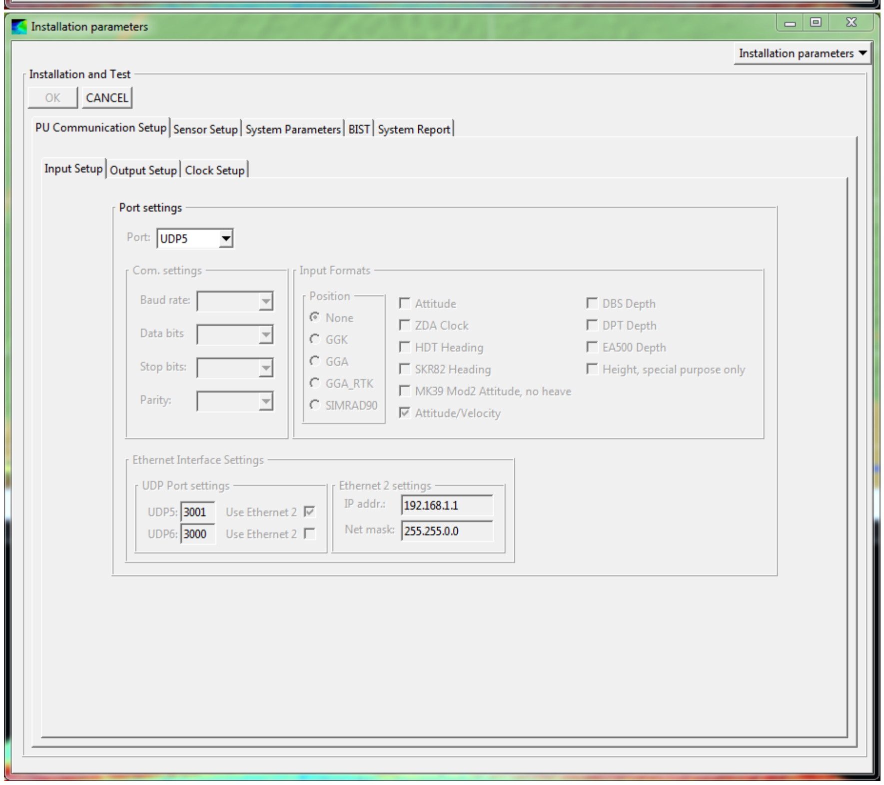
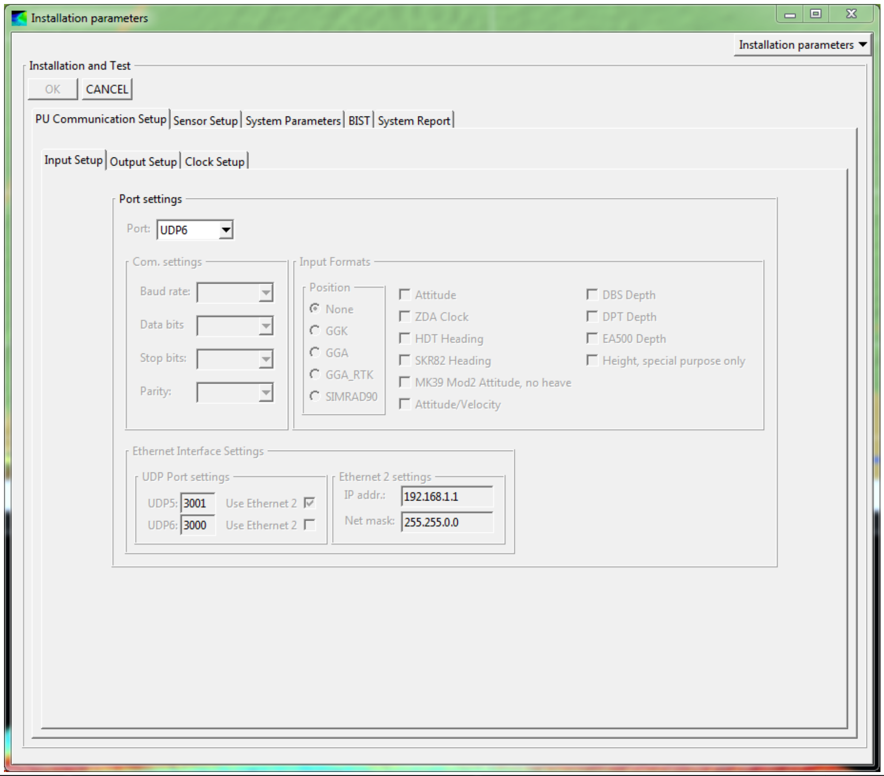
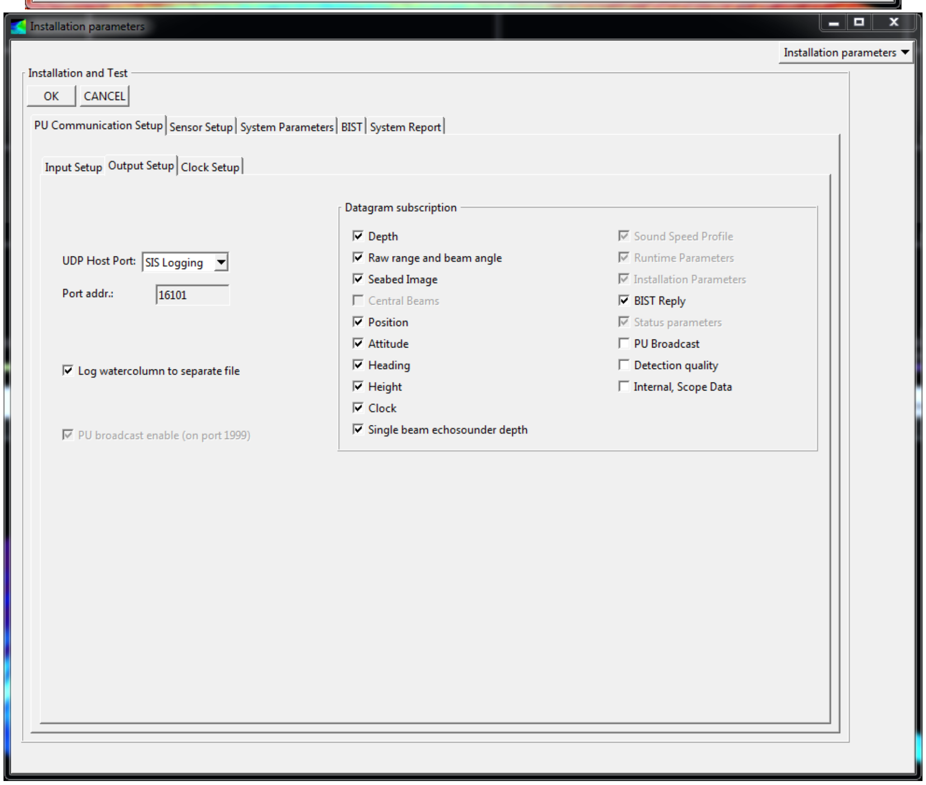
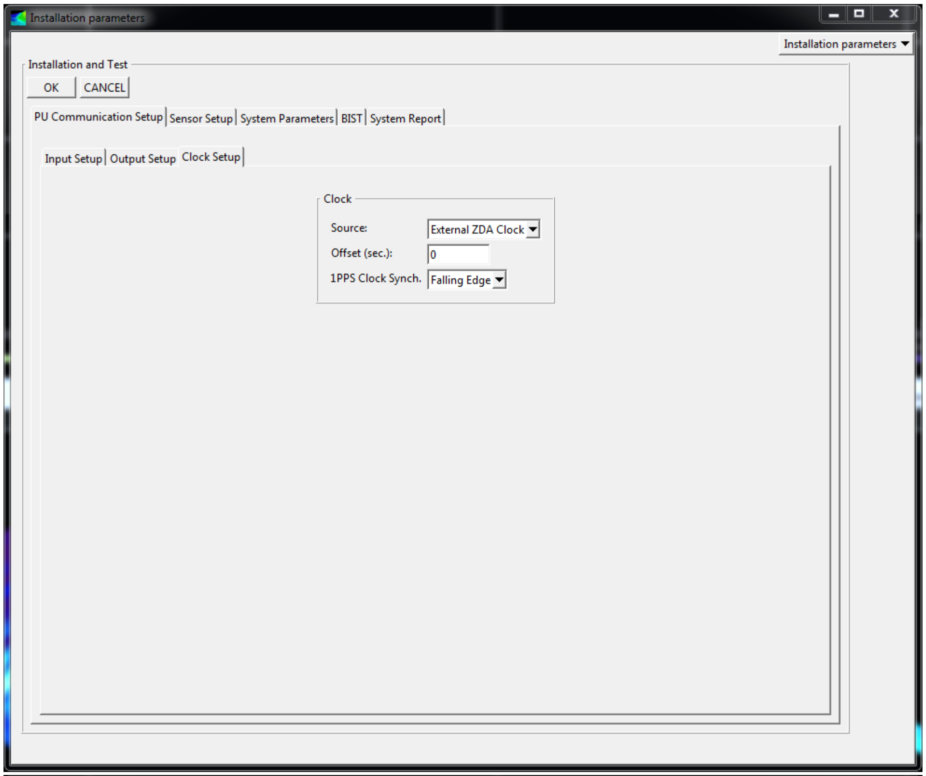
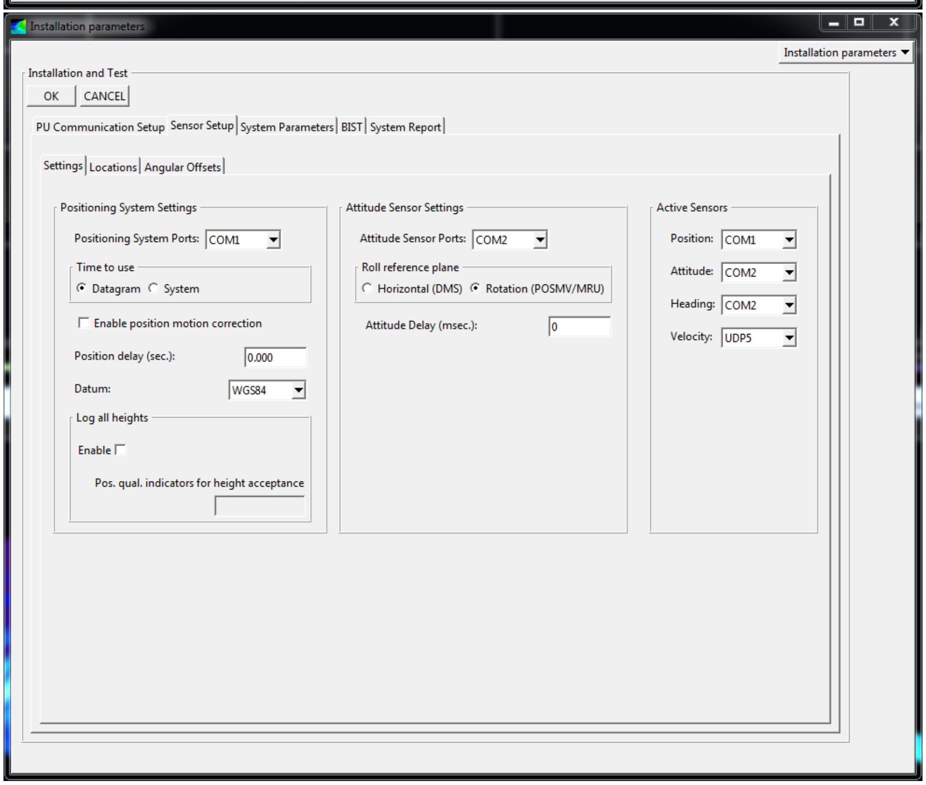
Stop bits:
Parity:
Input Formats
Position
None
GGK
GGA
GGA_RTK
SIMRAD90
Attitude
ZDA Clock
HDT Heading
SKR82 Heading
MK39 Mod2 Attitude, no heave
DBS Depth
DPT Depth
EA500 Depth
Height, special purpose only

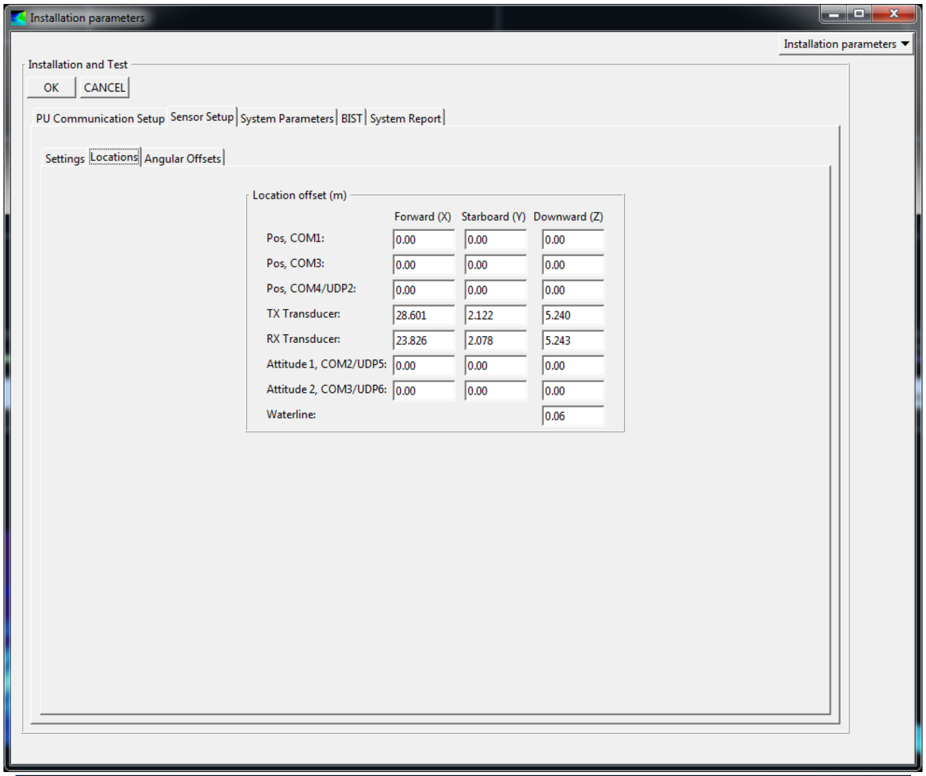

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Input Setup
Output Setup
Clock Setup
Port settings
Port:
UDP5
Com. settings
Baud rate:
Data bits
Stop bits:
Parity:
Input Formats
Position
None
GGK
GGA
GGA_RTK
SIMRAD90
Attitude
ZDA Clock
HDT Heading
SKR82 Heading
MK39 Mod2 Attitude, no heave
Attitude/Velocity
DBS Depth
DPT Depth
EA500 Depth
Height, special purpose only
Ethernet Interface Settings
UDP Port settings
UDP5: 3001
Use Ethernet 2
UDP6: 3000
Use Ethernet 2
Ethernet 2 settings
IP addr.: 192.168.1.1
Net mask: 255.255.0.0

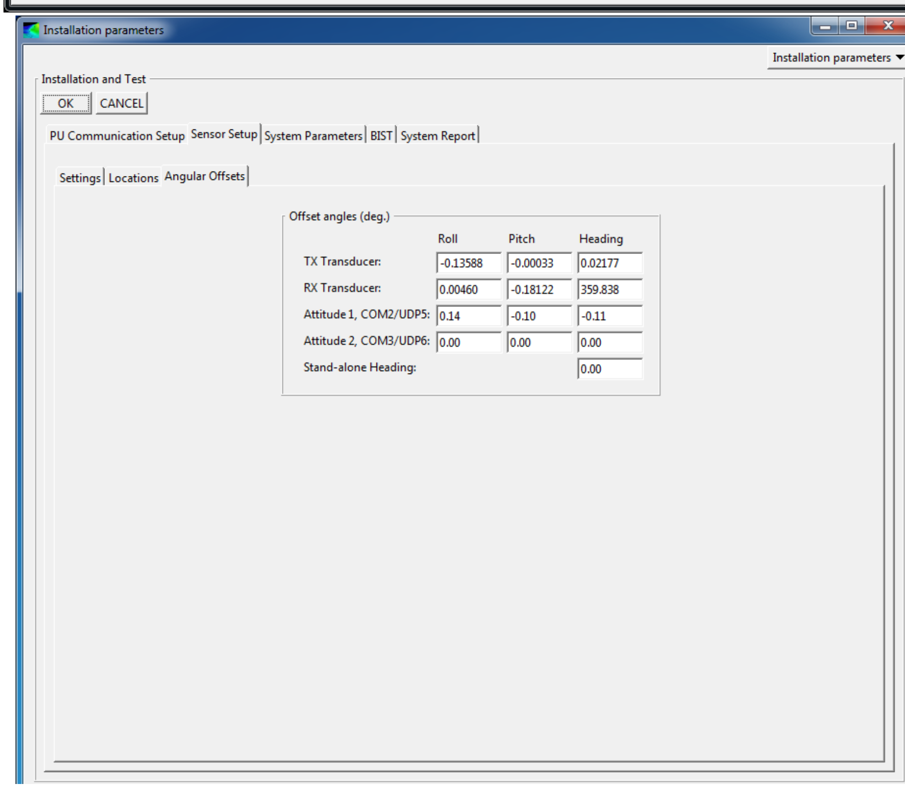

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Input Setup
Output Setup
Clock Setup
Port settings
Port: UDP6
Com. settings
Baud rate:
Data bits
Stop bits:
Parity:
Input Formats
Position
None
GGK
GGA
GGA_RTK
SIMRAD90
Attitude
ZDA Clock
HDT Heading
SKR82 Heading
MK39 Mod2 Attitude, no heave
Attitude/Velocity
DBS Depth
DPT Depth
EA500 Depth
Height, special purpose only
Ethernet Interface Settings
UDP Port settings
UDP5: 3001 Use Ethernet 2
UDP6: 3000 Use Ethernet 2
Ethernet 2 settings
IP addr.: 192.168.1.1
Net mask: 255.255.0.0

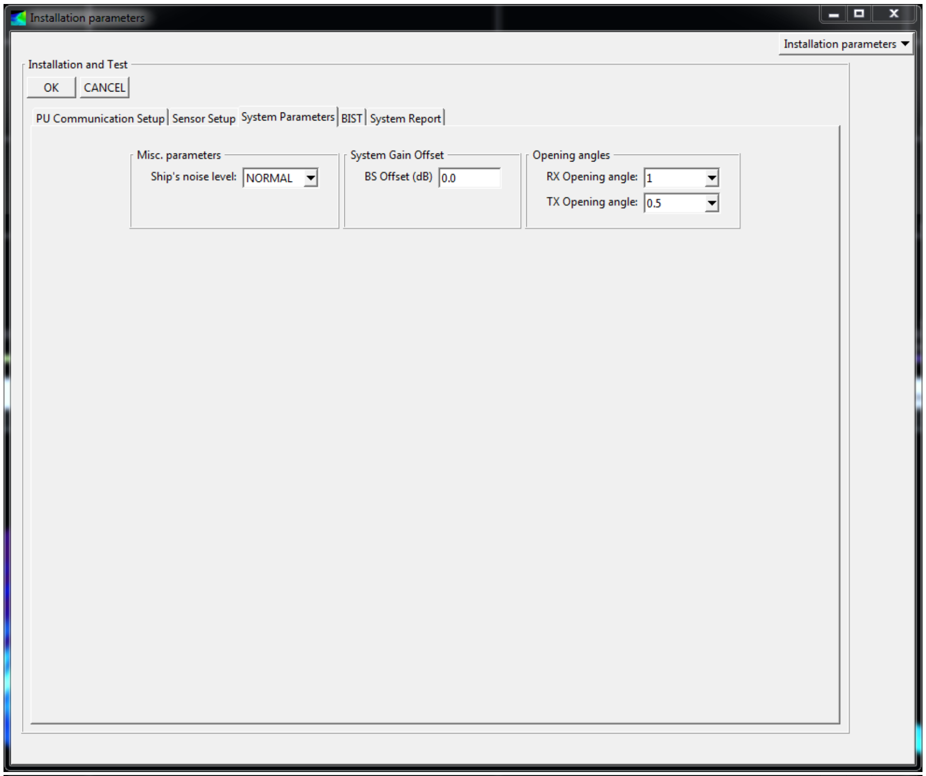

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Input Setup
Output Setup
Clock Setup
UDP Host Port: SIS Logging
Port addr.: 16101
Log watercolumn to separate file
PU broadcast enable (on port 1999)
Datagram subscription
Depth
Raw range and beam angle
Seabed Image
Central Beams
Position
Attitude
Heading
Height
Clock
Single beam echosounder depth
Sound Speed Profile
Runtime Parameters
Installation Parameters
BIST Reply
Status parameters
PU Broadcast
Detection quality
Internal, Scope Data

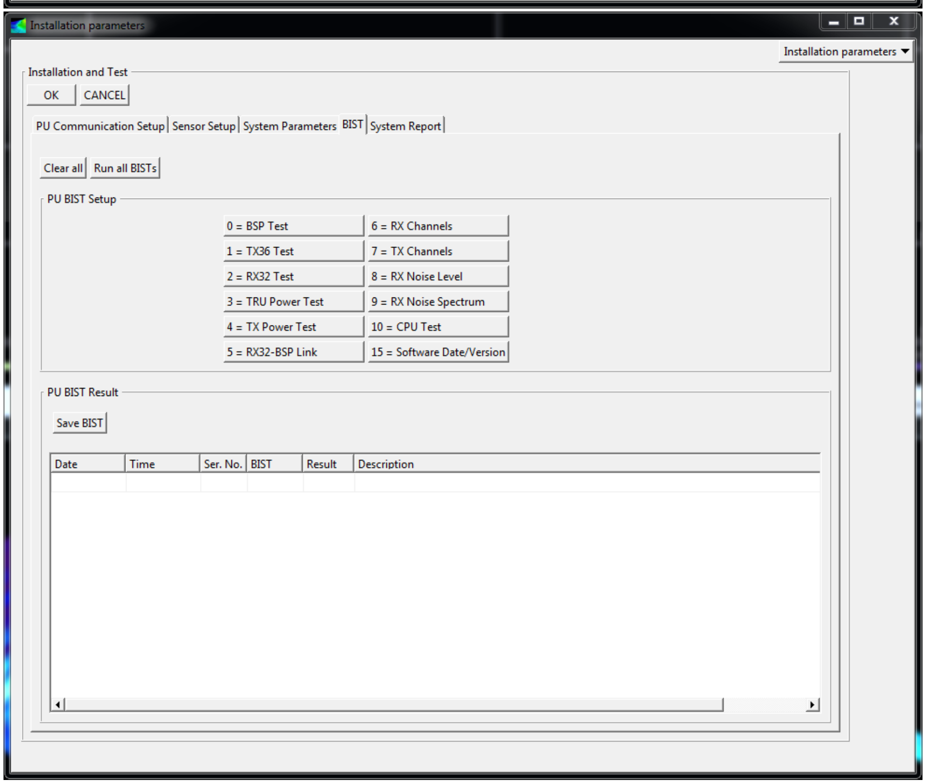

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Input Setup
Output Setup
Clock Setup
Clock
Source:
External ZDA Clock
Offset (sec.):
0
1PPS Clock Synch.
Falling Edge

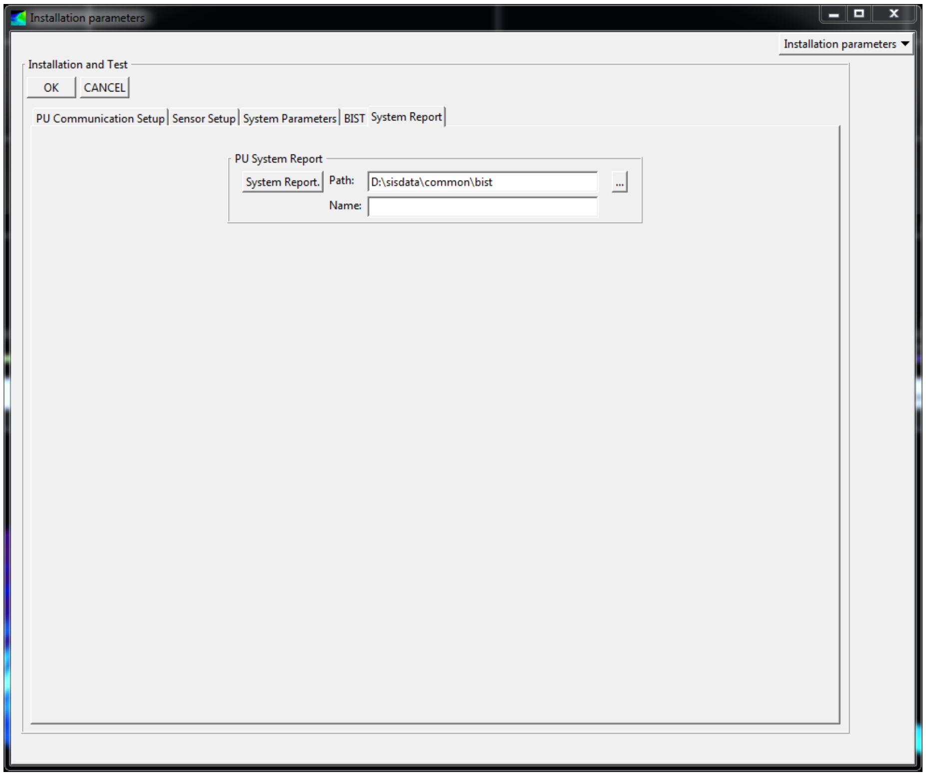

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Settings
Locations
Angular Offsets
Positioning System Settings
Positioning System Ports:
COM1
Time to use
Datagram
System
Enable position motion correction
Position delay (sec.):
0.000
Datum:
WGS84
Log all heights
Enable
Pos. qual. indicators for height acceptance
Attitude Sensor Settings
Attitude Sensor Ports:
COM2
Roll reference plane
Horizontal (DMS)
Rotation (POSMV/MRU)
Attitude Delay (msec.):
0
Active Sensors
Position:
COM1
Attitude:
COM2
Heading:
COM2
Velocity:
UDP5

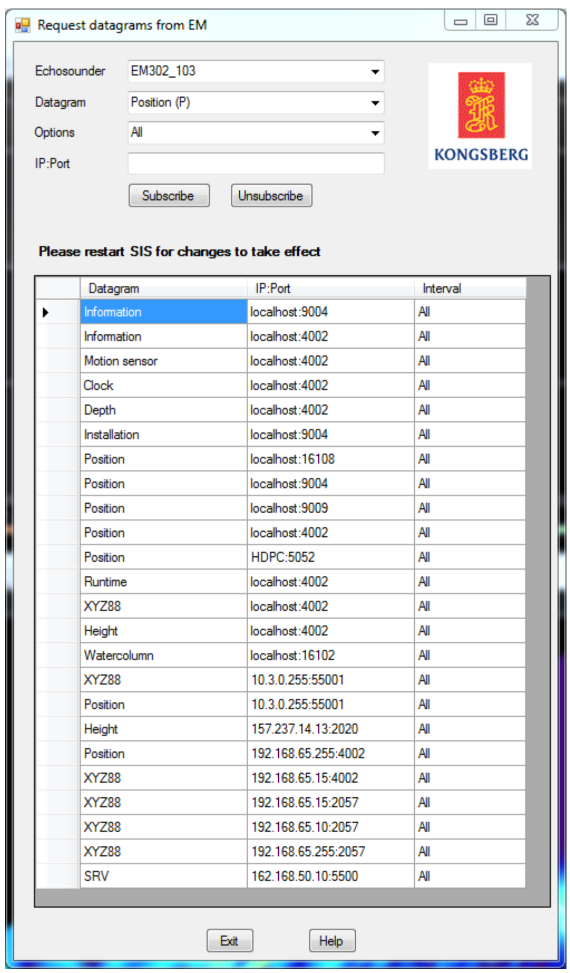

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Settings
Locations
Angular Offsets
Location offset (m)
Forward (X)
Starboard (Y)
Downward (Z)
Pos, COM1: 0.00 0.00 0.00
Pos, COM3: 0.00 0.00 0.00
Pos, COM4/UDP2: 0.00 0.00 0.00
TX Transducer: 28.601 2.122 5.240
RX Transducer: 23.826 2.078 5.243
Attitude 1, COM2/UDP5: 0.00 0.00 0.00
Attitude 2, COM3/UDP6: 0.00 0.00 0.00
Waterline: 0.06


Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Settings
Locations
Angular Offsets
Offset angles (deg.)
Roll
Pitch
Heading
TX Transducer: -0.13588 -0.00033 0.02177
RX Transducer: 0.00460 -0.18122 359.838
Attitude 1, COM2/UDP5: 0.14 -0.10 -0.11
Attitude 2, COM3/UDP6: 0.00 0.00 0.00
Stand-alone Heading: 0.00

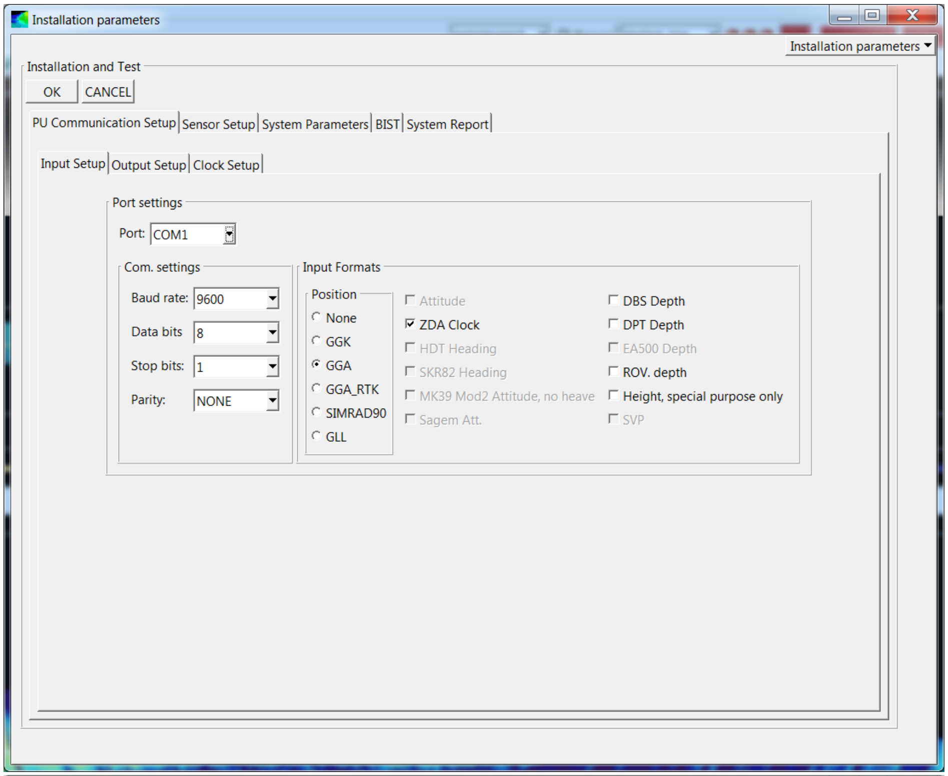

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Misc. parameters
Ship's noise level:
NORMAL
System Gain Offset
BS Offset (dB)
0.0
Opening angles
RX Opening angle:
1
TX Opening angle:
0.5

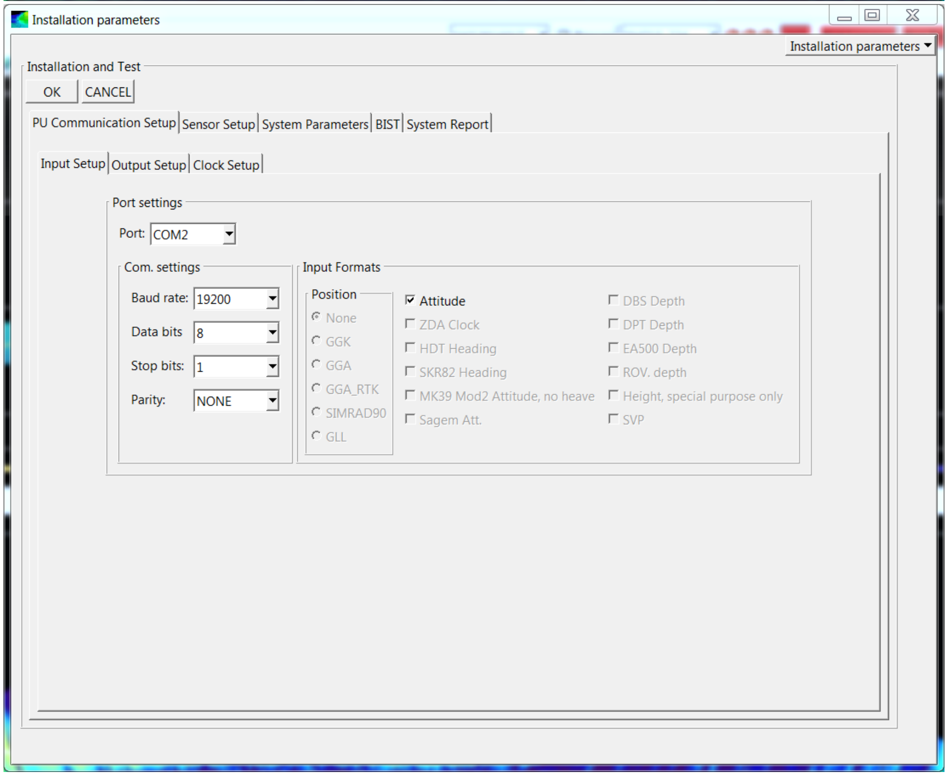

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Clear all
Run all BISTs
PU BIST Setup
0 = BSP Test
1 = TX36 Test
2 = RX32 Test
3 = TRU Power Test
4 = TX Power Test
5 = RX32-BSP Link
6 = RX Channels
7 = TX Channels
8 = RX Noise Level
9 = RX Noise Spectrum
10 = CPU Test
15 = Software Date/Version
PU BIST Result
Save BIST
Date
Time
Ser. No.
BIST
Result
Description

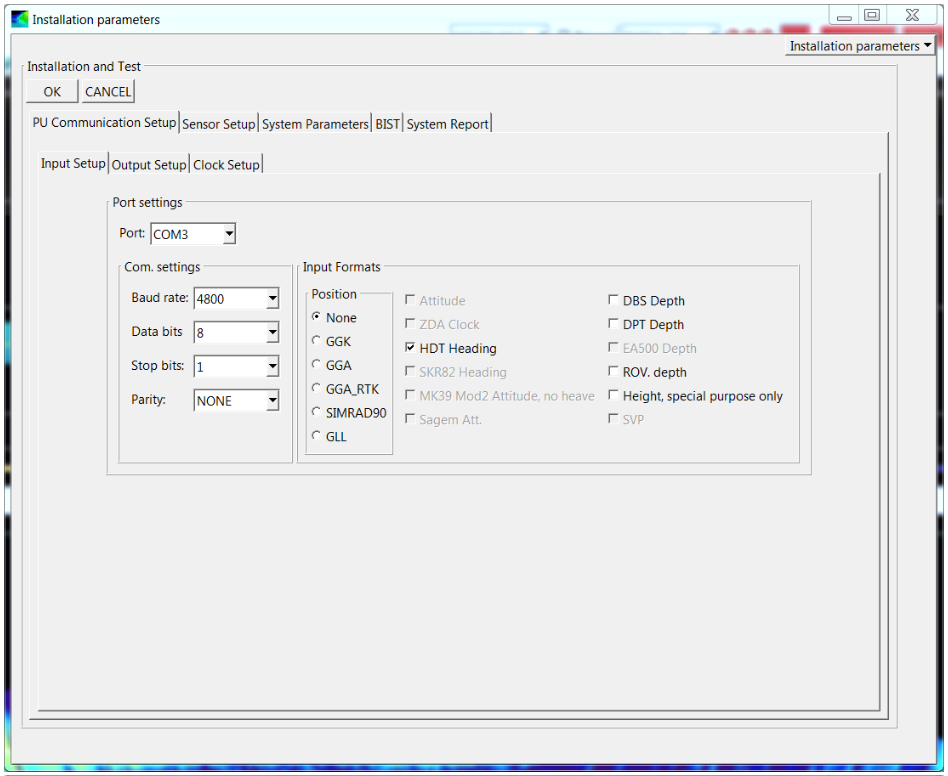

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
PU System Report
System Report.
Path:
D:\sisdata\common\bist
Name:

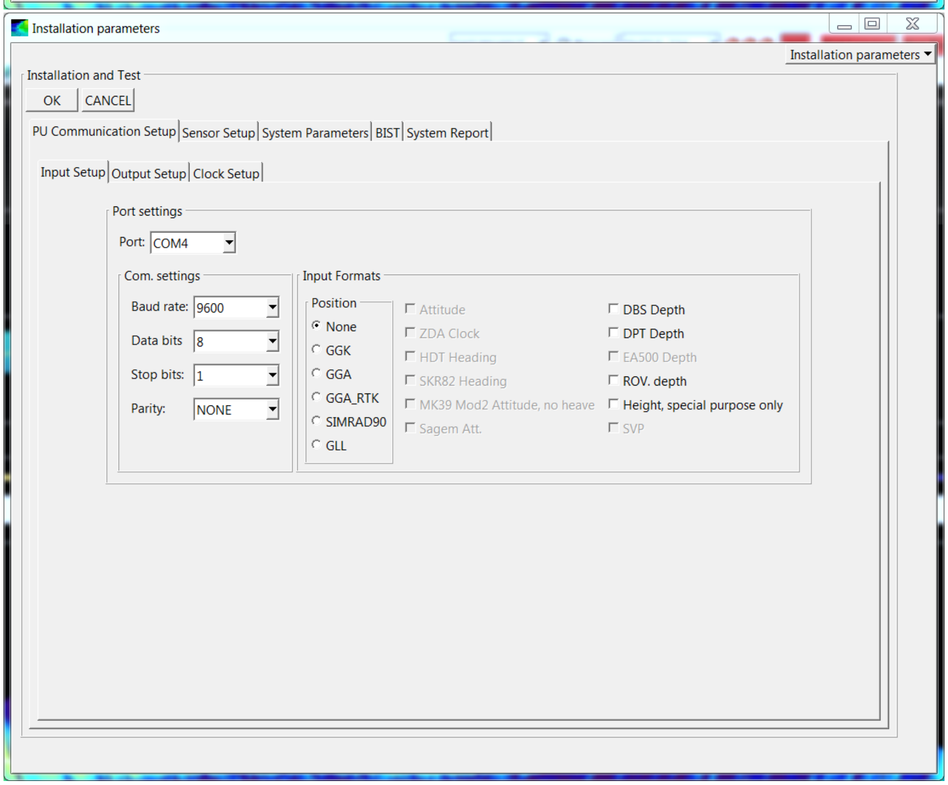

Request datagrams from EM
Echosounder
EM302_103
Datagram
Position (P)
Options
All
IP:Port
Subscribe
Unsubscribe
KONGSBERG
Please restart SIS for changes to take effect
Datagram
IP:Port
Interval
Information localhost:9004 All
Information localhost:4002 All
Motion sensor localhost:4002 All
Clock localhost:4002 All
Depth localhost:4002 All
Installation localhost:9004 All
Position localhost:16108 All
Position localhost:9004 All
Position localhost:9009 All
Position localhost:4002 All
Position HDPC:5052 All
Runtime localhost:4002 All
XYZ88 localhost:4002 All
Height localhost:4002 All
Watercolumn localhost:16102 All
XYZ88 10.3.0.255:55001 All
Position 10.3.0.255:55001 All
Height 157.237.14.13:2020 All
Position 192.168.65.255:4002 All
XYZ88 192.168.65.15:4002 All
XYZ88 192.168.65.15:2057 All
XYZ88 192.168.65.10:2057 All
XYZ88 192.168.65.255:2057 All
SRV 162.168.50.10:5500 All
Exit
Help

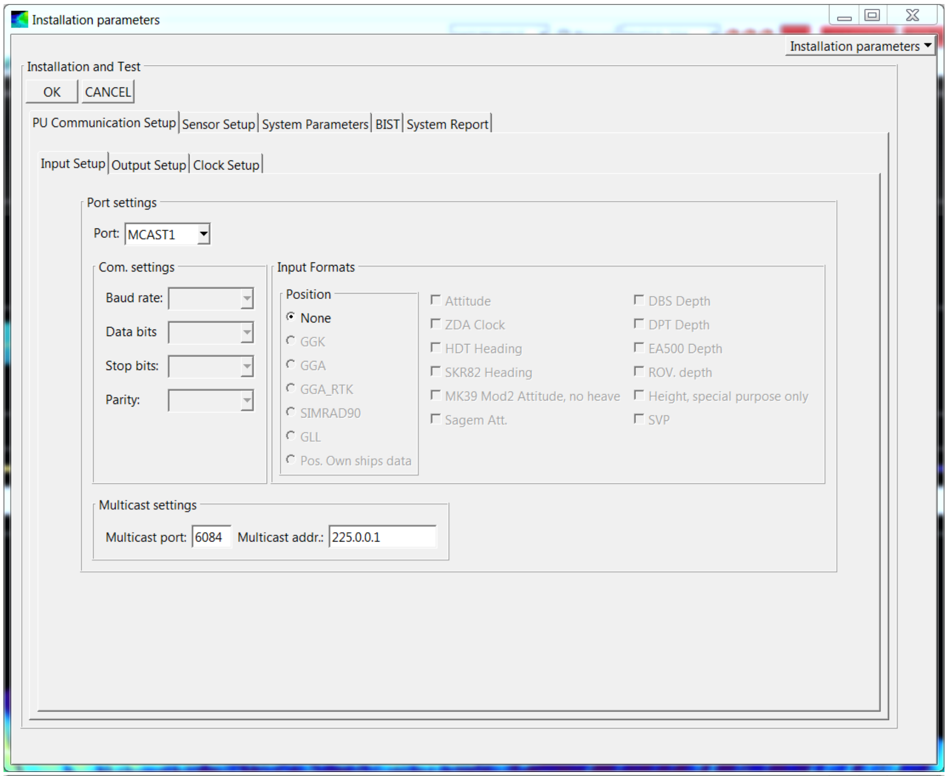
EM710 SIS Configuration

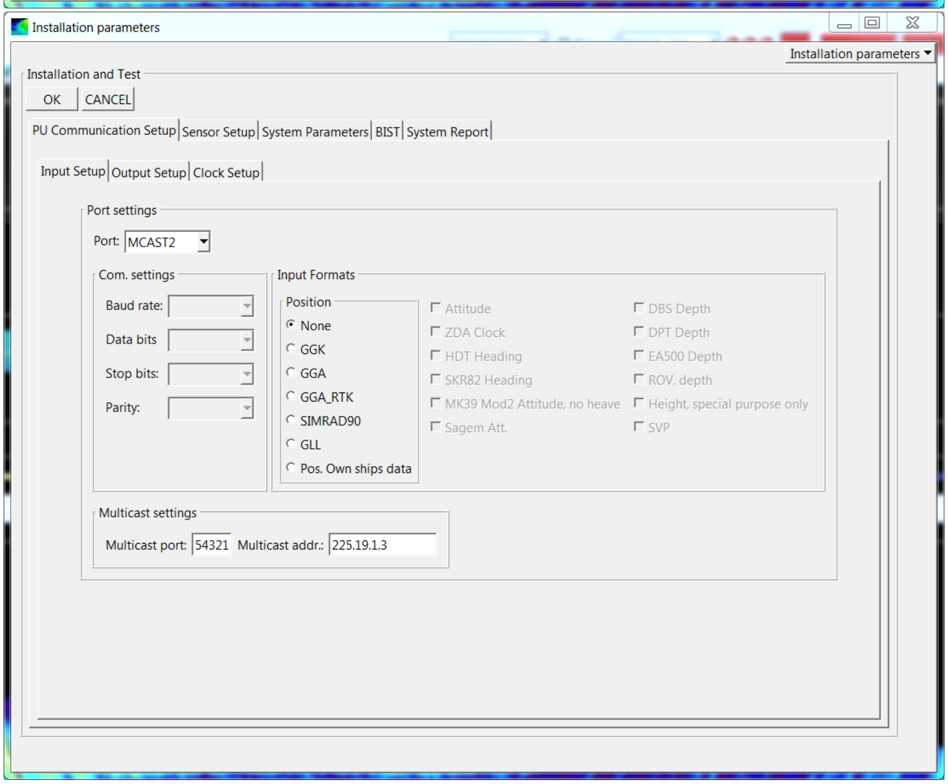


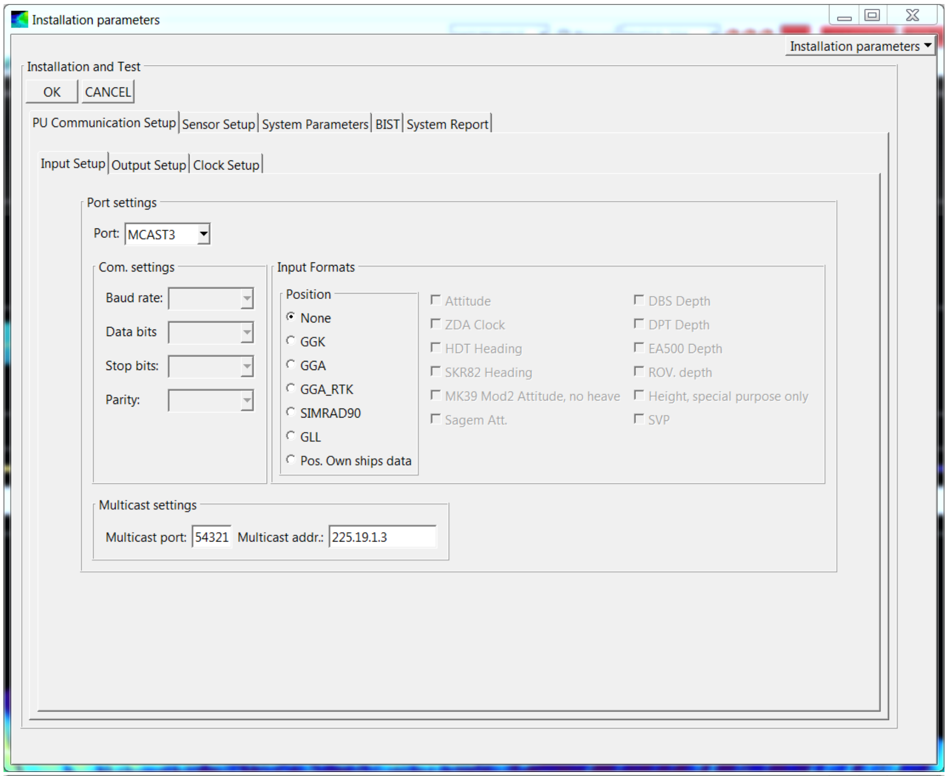


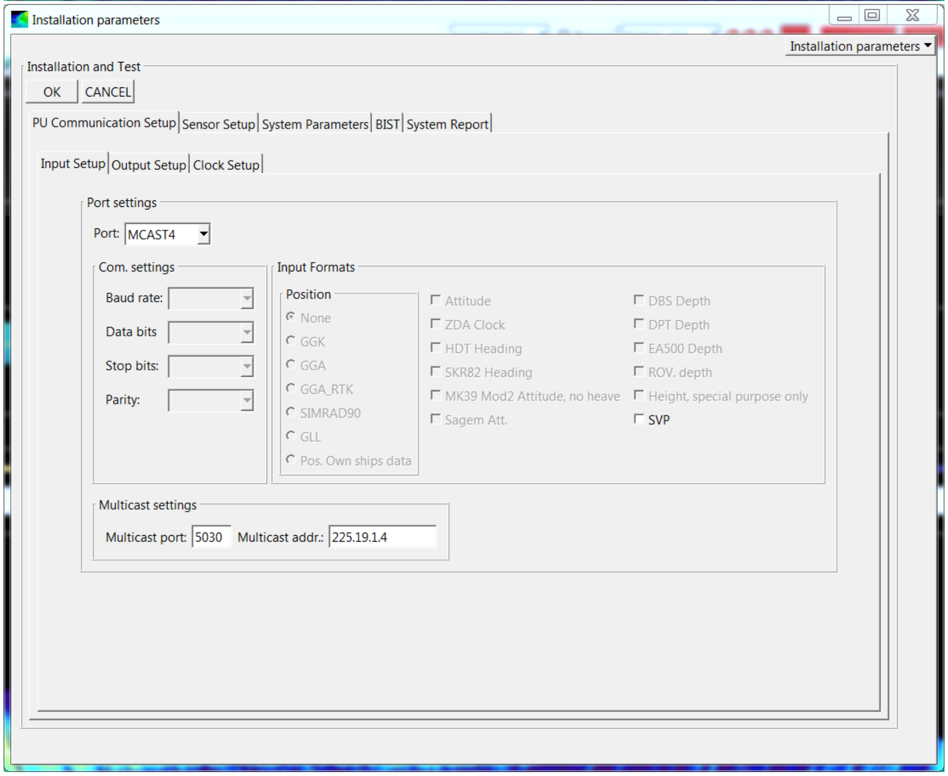

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Input Setup
Output Setup
Clock Setup
Port settings
Port: COM3
Com. settings
Baud rate: 4800
Data bits 8
Stop bits: 1
Parity: NONE
Input Formats
Position
None
GGK
GGA
GGA_RTK
SIMRAD90
GLL
Attitude
ZDA Clock
HDT Heading
SKR82 Heading
MK39 Mod2 Attitude, no heave
Sagem Att.
DBS Depth
DPT Depth
EA500 Depth
ROV. depth
Height, special purpose only
SVP

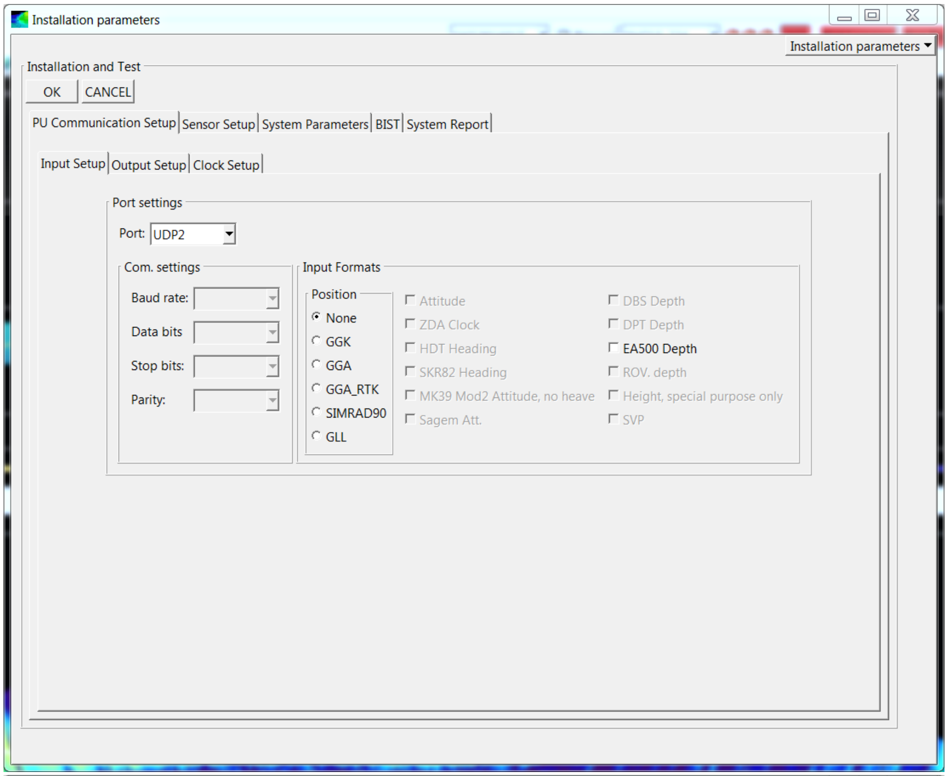

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Input Setup
Output Setup
Clock Setup
Port settings
Port: COM4
Com. settings
Baud rate: 9600
Data bits 8
Stop bits: 1
Parity: NONE
Input Formats
Position
None
GGK
GGA
GGA_RTK
SIMRAD90
GLL
Attitude
ZDA Clock
HDT Heading
SKR82 Heading
MK39 Mod2 Attitude, no heave
Sagem Att.
DBS Depth
DPT Depth
EA500 Depth
ROV. depth
Height, special purpose only
SVP

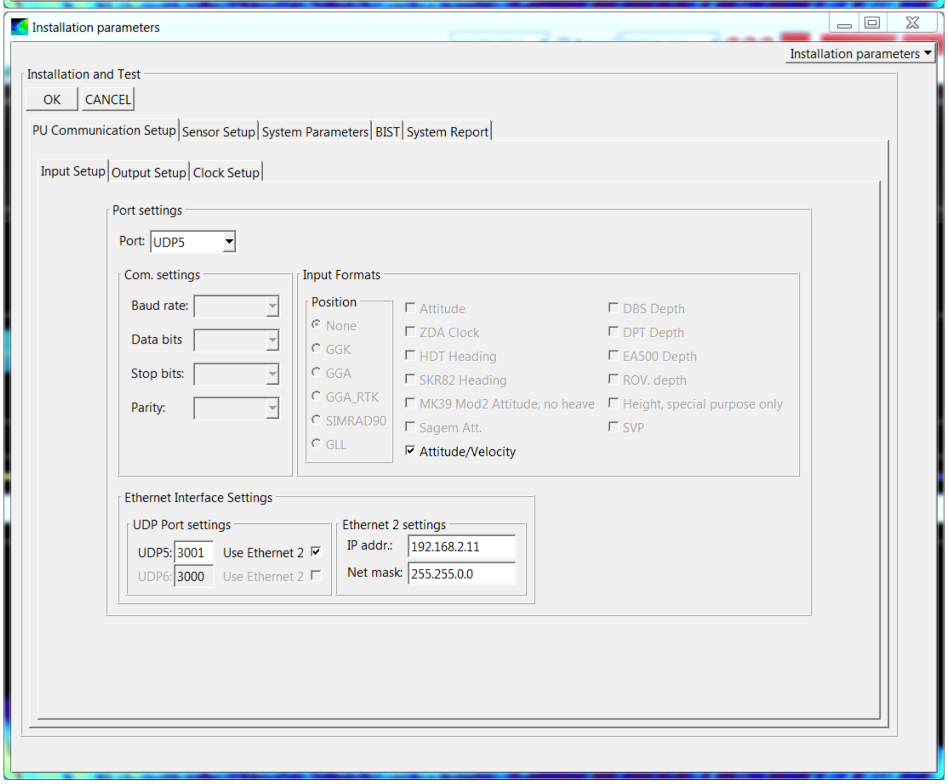

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Input Setup
Output Setup
Clock Setup
Port settings
Port: MCAST1
Com. settings
Baud rate:
Data bits
Stop bits:
Parity:
Input Formats
Position
None
GGK
GGA
GGA_RTK
SIMRAD90
GLL
Pos. Own ships data
Attitude
ZDA Clock
HDT Heading
SKR82 Heading
MK39 Mod2 Attitude, no heave
Sagem Att.
DBS Depth
DPT Depth
EA500 Depth
ROV. depth
Height, special purpose only
SVP
Multicast settings
Multicast port: 6084
Multicast addr.: 225.0.0.1

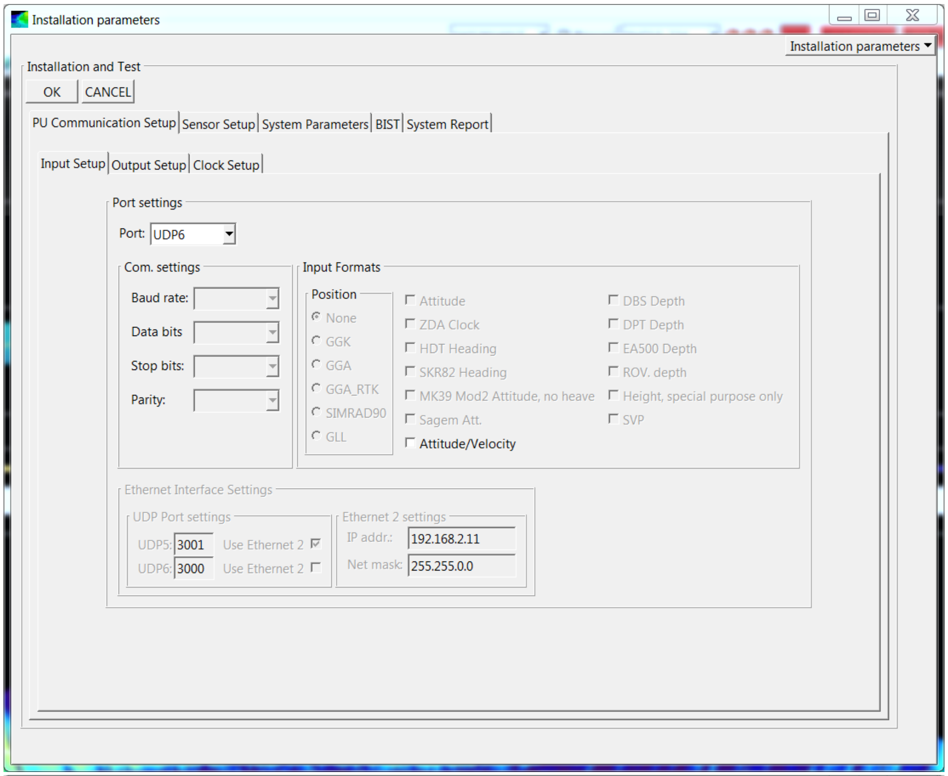

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Input Setup
Output Setup
Clock Setup
Port settings
Port: MCAST2
Com. settings
Baud rate:
Data bits
Stop bits:
Parity:
Input Formats
Position
None
GGK
GGA
GGA_RTK
SIMRAD90
GLL
Pos. Own ships data
Attitude
ZDA Clock
HDT Heading
SKR82 Heading
MK39 Mod2 Attitude, no heave
Sagem Att.
DBS Depth
DPT Depth
EA500 Depth
ROV. depth
Height, special purpose only
SVP
Multicast settings
Multicast port: 54321
Multicast addr.: 225.19.1.3

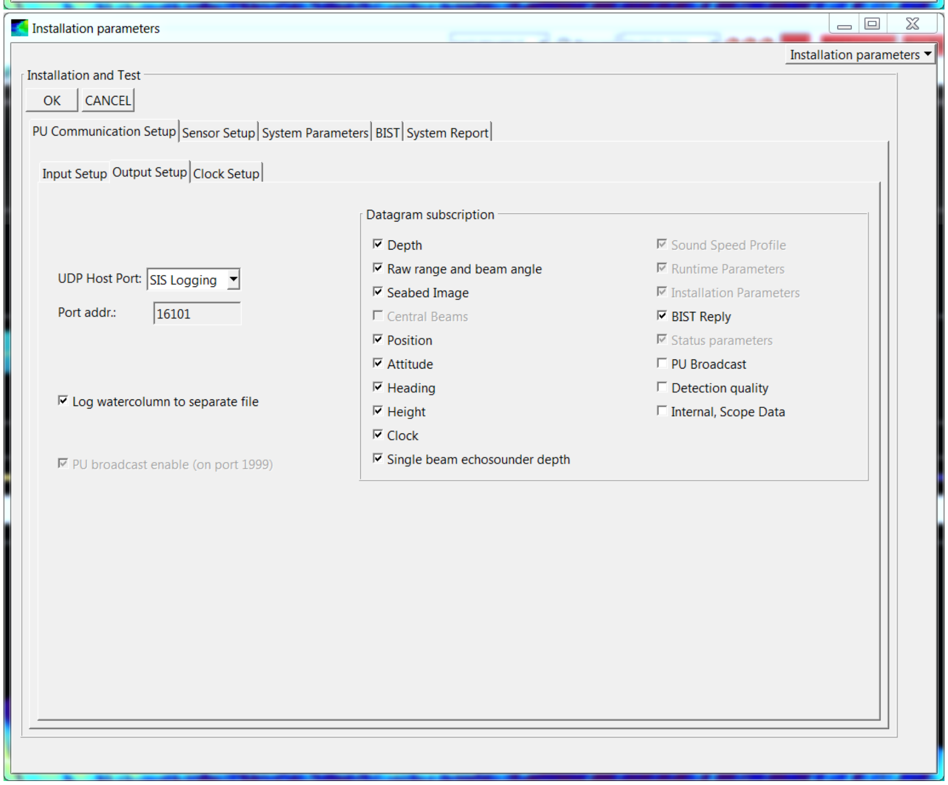

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Input Setup
Output Setup
Clock Setup
Port settings
Port: MCAST3
Com. settings
Baud rate:
Data bits
Stop bits:
Parity:
Input Formats
Position
None
GGK
GGA
GGA_RTK
SIMRAD90
GLL
Pos. Own ships data
Attitude
ZDA Clock
HDT Heading
SKR82 Heading
MK39 Mod2 Attitude, no heave
Sagem Att.
DBS Depth
DPT Depth
EA500 Depth
ROV. depth
Height, special purpose only
SVP
Multicast settings
Multicast port: 54321
Multicast addr.: 225.19.1.3

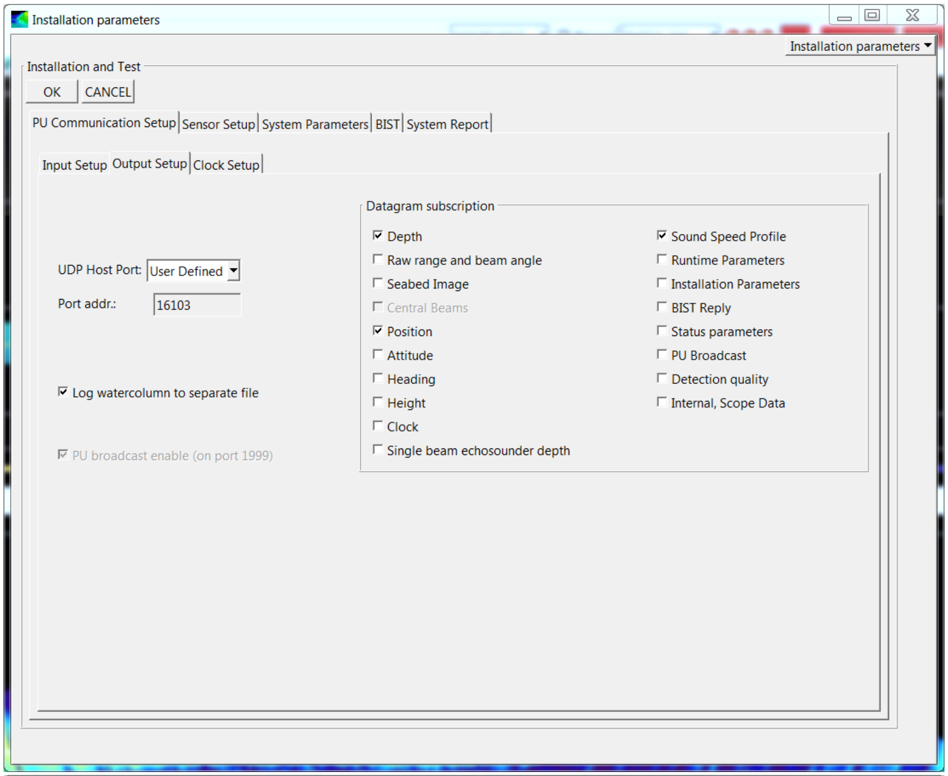

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Input Setup
Output Setup
Clock Setup
Port settings
Port: MCAST4
Com. settings
Baud rate:
Data bits
Stop bits:
Parity:
Input Formats
Position
None
GGK
GGA
GGA_RTK
SIMRAD90
GLL
Pos. Own ships data
Attitude
ZDA Clock
HDT Heading
SKR82 Heading
MK39 Mod2 Attitude, no heave
Sagem Att.
DBS Depth
DPT Depth
EA500 Depth
ROV. depth
Height, special purpose only
SVP
Multicast settings
Multicast port: 5030
Multicast addr.: 225.19.1.4

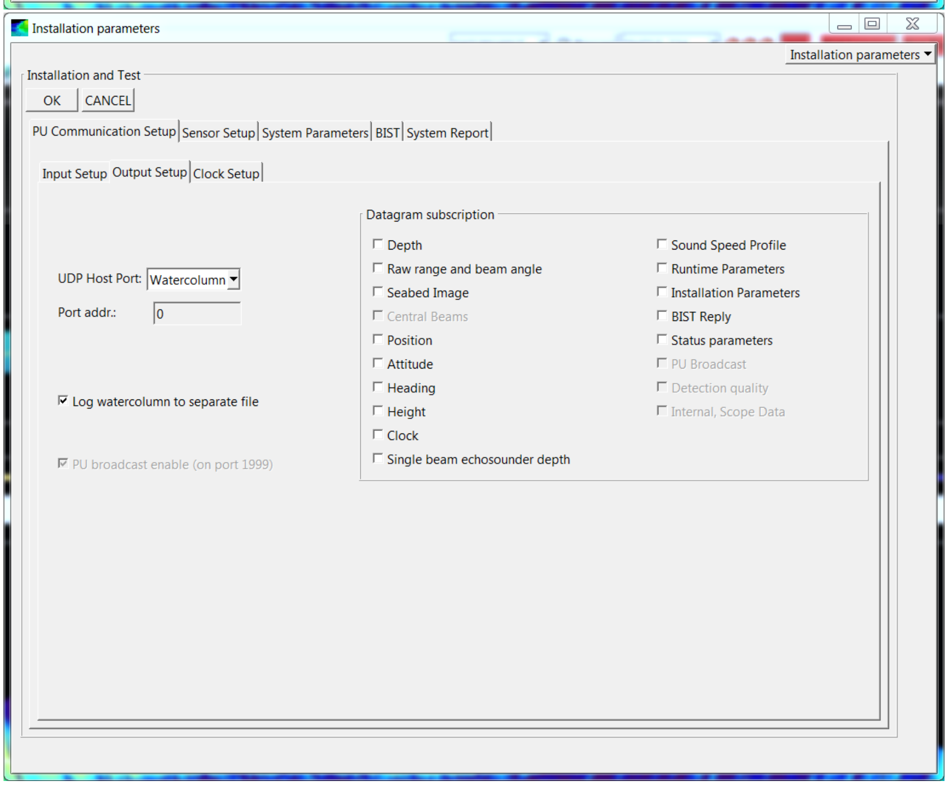

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Input Setup
Output Setup
Clock Setup
Port settings
Port: UDP2
Com. settings
Baud rate:
Data bits
Stop bits:
Parity:
Input Formats
Position
None
GGK
GGA
GGA_RTK
SIMRAD90
GLL
Attitude
ZDA Clock
HDT Heading
SKR82 Heading
MK39 Mod2 Attitude, no heave
Sagem Att.
DBS Depth
DPT Depth
EA500 Depth
ROV. depth
Height, special purpose only
SVP

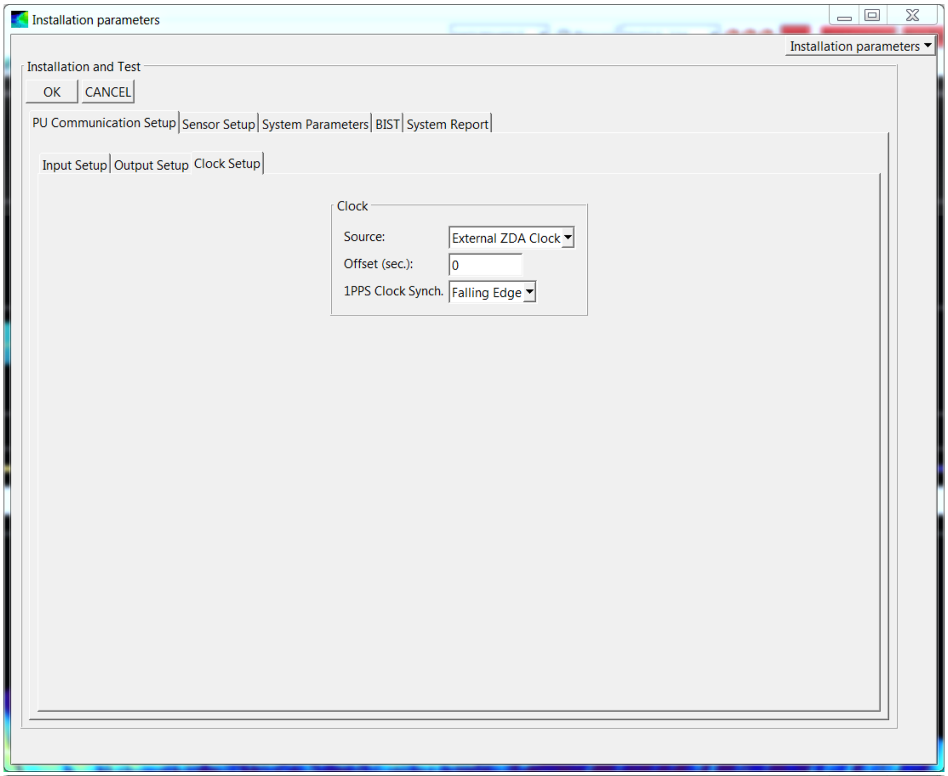

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Input Setup
Output Setup
Clock Setup
Port settings
Port: UDP5
Com. settings
Baud rate:
Data bits
Stop bits:
Parity:
Input Formats
Position
None
GGK
GGA
GGA_RTK
SIMRAD90
GLL
Attitude
ZDA Clock
HDT Heading
SKR82 Heading
MK39 Mod2 Attitude, no heave
Sagem Att.
Attitude/Velocity
DBS Depth
DPT Depth
EA500 Depth
ROV. depth
Height, special purpose only
SVP
Ethernet Interface Settings
UDP Port settings
UDP5: 3001
Use Ethernet 2
UDP6: 3000
Use Ethernet 2
Ethernet 2 settings
IP addr.: 192.168.2.11
Net mask: 255.255.0.0


Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Input Setup
Output Setup
Clock Setup
Port settings
Port:
UDP6
Com. settings
Baud rate:
Data bits
Stop bits:
Parity:
Input Formats
Position
None
GGK
GGA
GGA_RTK
SIMRAD90
GLL
Attitude
ZDA Clock
HDT Heading
SKR82 Heading
MK39 Mod2 Attitude, no heave
Sagem Att.
Attitude/Velocity
DBS Depth
DPT Depth
EA500 Depth
ROV. depth
Height, special purpose only
SVP
Ethernet Interface Settings
UDP Port settings
UDP5: 3001
Use Ethernet 2
UDP6: 3000
Use Ethernet 2
Ethernet 2 settings
IP addr.: 192.168.2.11
Net mask: 255.255.0.0

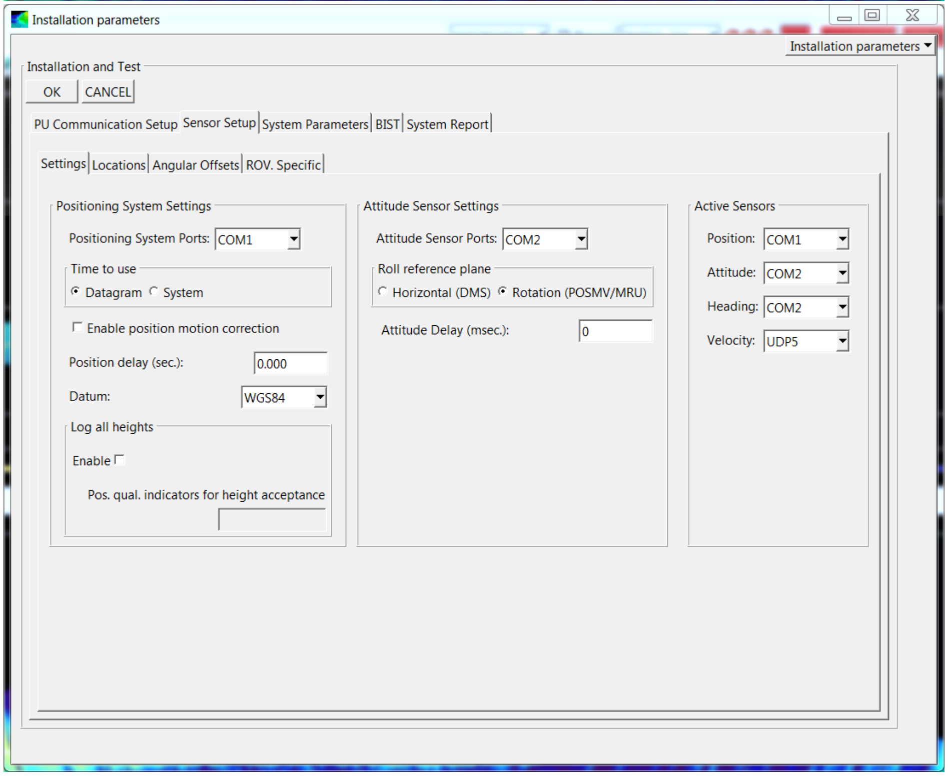

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Input Setup
Output Setup
Clock Setup
UDP Host Port: SIS Logging
Port addr.: 16101
Log watercolumn to separate file
PU broadcast enable (on port 1999)
Datagram subscription
Depth
Raw range and beam angle
Seabed Image
Central Beams
Position
Attitude
Heading
Height
Clock
Single beam echosounder depth
Sound Speed Profile
Runtime Parameters
Installation Parameters
BIST Reply
Status parameters
PU Broadcast
Detection quality
Internal, Scope Data


Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Input Setup
Output Setup
Clock Setup
UDP Host Port:
User Defined
Port addr.:
16103
Log watercolumn to separate file
PU broadcast enable (on port 1999)
Datagram subscription
Depth
Raw range and beam angle
Seabed Image
Central Beams
Position
Attitude
Heading
Height
Clock
Single beam echosounder depth
Sound Speed Profile
Runtime Parameters
Installation Parameters
BIST Reply
Status parameters
PU Broadcast
Detection quality
Internal, Scope Data

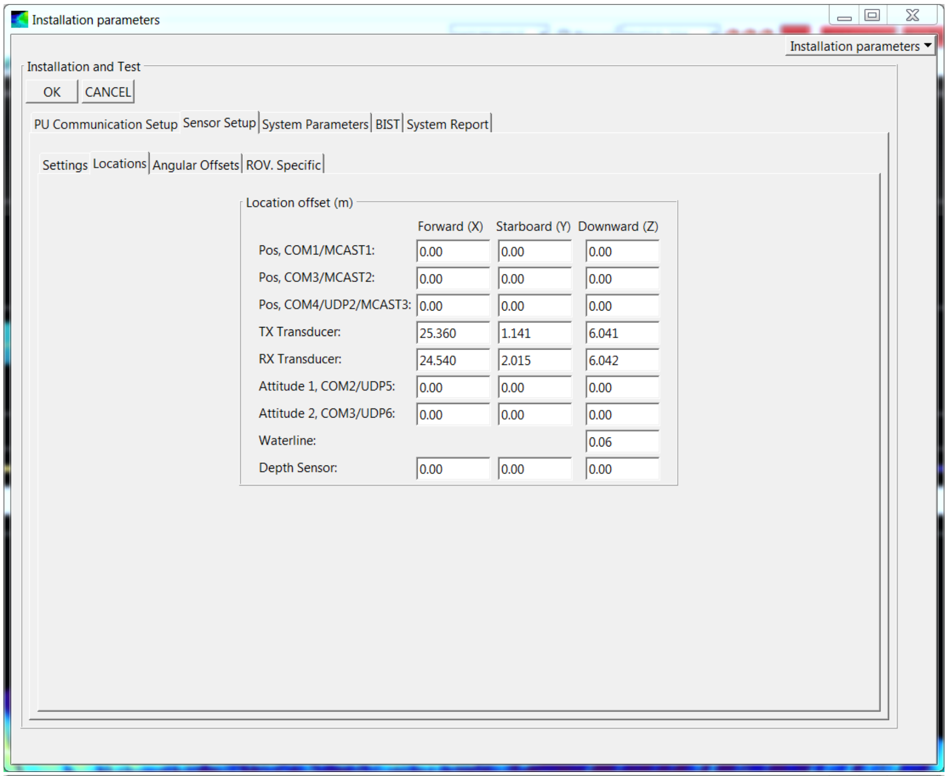

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Input Setup
Output Setup
Clock Setup
UDP Host Port:
Watercolumn
Port addr.:
0
Log watercolumn to separate file
PU broadcast enable (on port 1999)
Datagram subscription
Depth
Raw range and beam angle
Seabed Image
Central Beams
Position
Attitude
Heading
Height
Clock
Single beam echosounder depth
Sound Speed Profile
Runtime Parameters
Installation Parameters
BIST Reply
Status parameters
PU Broadcast
Detection quality
Internal, Scope Data

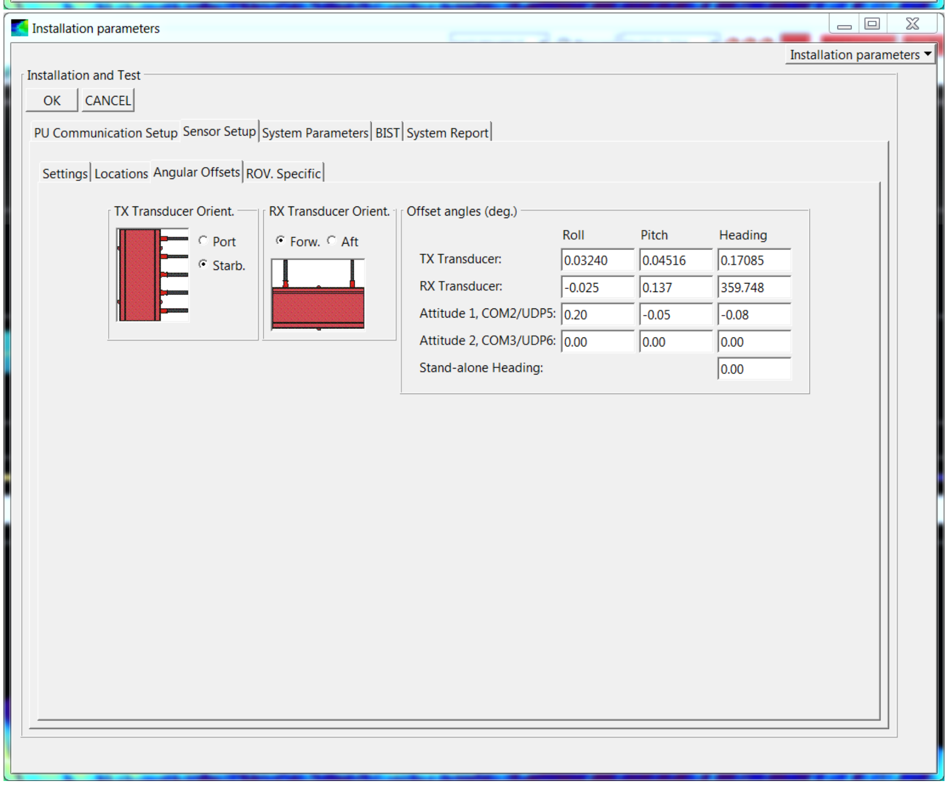


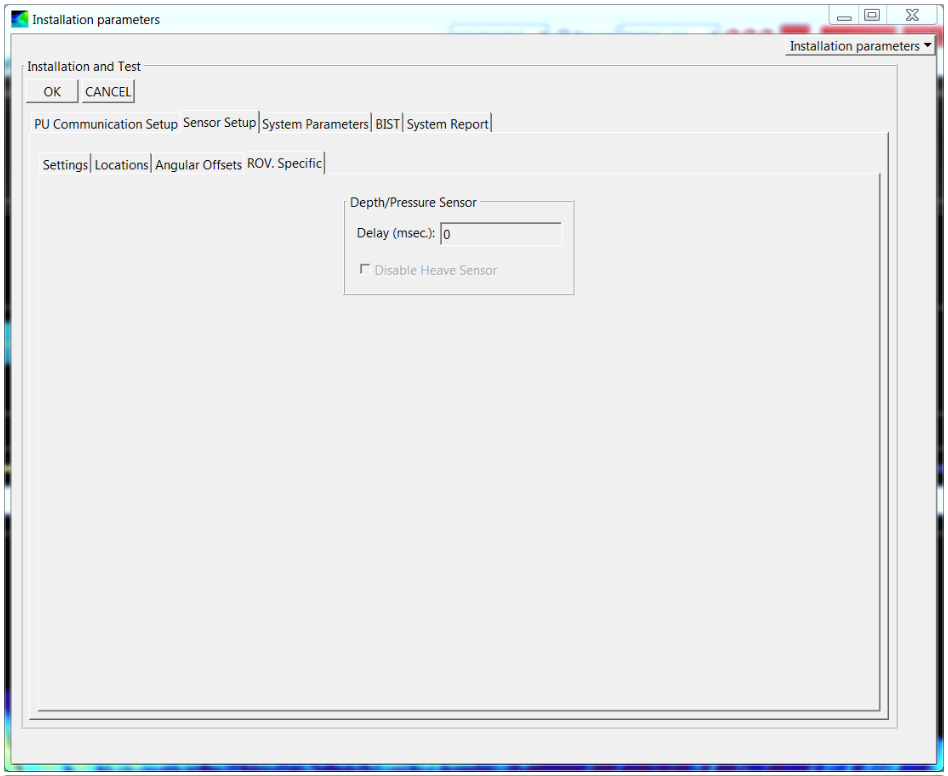
Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Input Setup
Output Setup
Clock Setup
Clock
Source:
External ZDA Clock
Offset (sec.):
0
1PPS Clock Synch.
Falling Edge

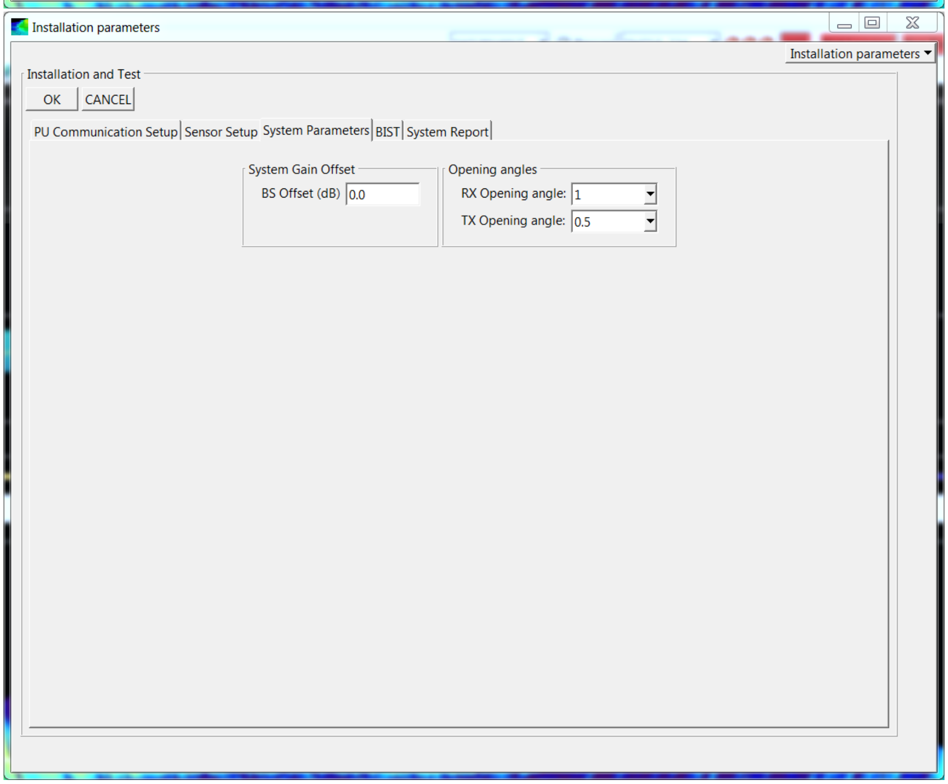


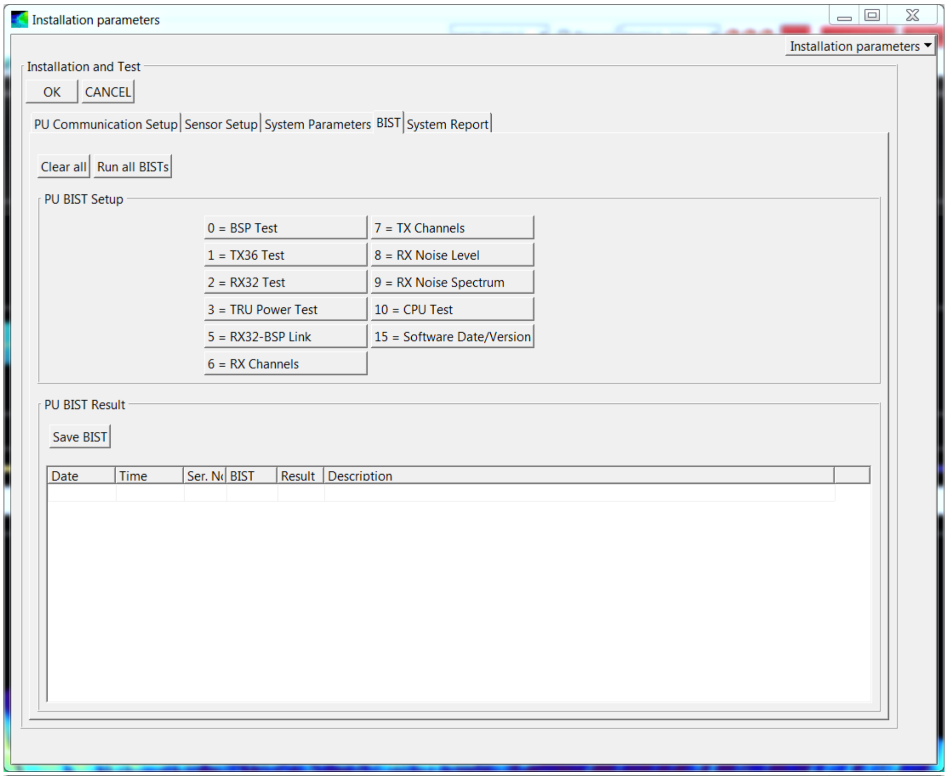
Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Settings
Locations
Angular Offsets
ROV. Specific
Positioning System Settings
Positioning System Ports:
COM1
Time to use
Datagram
System
Enable position motion correction
Position delay (sec.):
0.000
Datum:
WGS84
Log all heights
Enable
Pos. qual. indicators for height acceptance
Attitude Sensor Settings
Attitude Sensor Ports:
COM2
Roll reference plane
Horizontal (DMS)
Rotation (POSMV/MRU)
Attitude Delay (msec.):
0
Active Sensors
Position:
COM1
Attitude:
COM2
Heading:
COM2
Velocity:
UDP5

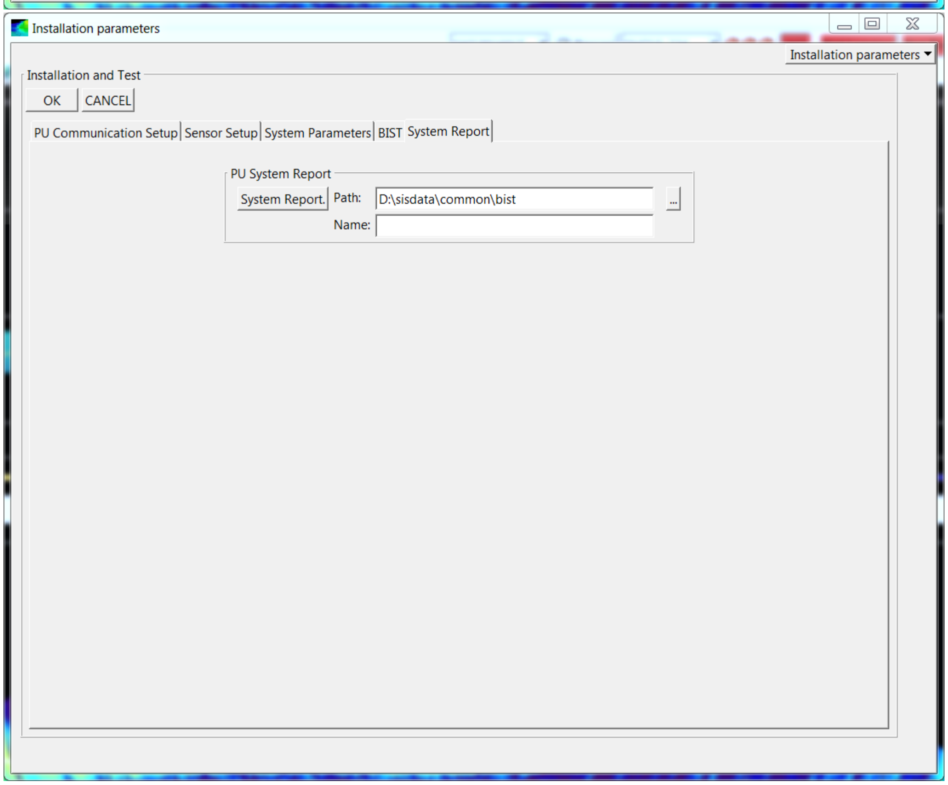

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Settings
Locations
Angular Offsets
ROV. Specific
Location offset (m)
Forward (X)
Starboard (Y)
Downward (Z)
Pos, COM1/MCAST1: 0.00 0.00 0.00
Pos, COM3/MCAST2: 0.00 0.00 0.00
Pos, COM4/UDP2/MCAST3: 0.00 0.00 0.00
TX Transducer: 25.360 1.141 6.041
RX Transducer: 24.540 2.015 6.042
Attitude 1, COM2/UDP5: 0.00 0.00 0.00
Attitude 2, COM3/UDP6: 0.00 0.00 0.00
Waterline: 0.06
Depth Sensor: 0.00 0.00 0.00

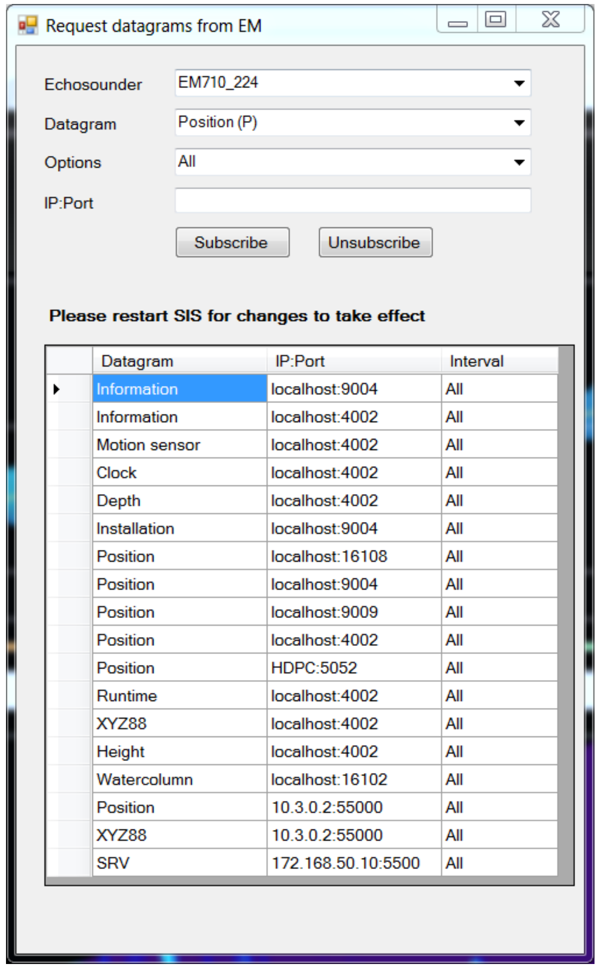

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Settings
Locations
Angular Offsets
ROV. Specific
TX Transducer Orient.
Port
Starb.
RX Transducer Orient.
Forw.
Aft
Offset angles (deg.)
Roll
Pitch
Heading
TX Transducer: 0.03240 0.04516 0.17085
RX Transducer: -0.025 0.137 359.748
Attitude 1, COM2/UDP5: 0.20 -0.05 -0.08
Attitude 2, COM3/UDP6: 0.00 0.00 0.00
Stand-alone Heading: 0.00


Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Settings
Locations
Angular Offsets
ROV. Specific
Depth/Pressure Sensor
Delay (msec.): 0
Disable Heave Sensor

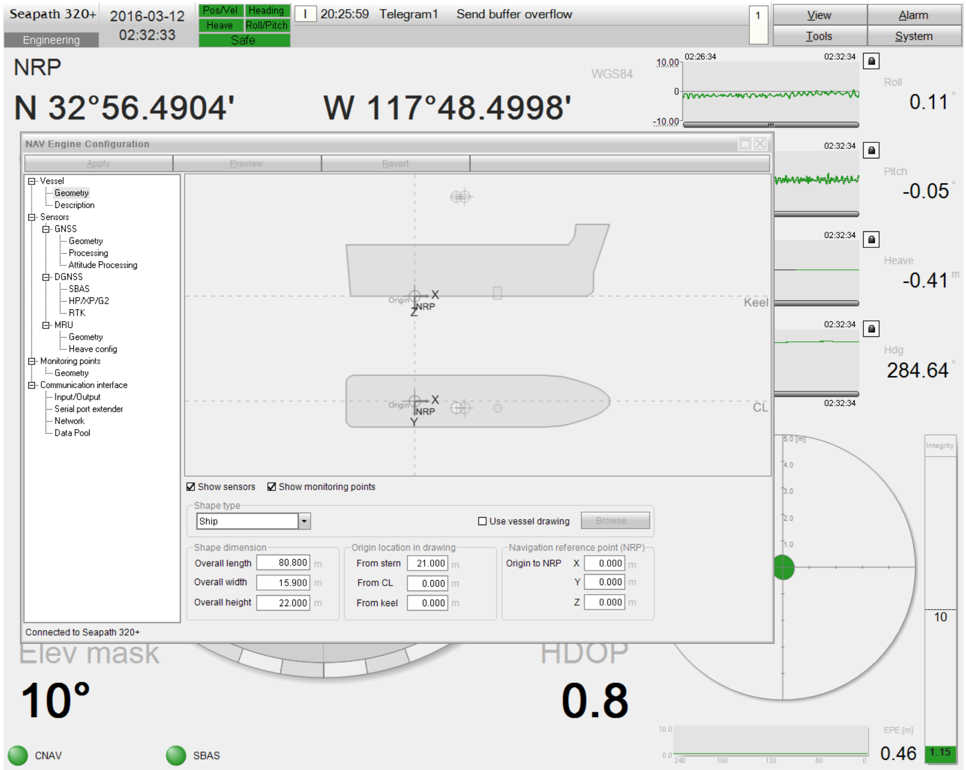

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
System Gain Offset
BS Offset (dB) 0.0
Opening angles
RX Opening angle: 1
TX Opening angle: 0.5

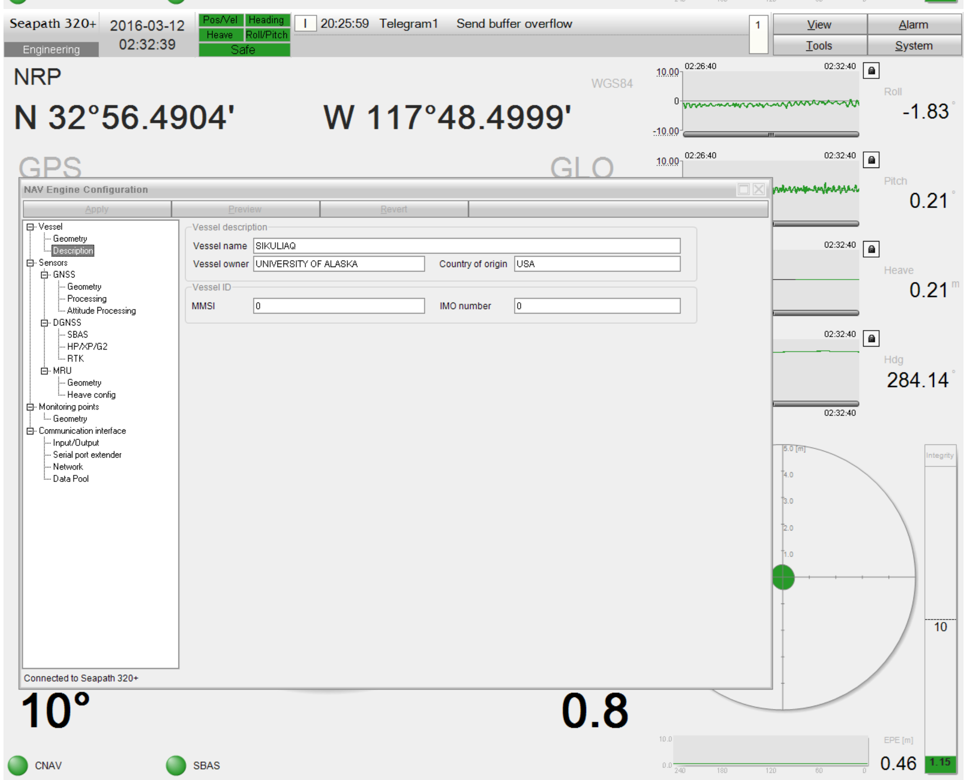

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
Clear all
Run all BISTs
PU BIST Setup
0 = BSP Test
1 = TX36 Test
2 = RX32 Test
3 = TRU Power Test
5 = RX32-BSP Link
6 = RX Channels
7 = TX Channels
8 = RX Noise Level
9 = RX Noise Spectrum
10 = CPU Test
15 = Software Date/Version
PU BIST Result
Save BIST
Date
Time
Ser. N
BIST
Result
Description

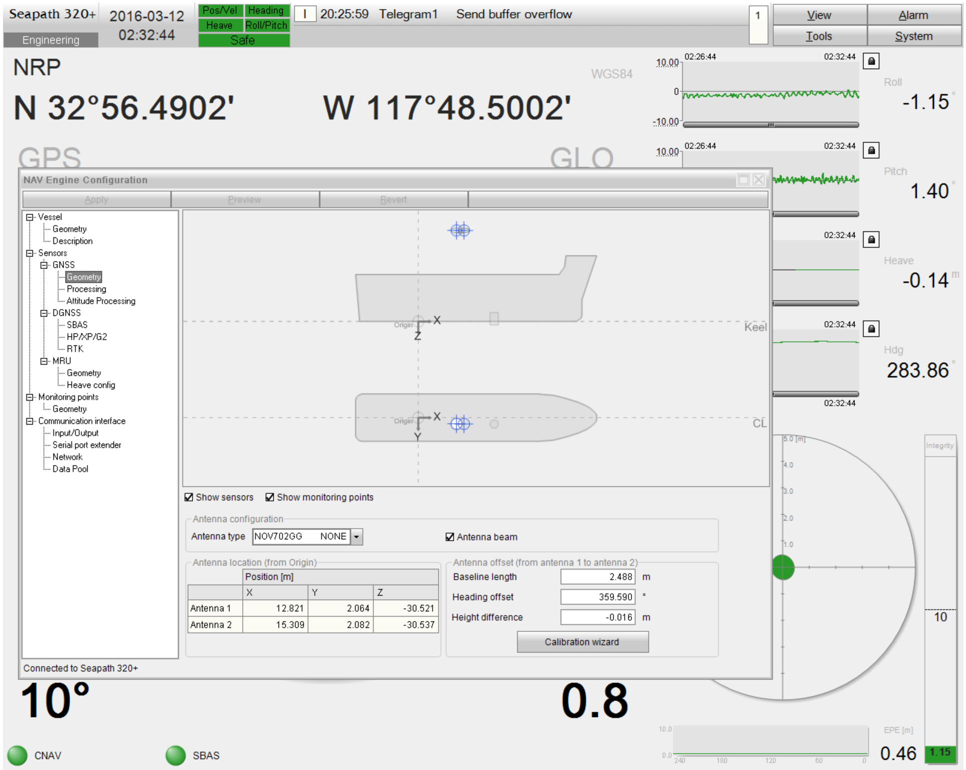

Installation parameters
Installation parameters
Installation and Test
OK
CANCEL
PU Communication Setup
Sensor Setup
System Parameters
BIST
System Report
PU System Report
System Report.
Path:
D:\sisdata\common\bist
Name:

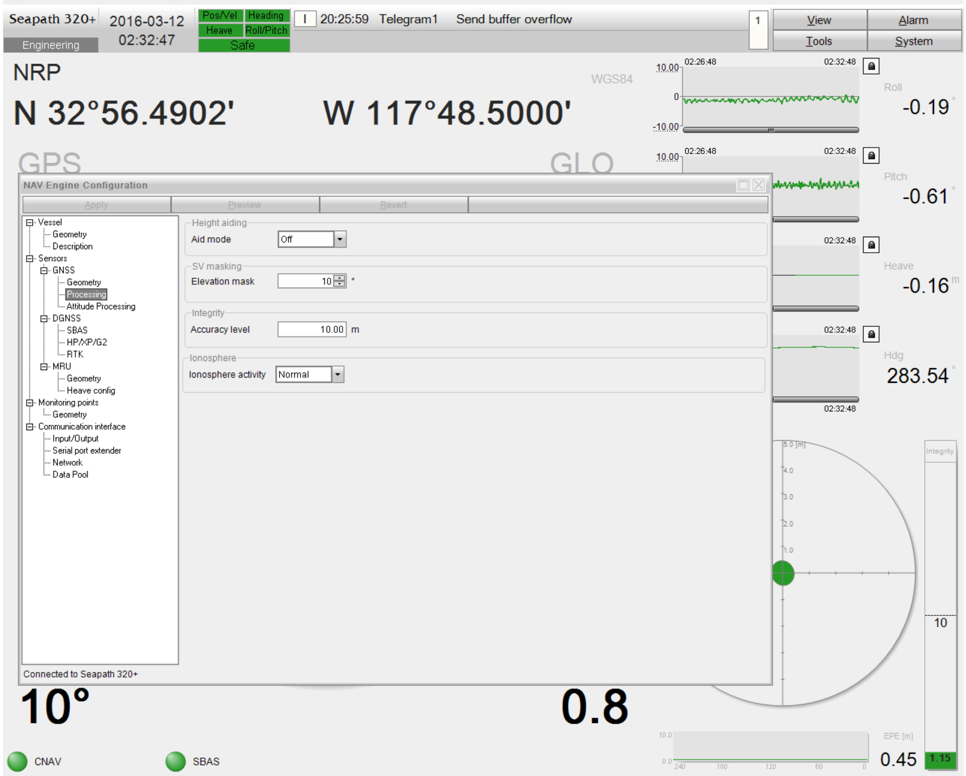

Request datagrams from EM
Echosounder
EM710_224
Datagram
Position (P)
Options
All
IP:Port
Subscribe
Unsubscribe
Please restart SIS for changes to take effect
Datagram IP:Port Interval
Information localhost:9004 All
Information localhost:4002 All
Motion sensor localhost:4002 All
Clock localhost:4002 All
Depth localhost:4002 All
Installation localhost:9004 All
Position localhost:16108 All
Position localhost:9004 All
Position localhost:9009 All
Position localhost:4002 All
Position HDPC:5052 All
Runtime localhost:4002 All
XYZ88 localhost:4002 All
Height localhost:4002 All
Watercolumn localhost:16102 All
Position 10.3.0.2:55000 All
XYZ88 10.3.0.2:55000 All
SRV 172.168.50.10:5500 All

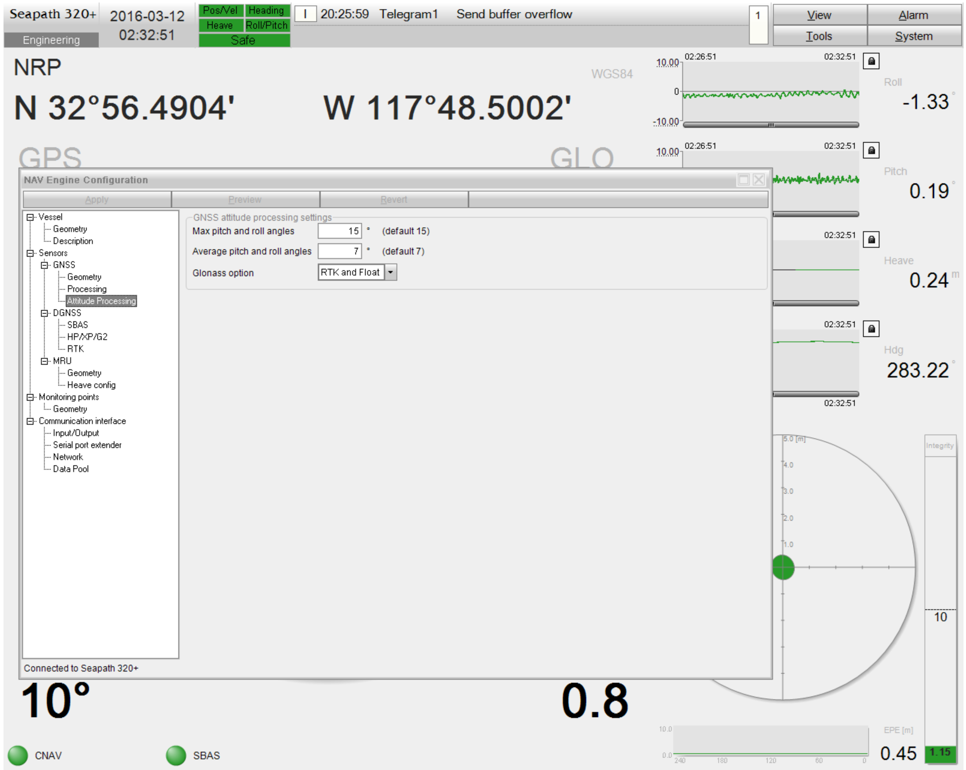
Seapath 320 Configuration

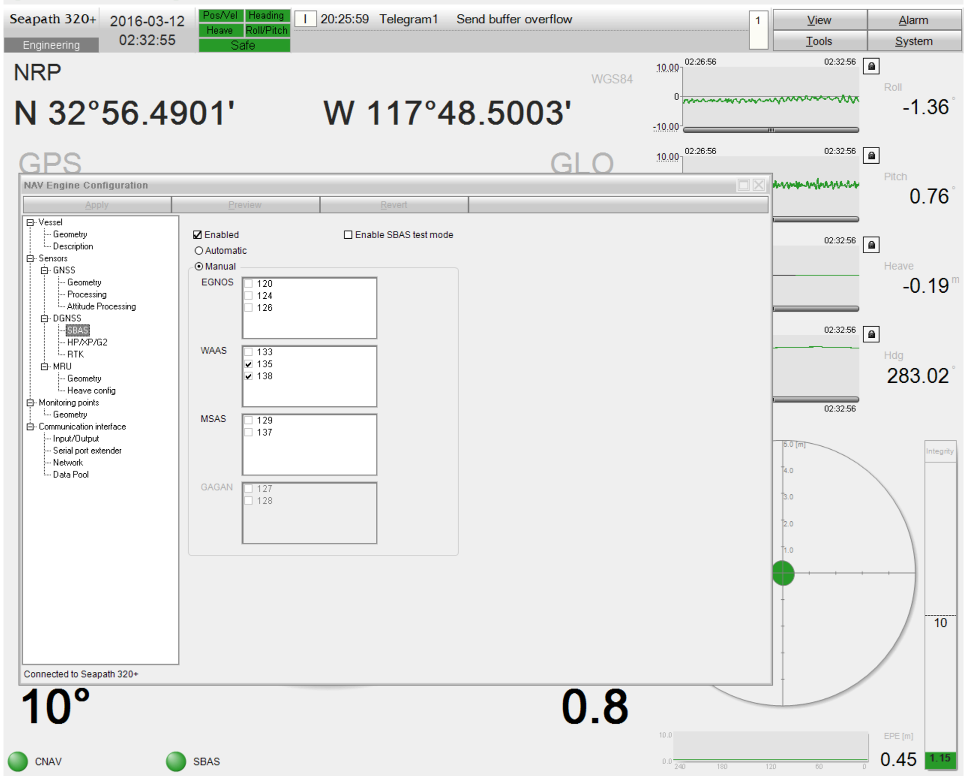


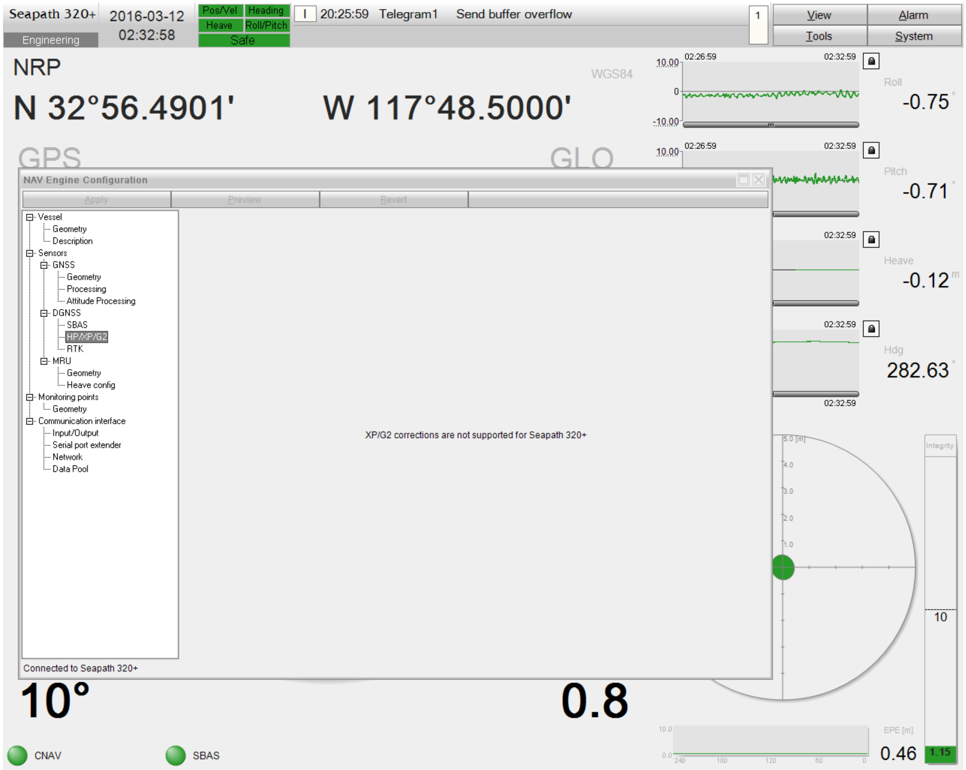


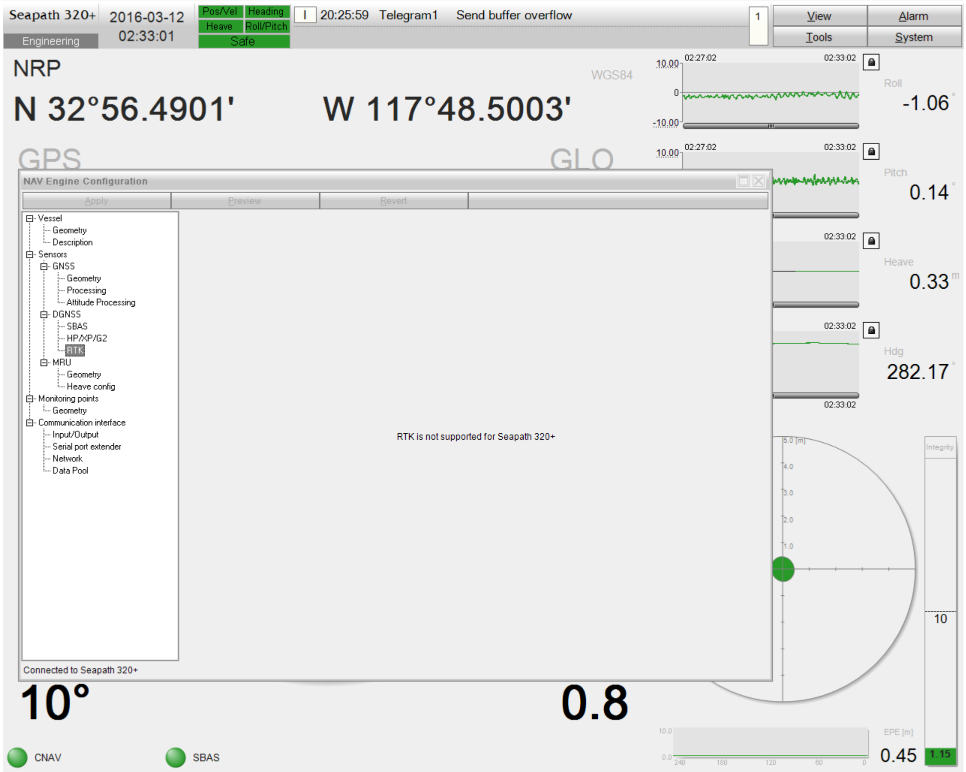


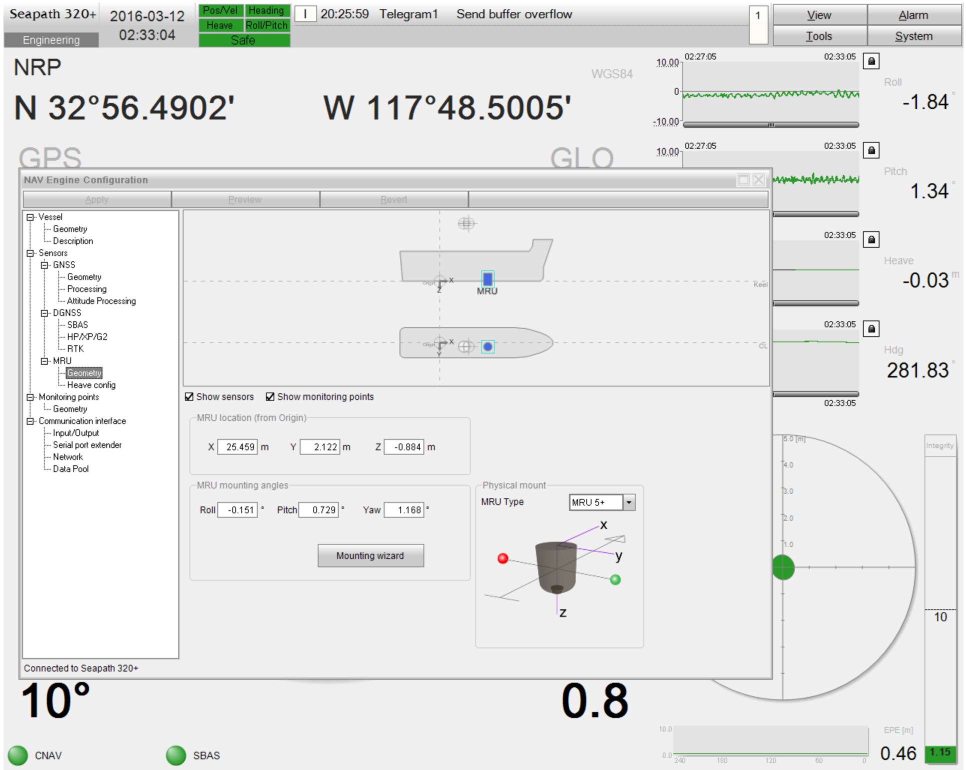


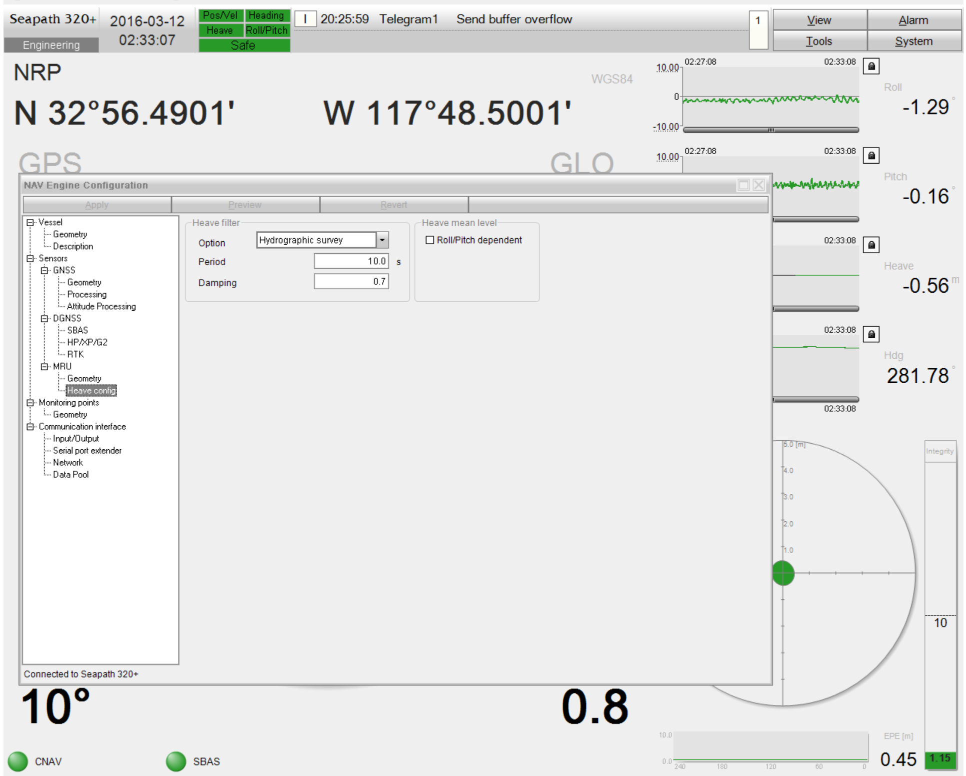

Seapath 320+
Engineering
2016-03-12
02:32:51
Pos/Vel
Heading
Heave
Roll/Pitch
Safe
20:25:59 Telegram1 Send buffer overflow
View
Alarm
Tools
System
NRP
WGS84
N 32°56.4904'
W 117°48.5002'
Roll
-1.33
Pitch
0.19
Heave
0.24
Hdg
283.22
NAV Engine Configuration
Apply
Preview
Revert
Vessel
Geometry
Description
Sensors
GNSS
Geometry
Processing
Attitude Processing
DGNSS
SBAS
HP/XP/G2
RTK
MRU
Geometry
Heave config
Monitoring points
Geometry
Communication interface
Input/Output
Serial port extender
Network
Data Pool
GNSS attitude processing settings
Max pitch and roll angles 15 ° (default 15)
Average pitch and roll angles 7 ° (default 7)
Glonass option RTK and Float
Connected to Seapath 320+
10°
0.8
CNAV
SBAS
0.45

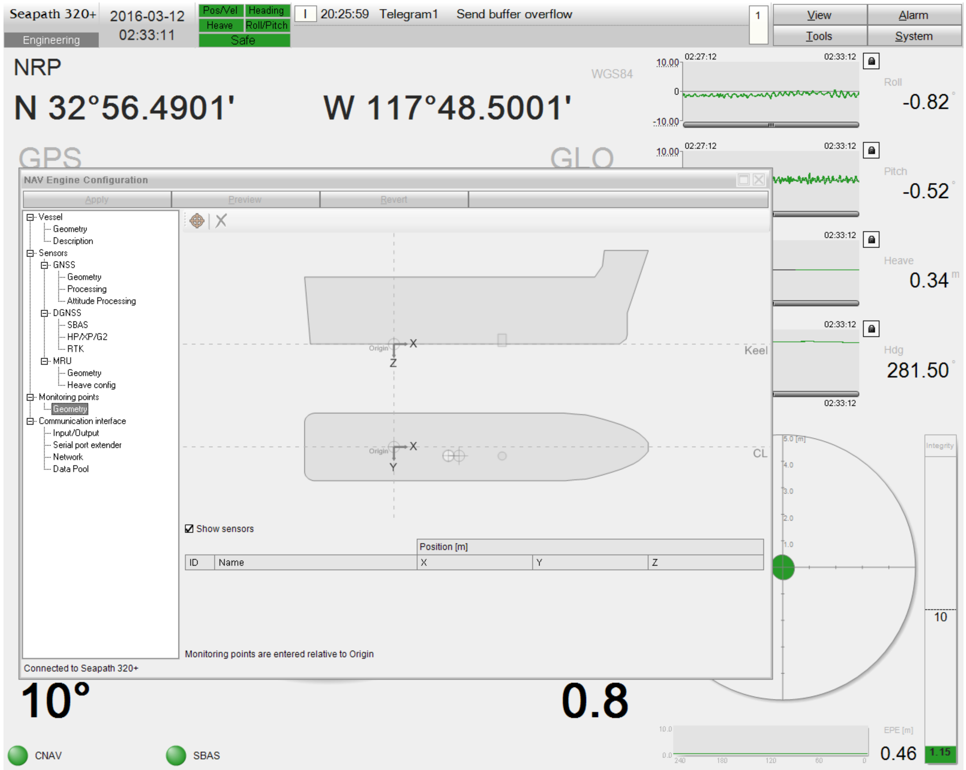

Seapath 320+
Engineering
2016-03-12
02:32:55
Pos/Vel
Heading
Heave
Roll/Pitch
Safe
20:25:59 Telegram1 Send buffer overflow
View
Alarm
Tools
System
NRP
WGS84
N 32°56.4901'
W 117°48.5003'
Roll
-1.36
Pitch
0.76
Heave
-0.19
Hdg
283.02
NAV Engine Configuration
Apply
Preview
Revert
Vessel
Geometry
Description
Sensors
GNSS
Geometry
Processing
Attitude Processing
DGNSS
SBAS
HP/XP/G2
RTK
MRU
Geometry
Heave config
Monitoring points
Geometry
Communication interface
Input/Output
Serial port extender
Network
Data Pool
Enabled
Enable SBAS test mode
Automatic
Manual
EGNOS
120
124
126
WAAS
133
135
138
MSAS
129
137
GAGAN
127
128
Connected to Seapath 320+
10°
0.8
CNAV
SBAS
0.45

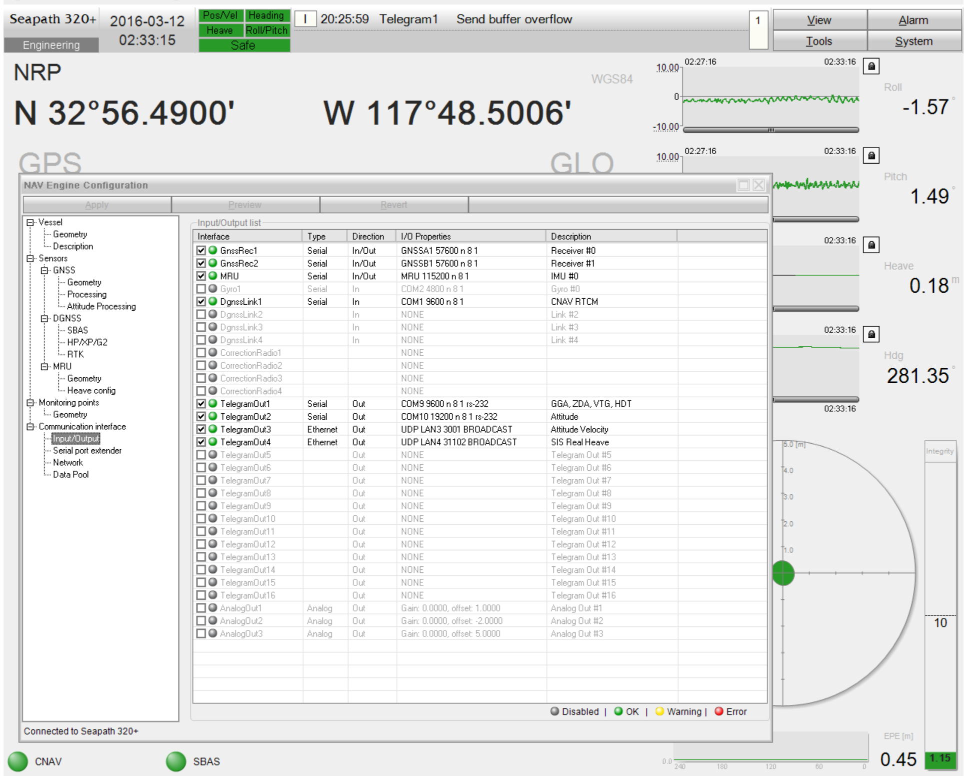

Seapath 320+
2016-03-12
02:32:58
Engineering
20:25:59 Telegram1 Send buffer overflow
View
Alarm
Tools
System
NRP
N 32°56.4901'
W 117°48.5000'
NAV Engine Configuration
XP/G2 corrections are not supported for Seapath 320+
Connected to Seapath 320+
Roll
-0.75
Pitch
-0.71
Heave
-0.12
Hdg
282.63
10°
0.8
0.46
CNAV
SBAS

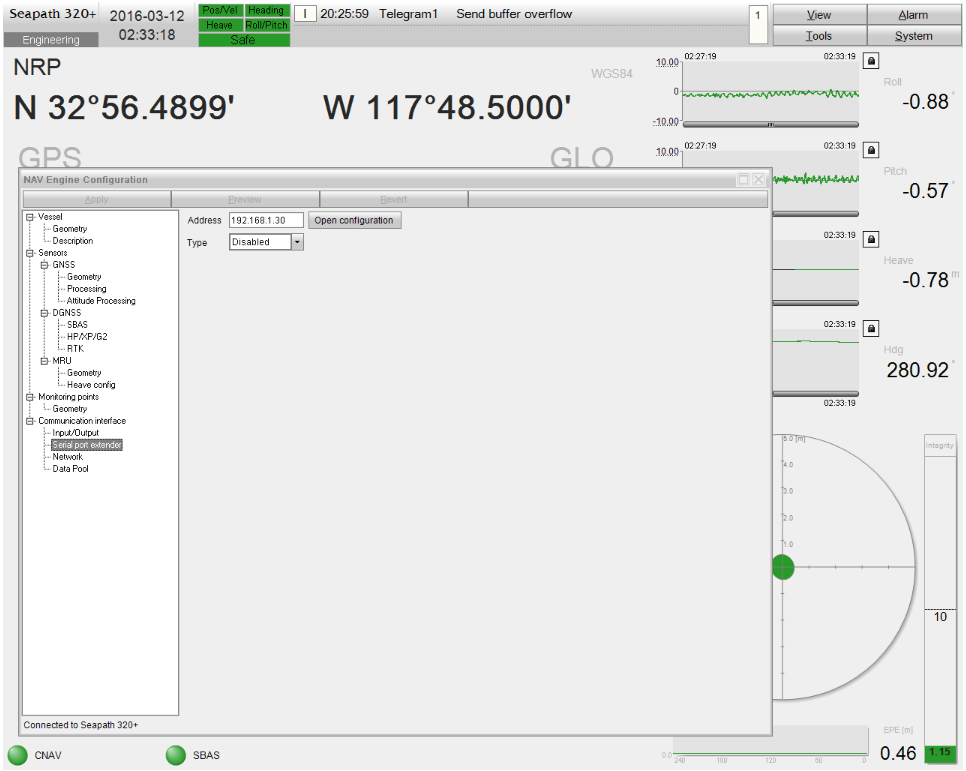

Seapath 320+
2016-03-12
02:33:01
Engineering
20:25:59 Telegram1 Send buffer overflow
View
Alarm
Tools
System
NRP
N 32°56.4901'
W 117°48.5003'
NAV Engine Configuration
RTK is not supported for Seapath 320+
Connected to Seapath 320+
Roll
-1.06
Pitch
0.14
Heave
0.33
Hdg
282.17
10°
0.8
0.45
CNAV
SBAS

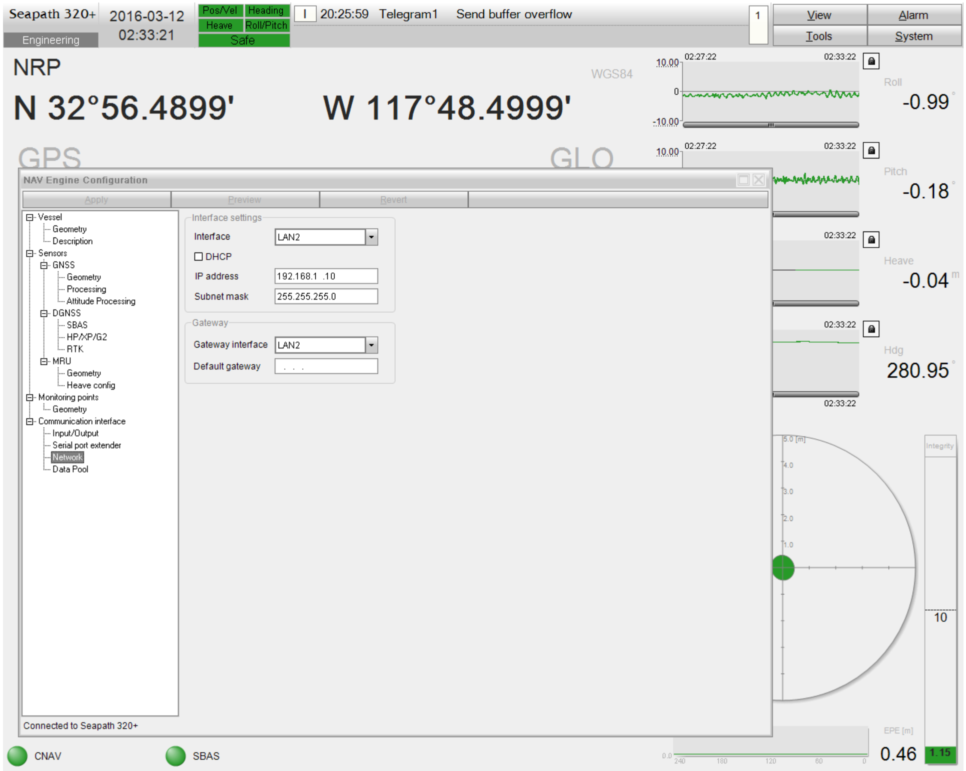

Seapath 320+
Engineering
2016-03-12
02:33:04
20:25:59 Telegram1 Send buffer overflow
View
Alarm
Tools
System
NRP
N 32°56.4902'
W 117°48.5005'
NAV Engine Configuration
Show sensors
Show monitoring points
MRU location (from Origin)
X 25.459 m
Y 2.122 m
Z -0.884 m
MRU mounting angles
Roll -0.151 °
Pitch 0.729 °
Yaw 1.168 °
Mounting wizard
Physical mount
MRU Type
MRU 5+
Connected to Seapath 320+
Roll -1.84
Pitch 1.34
Heave -0.03
Hdg 281.83
10°
0.8
CNAV
SBAS
0.46

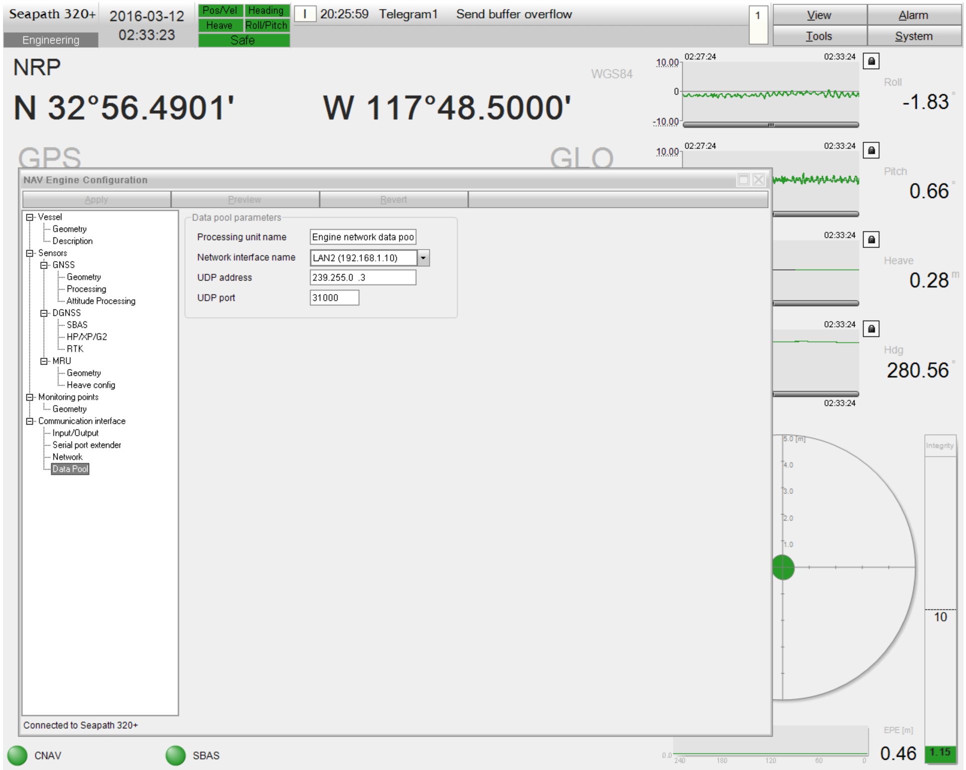

Seapath 320+
Engineering
2016-03-12
02:33:07
20:25:59 Telegram1 Send buffer overflow
View
Alarm
Tools
System
NRP
N 32°56.4901'
W 117°48.5001'
NAV Engine Configuration
Heave filter
Option
Hydrographic survey
Period 10.0 s
Damping 0.7
Heave mean level
Roll/Pitch dependent
Connected to Seapath 320+
Roll -1.29
Pitch -0.16
Heave -0.56
Hdg 281.78
10°
0.8
CNAV
SBAS
0.45


Seapath 320+
2016-03-12
02:33:11
Engineering
Pos/Vel
Heading
Heave
Roll/Pitch
Safe
20:25:59 Telegram1 Send buffer overflow
View
Alarm
Tools
System
NRP
WGS84
N 32°56.4901'
W 117°48.5001'
Roll
-0.82
Pitch
-0.52
Heave
0.34
Hdg
281.50
NAV Engine Configuration
Apply
Preview
Revert
Vessel
Geometry
Description
Sensors
GNSS
Processing
Attitude Processing
DGNSS
SBAS
HP/XP/G2
RTK
MRU
Heave config
Monitoring points
Communication interface
Input/Output
Serial port extender
Network
Data Pool
Keel
CL
Show sensors
Position [m]
ID
Name
X
Y
Z
Monitoring points are entered relative to Origin
Connected to Seapath 320+
10°
0.8
0.46
CNAV
SBAS


Seapath 320+
2016-03-12
02:33:15
Engineering
Pos/Vel
Heading
Heave
Roll/Pitch
Safe
20:25:59 Telegram1 Send buffer overflow
View
Alarm
Tools
System
NRP
WGS84
N 32°56.4900'
W 117°48.5006'
Roll
-1.57
Pitch
1.49
Heave
0.18
Hdg
281.35
NAV Engine Configuration
Apply
Preview
Revert
Input/Output list
Interface
Type
Direction
I/O Properties
Description
GnssRec1 Serial In/Out GNSSA1 57600 n 8 1 Receiver #0
GnssRec2 Serial In/Out GNSSB1 57600 n 8 1 Receiver #1
MRU Serial In/Out MRU 115200 n 8 1 IMU #0
DgnssLink1 Serial In COM1 9600 n 8 1 CNAV RTCM
TelegramOut1 Serial Out COM9 9600 n 8 1 rs-232 GGA, ZDA, VTG, HDT
TelegramOut2 Serial Out COM10 19200 n 8 1 rs-232 Attitude
TelegramOut3 Ethernet Out UDP LAN3 3001 BROADCAST Attitude Velocity
TelegramOut4 Ethernet Out UDP LAN4 31102 BROADCAST SIS Real Heave
Disabled
OK
Warning
Error
Connected to Seapath 320+
0.45
CNAV
SBAS


Seapath 320+
Engineering
2016-03-12
02:33:18
20:25:59 Telegram1 Send buffer overflow
NRP
N 32°56.4899'
W 117°48.5000'
NAV Engine Configuration
Address 192.168.1.30
Open configuration
Type Disabled
Connected to Seapath 320+
Roll -0.88
Pitch -0.57
Heave -0.78
Hdg 280.92
0.46
CNAV
SBAS


Seapath 320+
Engineering
2016-03-12
02:33:21
20:25:59 Telegram1 Send buffer overflow
NRP
N 32°56.4899'
W 117°48.4999'
NAV Engine Configuration
Interface settings
Interface LAN2
DHCP
IP address 192.168.1 .10
Subnet mask 255.255.255.0
Gateway
Gateway interface LAN2
Default gateway
Connected to Seapath 320+
Roll -0.99
Pitch -0.18
Heave -0.04
Hdg 280.95
0.46
CNAV
SBAS



Seapath 320+
Engineering
2016-03-12
02:33:23
Pos/Vel
Heading
Heave
Roll/Pitch
Safe
20:25:59 Telegram1 Send buffer overflow
View
Alarm
Tools
System
NRP
WGS84
N 32°56.4901'
W 117°48.5000'
GPS
GLO
NAV Engine Configuration
Apply
Preview
Revert
Vessel
Geometry
Description
Sensors
GNSS
Geometry
Processing
Attitude Processing
DGNSS
SBAS
HP/XP/G2
RTK
MRU
Geometry
Heave config
Monitoring points
Geometry
Communication interface
Input/Output
Serial port extender
Network
Data Pool
Data pool parameters
Processing unit name
Engine network data poo
Network interface name
LAN2 (192.168.1.10)
UDP address
239.255.0 .3
UDP port
31000
Connected to Seapath 320+
Roll
-1.83
Pitch
0.66
Heave
0.28
Hdg
280.56
EPE [m]
0.46
CNAV
SBAS

Transmitter Impedance BIST Instructions

The R/V *Sikuliaq* is equipped with a Kongsberg impedance measurement tool that can be used to troubleshoot and track bad elements when necessary. This is a tedious and time-consuming task, however. In order to monitor transmitter array health on a more routine basis with minimal hassle, the following BIST steps can be followed to measure element impedance indirectly, through the transceiver. This is not a substitute for direct measurements with the Kongsberg tool when necessary but provide an important window into transmitter health over its service life. Specifically, the number of 'high impedance' elements should be tracked at least yearly.

Record TX impedance BIST results via telnet into each TRU [IP address 157.237.XXX.XXX below] when not pinging:

a. EM302: 157.237.14.60
b. EM710: 157.237.2.71

1. Open a command prompt
2. Type 'telnet –f TX_BIST_[date and file name].txt 157.237.XXX.XXX' and hit ENTER
3. Type 'bist' and hit ENTER
4. Type '30' and hit ENTER
    a. Wait for the TRU to run the BIST
5. Type '31' and hit ENTER
    a. Wait for the TRU to run the BIST
6. Type '32' and hit ENTER
    a. Wait for the TRU to run the BIST
7. Type '33' and hit ENTER
    a. Wait for the TRU to run the BIST
8. Type '34' and hit ENTER
    a. Wait for the TRU to run the BIST
9. Type '-1' and hit ENTER
10. Close the command prompt or type 'exit' and hit ENTER