NOAA *Okeanos Explorer* Program

MAPPING DATA REPORT

CRUISE EX0909 Leg 4

Mapping Field Trials
Papahānaumokuākea Marine National Monument (PMNM)

October 2 - November 15, 2009
Honolulu, HI to Honolulu, HI

Report Contributors:
Elizabeth Lobecker, LT Nicola VerPlanck, Elaine Stuart, Colleen Peters, LTJG Megan Nadeau, Emily McDonald, Margot Bohan, and Karma Kissinger

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1. Introduction

The *Okeanos Explorer* Program

Commissioned in August 2008, the NOAA Ship *Okeanos Explorer* is the nation's only federal vessel dedicated to ocean exploration. With 95% of the world's oceans left unexplored, the ship's combination of scientific and technological tools uniquely positions it to systematically explore new areas of our largely unknown ocean. These exploration cruises are explicitly designed to generate hypotheses and lead to further investigations by the wider scientific community.

Using a high-resolution multibeam sonar with water column capabilities, a deep water remotely operated vehicle, and telepresence technology, *Okeanos Explorer* provides NOAA the ability to foster scientific discoveries by identifying new targets in real time, diving on those targets shortly after initial detection, and then sending this information back to shore for immediate near-real-time collaboration with scientists and experts at Exploration Command Centers around the world. The subsequent transparent and rapid dissemination of information-rich products to the scientific community ensures that discoveries are immediately available to experts in relevant disciplines for research and analysis

Through the *Okeanos Explorer* Program, NOAA's Office of Ocean Exploration and Research (OER) provides the nation with unparalleled capacity to discover and investigate new oceanic regions and phenomena, conduct the basic research required to document discoveries, and seamlessly disseminate data and information-rich products to a multitude of users. The program strives to develop technological solutions and innovative applications to critical problems in undersea exploration and to provide resources for developing, testing, and transitioning solutions to meet these needs.

Okeanos Explorer Management – a unique partnership within NOAA

The *Okeanos Explorer* Program combines the capabilities of the NOAA Ship *Okeanos Explorer* with shore-based high speed networks and infrastructure for systematic telepresence-enabled exploration of the world ocean. The ship is operated, managed and maintained by NOAA's Office of Marine and Aviation Operations, which includes commissioned officers of the NOAA Corps and civilian wage mariners. OER owns and is responsible for operating and managing the cutting-edge ocean exploration systems on the vessel (ROV, mapping and telepresence) and ashore including Exploration Command Centers and terrestrial high speed networks. The ship and shore-based infrastructure combine to be the only federal program dedicated to systematic telepresence-enabled exploration of the planet's largely unknown ocean.

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2. Purpose

The purpose of this report is to briefly describe the mapping data collection and processing methods, and to report the results of the cruise. For a detailed description of the *Okeanos Explorer* mapping capabilities, see appendix C and the ship's readiness report, which can be obtained by contacting the ships operations officer (ops.explorer@noaa.gov).

3. Cruise Objectives

This was the final cruise of the 2009 field trial season. The goal of the cruise was to further shakedown and refine the survey system onboard. There were also two programmatic objectives for the cruise. First, personnel from the Exploratorium in San Francisco were on board for the first few days of the cruise, in order to gain further understanding of ship and survey functionality for the upcoming telepresence and educational demonstrations at the museum. Second, another telepresence demonstration was conducted with 60 Minutes while they were filming at URI for their November 29 episode on ocean exploration. See the daily log below for further details on these events.

4. Participating personnel

NAME	ROLE	AFFILIATION
Richard Patana	Commanding Officer (acting)	NOAA Corps

Elizabeth "Meme" Lobecker	Expedition Coordinator / Mapping Team Lead	NOAA OER (ERT, Inc.)
LT Nicola VerPlanck	Field Operations Officer	NOAA Corps
Elaine Stuart	Senior Survey Technician	NOAA OMAO
Colleen Peters	Senior Survey Technician	NOAA OMAO
LTJG Megan Nadeau	Mapping Watch stander	NOAA Corps
Emily McDonald	Mapping Watch stander	NOAA OER
Margot Bohan	Mapping Watch stander	NOAA OER
Karma Kissinger	Mapping Watch stander	NOAA OER/UCAR Intern

5. Cruise Statistics

Dates	26 October 2009 – 15 November 2009
Weather delays (in days)	4.2
Total non-mapping days	6.5
Total survey mapping days	8.6
Total transit mapping days	5.9
Line kilometers of PMNM survey	2978 (1608 nm)
Beginning draft	15.0 inches(fwd)14.75 (aft)
Average ship speed for survey	7.8Kts

6. Mapping sonar setup

NOAA *Okeanos Explorer* (EX) is equipped with a 30 kHz Kongsberg EM 302 multibeam sonar and a 3.5 kHz Knudsen sub-bottom profiler (SBP 3260). During this cruise EM 302 bottom bathymetric and backscatter data were collected. Additional water column data logging was turned on where interesting features were observed in the water column.

The ship used a POS MV ver. 4 to record and correct the multibeam data for any vessel motion. C-NAV GPS system provided DGPS correctors with positional accuracy expected to be better than 2.0m.

All corrections (motion, sound speed profile, sound speed at sonar head, draft, sensor offsets) are applied during real time data acquisition in SIS ver. 1.04. XBT casts (Deep Blue, max depth 760 m) were taken every 6 hours (0030, 0630, 1230 and 1830 local time) and in between if needed. An 800m CTD cast was taken at 1230 as weather allowed. XBT cast data were converted to SIS compliant format using NOAA Velociwin ver. 8.92 Plus. See Appendix F for a complete list of software used for data processing.

Previous to this cruise, TX36 transmit board #16 failed twice, and was replaced both times with new spare boards from Kongsberg. Most recently, TX36 transmit board #16 was replaced during the in port on October 21, 2009. A successful Built In System Test (BIST) test was run on October 21 while the ship was pierside in Pearl Harbor. When the ship was outside of the harbor, two additional successful BISTs were immediately conducted on October 26 and October 27, 2009. See Appendixes B and C, respectively, for complete results.

On October 28, during transit to the survey working grounds, data quality was observed to degrade with little congruent change in weather, and an additional BIST was run. See Appendix D for complete results. The BIST results showed that TX36 transmit board # 16 had failed again, the third time this survey season. However, data quality was deemed acceptable for the purposes of the cruise, and transit to the working grounds was not interrupted

Additional command line BISTs were run on November 3rd, and results were sent to Kongsberg for evaluation.

A final BIST was run on November 11 to determine if the system had further degraded during the 10 day survey period. The value for the high voltage bridge #1 had decreased further below the acceptable range. See Appendix E for the complete results.

Table 1. Built In System Test (BIST) results for TX36 Board #16

Date	**Pass/Fail**	**High Voltage Br. 1 (spec 90.0 – 145.0)**	**Input Current 12V (spec 0.3 – 1.5)**
26 Oct 2009	Pass	120.9	0.6
27 Oct 2009	Pass	121.3	0.6
28 Oct 2009	Fail	7.6	1.8
11 Nov 2009	Fail	6.0	1.8

7. Data Acquisition Summary

The survey area for EX0909 Leg 4 was selected as a survey site after soliciting information from the Papahanaumokuakea Marine National Sanctuary (PMNM) regarding areas where there is a lack of high-resolution multibeam coverage. PMNM provided details on several areas which required such coverage. The survey working grounds for EX0909 Leg 4 was selected for the presence of five unexplored seamounts: Tamana, Sovereign, Haaheo, Don Quixote, and Euphemia. Very little is known about these seamounts, other than the origins of their names. Each was named after a vessel of significance from the 1800’s which had passed through or spent significant amounts of time in Hawaii.

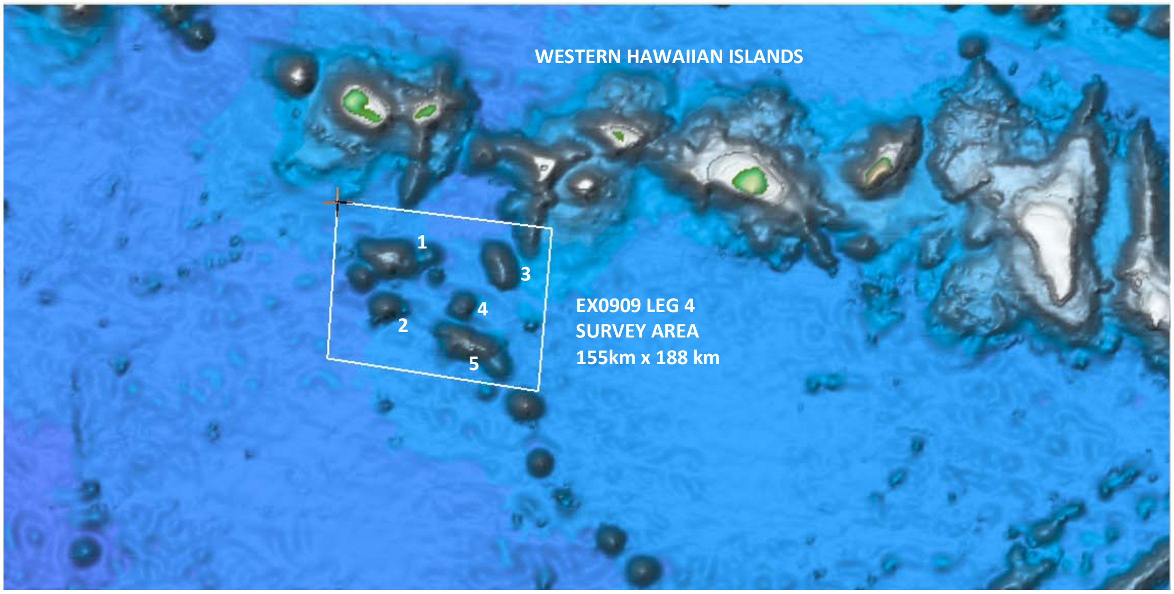


Figure 1. EX0909 Leg 4 survey area detail. Background data: satellite altimetry, source Sandwell and Smith. Expected water depths range from ~900m (atop Tamana Seamount) to ~5300m (on the seafloor between seamounts). KEY: 1) Don Quixote Seamount, 2) Euphemia Seamount, 3) Haaheo Seamount, 4) Sovereign Seamount, 5) Tamana Seamount.

Over the course of the three week cruise, a total of five distinct line plans were developed in an effort to work efficiently and safely in highly variable weather conditions. Initially, seas were expected to be a possible hindrance to ideal survey conditions, so two line plans were developed. The first (see Figure 2) had reciprocal azimuths of 6° and 186°, with mainscheme line spacing of 5800m, and three pairs of line splits over tops of the three highest seamounts (Don Quixote, Tamana, and Ha'aheo).

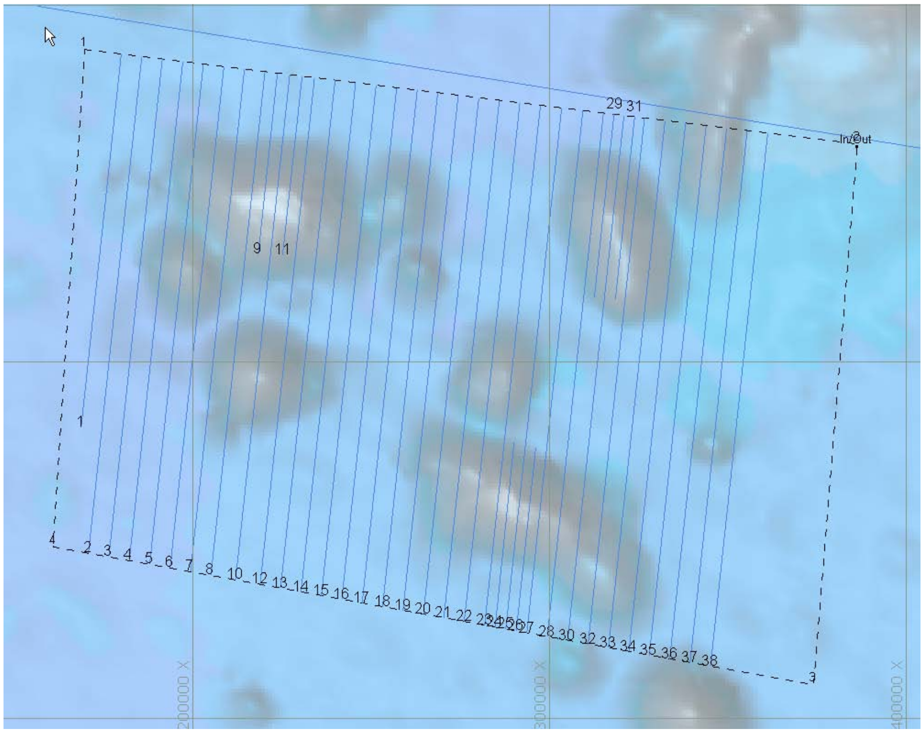


Figure 2. Initial line plan. Background data: satellite altimetry, source Sandwell and Smith. Image generated in Hypack. Image credit: NOAA.

A second line plan was also developed with 5800 meter line spacing and reciprocal azimuths of 100° and 280° (see Figure 3). Due to prevailing weather conditions, it was never utilized. This line plan also had three pairs of line splits over the tops of three highest seamounts (Don Quixote, Tamana, and Haaheo).

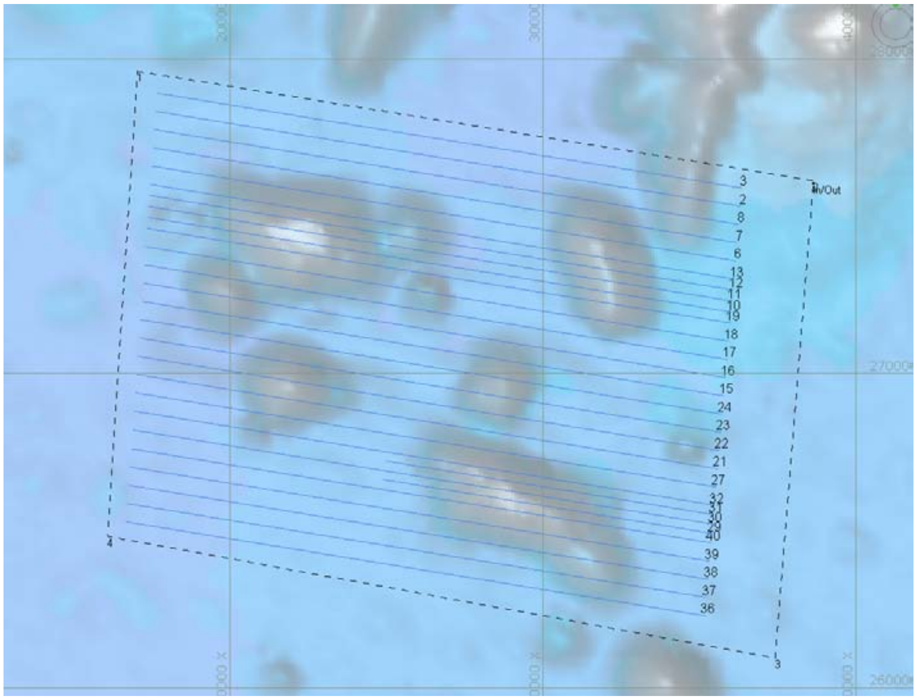


Figure 3. Second line plan. Background data: satellite altimetry, source Sandwell and Smith. Image generated in Hypack. Image credit: NOAA.

A large, slow moving high pressure storm system surrounded the survey grounds early in the cruise, and from the evening of October 31st to the end of the cruise on November 15th we experienced heavy seas of up to 20 feet with sustained winds up to 35 knots. As there was nowhere for the ship to hide from the geographically large storm in the small western Hawaiian Islands, we had no choice but to continually alter our line plans in an attempt to collect decent quality data under the circumstances.

On November 3rd, the seas made collecting acceptable data on the northerly lines of the initial line plan impossible, and a third line plan was developed (see Figure 4). The new line plan was developed with reciprocal azimuths of 50° and 230°. The line spacing was reduced to 5000m, to increase line-to-line overlap to compensate for outer beam loss from heavy seas. The line plan focused on the northwestern section of the survey grounds in order to target collection of "interesting data" during the November 9 and 10 telepresence demonstrations at the Inner Space Center at URI for CBS 60 Minutes filming.

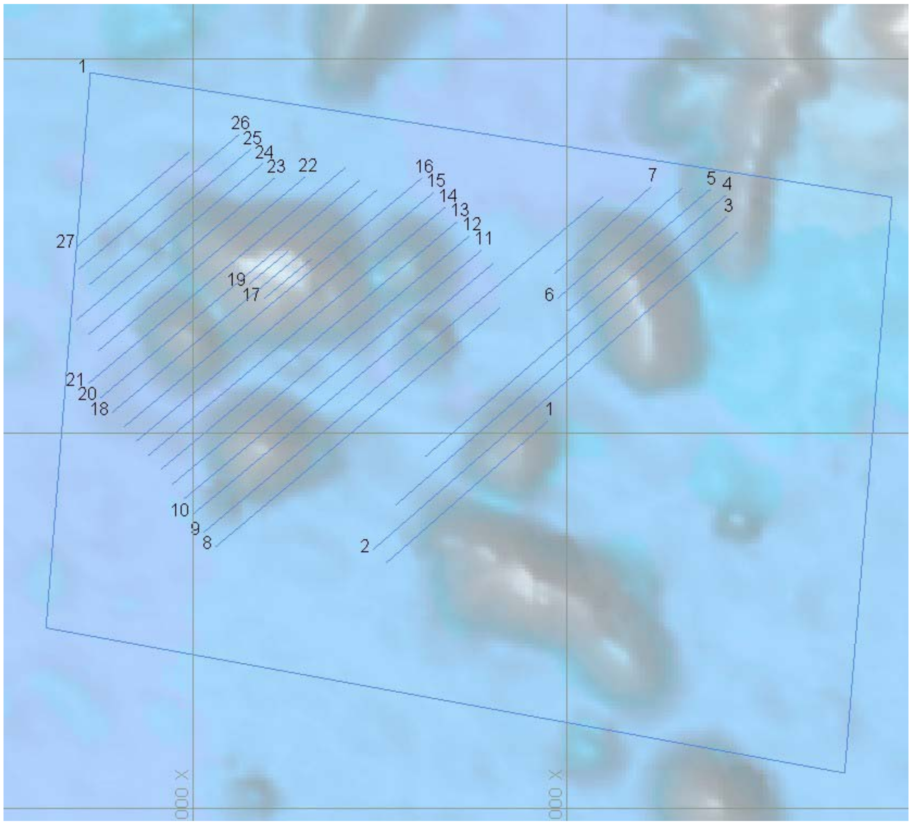


Figure 4. Third line plan (implemented November 3rd). Background data: satellite altimetry, source Sandwell and Smith. Image generated in Hypack. Image credit: NOAA.

On November 4th, a fourth line plan (see Figure 5) was developed, again due to the heavy seas. The new line plan had 5000m line spacing and reciprocal azimuths of 30° and 210°. This line plan shifted focus of the survey grounds to the eastern side in the vicinity of the seamounts Tamana and Sovereign, in order to minimize transit in heavy seas.

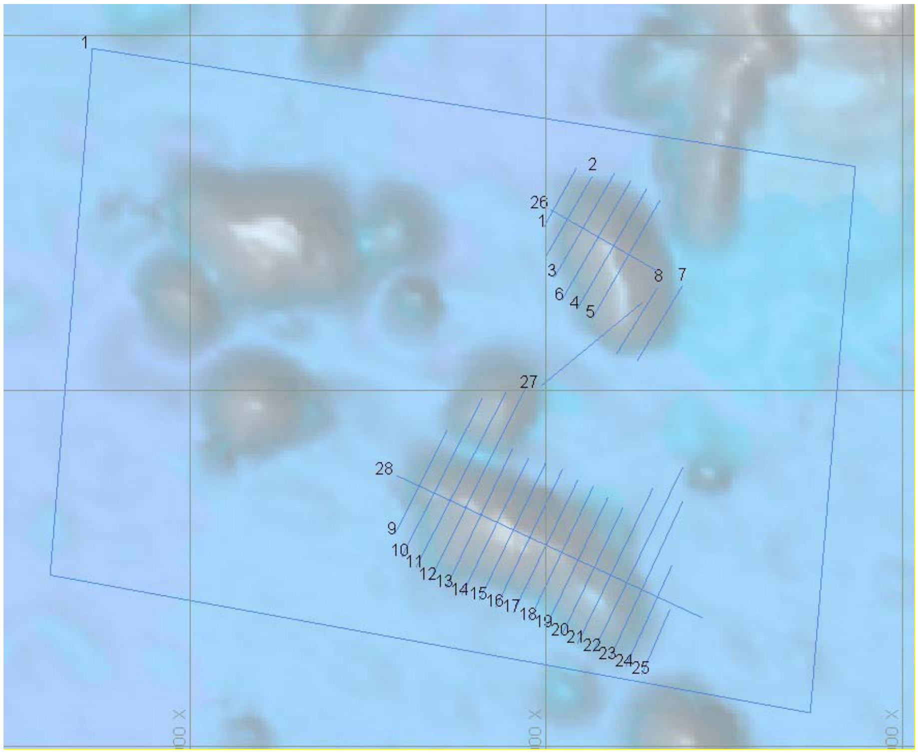


Figure 5. Fourth line plan, implemented November 5th. Background data: satellite altimetry, source Sandwell and Smith. Image generated in Hypack. Image credit: NOAA.

After completing mapping over Tamana Seamount, a fifth and final line plan was implemented to attempt to collect data over Euphemia and Don Quixote seamounts (see Figure 6).

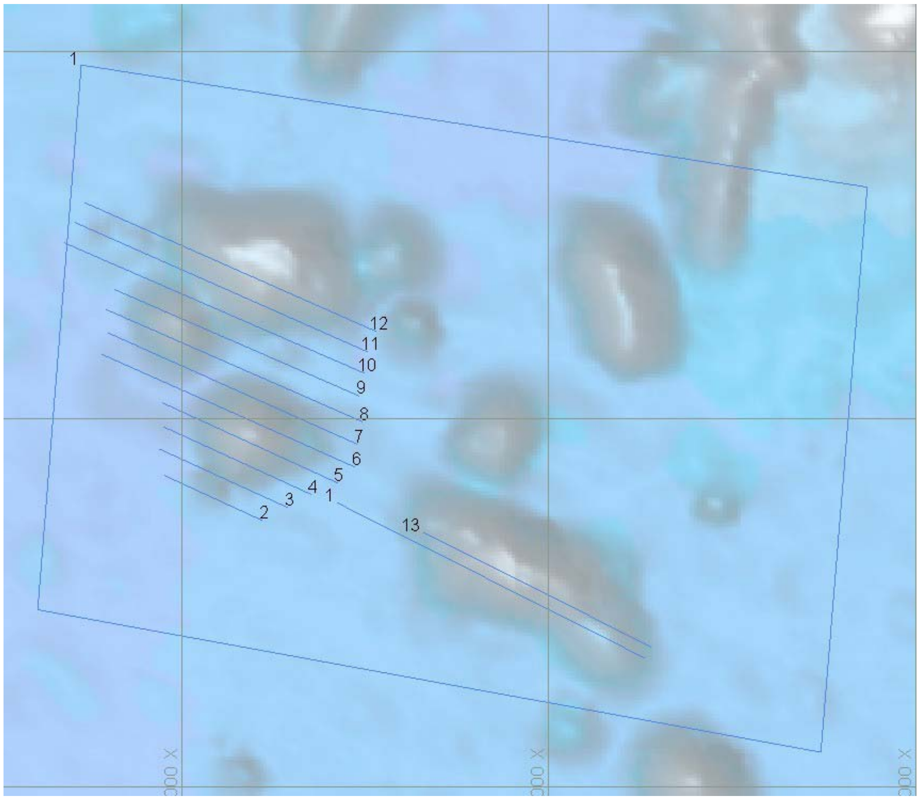


Figure 6. Fifth line plan, implemented November 7th. Background data: satellite altimetry, source Sandwell and Smith. Image generated in Hypack. Image credit: NOAA.

A 5 m – 6m ribbing artifact was observed in the multibeam data near the edges of the swath. This artifact is consistent with that seen in the data throughout the survey season. We have not yet been able to identify the source. It remains a focus of shakedown efforts.

8. Data processing

Angular offsets are tabulated as below. For complete processing unit setup (PU Setup) utilized for the cruise, please refer to Appendix B.

Table 2. Angular offsets for Transmit (TX) and Receive (RX) transducer.

	Roll	Pitch	Heading
Tx Transducer	0.0	0.0	359.98
Rx Transducer	0.0	0.0	0.03
Attitude	0	-0.7	0.0

Onboard processing of bathymetric data was done in CARIS HIPS ver. 6.1 during which the data were cleaned in ‘Swath Editor’ and ‘Subset Editor’. No tidal corrections were applied during post processing, however, no appreciable differences were observed between different lines by not applying tidal corrections. A nominal grid cell size of 50 m was chosen for the bathymetric grids.

Three crosslines were run, one over Euphemia Seamount and two over Tamana Seamount. Both cross lines yielded a favorable comparison between main scheme lines and cross lines. Displayed below in Figures 8 through 10 are the comparisons for the one of the crosslines over Tamana Seamount.

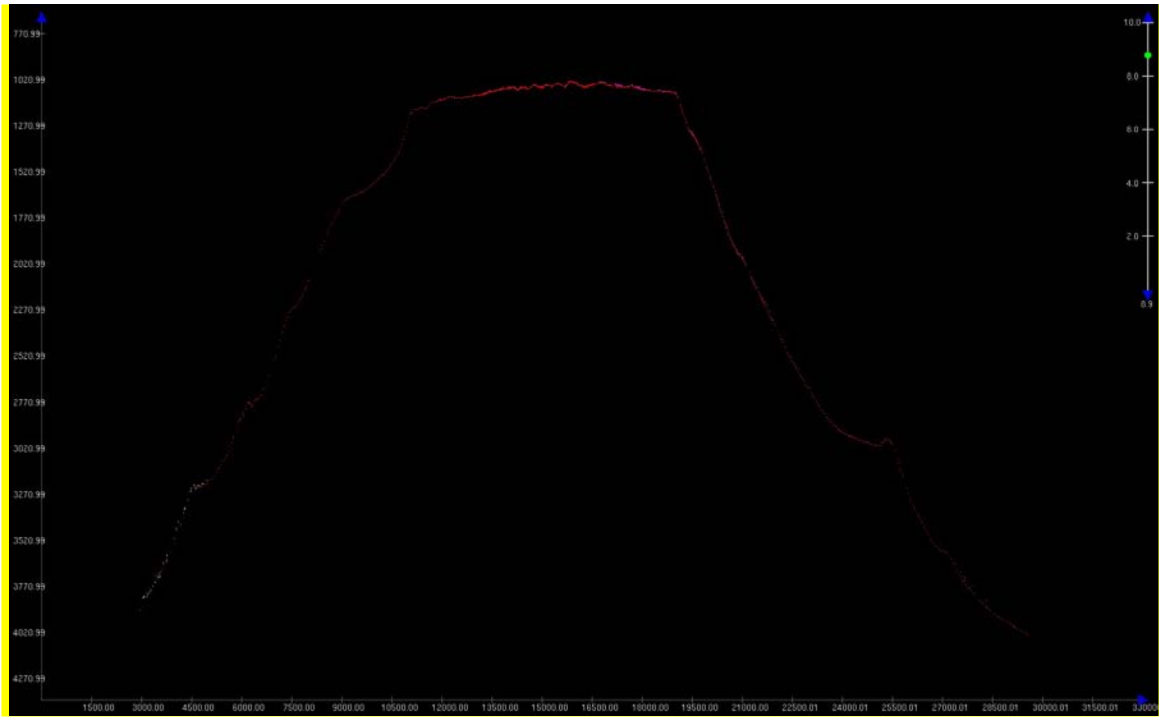


Figure 7. Screengrab of along track view of crossline over Tamana Seamount, showing agreeable crossline comparison with mainscheme lines. Crossline data are shown as red points, mainscheme data are shown as points in various other colors. Image generated in CARIS. Image credit: NOAA.

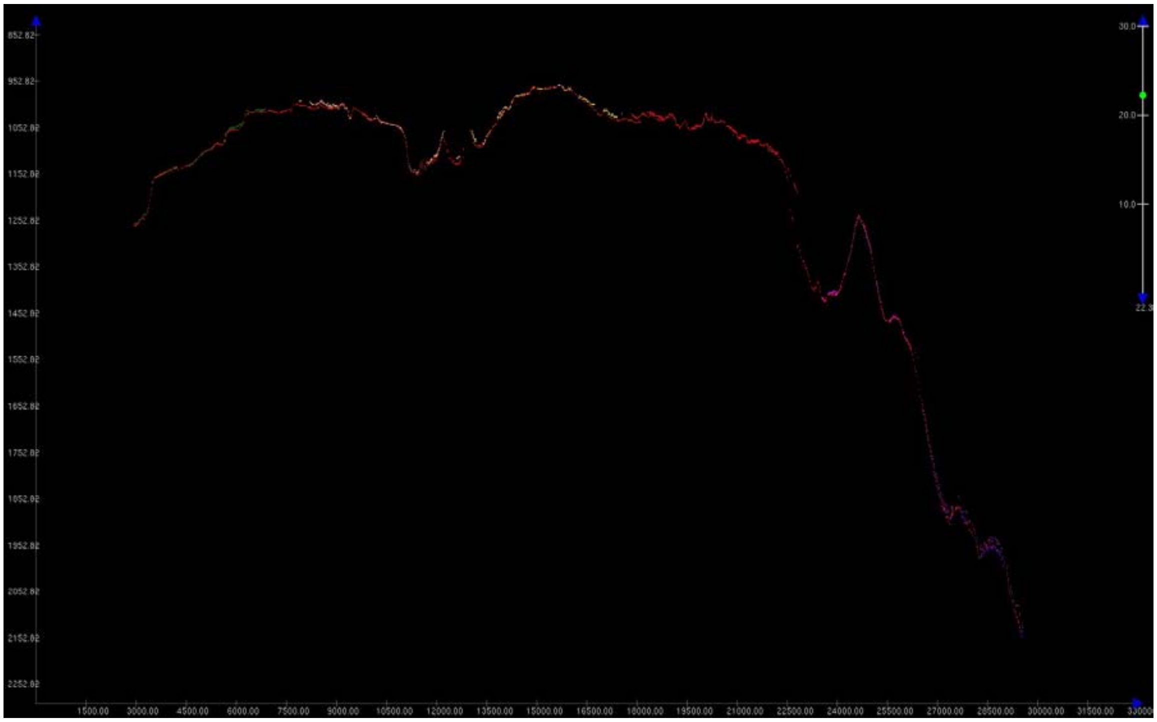


Figure 8. Screengrab of across track view of crossline over Tamana Seamount, showing agreeable crossline comparison with mainscheme lines. Crossline data are shown as red points, mainscheme lines are shown as points in various other colors. Image generated in CARIS. Image credit: NOAA.

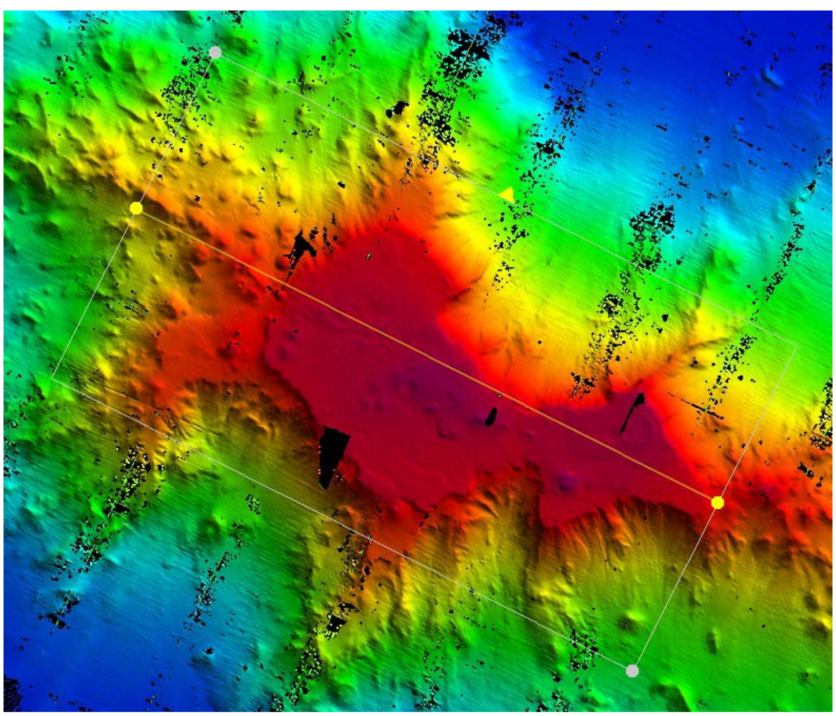


Figure 9. Screengrab showing data of Tamana Seamount loaded into subset editor for across track crossline comparison shown in Fig. 8 above. Image generated in CARIS. Image credit: NOAA.

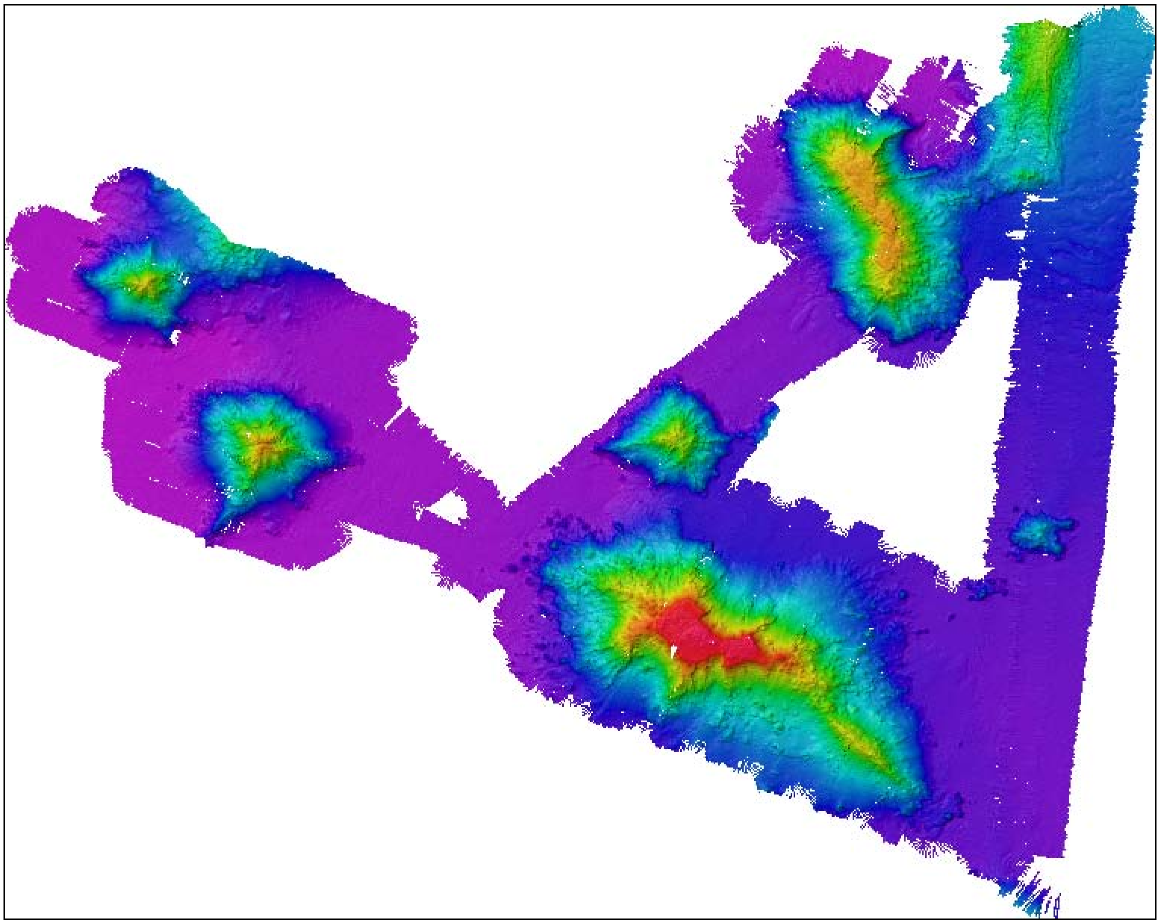


Figure 10. 50 meter cell size grid showing total seamount mapping area completed with EM302 during cruise EX0909 Leg 4. Image generated in Fledermaus. Image credit: NOAA.

9. Cruise Calendar

October 2009						
Mon	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**
				23 Lobecker boarded ship	24 NOAA non-mapping personnel (Russell, Carothers) boarded ship	25 Mission party, and Exploratorium personnel boarded ship.
26 Additional non-mapping NOAA personnel (Keener, Akamine) boarded the ship. Orientation and training for the mission party.	27 Commence Exploratorium demo survey. Telepresence demo with UNH. Exploratorium and non-mapping NOAA personnel	28 Transit to survey grounds outside of PMNM. Multibeam data continuously collected.	29 Transit to survey grounds outside of PMNM. Multibeam data continuously collected.	30 Transit to survey grounds outside of PMNM. Multibeam data continuously collected.	31 Arrive at survey grounds outside of PMNM 0645. Commence mapping PMNM priority area.	

Took on fuel. Transit to Exploratorium demo survey grounds.	disembark. Commence transit to survey grounds outside of PMNM.					
November 2009						
Mon	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**
						1 Continue mapping PMNM priority area.
2 Continue mapping PMNM priority area throughout the day. WX standdown at 1745.	3 Resume mapping PMNM at 0830. Stop mapping at 1530. Wx standdown overnight.	4 Resume mapping operations 0800.	5 Continue mapping PMNM priority area throughout the day.	6 Continue mapping PMNM priority area throughout the day.	7 Continue mapping PMNM priority area throughout the day.	8 Continue mapping PMNM priority area throughout the day.
9 Continue mapping PMNM priority area throughout the day.	10 Continue mapping PMNM priority area throughout the day. CBS 60 Minutes telepresence demonstration. Commence transit to Honolulu.	11 Continue transit to Honolulu. Secure multibeam and discontinue mapping at 0954 due to weather.	12 Continue transit to Honolulu. Multibeam remains secured.	13 Continue transit to Honolulu. Multibeam remains secured.	14 Continue transit to Honolulu. Multibeam remains secured.	15 Continue transit to Honolulu. Arrive at dock on Ford Island, Pearl Harbor Naval Base, Honolulu.
16 Mapping team disembarks *Okeanos Explorer*.						

10. Daily cruise log

(ALL TIMES LOCAL HST)

October 23, 2009
Elizabeth Lobecker, cruise coordinator for this cruise, boarded the ship.

October 24, 2009
NOAA non-mapping personnel (Craig Russell and Kyle Carothers) boarded the ship.

October 25, 2009
Mapping personnel boarded the ship (Margot Bohan, Karma Kissinger, Emily McDonald). Exploratorium personnel boarded the ship.Conducted initial ship orientation, introduction to multibeam control room, and introduction to watchstander responsibilities.

October 26, 2009
Additional NOAA non-mapping personnel (Paula Keener, Bradley Akamine) boarded the ship. The ship took on fuel in Pearl Harbor and departed for the Exploratorium demonstration survey grounds in the vicinity of Penguin Bank. Arrived at demonstration survey grounds ~2100. Stood by overnight to commence survey ops in the morning. Data was collected overnight but was not processed.

Conducted in-depth mapping training: communications, XBT, watchstander duties. Successful BIST conducted after departing harbor.

Observed weather for the day: winds SE 10-15 kts, seas 3-4 foot swell with 1-3 foot seas.

October 27, 2009
Commenced survey operations at the Exploratorium demonstration survey grounds near Penguin Bank at 0745. Data was collected but not processed.

From Paula Keener regarding Exploratorium/NOAA team efforts on board:
The Exploratorium/NOAA team continued with the orientation cruise on board the *Okeanos Explorer* in preparation for development of an *Okeanos* Web page by the Exploratorium. XBT and CTD casts were observed and videotaped, and a telepresence test was conducted with the ISC and the Exploratorium, switching among the different cameras on board the ship with audio to detail the description of imagery collected by the cameras. Conversations continued about possible approaches to Web page design and content, the ship's schedule, ideas for how the ECCs might operate, and how information might flow to the public as discoveries are made. The NOAA/Exploratorium personnel participated in the ship's daily Ops Meeting .

Exploratorium personnel and NOAA non-survey personnel disembarked *Okeanos Explorer* via small boat transfer at 1700 and 1815. Another successful BIST was conducted prior to commencement of transit to PMNM survey grounds at 1900.

Observed weather for the day: winds were SE 5-15 kts, seas were a 2-5 foot swell with 1-4 foot seas.

October 28, 2009
In transit to PNMN. Standard mapping watchstander procedures in effect. Weather started to degrade in the evening. Effects of weather seen in transit data. Data degraded to the point where it was appropriate to run a BIST. BIST results showed transmit board 16 failed again. The data are still acceptable, so we are continuing on to the survey working grounds.

Observed weather for the day: winds were SE 15-19 kts earlier in the day, and became NE 10-15 in the evening. Seas were a 3-6 foot swell with 4-7 foot seas.

October 29, 2009

In transit to PNMN. Standard mapping watchstander procedures in effect.
Observed weather for the day: winds were NW 10-15 kts, seas 6-8 foot swell with 2-4 foot seas.

October 30, 2009

In transit to PNMN. Standard mapping watchstander procedures in effect. A conference call was conducted with members of OER and the 60 Minutes production staff to discuss the plans for the exploration and telepresence demonstration on 11/09/09 and 11/10/09.

Observed weather for the day: Winds were NE 12-18 kts, seas were a 6-8 foot swell with 3-6 foot seas.

October 31, 2009

Arrived at survey grounds and commenced survey at 0645. Our line plan has azimuths of 6°/186°, which puts us approximately 60° off the direction of the swell. On the previous cruise (EX0909 Leg 3), a star pattern was run and determined that 60° off the swell is the best direction to run to give a combination of high quality data and tolerable working conditions for all onboard.

At approximately 1130, the weather came up and the data quality started to degrade. In the morning we were acquiring at upwards of 8km swath. Between 1130 and 1300 our swath coverage was ranging from 3.5km to 6.5km while in Very Deep and Extra Deep Mode. At 1300 swath was holding steady in Auto Mode (very deep) and upwards of 6.5km across track coverage. We slowed our speed to 7 kts on northerly line to maintain data quality. We increased speed back up to 9-10 knots on the southerly line.

1230 CTD was cancelled due to weather.

CNAV stopped sending data to the POSMV for approximately 45 minutes, despite the fact that it was seeing 10 satellites. We restarted CNAV three times, it started sending position data the third time.

We completed the first two eastern survey lines today.

Observed weather for the day: Winds were NE 15-23 kts, seas were a 4-8 foot swell with 4-6 foot seas.

November 1, 2009

The weather has picked up significantly. Throughout the day we experienced XX foot seas, which significantly impacted data quality in the northerly direction. We finished our first line of the day all the way to the north end, then reran the same in the southerly direction to attain better coverage. Data was collected in the northerly direction but not processed due to extremely poor quality.

We are in the center of a very large high pressure system. There are no islands nearby to hide behind, and the storm system is too large to transit out of, so we have no choice but to continue to survey.

1230 CTD was cancelled due to weather

The bridge has restricted access to the weather decks.

TSG pump has been secured due to pitching of the ship, so we are no longer receiving sound speed at the sonar head.

Observed weather for the day: Winds were NE 25-30 kts, seas were a 14-16 foot swell with 4-6 foot seas.

November 2, 2009
Throughout the day we experienced a sea state of 8 on the Beaufort scale, with seas of up to 18 feet and winds of up to XX coming from the NE. We continue to collect mainscheme lines in both northerly and southerly directions, but we are not processing the northerly data. Bathymetry is acceptable in the southerly direction, but backscatter data is severely degraded.

TSG pump remains secured due to the constant pitching of the ship.

At 1715, while on a southerly line, the ship took a series of large rolls and the EM302 lost bottom for several minutes. Multibeam data quality continued to degrade beyond acceptable quality, and at 1745 we decided to stop collecting data and hove to in order to find a better ride. The EM302 TRU, SIS, and multibeam computer were all shut completely off to give the system a break. We expect to be in the worst part of the weather system at 0300 tomorrow. We will continue to assess when we can get back online in the upcoming days.

Observed weather for the day: Winds were NE 30-35 kts, seas were 18-20 feet.

November 3, 2009
With following seas, we turned the EM302 multibeam on at 0830 to see how the data quality looked. It was deemed acceptable and logging was started. A new line plan was developed to take advantage of the current weather conditions, with azimuths of 50° and 230°. This puts the seas directly astern and directly into the bow. At 1408 we completed our first line of the new plan, and turned to head into the seas. Data quality quickly became unacceptable, so we turned stopped EM302 logging and pinging. We took the opportunity to perform additional BIST testing requested by Kongsberg to troubleshoot the 3rd failure of TX36 board #16. We telnet'ed into the TRU and ran bist tests 30-34, then swapped TR36 board #'s 16 and 24, then ran BIST tests 30-34, the swapped boards 16 and 24 back, then reran BISTs 30-34. Results were sent to Kongsberg for analysis.

Observed weather for the day: Winds were NE 25-30 kts, seas were 14-16 feet.

November 4, 2009

We reached the north side of the survey area at 0800. We turned south and started acquiring data at that time. Data quality looked good so we ran a line south until noon, then headed north again. At 2000, we headed south for a smoother ride and data acquisition overnight.

At 1000 the multibeam froze and required a restart. SIS was giving an error message that it could not find the sounder. We restarted the TRU and the system came up normally. In the present weather conditions, it was deemed prudent to continue on in our current line rather than turn around and fill the 15 minute data gap created by the restart.

Observed weather for the day: The seas were 12 ft throughout the day. The winds averaged 26-27 kts from the NE.

November 5, 2009

Weather decks opened, which greatly improved morale. The EM302 multibeam collected good data until approximately 0900, when the ship turned onto a North bound line. To limit poor data quality and to maximize surveying efforts, a new line plan was established with azimuths 30°/120°. The plan covers the seamounts Tamana, Sovereign, and Haaheao. This line plan demonstrates the best direction to cut through the swells and give the most favorable data in the North bound direction. This line plan was implemented at ~1400.

Observed weather for the day: seas were 10 feet with a 6 foot swell, winds averaged NE 20 kts.

November 6, 2009

At 0100, the ship entered a series of intense squalls that lasted intermittently throughout the night until 0700. Lightning was observed throughout the squall period.

Throughout the rest of the day, survey operations returned to normal with the seas continuing to lie down. We were able to complete mapping over Haaheao Seamount and transited south to continue mapping over the seamounts Sovereign and Tamana. CTD deployments are still on hold due to swells. We completed crossline over Ha'aheo Seamount today. Results were favorable.

Observed weather for the day: The seas were 7- 10 ft throughout the day. The winds averaged 20 kts from the NE.

Figure 11. Profile view of Ha'aheo Seamount. Units shown in meters. Height of Ha'aheo Seamount above surrounding seafloor = approx. 3200m. Image generated in Fledermaus. Image credit: NOAA.

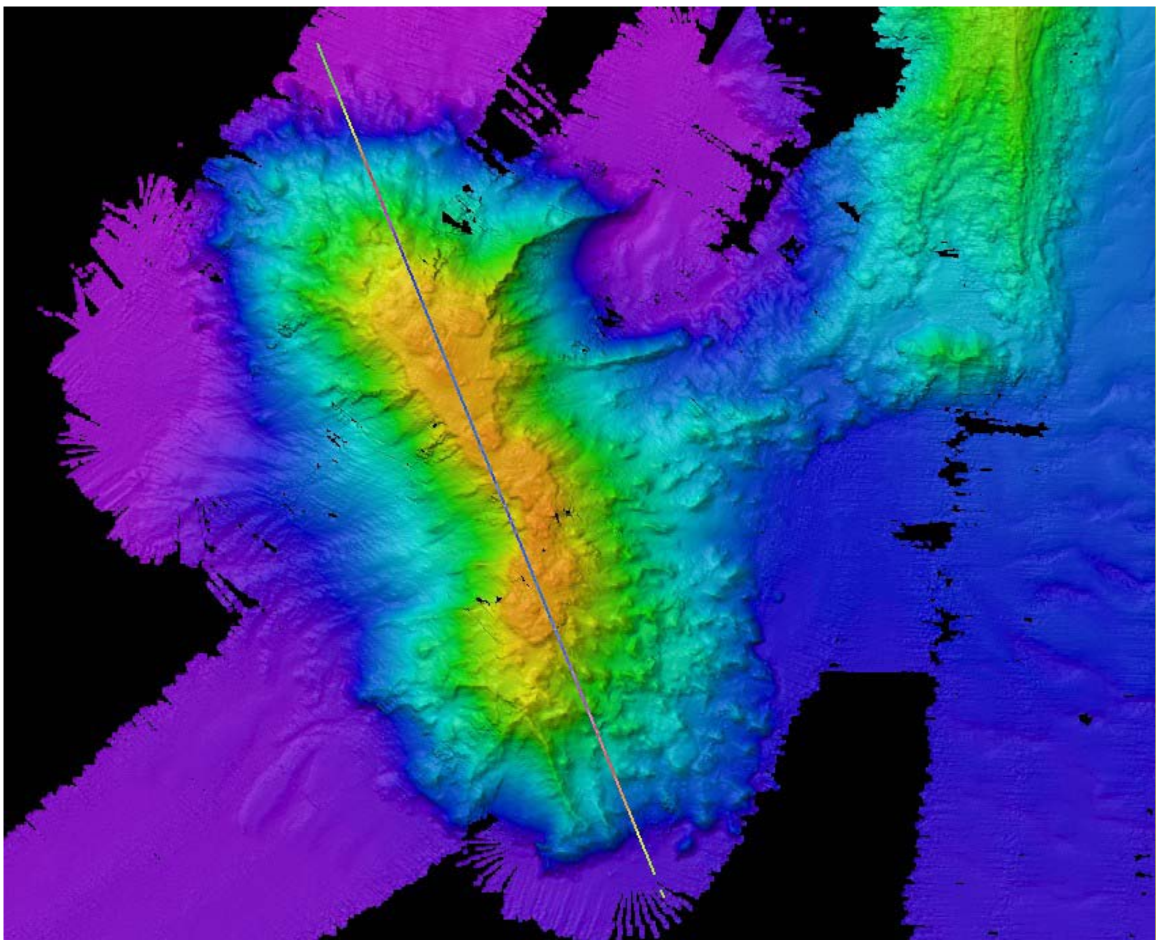


Figure 12. Overview of Ha'aheo Seamount. White line indicates direction of depth profile shown in Fig. 11 above. Image generated in Fledermaus. Image credit: NOAA.

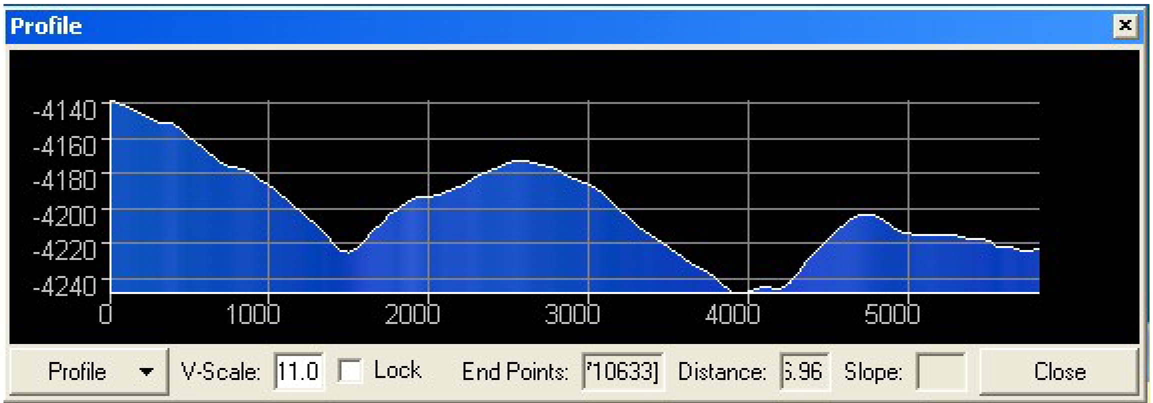


Figure 13. Profile of interesting sediment or lava flow pattern at northeast corner of survey site near Ha'aheo Seamount and Northhampton Seamounts extension. Image generated in Fledermaus. Image credit: NOAA.

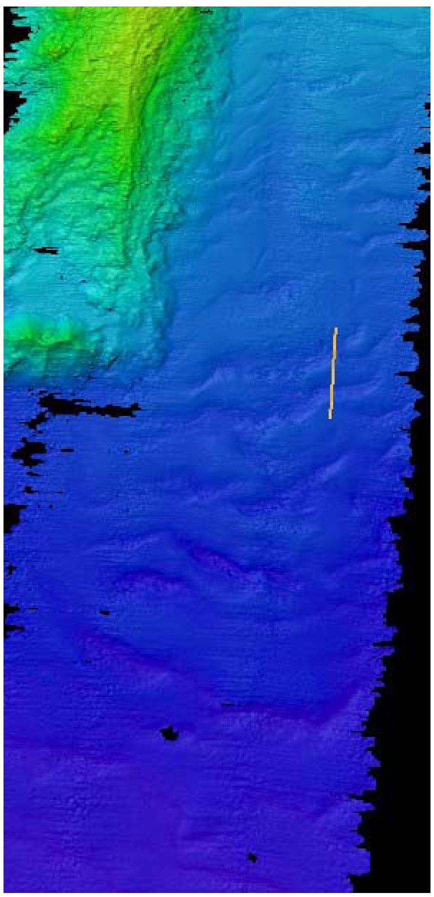


Figure 14. Interesting sediment or lava flow pattern at northeast corner of survey site near Ha'aheo Seamount and Northhampton Seamounts extension. White line indicates profile in Fig. 13 above. Image generated in Fledermaus. Image credit: NOAA.

November 7, 2009

We continued mapping over the seamounts Sovereign and Tamana today. The data quality is much improved with the seas laying down. A benefit of the sea state we experienced of the course of the last week is that improperly secured items, such as tv screens and broken storage cabinet drawers, came loose and were then made seaworthy. CTD deployment is still on hold due to lingering swells. The TSG pump was cleared and turned back on today, so we are now receiving sound speed at the sonar head.

Observed weather for the day: The seas were 4-6 ft throughout the day. The winds averaged 11 kts from the NE and became E.

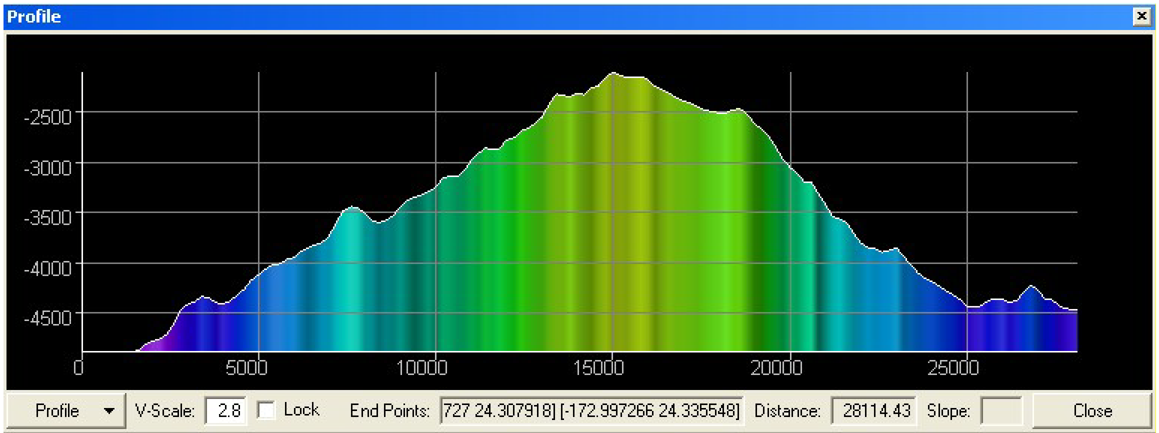


Figure 15. Profile of Sovereign Seamount. Units shown in meters. Height of Sovereign Seamount above surrounding seafloor = approx. 2700m. Image generated in Fledermaus. Image credit: NOAA.

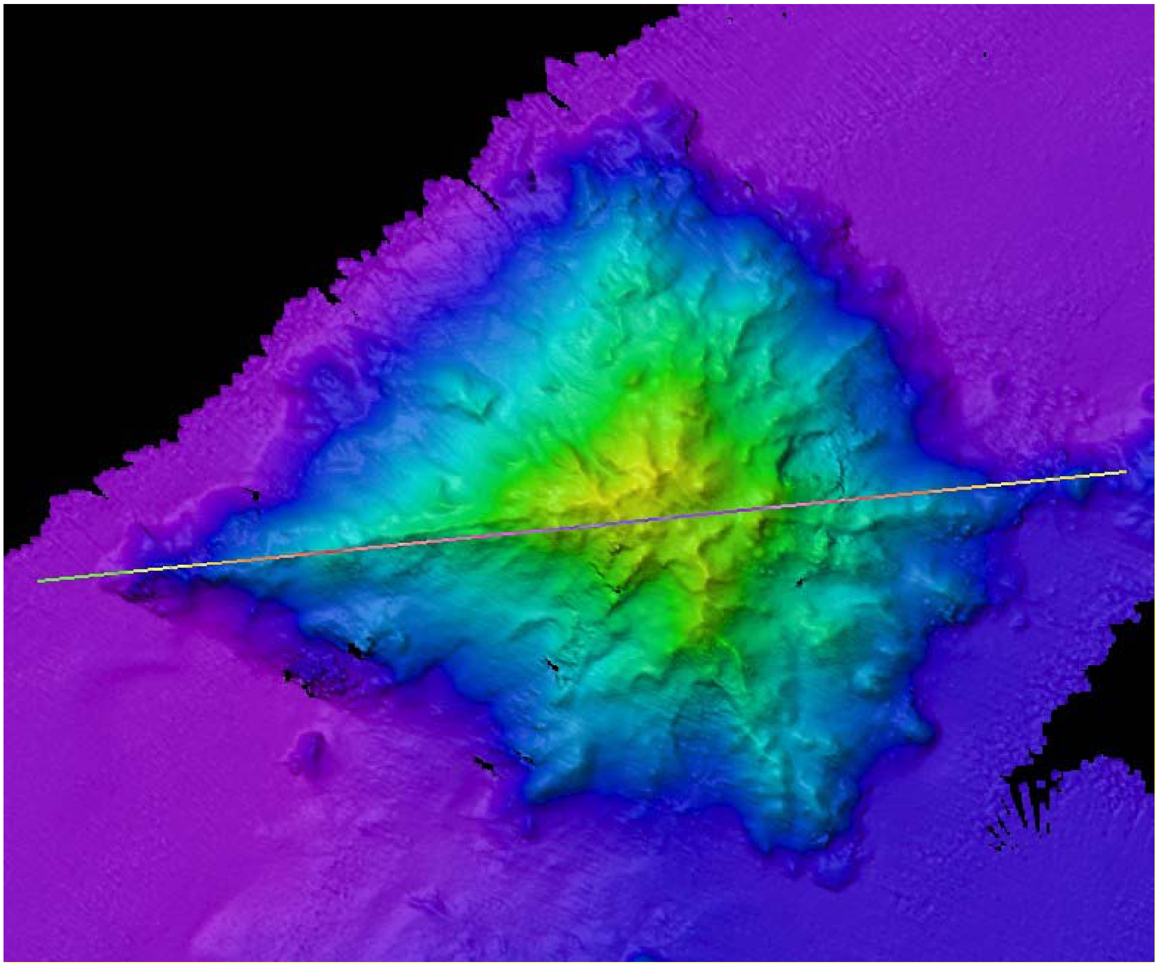


Figure 16. Overview of Sovereign Seamount. White line indicates profile trace shown above in Fig. 15. Image generated in Fledermaus. Image credit: NOAA.

November 8, 2009

We completed mainscheme mapping lines over Tamana Seamount at 1005 in the late evening, at which point we started on a crossline / transit line over to Euphemia Seamount. See Line plan #5 in Figure X above.

In the morning the mapping team went over the protocols and expectations for the telepresence demonstration for CBS 60 Minutes taking place on November 9^{th} and 10^{th} between the ship and the Inner Space Center at URI.

At 1230 we completed a successful CTD cast to 800 meters, the first CTD cast of the cruise due to weather constraints. We conducted a simultaneous XBT (Deep Blue model) to 760 meters. The comparison results were acceptable and are shown below.

Observed weather for the day: The seas were 2-5 feet throughout the day from the E. Winds were between 10-13 kts from the E.

Figure X. 08 November 2009 CTD to XBT comparison cast results.

November 9, 2009

Today we mapped all of Euphemia Seamount and started mapping the southern flank of Don Quixote seamount. We further prepared for the CBS 60 Minutes telepresence demonstration at the Inner Space Center at the URI Bay Campus.

Observed weather for the day: The seas were 5 feet throughout the day from the E. Winds were between 13-14 kts from the E.

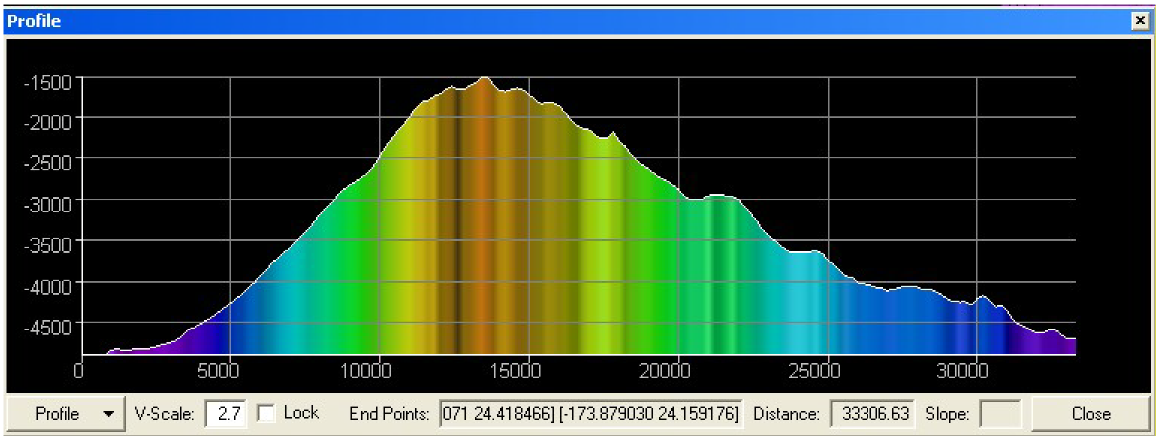


Figure 17. Profile view of Euphemia Seamount. Height of Euphemia Seamount above surrounding seafloor = approx. 3200m.

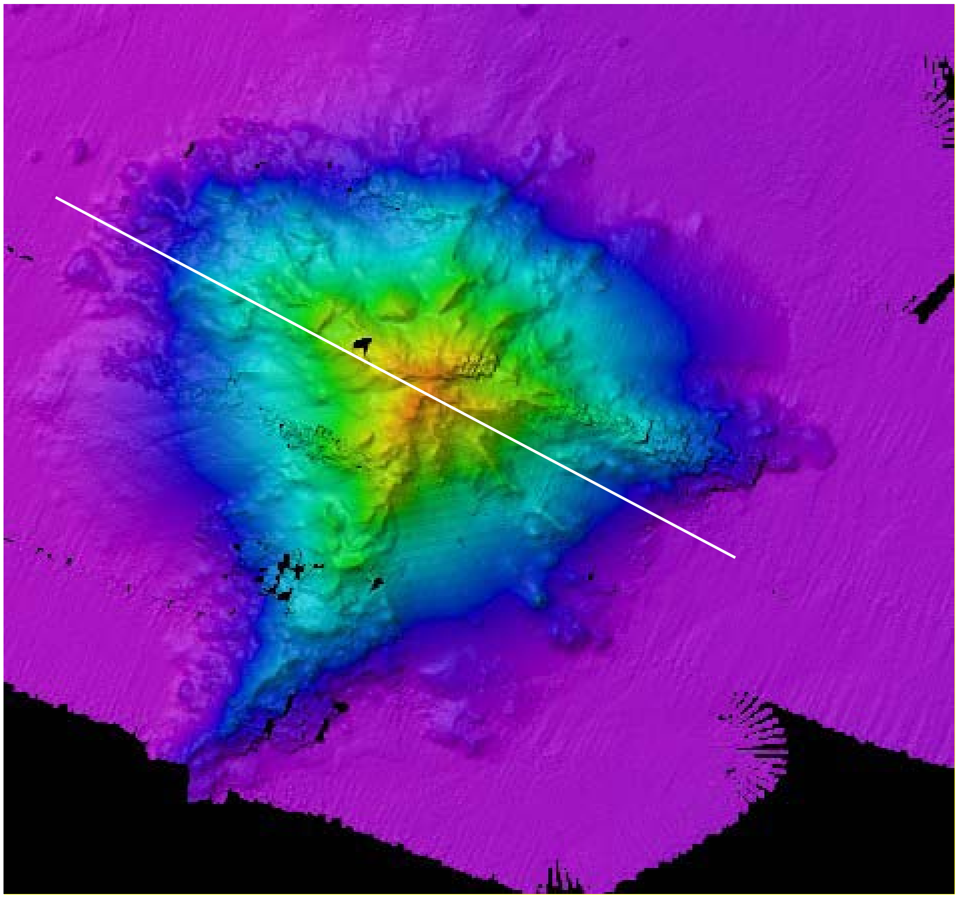


Figure 18. Overview of Euphemia Seamount. White line indicates direction of profile shown in Fig. 17 above. Image generated in Fledermaus. Image credit: NOAA.

November 10, 2009

In the morning we conducted a telepresence demonstration for a CBS 60 Minutes broadcast to be aired November 29 this year. We completed what we could of mapping over Don Quixote seamount before departing at 1130 for the southern portion of the survey working grounds. At 1740 we started on the final survey line for the survey, a crossline/holiday line over Tamana Seamount.

Observed weather for the day: The seas were 5-9 feet throughout the day, with swells from the E. Winds were between 20-25 kts from the E. Seas started picking up around 2000.

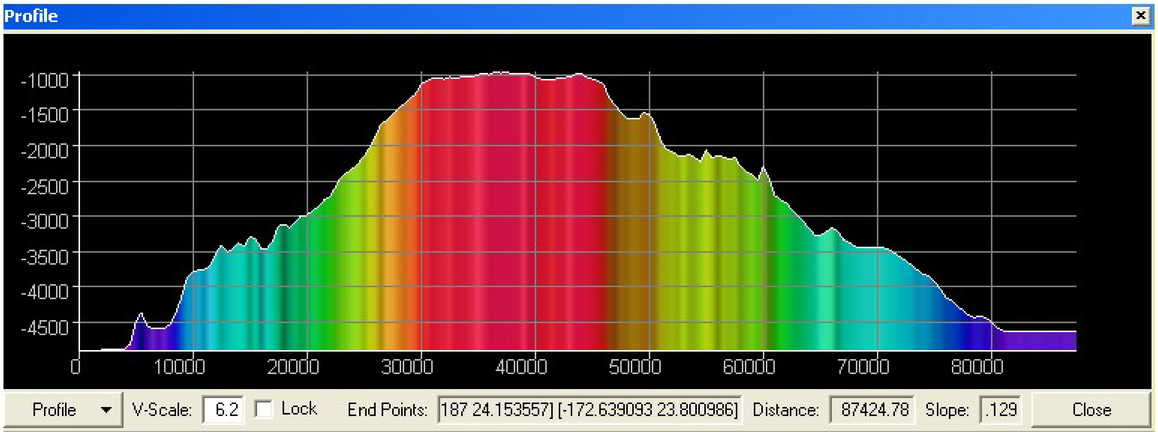


Figure 19. Profile of Tamana seamount. Units shown in meters. Height of Tamana Seamount above surrounding seafloor = approx. 3600m. Image generated in Fledermaus. Image credit: NOAA.

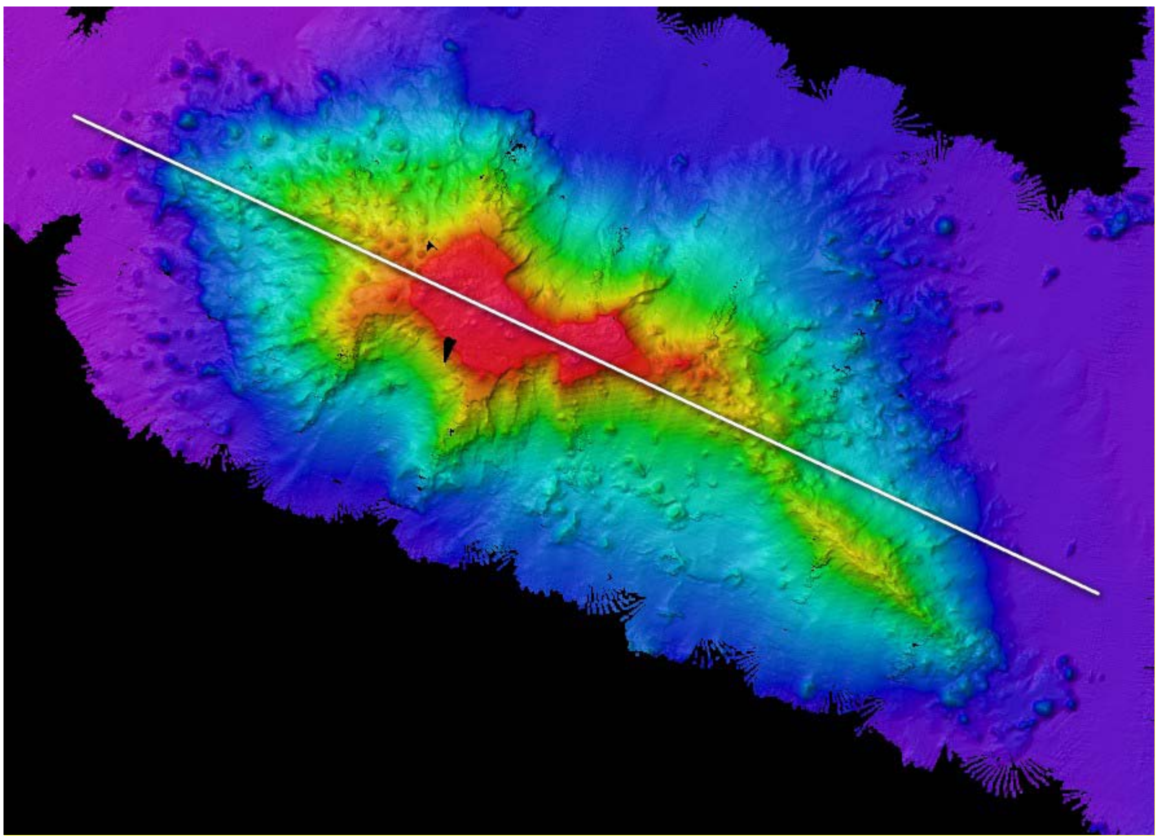


Figure 20. Overview of Tamana Seamount. White line indicates direction of profile shown above in Fig. 19. Image generated in Fledermaus. Image credit: NOAA.

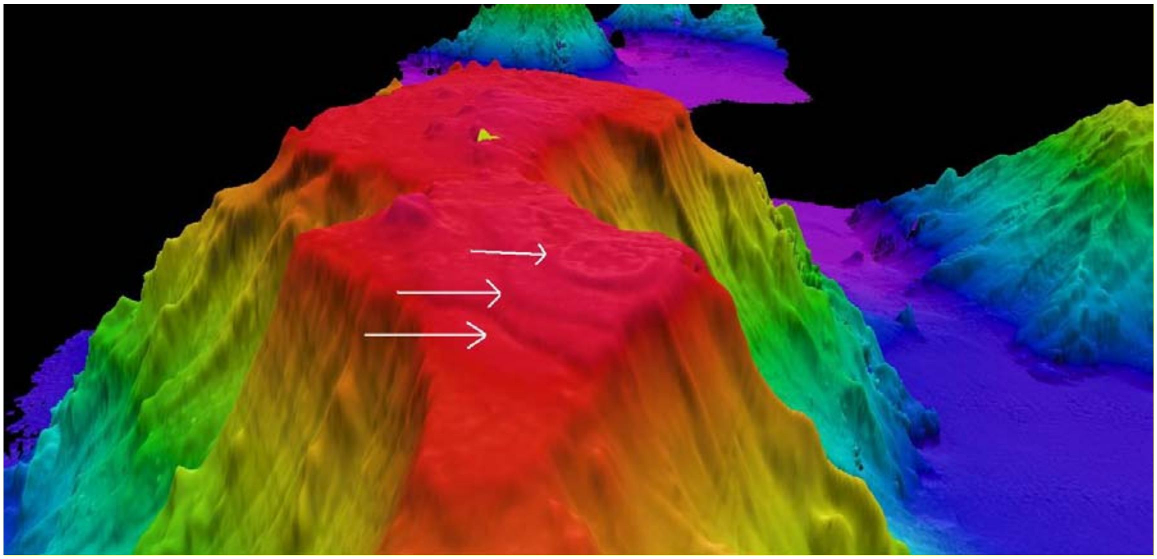


Figure 21. Looking west over Tamana Seamount. Possible extinct coastlines or coral reefs indicated by white arrows. Image generated in Fledermaus. Image credit: NOAA.

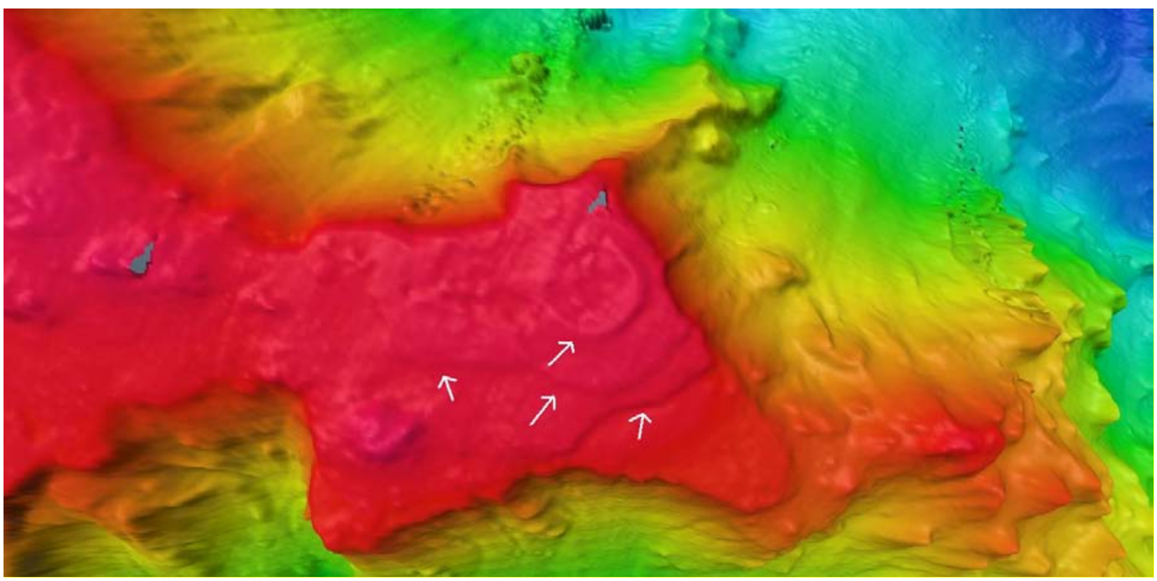


Figure 22. Overview of eastern section of planed top of Tamana Seamount. Possible extinct coastlines or coral reefs indicated by white arrows. Image generated in Fledermaus. Image credit: NOAA.

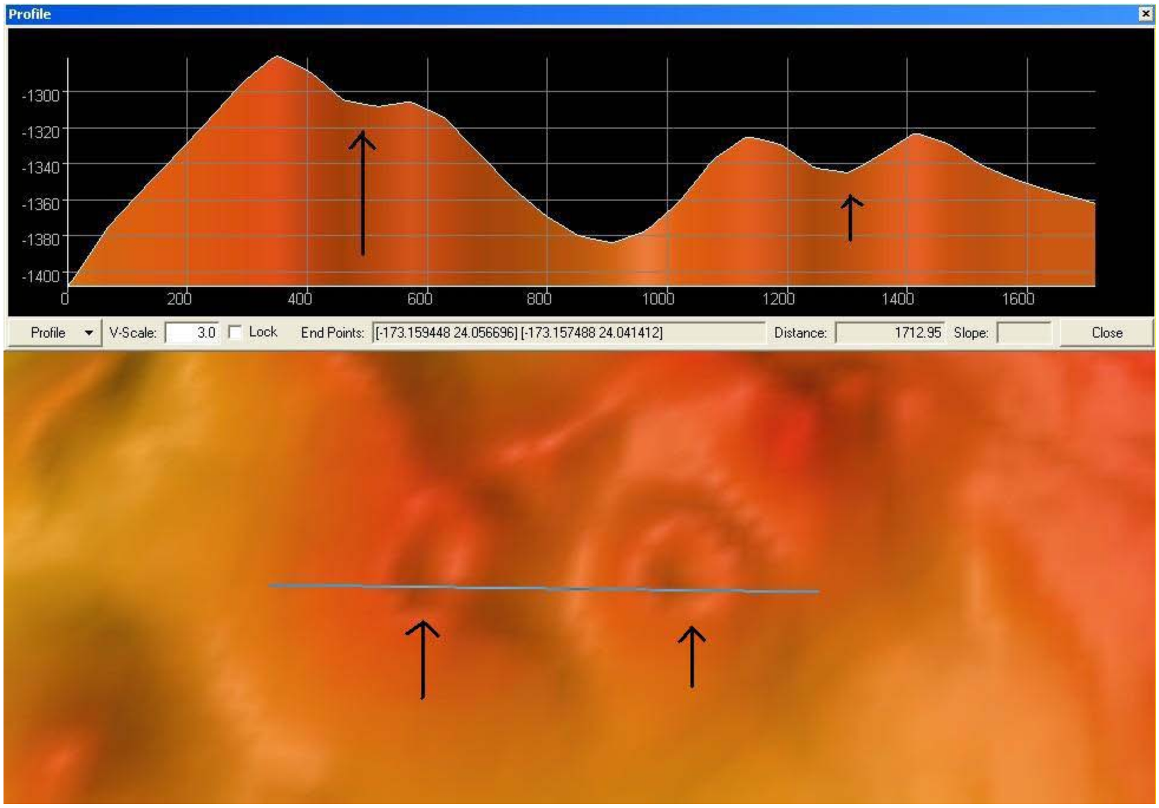


Figure 23. Parasitic cones, indicated by black arrows, found on western flank of Tamana Seamount. White line indicates direction of profile. Parasitic cone centers found to 20m deep or less. Image generated in Fledermaus. Image credit: NOAA.

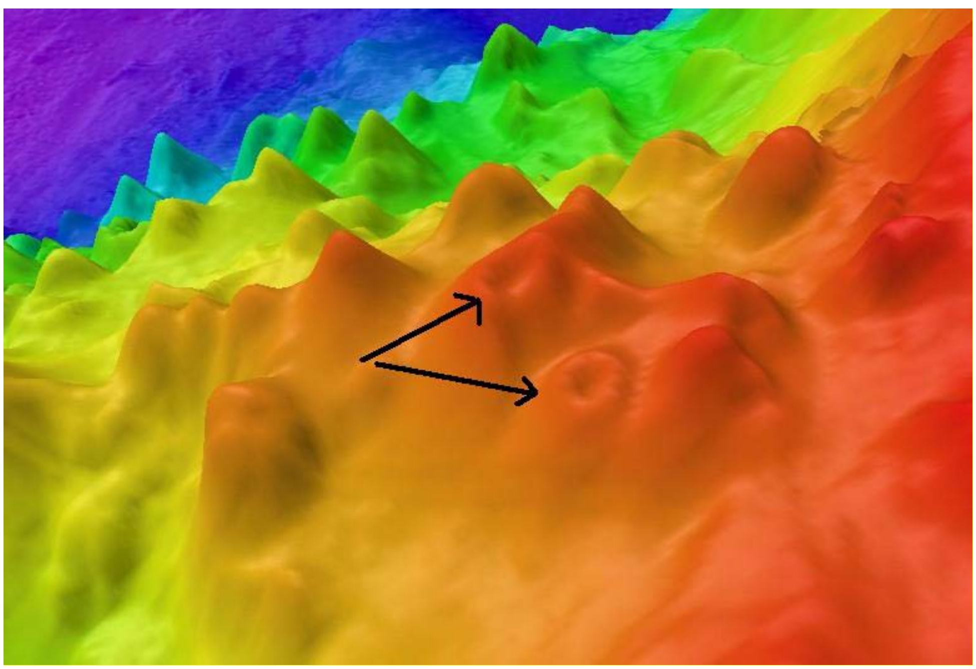


Figure 24. Parasitic cones, indicated by black arrows, found on the western flank of Tamana Seamount. Image generated in Fledermaus. Image credit: NOAA.

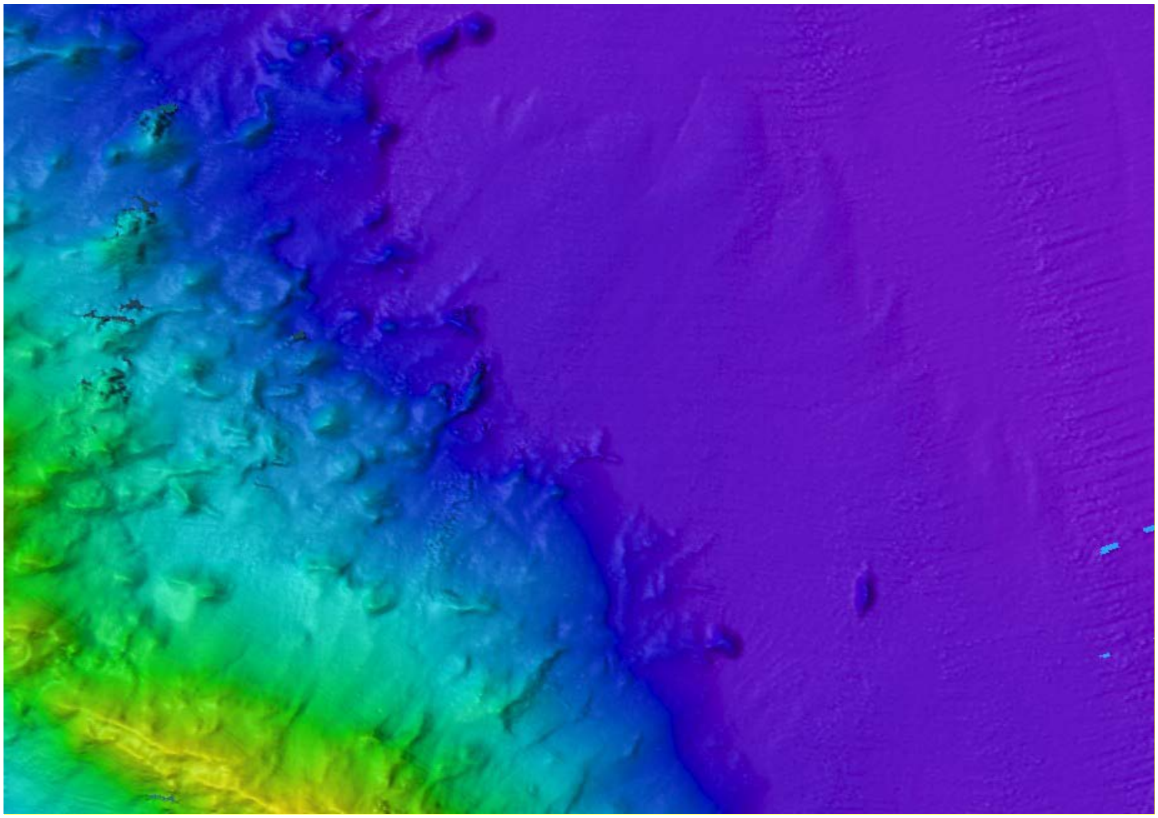


Figure 25. Interesting lava or sediment flow off of eastern flank of Tamana Seamount. Image generated in Fledermaus. Image credit: NOAA.

November 11, 2009
We commenced transit from the southeast corner of the survey working grounds to Honolulu at 0015. The seas have picked up significantly due to another large high pressure system to our north. Our transit direction puts the weather almost directly at our bow.

At 0945 the multibeam system was secured. Data quality had degraded quickly throughout the morning with the building seas. The mapping team worked on finalizing data processing.

Observed weather for the day: The seas averaged 10 feet throughout the day from the E. Winds were between 30kts from the E. Weather decks were closed at 1215.

November 12, 2009
We continued transit back to Honolulu. The mapping team is finalizing data processing and developing mapping products for the cruise. Weather decks remained closed.

Observed weather for the day: Seas averaged 10-15 feet throughout the day from the NE. Winds averaged 28 kts from the east.

November 13, 2009
We continued transit back to Honolulu. The mapping team is finalizing data processing and developing mapping products for the cruise. Weather decks remained closed.

Overnight last night the VSAT dome lost two hatches due to the heavy seas we have experienced throughout the trip. Due to the continuing heavy seas, the ETs cannot go up the pedestal and secure the holes left by the missing hatches. Personnel are not allowed on the boat deck due to possibility of falling debris from the VSAT dome.

Observed weather for the day: Winds were from the east at 20 kts in the early part of the day, and became 15 kts in the evening. Seas were an 8-10 foot swell from the NE.

November 14, 2009
For approximately one hour, we fired up the Knudsen 3260 subbottom profiler and the Kongsberg EA600 singlebeam echosounder as a final test of the systems before the winter inport. Both systems performed well in 3500-4000 meters of water.

The engineering department conducted a DP test from 2030 to 2300 to test the bow thrusters for possible overheating.

We arrived at the Pearl Harbor seabuoy at 0645.

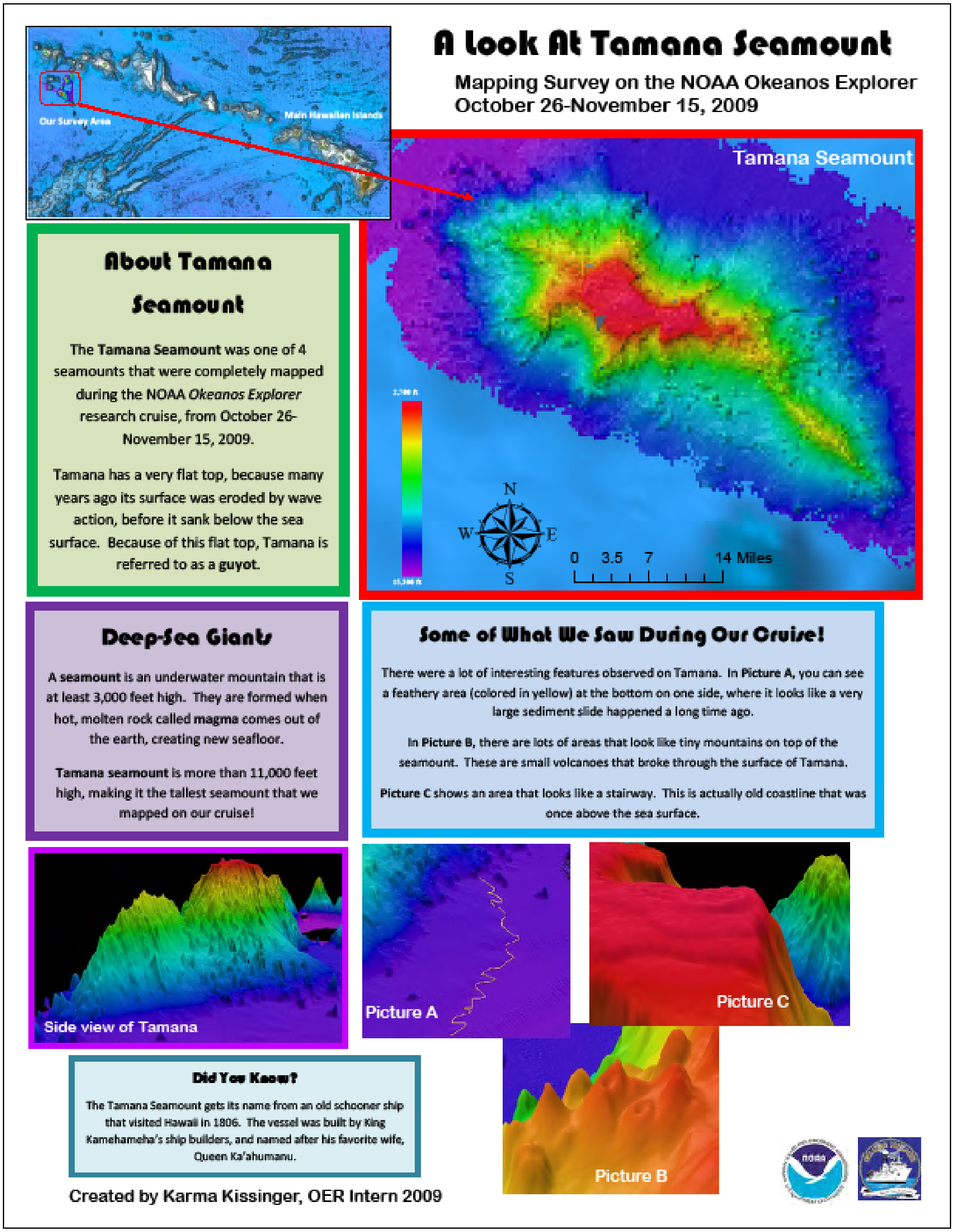
Observed weather for the day: The seas averaged an 8-10 foot swell throughout the day from the NE. Winds averaged 20 kts in the morning, and became 15 kts from the E in the evening. The fantail was opened for general use. The rest of the weather decks remained closed.

November 15, 2009
We pulled into the dock at Ford Island at approximately 0830.

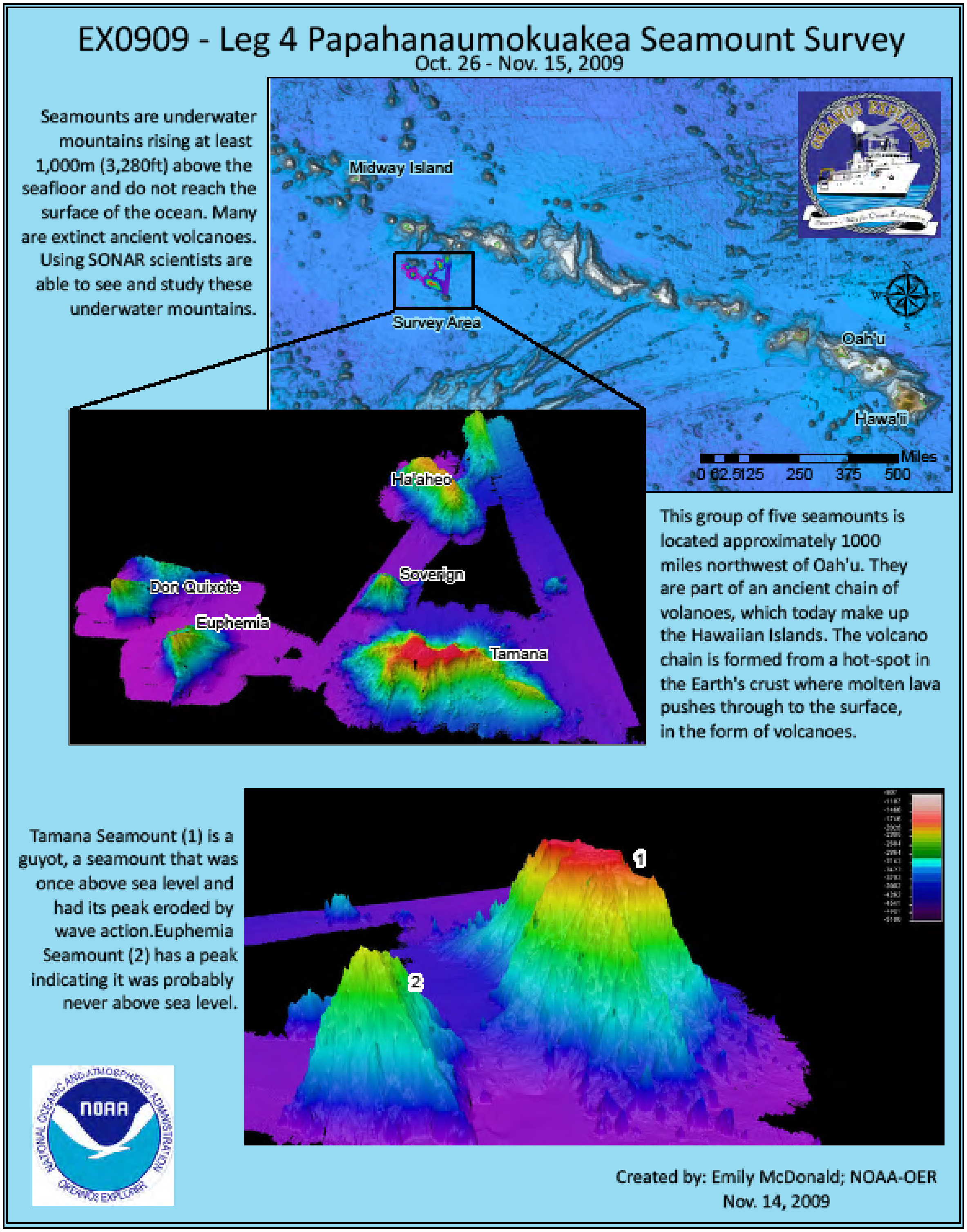
11. Appendices

Appendix A: Field products created during the cruise

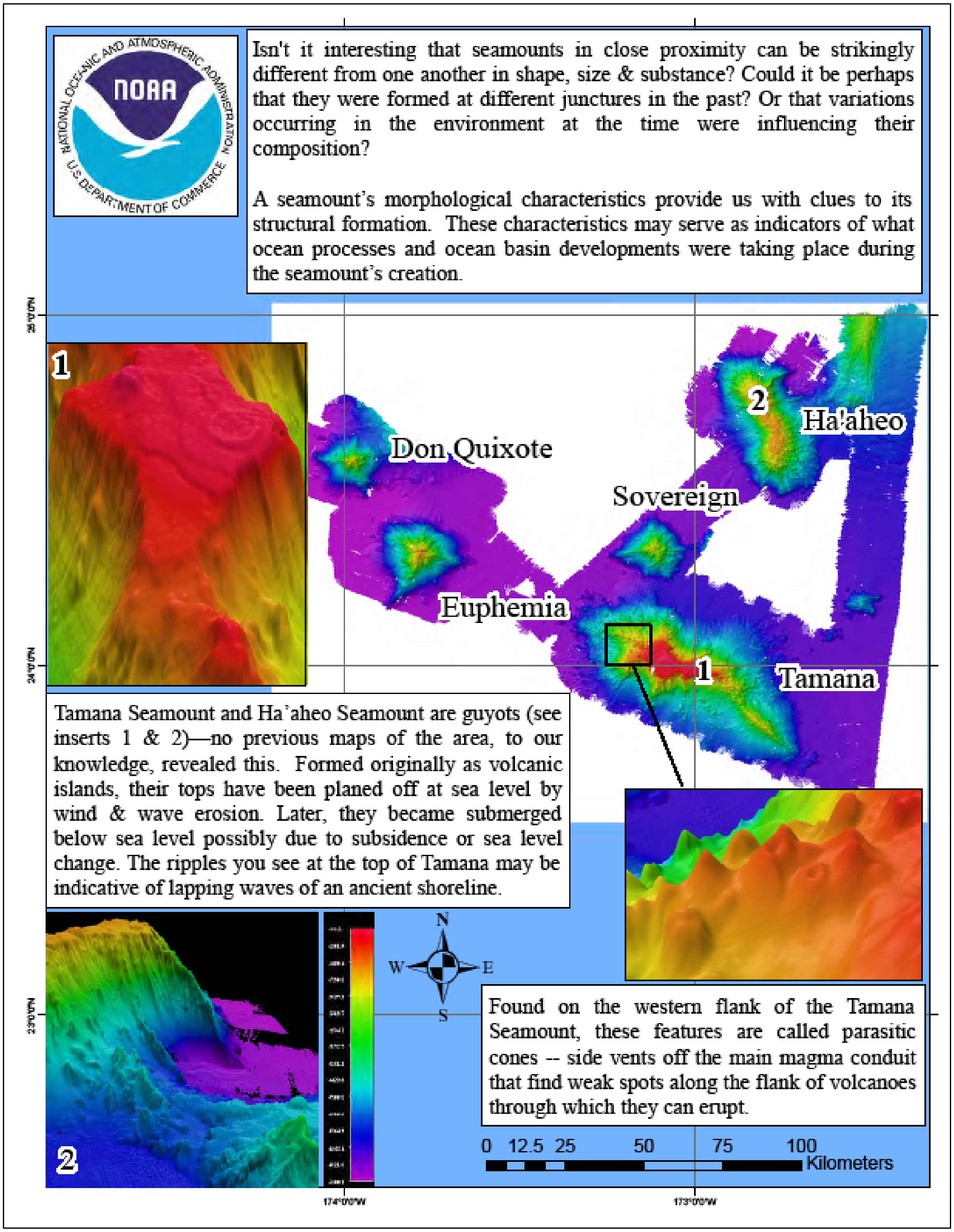
Following are samples of mapsheets created by onboard interns. They were created as part of an educational exercise on board and *should not be considered final data products*. Please contact the NOAA Office of Ocean Exploration and Research to obtain final products.



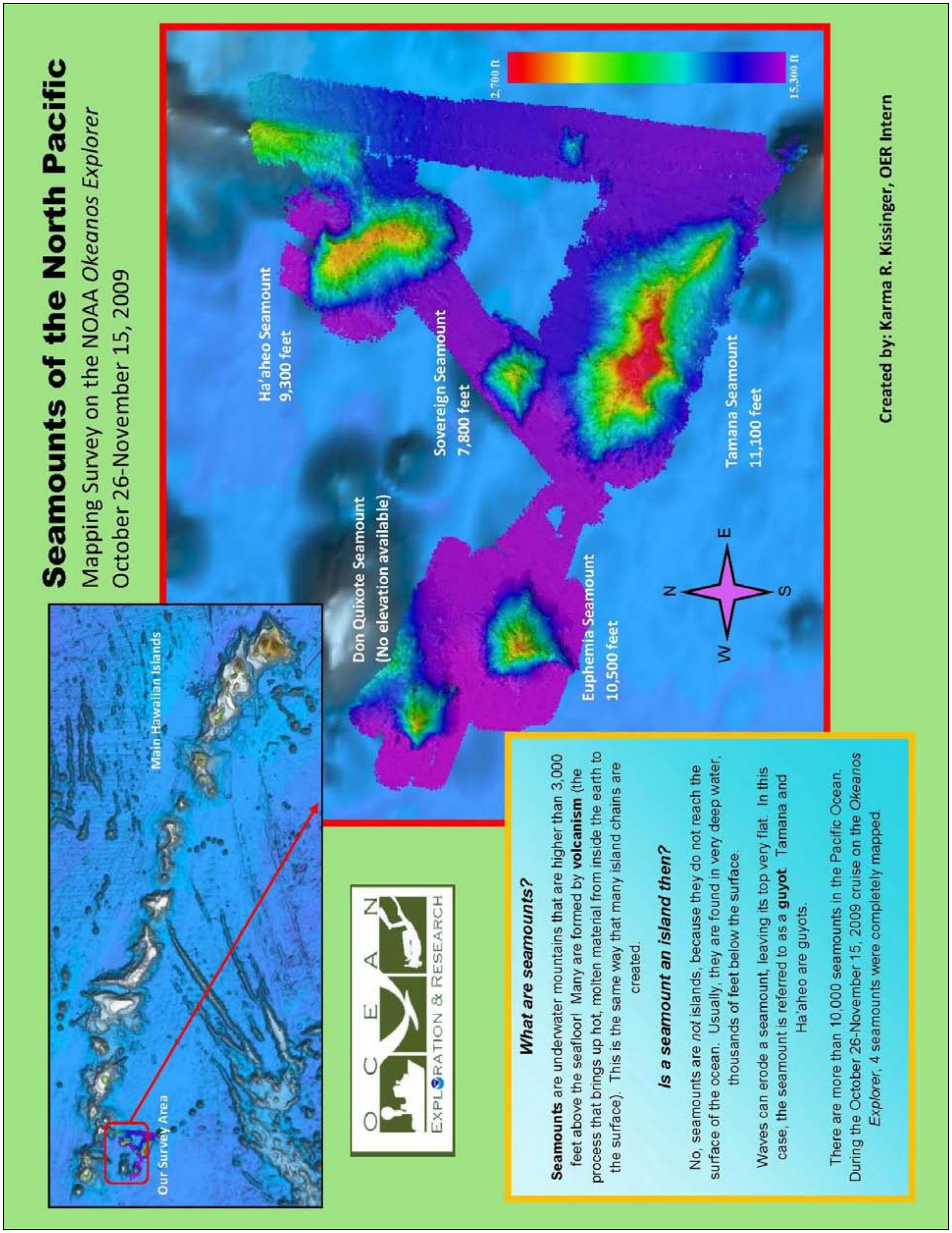
Map Sheet 1. Data credit: NOAA Ship *Okeanos Explorer*. Map sheet created by NOAA OER Intern Karma Kissinger, directed towards younger audiences.



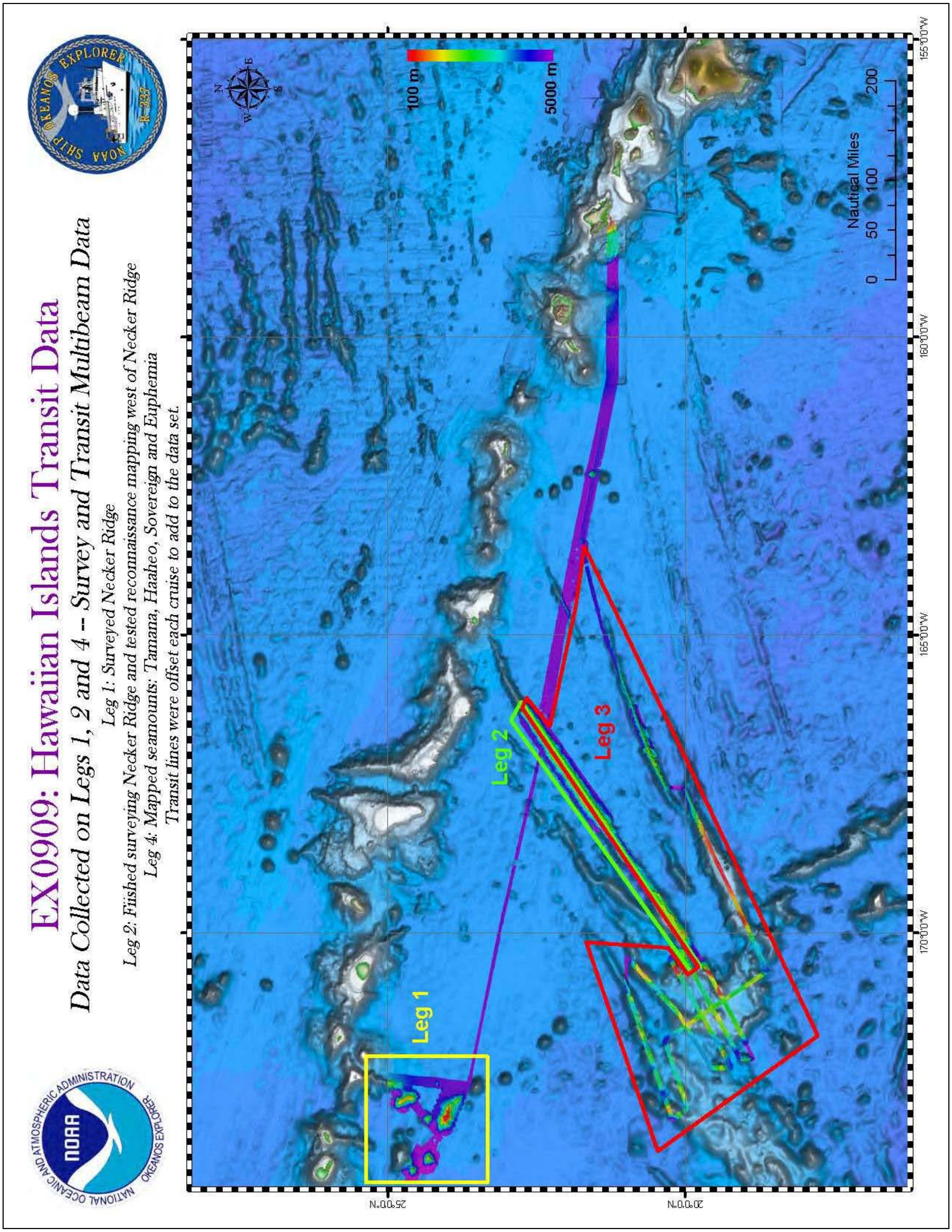
Map Sheet 2. Data credit: NOAA Ship *Okeanos Explorer*. Map sheet created by Emily McDonald.



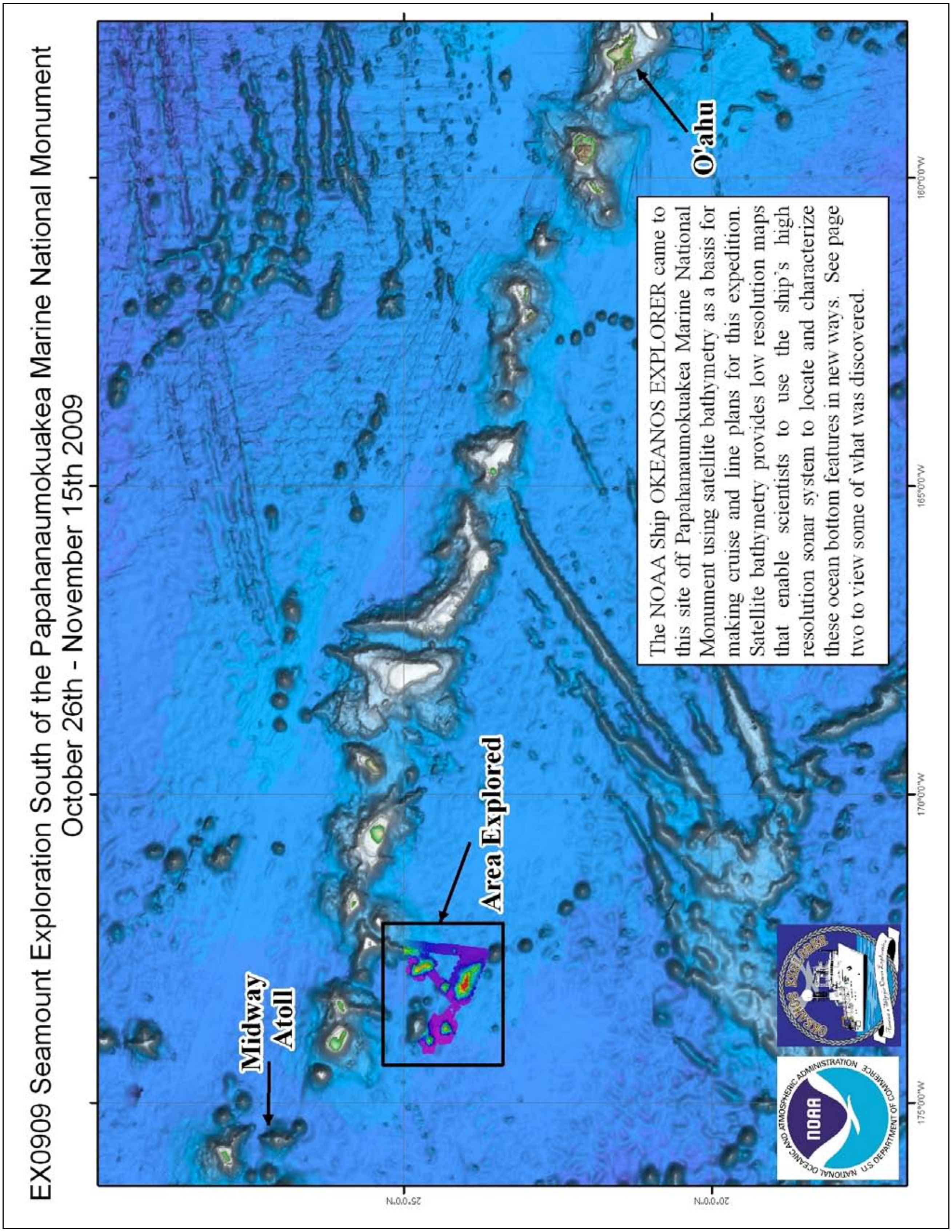
Map Sheet 3. Data credit: NOAA Ship *Okeanos Explorer*. Map sheet created Margo Bohan.



Map Sheet 4. Data credit: NOAA Ship *Okeanos Explorer*. Map sheet created by NOAA OER Intern Karma Kissinger.



Map Sheet 5. Data credit: NOAA Ship *Okeanos Explorer*. Map sheet created by SST Colleen Peters.



Map Sheet 6. Data credit: NOAA Ship *Okeanos Explorer*.

Appendix B. Tables of data files collected

EX0909 LEG 4 SOUND VELOCITY FILES					
Date (GMT)	**Time (GMT)**	**XBT/CTD Filename**	**Latitude**	**Longitude**	**Remarks**
10/27/2009	04:26:09	XBT_102709_01	21 4.59448N	157 45.44629W	Training
10/27/2009	18:05:23	XBT_102709_02	21 1.96289N	157 43.55566W	Exploratorium Demo Survey
10/27/2009	22:44:07	CTD_102709_01	20 54.32 N	157 46.95 W	Exploratorium Demo Survey
10/28/2009	05:41:18	XBT_102809_03	21 14.178 N	158 0.136 W	Transit
10/28/2009	10:31:30	XBT_102809_04	21 14.212 N	157 59.938 W	Transit
10/28/2009	16:29:47	XBT_102809_05	20 59.006N	157 44.025W	Transit
10/28/2009	22:38:46	XBT_102809_06	21 12.56372N	160 58.34766W	Transit
10/28/2009	04:37:24	XBT_102809_07	21 24.68042N	161 59.18262W	Transit
10/29/2009	10:29:22	XBT_102909_08	21 36.663 N	162 59.423 W	Transit
10/29/2009	16:29:05	XBT_102909_09	21 49.511N	164 4.096W	Transit to Haaheo Seamount
10/29/2009	22:24:36	XBT_102909_10	22 3.7312N	165 4.74219W	Bad XBT
10/29/2009	22:37:15	XBT_102909_11	22 3.8125N	165 5.18555W	Transit
10/30/2009	04:34:28	XBT_103009_12	22 14.76099N	166 5.74609W	Transit
10/30/2009	10:30:33	XBT_103009_13	22 27.801 N	167 5.963 W	Transit
10/30/2009	16:29:00	XBT_103009_14	22 41.675N	168 7.059W	Transit
10/30/2009	22:32:57	XBT_103009_15	22 56.67896N	169 13.26367W	Transit
10/31/2009	04:29:55	XBT_103109_16	23 11.4873N	170 19.4629W	Transit
10/31/2009	10:28:29	XBT_103109_17	23 24.34N	171 21.879W	Transit
10/31/2009	16:26:22	XBT_103109_18	23 37.347N	172 27.222W	Transit

10/31/2009	22:32:34	XBT_103109_19	24 32.46411N	172 25.3457W	PMNMSeamounts Survey
11/01/2009	04:29:08	XBT_110109_20	24 41.13965N	172 27.88477W	PMNMSeamounts Survey
11/01/2009	10:26:19	XBT_110109_21	23 45.723N	172 33.705W	PMNMSeamounts Survey
11/01/2009	16:31:22	XBT_110109_22	24 12.942N	172 34.295W	PMNMSeamounts Survey
11/02/2009	00:44:58	XBT_110209_23	24 56.26733N	172 29.55469W	PMNMSeamounts Survey
11/02/2009	04:42:19	XBT_110209_24	24 18.54346N	172 33.53516W	PMNMSeamounts Survey
11/03/09	01:09:48	XBT_110309_25	24 58.47485N	172 32.97266W	PMNMSeamounts Survey
11/03/09	19:28:51	XBT_110309_26	24 25.7771N	173 0.75977W	PMNMSeamounts Survey
11/04/09	18:23:11	XBT_110409_27	24 46.42407N	172 33.44336W	PMNMSeamounts Survey
11/05/09	04:33:22	XBT_110409_28	24 43.69653N	172 40.33594W	PMNMSeamounts Survey
11/05/09	18:52:39	XBT_110509_29	24 18.33008N	173 19.08398W	PMNMSeamounts Survey
11/06/09	04:35:05	XBT_110609_30	24 56.48438N	172 47.9668W	PMNMSeamounts Survey
11/06/09	10:30:55	XBT_110609_31	24 53.582N	172 53.146W	PMNMSeamounts Survey
11/06/09	18:29:31	XBT_110609_32	24 41.6128N	172 46.92969W	PMNMSeamounts Survey
11/07/09	00:39:27	XBT_110609_33	24 40.53296N	172 40.32422W	PMNMSeamounts Survey
11/07/09	04:39:43	XBT_110709_34	24 37.43677N	172 41.7207W	PMNMSeamounts Survey
11/07/09	10:30:11	XBT_110709_35	24 1.171N	173 17.148W	PMNMSeamounts Survey
11/07/09	16:29:21	XBT_110709_36	24 4.344N	173 18.699W	PMNMSeamounts Survey
11/07/09	22:37:48	XBT_110709_37	24 4.41479N	173 18.66211W	PMNMSeamounts Survey
11/08/09	04:33:05	XBT_110709_38	24 6.42944N	173 1.59766W	PMNMSeamounts Survey
11/08/09	10:29:33	XBT_110809_39	23 57.936N	173 59.300W	PMNMSeamounts Survey
11/08/09	16:30:28	XBT_110809_40	23 48.709N	172 75.14W	PMNMSeamounts Survey

11/08/09	22:41:10	CTD_110809_2	23 47.79N	172 47.90W	PMNMSeamounts Survey
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11/10/09	10:28:11	XBT_111009_48	24 22.944N	173 38.283W	PMNMSeamounts Survey
11/10/09	16:28:56	XBT_111009_49	24 33.530N	173 50.001W	PMNMSeamounts Survey
11/10/09	22:44:09	XBT_111009_50	24 37.28784N	173 51.8457W	PMNMSeamounts Survey
11/11/09	04:30:45	XBT_111109_51	24 3.99536N	173 11.38672W	PMNMSeamounts Survey
11/11/09	10:31:48	XBT_111109_52	23 33.678N	172 25.980W	Transit to Honolulu

EX0909 LEG 4 EM302 MULTIBEAM FILES					
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300	102709	0001_20091027_114015_EX	Penguin Bank	Exploratorium_Demo	Transit to Exploratorium demo site – does not need to be processed
300	102709	0002_20091027_174016_EX	Penguin Bank	Exploratorium_Demo	Transit to Exploratorium demo site – does not need to be processed
300	102709	0003_20091027_180219_EX	Penguin Bank	Exploratorium_Demo	Exploratorium Demo Survey
300	102709	0004_20091027_193115_EX	Penguin Bank	Exploratorium_Demo	Exploratorium Demo Survey
300	102709	0005_20091027_193804_EX	Penguin Bank	Exploratorium_Demo	Exploratorium Demo Survey
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300	102709	0010_20091027_231844_EX	Penguin Bank	Exploratorium Demo	Exploratorium Demo Survey
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310	110609	0034_20091106_043000_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
310	110609	0035_20091106_064936_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
310	110609	0036_20091106_071419_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
310	110609	0037_20091106_095331_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
310	110609	0038_20091106_100007_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
310	110609	0039_20091106_120341_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
310	110609	0040_20091106_121336_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
310	110609	0041_20091106_124335_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
310	110609	0042_20091106_133642_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
310	110609	0043_20091106_153649_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
310	110609	0044_20091106_154037_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
310	110609	0045_20091106_163240_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
310	110609	0046_20091106_170211_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
310	110609	0047_20091106_ 210916_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
310	110609	0048_20091106_211824_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
310	110609	0049_20091106_224311_EX	PMNM	EX0909_PMNMSmnts	DNP
310	110609	0050_20091106_230220_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
311	110709	0051_20091106_002404_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
311	110709	0052_20091107_012310_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
311	110709	0053_20091107_012834_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
311	110709	0054_20091107_031320_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
311	110709	0055_20091107_033454_EX	PMNM	EX0909_PMNMSmnts	DNP
311	110709	0056_20091107_033454_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
311	110709	0057_20091107_050902_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
311	110709	0058_20091107_072548_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
311	110709	0059_20091107_075744_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
311	110709	0060_20091107_110027_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
311	110709	0061_20091107_110835_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
311	110709	0062_20091107_110845_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
311	110709	0063_20091107_113609_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
311	110709	0064_20091107_113825_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
311	110709	0065_20091107_133202_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
311	110709	0066_20091107_142929_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
311	110709	0067_20091107_170708_EX	PMNM	EX0909_PNMNSmnts	PMNMSmnts Survey
311	110709	0068_20091107_174546_EX	PMNM	EX0909_PNMNSmnts	PMNMSmnts Survey
311	110709	0069_20091107_211043_EX	PMNM	EX0909_PNMNSmnts	PMNMSmnts Survey
311	110709	0070_20091107_213041_EX	PMNM	EX0909_PNMNSmnts	PMNMSmnts Survey
312	110809	0071_20091107_02441_EX	PMNM	EX0909_PNMNSmnts	PMNMSmnts Survey
312	110809	0072_20091107_010420_EX	PMNM	EX0909_PNMNSmnts	PMNMSmnts Survey
312	110809	0073_20091108_010420_EX	PMNM	EX0909_PNMNSmnts	PMNMSmnts Survey
312	110809	0074_20091108_032640_EX	PMNM	EX0909_PNMNSmnts	PMNMSmnts Survey
312	110809	0075_20091108_034850_EX	PMNM	EX0909_PNMNSmnts	PMNMSmnts Survey
312	110809	0076_20091108_060916_EX	PMNM	EX0909_PNMNSmnts	PMNMSmnts Survey
312	110809	0077_20091108_062826_EX	PMNM	EX0909_PNMNSmnts	PMNMSmnts Survey
312	110809	0078_20091108_084646_EX	PMNM	EX0909_PNMNSmnts	PMNMSmnts Survey
312	110809	0079_20091108_090725_EX	PMNM	EX0909_PNMNSmnts	PMNMSmnts Survey

312	110809	0080_20091108_111941_EX	PMNM	EX0909_PNMNSmnts	PMNMSmnts Survey
312	110809	0081_20091108_114344_EX	PMNM	EX0909_PNMNSmnts	PMNMSmnts Survey
312	110809	0082_20091108_140155_EX	PMNM	EX0909_PNMNSmnts	PMNMSmnts Survey
312	110809	0083_20091108_142621_EX	PMNM	EX0909_PNMNSmnts	PMNMSmnts Survey
312	110809	0084_20091108_163350_EX	PMNM	EX0909_PNMNSmnts	PMNMSmnts Survey
312	110809	0085_20091108_165723_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
312	110809	0086_20091108_183406_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
312	110809	0087_20091108_190835_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
312	110809	0088_20091108_193014_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
312	110809	0089_20091108_213904_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
312	110809	0090_20091108_232752_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
312	110809	0091_20091108_234951_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
312	110809	0092_20091108_234951_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
313	110909	0093_20091109_014041_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
313	110909	0094_20091109_020031_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
313	110909	0095_20091109_041211_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
313	110909	0096_20091109_043716_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Surveyv
313	110909	0097_20091109_061142_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
313	110909	0098_20091109_065918_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
313	110909	0099_20091109_080500_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
313	110909	0100_20091109_085406_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
313	110909	0101_20091109_135059_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
313	110909	0102_20091109_163659_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
313	110909	0103_20091109_172948_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
313	110909	0104_20091109_190125_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
313	110909	0105_20091109_193628_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
313	110909	0106_20091109_212807_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
313	110909	0107_20091109_232446 _EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
314	111009	0108_20091110_000000 _EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
314	111009	0109_20091110_023020_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
314	111009	0110_20091110_025540_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
314	111009	0111_20091110_064958_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
314	111009	0112_20091110_071554_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
314	111009	0113_20091110_103720_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
314	111009	0114_20091110_105705_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
314	111009	0115_20091110_141006_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
314	111009	0116_20091110_143214_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
314	111009	0117_20091110_180234_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
314	111009	0118_20091110_182551_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
314	111009	0119_20091110_211024_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
314	111009	0120_20091110_213514_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
314	111009	0121_20091110_215226_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
315	111109	0122_20091111_000030_ EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
315	111109	0123_20091111_034009_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
315	111109	0124_20091111_062555_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
315	111109	0125_20091111_100208_EX	PMNM	EX0909_PMNMSmnts	PMNMSmnts Survey
315	111109	0018_20091111_100838_EX	Transit	EX0909_4_Transit	Transiting to Honolulu
315	111109	0019_20091111_101559_EX	Transit	EX0909_4_Transit	Transiting to Honolulu
315	111109	0020_20091111_131008_EX	Transit	DNP	Transiting to Honolulu
315	111109	0021_20091111_191014_EX	Transit	DNP	Transiting to Honolulu

Appendix C: EM302 description and operational specs

EM 302 : Ideal for Ocean Exploration

There are several features of the Okeanos Explorer's 30 kHz multibeam that make it an excellent tool for ocean exploration. The following is a brief description of these features.

Depth Range

The system is designed to map the seafloor in water depths of 10 to 7000 meters. This leaves only the deepest parts of the deeper ocean trenches out of the EM 302's reach. Moreover, operational experience on the *Okeanos Explorer* has shown consistent EM 302 bottom detection at depth ranges in excess of 8000m.

High Density Data

In multibeam data, the denser the data, the finer resolution maps you can produce. The system can operate in dual swath, or multiping mode, which results in increased along track data density. This is achieved by detecting two swaths per ping cycle, resulting in up to 864 beams per ping.

The Okeanos Explorer mapping team typically operates the multibeam in high density equidistant ping mode, which results in up to 864 soundings on the seafloor per ping.

Full Suite of Data Types Collected

The system collects seafloor backscatter data, which provides information about the character of the seafloor in terms of bottom type.

The system also collects water column backscatter data, which has the ability to detect gaseous plumes in the water column. The full value of this feature is still being realized.

FM chirp mode is utilized in water depths greater than 1000 meters, and allows for the detection of the bottom further out from nadir than with previous 30 kHz systems.

Multibeam Primer

The area of the seafloor covered, or ensonified, by a single beam within a pulse of sound, or ping, is called the beam footprint. This beam footprint is defined in terms of the across track and along track values. Both of these values are dependent on water depth and the beam width at which the sound pulse is transmitted and received. The across track beam width value is also dependent on the receive angle, or "listening" angle, of the system, and the angle from nadir which it is received from. The receive angle for the receive transducer on the Okeanos Explorer EM302 is 1°, which is the smallest possible angle currently available for the EM302 system. The further out from nadir a sounding occurs, the larger the footprint will be. For example, as seen in Table 1 below, in 2000 meters of water, a beam footprint will have a radius of 18 meters at nadir but 25 meters by the time it hits the seafloor at an angle 140 degrees out from nadir.

Calculated acrosstrack acoustic beam footprint for EM 302 (high density ping mode, 432 soundings/profile)	
Water depth (m)	**Angle from nadir**

50	1 deg RX center	90 deg	120 deg	140 deg
100	1	0.5	1	1
200	2	1	2	3
400	4	2	3	5
1000	7	4	6	10
2000	18	9	16	25
4000	35	19	32	-
6000	70	37	-	-
7000	105	56	-	-

Table 3. Calculated across track EM 302 beam footprint. Reference: Kongsberg Product description, Kongsberg document 302675 Rev B, Date 14/06/06, p. 17.

Calculated acrosstrack sounding density for EM 302 (high density ping mode, 432 soundings/profile)			
Water depth (m)	**Swath Width**		
50	90 deg	120 deg	140 deg
100	0.2	0.4	0.9
200	0.5	0.8	1.7
400	0.9	1.6	3.5
1000	1.9	3.2	6.9
2000	4.6	8.1	17.4
4000	9.3	16.2	-

Table 4. Calculated across track EM 302 sounding density. Reference: Kongsberg Product description, Kongsberg document 302675 Rev B, Date 14/06/06, p. 17.

Acrosstrack sounding density describes the spacing between individual soundings on the seafloor in the acrosstrack direction. The maximum swath of the EM 302 is 150 degrees. At this swath, the sounding density will be the least dense, since the beams will be spread out over a larger horizontal distance over the seafloor. As the swath angle (width) is decreased, the sounding density will increase, as the same number of beams are now spread out over a smaller horizontal distance over the seafloor.

Calculated ping rate and alongtrack resolution for EM 302					
140 deg swath, one profile per ping					
			Alongtrack distance between profiles (m)		
Water depth (m)	**Swath Width (m)**	**Ping Rate (pings/second)**	**@4 kts**	**@8 kts**	**@12 kts**
50	275	3.2	0.7	1.2	1.9

100	550	1.8	1.1	2.2	3.3
200	1100	1	2.1	4.2	6.3
400	2200	0.5	4.1	8.2	12.2
1000	5500	0.2	10	20	30
2000	8000	0.1	15.2	30.5	45.7
4000	8000	0.06	19.2	38.5	57.7
6000	8000	0.04	24.5	49	73.4

Table 5. Calculated ping rate and along track EM 302 sounding density, one profile per ping. Reference: Kongsberg Product description, Kongsberg document 302675 Rev B, Date 14/06/06, p. 15.

Calculated ping rate and alongtrack resolution for EM 302					
140 deg swath, two profiles per ping					
Water depth (m)	**Swath Width (m)**	**Ping Rate**	**Alongtrack distance between profiles (m)**		
			@4 kts	**@8 kts**	**@12 kts**
50	275	3.2	0.3	0.6	0.9
100	550	1.8	0.6	1.1	1.7
200	1100	1	1.1	2.1	3.2
400	2200	0.5	2	4.1	6.1
1000	5500	0.2	5	10	15
2000	8000	0.1	7.6	15.2	22.8

Table 6. Calculated ping rate and along track EM 302 sounding density, two profiles per ping. Reference: Kongsberg Product description, Kongsberg document 302675 Rev B, Date 14/06/06, p. 15.

Reference: Kongsberg Product Description: EM 302 multibeam echosounder

Appendix D: EM302 PU Parameters

```
#// Database Parameters

#// Seafloor Information System
#// Kongsberg Maritime AS
#// Saved:  2009.09.01 01:13:33

#// Build info:
#* SIS:              [Version: 3.6.1, Build: 174,
DBVersion 16.0 CD generated: Tue Nov 11
15:39:05 2008]
[Fox ver = 1.6.29]
[db ver = 16, proc = 16.0]
[OTL = 4.0.-95]
[ACE ver = 5.5]
[Coin ver = 2.4.4]
[Simage ver = 1.6.2a]
[Dime ver = DIME v0.9]
[STLPort ver = 513]
[FreeType ver = 2.1.9]
[TIFF ver = 3.8.2]
[GeoTIFF ver = 1230]
[GridEngine ver = 2.3.0]

#* Language          [3] #// Current language, 1-
Norwegian, 2-German,3-English, 4-Spanish

#* Type              [302]
#* Serial no.        [101]
#* Number of heads      [2]
#* System descriptor    [50331648] #// 03000000

#//
****************************************
******************************
#// Installation parameters


#{ Input Setup #// All Input setup parameters

  #{ COM1 #// Link settings.

    #{ Com. settings #// Serial line parameter
settings.

  #* Baud rate:        [9600]
   #* Data bits        [8]
   #* Stop bits:       [1]
   #* Parity:          [NONE]
#} Com. settings

#{ Position #// Position input settings.
   #* None             [1] [0]
   #* GGK              [1] [0]
   #* GGA              [1] [1]
   #* GGA_RTK          [1] [0]
   #* SIMRAD90         [1] [0]
#} Position

#{ Input Formats #// Format input settings.
   #* Attitude         [0] [0]
   #* MK39 Mod2 Attitude,  [0] [0]
   #* ZDA Clock         [1] [1]
   #* HDT Heading       [0] [0]
   #* SKR82 Heading     [0] [0]
```

#* DBS Depth [1] [0]
#* DBT Depth [1] [0]
#* EA500 Depth [0] [0]
#* ROV. depth [1] [0]
#* Height, special purp [1] [0]
#* Ethernet AttVel [0] [0]
#} Input Formats

#} COM1

#{ COM2 #// Link settings.

#{ Com. settings #// Serial line parameter settings.
#* Baud rate: [19200]
#* Data bits [8]
#* Stop bits: [1]
#* Parity: [NONE]
#} Com. settings

#{ Position #// Position input settings.
#* None [0] [1]
#* GGK [0] [0]
#* GGA [0] [0]
#* GGA_RTK [0] [0]
#* SIMRAD90 [0] [0]
#} Position

#{ Input Formats #// Format input settings.
#* Attitude [1] [1]
#* MK39 Mod2 Attitude, [0] [0]
#* ZDA Clock [0] [0]
#* HDT Heading [0] [0]
#* SKR82 Heading [0] [0]
#* DBS Depth [0] [0]
#* DBT Depth [0] [0]
#* EA500 Depth [0] [0]
#* ROV. depth [0] [0]
#* Height, special purp [0] [0]
#* Ethernet AttVel [0] [0]
#} Input Formats

#} COM2

#{ COM3 #// Link settings.

#{ Com. settings #// Serial line parameter settings.
#* Baud rate: [4800]
#* Data bits [8]
#* Stop bits: [1]
#* Parity: [NONE]
#} Com. settings

#{ Position #// Position input settings.
#* None [1] [1]
#* GGK [1] [0]
#* GGA [1] [0]
#* GGA_RTK [1] [0]
#* SIMRAD90 [1] [0]
#} Position

#{ Input Formats #// Format input settings.
#* Attitude [0] [0]
#* MK39 Mod2 Attitude, [1] [0]
#* ZDA Clock [0] [0]
#* HDT Heading [1] [1]
#* SKR82 Heading [0] [0]
#* DBS Depth [1] [0]
#* DBT Depth [1] [0]
#* EA500 Depth [0] [0]
#* ROV. depth [1] [0]
#* Height, special purp [1] [0]
#* Ethernet AttVel [0] [0]
#} Input Formats

#} COM3

#{ COM4 #// Link settings.

#{ Com. settings #// Serial line parameter settings.
#* Baud rate: [9600]
#* Data bits [8]
#* Stop bits: [1]
#* Parity: [NONE]
#} Com. settings

#{ Position #// Position input settings.
#* None [1] [1]
#* GGK [1] [0]
#* GGA [1] [0]
#* GGA_RTK [1] [0]
#* SIMRAD90 [1] [0]
#} Position

#{ Input Formats #// Format input settings.
#* Attitude [0] [0]
#* MK39 Mod2 Attitude, [0] [0]
#* ZDA Clock [0] [0]
#* HDT Heading [0] [0]
#* SKR82 Heading [0] [0]
#* DBS Depth [1] [0]
#* DBT Depth [1] [0]
#* EA500 Depth [0] [0]
#* ROV. depth [1] [0]
#* Height, special purp [1] [0]
#* Ethernet AttVel [0] [0]
#} Input Formats

#} COM4

#{ UDP2 #// Link settings.

#{ Com. settings #// Serial line parameter settings.
#// N/A
#} Com. settings

#{ Position #// Position input settings.
#* None [1] [1]
#* GGK [1] [0]
#* GGA [1] [0]
#* GGA_RTK [1] [0]
#* SIMRAD90 [1] [0]
#} Position

#{ Input Formats #// Format input settings.
#* Attitude [0] [0]
#* MK39 Mod2 Attitude, [0] [0]
#* ZDA Clock [0] [0]
#* HDT Heading [0] [0]
#* SKR82 Heading [0] [0]
#* DBS Depth [0] [0]
#* DBT Depth [0] [0]
#* EA500 Depth [1] [0]
#* ROV. depth [0] [0]
#* Height, special purp [0] [0]
#* Ethernet AttVel [0] [0]
#} Input Formats

#} UDP2

#{ UDP3 #// Link settings.

#{ Com. settings #// Serial line parameter settings.
#// N/A
#} Com. settings

#{ Position #// Position input settings.
#* None [0] [1]
#* GGK [0] [0]
#* GGA [0] [0]
#* GGA_RTK [0] [0]
#* SIMRAD90 [0] [0]
#} Position

#{ Input Formats #// Format input settings.
#* Attitude [0] [0]
#* MK39 Mod2 Attitude, [0] [0]
#* ZDA Clock [0] [0]
#* HDT Heading [1] [0]
#* SKR82 Heading [0] [0]
#* DBS Depth [1] [0]
#* DBT Depth [1] [0]
#* EA500 Depth [0] [0]
#* ROV. depth [1] [0]
#* Height, special purp [1] [0]
#* Ethernet AttVel [0] [0]
#} Input Formats

#} UDP3

#{ UDP4 #// Link settings.

#{ Com. settings #// Serial line parameter settings.
#// N/A
#} Com. settings

#{ Position #// Position input settings.
#* None [0] [1]
#* GGK [0] [0]
#* GGA [0] [0]
#* GGA_RTK [0] [0]
#* SIMRAD90 [0] [0]
#} Position

#{ Input Formats #// Format input settings.
#* Attitude [1] [0]
#* MK39 Mod2 Attitude, [0] [0]
#* ZDA Clock [0] [0]
#* HDT Heading [1] [0]
#* SKR82 Heading [0] [0]
#* DBS Depth [1] [0]
#* DBT Depth [1] [0]
#* EA500 Depth [0] [0]
#* ROV. depth [1] [0]
#* Height, special purp [1] [0]
#* Ethernet AttVel [0] [0]
#} Input Formats

#} UDP4

#{ UDP5 #// Link settings.

#{ Com. settings #// Serial line parameter settings.
#// N/A

#} Com. settings

#{ Position #// Position input settings.
#* None [0] [0]
#* GGK [0] [0]
#* GGA [0] [0]
#* GGA_RTK [0] [0]
#* SIMRAD90 [0] [0]
#} Position

#{ Input Formats #// Format input settings.
#* Attitude [0] [0]
#* MK39 Mod2 Attitude, [0] [0]
#* ZDA Clock [0] [0]
#* HDT Heading [0] [0]
#* SKR82 Heading [0] [0]
#* DBS Depth [0] [0]
#* DBT Depth [0] [0]
#* EA500 Depth [0] [0]
#* ROV. depth [0] [0]
#* Height, special purp [0] [0]
#* Ethernet AttVel [1] [1]
#} Input Formats

#{ Attitude Velocity settings #// Only relevant for UDP5 on EM122, EM302 and EM710, currently
#* Attitude 1 [1] [1]
#* Attitude 2 [1] [0]
#* Use Ethernet 2 [1] [1]
#* Port: [5602]
#* IP addr.: [192.168.2.20]
#* Net mask: [255.255.255.0]
#} Attitude Velocity settings

#} UDP5

#{ Misc. #// Misc. input settings.
#* External Trigger [1] [0]
#} Misc.

#} Input Setup

#{ Output Setup #// All Output setup parameters

#* PU broadcast enable [1] [1]
#* Log watercolumn to s [1] [1]

#{ Host UDP1 #// Host UDP1 Port: 16100

#{ Datagram subscription #//
#* Depth [0] [0]
#* Raw range and beam a [0] [0]
#* Seabed Image [0] [0]
#* Central Beams [0] [0]
#* Position [0] [0]
#* Attitude [0] [0]
#* Heading [0] [0]
#* Height [0] [0]
#* Clock [0] [0]
#* Single beam echosoun [0] [0]
#* Sound Speed Profile [0] [1]
#* Runtime Parameters [0] [1]
#* Installation Paramet [0] [1]
#* BIST Reply [0] [1]
#* Status parameters [0] [1]
#* PU Broadcast [0] [0]
#* Stave Display [0] [0]
#* Water Column [0] [0]
#* Internal, Range Data [0] [0]
#* Internal, Scope Data [0] [0]
#} Datagram subscription

#} Host UDP1

#{ Host UDP2 #// Host UDP2 Port: 16101

#{ Datagram subscription #//
#* Depth [1] [1]
#* Raw range and beam a [1] [1]
#* Seabed Image [1] [1]
#* Central Beams [1] [0]
#* Position [1] [1]
#* Attitude [1] [1]
#* Heading [1] [1]
#* Height [1] [1]
#* Clock [1] [1]
#* Single beam echosoun [1] [1]
#* Sound Speed Profile [0] [1]
#* Runtime Parameters [0] [1]
#* Installation Paramet [0] [1]
#* BIST Reply [1] [1]
#* Status parameters [0] [1]
#* PU Broadcast [1] [0]
#* Stave Display [0] [1]
#* Water Column [0] [1]
#* Internal, Range Data [1] [0]
#* Internal, Scope Data [1] [0]
#} Datagram subscription

#} Host UDP2

#{ Host UDP3 #// Host UDP3 Port: 16102

#{ Datagram subscription #//
#* Depth [0] [1]
#* Raw range and beam a [0] [0]
#* Seabed Image [0] [0]
#* Central Beams [0] [0]
#* Position [0] [0]
#* Attitude [0] [1]
#* Heading [0] [0]
#* Height [0] [1]
#* Clock [0] [0]
#* Single beam echosoun [0] [1]
#* Sound Speed Profile [0] [1]
#* Runtime Parameters [0] [0]
#* Installation Paramet [0] [1]
#* BIST Reply [0] [0]
#* Status parameters [0] [0]
#* PU Broadcast [0] [0]
#* Stave Display [0] [0]
#* Water Column [0] [0]
#* Internal, Range Data [0] [0]
#* Internal, Scope Data [0] [1]
#} Datagram subscription

#} Host UDP3

#{ Host UDP4 #// Host UDP4 Port 16103

#{ Datagram subscription #//
#* Depth [1] [0]
#* Raw range and beam a [1] [0]
#* Seabed Image [1] [0]
#* Central Beams [1] [0]
#* Position [1] [0]
#* Attitude [1] [0]
#* Heading [1] [0]
#* Height [1] [0]
#* Clock [1] [0]
#* Single beam echosoun [1] [0]
#* Sound Speed Profile [1] [0]
#* Runtime Parameters [1] [0]
#* Installation Paramet [1] [0]
#* BIST Reply [1] [0]
#* Status parameters [1] [0]
#* PU Broadcast [1] [0]
#* Stave Display [1] [0]
#* Water Column [1] [0]
#* Internal, Range Data [1] [0]
#* Internal, Scope Data [1] [0]
#} Datagram subscription

#} Host UDP4

#{ Watercolumn #// Host UDP4 Port 16103

#{ Datagram subscription #//
#* Depth [1] [0]
#* Raw range and beam a [1] [0]
#* Seabed Image [1] [0]
#* Central Beams [1] [0]
#* Position [1] [0]
#* Attitude [1] [0]
#* Heading [1] [0]
#* Height [1] [0]
#* Clock [1] [0]
#* Single beam echosoun [1] [0]
#* Sound Speed Profile [1] [0]
#* Runtime Parameters [1] [0]
#* Installation Paramet [1] [0]
#* BIST Reply [1] [0]
#* Status parameters [1] [0]
#* PU Broadcast [1] [0]
#* Stave Display [1] [0]
#* Water Column [1] [1]
#* Internal, Range Data [1] [0]
#* Internal, Scope Data [1] [0]
#} Datagram subscription

#} Watercolumn

#} Output Setup

#{ Clock Setup #// All Clock setup parameters

#{ Clock #// All clock settings.
#* Source: [1] #// External ZDA Clock
#* 1PPS Clock Synch. [1] [1]
#* Offset (sec.): [0]
#} Clock

#} Clock Setup

#{ Settings #// Sensor setup parameters

#{ Positioning System Settings #// Position related settings.

#{ COM1 #// Positioning System Ports:
#* P1T [1] #// Datagram
#* P1M [0] #// Enable position motion correction

#* P1D [0.000] #// Position delay (sec.):
#* P1G [WGS84] #// Datum:
#* P1Q [1] #// Enable
#* Pos. qual. indicator [] #//
#} COM1

#} Positioning System Settings

#{ Motion Sensor Settings #// Motion related settings.

#{ COM2 #// Motion Sensor Ports:
#* MRP [RP] #// Rotation (POSMV/MRU)
#* MSD [0] #// Motion Delay (msec.):
#* MAS [1.00] #// Motion Sensor Roll Scaling:
#} COM2

#} Motion Sensor Settings

#{ Active Sensors #//
#* APS [0] [COM1] #// Position:
#* ARO [2] [COM2] #// Motion:
#* AHE [2] [COM2] #// Motion:
#* AHS [3] [COM3] #// Heading:
#} Active Sensors

#} Settings

#{ Locations #// All location parameters

#{ Location offset (m) #//

#{ Pos, COM1: #//
#* P1X [0.00] #// Forward (X)
#* P1Y [0.00] #// Starboard (Y)
#* P1Z [0.00] #// Downward (Z)
#} Pos, COM1:

#{ Pos, COM3: #//
#* P2X [0.00] #// Forward (X)
#* P2Y [0.00] #// Starboard (Y)
#* P2Z [0.00] #// Downward (Z)
#} Pos, COM3:

#{ Pos, COM4/UDP2: #//
#* P3X [0.00] #// Forward (X)
#* P3Y [0.00] #// Starboard (Y)
#* P3Z [0.00] #// Downward (Z)
#} Pos, COM4/UDP2:

#{ TX Transducer: #//
#* S1X [6.147] #// Forward (X)
#* S1Y [1.822] #// Starboard (Y)
#* S1Z [6.796] #// Downward (Z)
#} TX Transducer:

#{ RX Transducer: #//
#* S2X [2.497] #// Forward (X)
#* S2Y [2.481] #// Starboard (Y)
#* S2Z [6.790] #// Downward (Z)
#} RX Transducer:

#{ Attitude 1, COM2: #//
#* MSX [0.00] #// Forward (X)
#* MSY [0.00] #// Starboard (Y)
#* MSZ [0.00] #// Downward (Z)
#} Attitude 1, COM2:

#{ Attitude 2, COM3: #//
#* NSX [0.00] #// Forward (X)
#* NSY [0.00] #// Starboard (Y)
#* NSZ [0.00] #// Downward (Z)
#} Attitude 2, COM3:

#{ Waterline: #//
#* WLZ [1.838] #// Downward (Z)
#} Waterline:

#} Location offset (m)

#} Locations

#{ Angular Offsets #// All angular offset parameters

#{ Offset angles (deg.) #//

#{ TX Transducer: #//
#* S1R [0.0] #// Roll
#* S1P [0.00] #// Pitch
#* S1H [359.98] #// Heading
#} TX Transducer:

#{ RX Transducer: #//
#* S2R [0.0] #// Roll
#* S2P [0.00] #// Pitch
#* S2H [.03] #// Heading
#} RX Transducer:

#{ Attitude 1, COM2: #//
#* MSR [0.00] #// Roll
#* MSP [-0.70] #// Pitch
#* MSG [0.00] #// Heading
#} Attitude 1, COM2:

#{ Attitude 2, COM3: #//
#* NSR [0.00] #// Roll
#* NSP [0.00] #// Pitch
#* NSG [0.00] #// Heading
#} Attitude 2, COM3:

#{ Stand-alone Heading: #//
#* GCG [0.00] #// Heading
#} Stand-alone Heading:

#} Offset angles (deg.)

#} Angular Offsets

#{ ROV. Specific #// All ROV specific parameters

#{ Depth/Pressure Sensor #//
#* DSF [1.00] #// Scaling:
#* DSO [0.00] #// Offset:
#* DSD [0.00] #// Delay:
#* DSH [NI] #// Disable Heave Sensor
#} Depth/Pressure Sensor

#} ROV. Specific

#{ System Parameters #// All system parameters

#{ System Gain Offset #//
#* GO1 [0.0] #// BS Offset (dB)
#} System Gain Offset

#{ Opening angles #//
#* S1S [0] #// TX Opening angle:
#* S2S [1] #// RX Opening angle:
#} Opening angles

#} System Parameters

#// ***
#// Runtime parameters

#{ Sounder Main #//

#{ Sector Coverage #//

#{ Max. angle (deg.): #//
#* MPA [70] #// Port
#* MSA [70] #// Starboard
#} Max. angle (deg.):

#{ Max. Coverage (m): #//
#* MPC [5000] #// Port
#* MSC [5000] #// Starboard
#} Max. Coverage (m):

#* ACM [1] #// Angular Coverage mode: AUTO
#* BSP [2] #// Beam Spacing: HIDENS EQDIST

#} Sector Coverage

#{ Depth Settings #//
#* FDE [4700] #// Force Depth (m)
#* MID [500] #// Min. Depth (m):
#* MAD [6000] #// Max. Depth (m):
#* DSM [0] #// Dual swath mode: OFF
#* PMO [0] #// Ping Mode: AUTO
#* FME [1] #// FM enable
#} Depth Settings

#{ Stabilization #//
#* YPS [1] #// Pitch stabilization
#* TXA [3] #// Along Direction (deg.):

#{ Yaw Stabilization #//
#* YSM [2] #// Mode: REL. MEAN HEADING
#* YMA [300] #// Heading:
#* HFI [1] #// Heading filter: MEDIUM
#} Yaw Stabilization

#} Stabilization
#} Sounder Main

#{ Sound Speed #//

#{ Sound Speed at Transducer #//
#* SHS [0] #// Source SENSOR
#* SST [14672] #// Sound Speed (dm/sec.):
#* Sensor Offset (m/sec [0.0] #//
#* Filter (sec.): [5] #//
#} Sound Speed at Transducer

#} Sound Speed

#{ Filter and Gains #//

#{ Filtering #//
#* SFS [2] #// Spike Filter Strength: MEDIUM
#* PEF [2] #// Penetration Filter Strength: MEDIUM
#* RGS [1] #// Range Gate: NORMAL
#* SLF [1] #// Slope
#* AEF [1] #// Aeration
#* STF [1] #// Sector Tracking
#* IFF [1] #// Interference
#} Filtering

#{ Absorption Coefficient #//
#* ABC [5.415] #// 31.5 kHz
#} Absorption Coefficient

#{ Normal incidence sector #//
#* TCA [12] #// Angle from nadir (deg.):
#} Normal incidence sector

#{ Mammal protection #//
#* TXP [0] #// TX power level (dB): Max.
#* SSR [0] #// Soft startup ramp time (min.):
#} Mammal protection
#} Filter and Gains

#{ Data Cleaning #//
#* Active rule: [AUTOMATIC1] #//
#{ AUTOMATIC1 #//
#* PingProc.maxPingCountRadius [10]
#* PingProc.radiusFactor [0.050000]
#* PingProc.medianFactor [1.500000]
#* PingProc.beamNumberRadius [3]
#* PingProc.sufficientPointCount [40]
#* PingProc.neighborhoodType [Elliptical]
#* PingProc.timeRule.use [false]
#* PingProc.overhangRule.use [false]
#* PingProc.medianRule.use [false]
#* PingProc.medianRule.depthFactor [0.050000]
#* PingProc.medianRule.minPointCount [6]
#* PingProc.quantileRule.use [false]
#* PingProc.quantileRule.quantile [0.100000]
#* PingProc.quantileRule.scaleFactor [6.000000]
#* PingProc.quantileRule.minPointCount [40]
#* GridProc.minPoints [8]
#* GridProc.depthFactor [0.200000]
#* GridProc.removeTooFewPoints [false]
#* GridProc.surfaceFitting.surfaceDegree [1]
#* GridProc.surfaceFitting.tukeyConstant [6.000000]
#* GridProc.surfaceFitting.maxIteration [10]
#* GridProc.surfaceFitting.convCriterion [0.010000]
#* GridProc.surfaceDistanceDepthRule.use [false]
#* GridProc.surfaceDistanceDepthRule.depthFactor [0.050000]
#* GridProc.surfaceDistancePointRule.use [false]
#* GridProc.surfaceDistancePointRule.scaleFactor [1.000000]
#* GridProc.surfaceDistanceUnitRule.use [false]
#* GridProc.surfaceDistanceUnitRule.scaleFactor [1.000000]
#* GridProc.surfaceDistanceStDevRule.use [false]
#* GridProc.surfaceDistanceStDevRule.scaleFactor [2.000000]
#* GridProc.surfaceAngleRule.use [false]
#* GridProc.surfaceAngleRule.minAngle [20.000000]
#* SonarProc.use [false]
#* SonarProc.gridSizeFactor [4]
#* SonarProc.mergerType [Average]
#* SonarProc.interpolatorType [TopHat]
#* SonarProc.interpolatorRadius [1]
#* SonarProc.fillInOnly [true]
#} AUTOMATIC1

#{ Seabed Image Processing #//
#* Seabed Image Process [1] [0]
#} Seabed Image Processing
#} Data Cleaning

#{ Advanced param. #//
#} Advanced param.

Appendix E: Passed BIST results October 26, 2009

Saved: 2009.10.27 04:24:41

Sounder Type: 302, Serial no.: 101

Date Time Ser. No. BIST Result

2009.10.27 04:13:31.190 101 0 OK

Number of BSP67B boards: 2
BSP 1 Master 2.2 081216 4.3 070913 4.3 070913
BSP 1 Slave 2.2 081216 6.0 080902
BSP 1 RXI FPGA 3.6 080821
BSP 1 DSP FPGA A 4.0 070531
BSP 1 DSP FPGA B 4.0 070531
BSP 1 DSP FPGA C 4.0 070531
BSP 1 DSP FPGA D 4.0 070531
BSP 1 PCI TO SLAVE A1 FIFO: ok
BSP 1 PCI TO SLAVE A2 FIFO: ok
BSP 1 PCI TO SLAVE A3 FIFO: ok
BSP 1 PCI TO SLAVE B1 FIFO: ok
BSP 1 PCI TO SLAVE B2 FIFO: ok
BSP 1 PCI TO SLAVE B3 FIFO: ok
BSP 1 PCI TO SLAVE C1 FIFO: ok
BSP 1 PCI TO SLAVE C2 FIFO: ok
BSP 1 PCI TO SLAVE C3 FIFO: ok
BSP 1 PCI TO SLAVE D1 FIFO: ok
BSP 1 PCI TO SLAVE D2 FIFO: ok
BSP 1 PCI TO SLAVE D3 FIFO: ok
BSP 1 PCI TO MASTER A HPI: ok
BSP 1 PCI TO MASTER B HPI: ok
BSP 1 PCI TO MASTER C HPI: ok
BSP 1 PCI TO MASTER D HPI: ok
BSP 1 PCI TO SLAVE A0 HPI: ok
BSP 1 PCI TO SLAVE A1 HPI: ok
BSP 1 PCI TO SLAVE A2 HPI: ok

BSP 1 PCI TO SLAVE B0 HPI: ok
BSP 1 PCI TO SLAVE B1 HPI: ok
BSP 1 PCI TO SLAVE B2 HPI: ok
BSP 1 PCI TO SLAVE C0 HPI: ok
BSP 1 PCI TO SLAVE C1 HPI: ok
BSP 1 PCI TO SLAVE C2 HPI: ok
BSP 1 PCI TO SLAVE D0 HPI: ok
BSP 1 PCI TO SLAVE D1 HPI: ok
BSP 1 PCI TO SLAVE D2 HPI: ok
BSP 2 Master 2.2 081216 4.3 070913 4.3 070913
BSP 2 Slave 2.2 081216 6.0 080902
BSP 2 RXI FPGA 3.6 080821
BSP 2 DSP FPGA A 4.0 070531
BSP 2 DSP FPGA B 4.0 070531
BSP 2 DSP FPGA C 4.0 070531
BSP 2 DSP FPGA D 4.0 070531
BSP 2 PCI TO SLAVE A1 FIFO: ok
BSP 2 PCI TO SLAVE A2 FIFO: ok
BSP 2 PCI TO SLAVE A3 FIFO: ok
BSP 2 PCI TO SLAVE B1 FIFO: ok
BSP 2 PCI TO SLAVE B2 FIFO: ok
BSP 2 PCI TO SLAVE B3 FIFO: ok
BSP 2 PCI TO SLAVE C1 FIFO: ok
BSP 2 PCI TO SLAVE C2 FIFO: ok
BSP 2 PCI TO SLAVE C3 FIFO: ok
BSP 2 PCI TO SLAVE D1 FIFO: ok
BSP 2 PCI TO SLAVE D2 FIFO: ok
BSP 2 PCI TO SLAVE D3 FIFO: ok
BSP 2 PCI TO MASTER A HPI: ok
BSP 2 PCI TO MASTER B HPI: ok
BSP 2 PCI TO MASTER C HPI: ok
BSP 2 PCI TO MASTER D HPI: ok
BSP 2 PCI TO SLAVE A0 HPI: ok
BSP 2 PCI TO SLAVE A1 HPI: ok
BSP 2 PCI TO SLAVE A2 HPI: ok
BSP 2 PCI TO SLAVE B0 HPI: ok
BSP 2 PCI TO SLAVE B1 HPI: ok
BSP 2 PCI TO SLAVE B2 HPI: ok
BSP 2 PCI TO SLAVE C0 HPI: ok
BSP 2 PCI TO SLAVE C1 HPI: ok
BSP 2 PCI TO SLAVE C2 HPI: ok
BSP 2 PCI TO SLAVE D0 HPI: ok
BSP 2 PCI TO SLAVE D1 HPI: ok
BSP 2 PCI TO SLAVE D2 HPI: ok

2009.10.27 04:13:31.260 101 1 OK

High Voltage Br. 1

TX36 Spec: 90.0 - 145.0
0-1 120.5
0-2 121.3
0-3 120.9
0-4 121.7
0-5 120.9
0-6 120.9
0-7 120.9
0-8 121.3
0-9 120.5
0-10 122.1
0-11 120.5
0-12 120.1
0-13 120.5
0-14 120.9
0-15 120.9
0-16 120.9
0-17 120.5
0-18 122.1
0-19 121.3
0-20 121.7
0-21 121.3
0-22 120.1
0-23 120.5
0-24 120.9

High Voltage Br. 2

TX36 Spec: 90.0 - 145.0
0-1 120.9
0-2 121.3
0-3 120.9
0-4 121.7
0-5 120.9
0-6 120.9
0-7 120.5
0-8 120.9
0-9 120.5
0-10 121.3
0-11 120.1
0-12 120.1
0-13 120.9
0-14 120.5
0-15 120.9
0-16 120.5
0-17 120.5
0-18 121.3
0-19 121.3
0-20 121.7
0-21 121.3
0-22 120.9
0-23 120.5
0-24 120.1

Input voltage 12V

TX36 Spec: 11.0 - 13.0
0-1 11.9
0-2 11.9
0-3 11.9
0-4 11.9
0-5 11.9
0-6 11.9
0-7 11.9
0-8 11.9
0-9 11.9
0-10 11.9
0-11 11.9
0-12 11.9
0-13 11.9
0-14 11.9
0-15 11.9
0-16 11.9
0-17 11.9
0-18 11.9
0-19 11.9
0-20 11.9
0-21 11.9
0-22 11.8
0-23 11.9
0-24 11.9

Digital 3.3V

TX36 Spec: 2.8 - 3.5
0-1 3.3
0-2 3.3
0-3 3.3
0-4 3.3
0-5 3.3

0-6 3.3
0-7 3.3
0-8 3.3
0-9 3.3
0-10 3.3
0-11 3.3
0-12 3.3
0-13 3.3
0-14 3.3
0-15 3.3
0-16 3.3
0-17 3.3
0-18 3.3
0-19 3.3
0-20 3.3
0-21 3.3
0-22 3.3
0-23 3.3
0-24 3.3

Digital 2.5V

TX36 Spec: 2.4 - 2.6
0-1 2.5
0-2 2.5
0-3 2.5
0-4 2.5
0-5 2.5
0-6 2.5
0-7 2.5
0-8 2.5
0-9 2.5
0-10 2.5
0-11 2.5
0-12 2.5
0-13 2.5
0-14 2.5
0-15 2.5
0-16 2.5
0-17 2.5
0-18 2.5
0-19 2.5
0-20 2.5
0-21 2.5
0-22 2.5
0-23 2.5
0-24 2.5

Digital 1.5V

TX36 Spec: 1.4 - 1.6
0-1 1.5
0-2 1.5
0-3 1.5
0-4 1.5
0-5 1.5
0-6 1.5
0-7 1.5
0-8 1.5
0-9 1.5
0-10 1.5
0-11 1.5
0-12 1.5
0-13 1.5
0-14 1.5
0-15 1.5
0-16 1.5
0-17 1.5
0-18 1.5
0-19 1.5
0-20 1.5
0-21 1.5
0-22 1.5
0-23 1.5
0-24 1.5

Temperature

TX36 Spec: 15.0 - 75.0
0-1 26.0
0-2 25.6
0-3 26.0
0-4 27.6
0-5 25.6
0-6 24.0
0-7 23.6
0-8 23.6
0-9 26.0
0-10 28.0
0-11 24.8
0-12 24.4
0-13 25.2
0-14 24.4
0-15 26.0
0-16 26.8
0-17 25.6
0-18 26.8
0-19 26.0
0-20 26.8
0-21 28.0
0-22 27.6
0-23 24.4
0-24 25.6

Input Current 12V

TX36 Spec: 0.3 - 1.5
0-1 0.9
0-2 0.7
0-3 0.7
0-4 0.7
0-5 0.7
0-6 0.6
0-7 0.7
0-8 0.7
0-9 0.6
0-10 0.7
0-11 0.7
0-12 0.7
0-13 0.7
0-14 0.6
0-15 0.6
0-16 0.6
0-17 0.6
0-18 0.7
0-19 0.6
0-20 0.6
0-21 0.7
0-22 0.6
0-23 0.8
0-24 0.6

TX36 power test passed

IO TX MB Embedded PPC Embedded
PPC Download
1.11 Generic1.11 GenericDec 15 2005/1.06 Mar 6
2006/1.07 Jul 21 2008/1.11

TX36 unique firmware test OK

2009.10.27 04:13:45.995 101 2 OK

Input voltage 12V

RX32 Spec: 11.0 - 13.0
7-1 11.7
7-2 11.7
7-3 11.7
7-4 11.7

Input voltage 6V

RX32 Spec: 5.0 - 7.0
7-1 5.7
7-2 5.7
7-3 5.7
7-4 5.7

Digital 3.3V

RX32 Spec: 2.8 - 3.5
7-1 3.3
7-2 3.3
7-3 3.3
7-4 3.3

Digital 2.5V

RX32 Spec: 2.4 - 2.6
7-1 2.4
7-2 2.5
7-3 2.5
7-4 2.4

Digital 1.5V

RX32 Spec: 1.4 - 1.6
7-1 1.5
7-2 1.5
7-3 1.5
7-4 1.5

Temperature

RX32 Spec: 15.0 - 75.0
7-1 24.0
7-2 23.0
7-3 24.0
7-4 25.0

Input Current 12V

RX32   Spec: 0.4 - 1.5
7-1   0.7
7-2   0.7
7-3   0.7
7-4   0.7

Input Current 6V

RX32   Spec: 2.4 - 3.3
7-1   2.9
7-2   2.7
7-3   2.8
7-4   2.8

RX32   power test passed

IO   RX   MB Embedded   PPC Embedded
PPC Download
1.12 Generic1.14 GenericMay 5 2006/1.06 May 5 2006/1.07 Apr 25 2008/1.11

RX32 unique firmware test OK

2009.10.27 04:13:46.128 101   3   OK

High Voltage Br. 1

TX36   Spec: 90.0 - 145.0
0-1   120.5
0-2   120.9
0-3   120.9
0-4   121.7
0-5   120.9
0-6   120.9
0-7   120.5
0-8   120.9
0-9   120.5
0-10   121.7
0-11 120.5
0-12 120.1
0-13 120.5
0-14 120.9
0-15 120.9
0-16 120.9
0-17 120.5
0-18 121.7
0-19 121.3
0-20 121.3
0-21 121.3
0-22 120.1
0-23 120.5
0-24 120.5

High Voltage Br. 2

TX36   Spec: 90.0 - 145.0
0-1   120.9
0-2   120.9
0-3   120.5
0-4   121.7
0-5   120.9
0-6   120.9
0-7   120.5
0-8   120.5
0-9   120.5
0-10   121.3
0-11 120.1
0-12 120.1
0-13 120.5
0-14 120.5
0-15 120.9
0-16 120.1
0-17 120.1
0-18 120.9
0-19 121.3
0-20 121.7
0-21 120.9
0-22 120.5
0-23 120.1
0-24 120.1

Input voltage 12V

TX36   Spec: 11.0 - 13.0
0-1   11.9
0-2   11.9
0-3   11.9
0-4   11.9
0-5   11.9
0-6   11.9
0-7   11.9
0-8   11.9
0-9   11.9
0-10   11.9
0-11   11.9
0-12   11.9
0-13   11.9
0-14   11.9
0-15   11.9
0-16   11.9
0-17   11.9
0-18   11.9
0-19   11.9
0-20   11.9
0-21   11.9
0-22   11.8
0-23   11.9
0-24   11.9

RX32   Spec: 11.0 - 13.0
7-1   11.7
7-2   11.7
7-3   11.7
7-4   11.7

Input voltage 6V

RX32   Spec: 5.0 - 7.0
7-1   5.7
7-2   5.7
7-3   5.7
7-4   5.7

TRU power test passed

2009.10.27 04:13:46.311 101   4   OK

EM 302 High Voltage Ramp Test
Test Voltage:20.00 Measured Voltage: 18.00
PASSED
Test Voltage:40.00 Measured Voltage: 39.00
PASSED
Test Voltage:60.00 Measured Voltage: 59.00
PASSED
Test Voltage:80.00 Measured Voltage: 79.00
PASSED
Test Voltage:100.00 Measured Voltage: 101.00
PASSED
Test Voltage:120.00 Measured Voltage: 121.00
PASSED
Test Voltage:120.00 Measured Voltage: 120.00
PASSED
Test Voltage:100.00 Measured Voltage: 106.00
PASSED
Test Voltage:80.00 Measured Voltage: 85.00
PASSED
Test Voltage:60.00 Measured Voltage: 65.00
PASSED
Test Voltage:40.00 Measured Voltage: 45.00
PASSED

11 of 11 tests OK

2009.10.27 04:16:22.171 101   5   OK

BSP 1 RXI TO RAW FIFO: ok
BSP 2 RXI TO RAW FIFO: ok

2009.10.27 04:16:26.438 101   6   OK

Receiver impedance limits [600.0 1000.0] ohm

Board	1	2	3	4
1:	876.0	860.3	869.9	828.8
2:	871.7	833.3	848.3	832.9
3:	847.5	824.6	860.2	859.0
4:	853.2	842.7	843.4	851.6
5:	871.7	848.8	859.4	784.8
6:	837.1	854.3	866.0	840.0
7:	873.5	841.4	863.8	851.1

8:	794.3	846.4	857.8	862.7
9:	886.9	843.6	857.8	837.8
10:	859.0	824.6	864.6	793.8
11:	873.4	843.6	848.1	845.1
12:	874.1	853.6	828.2	837.1
13:	857.4	847.6	848.5	831.5
14:	863.7	835.1	853.1	865.9
15:	844.6	830.0	852.4	854.5
16:	891.5	852.0	843.8	864.7
17:	882.9	830.5	890.1	858.8
18:	855.0	849.3	865.7	866.5
19:	867.6	823.7	854.6	833.1
20:	877.3	838.6	879.5	858.5
21:	900.5	864.2	855.1	893.9
22:	837.0	882.9	858.0	848.8
23:	888.6	876.3	875.9	866.9
24:	878.9	883.8	889.0	883.2
25:	885.7	844.5	852.8	851.0
26:	876.7	848.0	853.9	859.5
27:	867.9	834.1	849.6	852.7
28:	868.1	825.6	849.0	829.3
29:	867.5	824.1	868.9	846.8
30:	865.8	860.3	849.6	850.2
31:	859.1	842.0	852.7	862.9
32:	888.8	859.8	884.5	860.9

Transducer impedance limits [250.0 2000.0] ohm

Board	1	2	3	4
1:	333.4	339.7	339.8	350.4
2:	342.8	357.0	346.2	356.0
3:	342.4	339.0	358.0	343.0
4:	342.9	343.7	367.4	345.5
5:	340.3	339.4	360.0	347.1
6:	344.4	336.4	344.5	347.0
7:	337.4	349.0	365.3	354.5
8:	358.8	325.8	357.5	346.7
9:	362.8	346.8	366.6	356.9
10:	346.7	346.6	353.4	358.7
11:	334.9	340.1	366.1	340.4
12:	341.3	348.2	361.6	348.0
13:	344.5	345.1	355.3	358.8
14:	358.3	344.9	359.4	346.3
15:	336.9	342.8	348.1	337.9
16:	327.3	343.7	371.0	352.5
17:	333.9	339.5	344.1	349.0
18:	355.4	332.2	360.6	350.3
19:	358.3	334.3	354.8	351.7
20:	345.4	337.0	346.7	341.8
21:	340.3	333.5	342.9	350.8
22:	350.9	353.8	350.9	353.0
23:	348.6	347.8	343.6	354.5
24:	346.7	359.0	343.2	341.5
25:	340.6	345.5	348.6	351.2
26:	341.4	350.9	368.0	346.5
27:	329.9	357.1	343.8	346.9
28:	338.9	367.4	356.7	334.7
29:	354.3	341.4	360.1	361.5
30:	336.8	330.6	337.1	347.8
31:	348.0	345.6	348.7	339.3
32:	341.1	337.0	350.4	341.1

Receiver Phase limits [-50.0 20.0] deg

Board	1	2	3	4
1:	-2.0	-1.4	1.1	4.7
2:	-3.1	2.2	1.3	3.7
3:	2.9	3.5	-2.4	-0.9
4:	1.0	0.5	3.0	0.8
5:	0.1	-0.4	0.5	9.1
6:	6.2	-2.3	-2.8	0.8
7:	-2.1	1.8	-0.5	1.9
8:	12.1	-1.4	-0.3	-4.3
9:	-2.1	-0.6	2.6	3.2
10:	-1.6	3.5	-2.3	7.8
11:	0.3	-2.4	2.5	-1.5
12:	-1.6	-1.5	4.3	0.9
13:	3.6	1.0	1.2	3.8
14:	0.1	2.1	-0.6	-0.6
15:	3.5	1.1	-2.7	-0.7
16:	-4.9	-1.6	2.7	-3.2
17:	-0.9	0.7	-3.2	-2.0
18:	2.5	-2.8	0.6	-3.3
19:	0.9	1.8	2.1	0.5
20:	0.2	1.4	-2.6	-1.2
21:	-3.7	-0.7	3.0	-7.0
22:	5.2	-2.5	-0.6	0.5
23:	-2.8	-0.4	-3.6	-1.4
24:	-2.9	-2.6	-2.2	-5.3
25:	-3.6	0.1	2.1	1.1
26:	-3.3	-0.8	3.2	-3.9
27:	-2.8	1.7	-1.2	-0.6
28:	-0.7	5.3	-0.8	1.5
29:	2.4	2.6	0.6	0.9
30:	0.9	-3.3	-0.3	-0.6
31:	1.4	-0.3	-0.3	-2.6
32:	-5.1	-4.3	-4.3	-1.9

Transducer Phase limits [-100.0 0.0] deg

Board	1	2	3	4
1:	-31.5	-37.2	-32.5	-35.2
2:	-35.8	-35.2	-30.1	-40.5
3:	-30.1	-39.6	-33.4	-41.1
4:	-35.4	-36.1	-34.0	-34.6
5:	-35.1	-39.7	-38.8	-33.1
6:	-29.9	-34.7	-34.8	-36.5
7:	-33.3	-37.8	-36.0	-37.3
8:	-29.1	-40.1	-37.7	-39.5
9:	-36.3	-37.0	-32.6	-39.0
10:	-41.8	-35.2	-29.6	-31.5
11:	-34.5	-39.2	-38.1	-39.6
12:	-32.4	-37.8	-39.1	-39.1
13:	-32.6	-40.9	-31.4	-40.8
14:	-34.8	-40.6	-33.0	-38.4
15:	-26.4	-43.9	-34.8	-31.4
16:	-35.7	-39.6	-30.3	-34.5
17:	-27.0	-33.7	-37.0	-36.7
18:	-28.5	-35.7	-33.5	-39.2
19:	-35.4	-34.1	-29.3	-39.2
20:	-31.5	-37.5	-38.9	-39.5
21:	-31.8	-37.2	-28.3	-39.6
22:	-30.5	-39.8	-29.5	-36.5
23:	-34.3	-41.3	-32.7	-35.1
24:	-34.7	-38.2	-37.0	-34.0
25:	-28.3	-35.6	-32.6	-36.4
26:	-37.5	-38.3	-29.0	-41.4
27:	-31.2	-36.6	-31.5	-39.7
28:	-36.4	-34.4	-31.4	-35.7
29:	-36.1	-39.9	-33.4	-36.1
30:	-31.0	-39.8	-34.2	-33.4
31:	-37.4	-40.3	-30.6	-31.9
32:	-38.4	-38.9	-32.1	-38.6

Rx Channels test passed

2009.10.27 04:16:53.456 101 7 OK

Tx Channels test passed

2009.10.27 04:19:33.766 101 8 OK

RX NOISE LEVEL

Board No:	1	2	3	4	
0:	52.3	45.0	45.2	45.8	dB
1:	51.0	46.8	48.5	45.5	dB
2:	50.4	49.3	48.4	46.5	dB
3:	47.4	50.1	50.1	48.0	dB
4:	48.0	49.7	52.1	45.1	dB
5:	49.1	46.2	47.1	45.6	dB
6:	50.8	50.0	46.1	45.8	dB
7:	48.9	47.8	47.1	44.4	dB
8:	48.3	51.4	49.0	49.2	dB
9:	47.3	48.1	44.2	46.5	dB
10:	48.6	48.0	46.8	47.2	dB
11:	47.9	47.1	47.5	49.8	dB
12:	48.0	48.5	45.7	49.5	dB
13:	45.5	46.8	45.3	46.9	dB
14:	49.6	50.1	45.4	48.1	dB
15:	46.2	44.3	47.4	46.1	dB
16:	48.6	43.5	43.7	50.2	dB
17:	50.9	48.6	43.9	50.4	dB
18:	49.3	45.6	45.0	50.9	dB
19:	50.9	45.6	44.2	53.8	dB
20:	49.5	44.6	46.8	50.5	dB
21:	45.8	45.5	44.2	47.7	dB
22:	49.4	48.1	46.9	48.8	dB
23:	44.9	45.7	46.6	46.8	dB
24:	47.7	43.4	45.1	49.5	dB
25:	44.9	45.9	45.3	48.3	dB
26:	46.1	48.3	43.5	49.2	dB
27:	49.8	51.2	42.5	53.3	dB
28:	49.5	48.8	44.0	53.6	dB
29:	44.1	45.4	43.0	52.1	dB
30:	47.2	47.8	44.1	51.8	dB
31:	47.6	46.3	45.0	51.5	dB

Maximum noise at Board 4 Channel 19 Level: 53.8 dB

Broadband noise test

Average noise at Board 1 48.7 dB OK
Average noise at Board 2 47.8 dB OK
Average noise at Board 3 46.5 dB OK
Average noise at Board 4 49.5 dB OK

2009.10.27 04:19:39.400 101 9 OK

RX NOISE SPECTRUM

Board No:	1	2	3	4	
26.1 kHz:	44.7	40.8	40.9	43.6	dB
26.3 kHz:	40.1	38.2	39.0	41.2	dB
26.5 kHz:	41.3	38.7	38.5	39.8	dB
26.7 kHz:	41.4	38.8	37.6	39.6	dB
26.9 kHz:	42.2	38.8	37.2	39.0	dB
27.1 kHz:	41.1	38.9	37.4	39.0	dB
27.3 kHz:	41.0	38.7	38.0	39.2	dB
27.5 kHz:	41.0	38.7	38.1	38.7	dB
27.7 kHz:	40.6	38.0	36.9	38.8	dB
27.9 kHz:	41.3	38.4	37.1	39.0	dB
28.1 kHz:	40.5	38.7	38.0	39.6	dB
28.3 kHz:	41.2	38.7	38.3	39.3	dB
28.5 kHz:	41.8	39.8	38.5	39.7	dB
28.7 kHz:	43.9	39.3	38.9	39.5	dB
28.9 kHz:	41.5	39.2	37.9	39.6	dB
29.1 kHz:	40.3	38.7	38.7	40.4	dB
29.3 kHz:	40.7	39.2	38.0	40.0	dB
29.5 kHz:	39.7	39.0	38.2	39.2	dB
29.7 kHz:	40.3	38.4	38.6	39.4	dB
29.9 kHz:	41.8	39.1	37.9	38.5	dB
30.1 kHz:	40.1	38.4	38.0	38.7	dB
30.3 kHz:	40.4	38.5	37.4	37.7	dB
30.5 kHz:	39.8	38.9	37.9	40.9	dB
30.7 kHz:	40.8	38.9	38.6	39.2	dB
30.9 kHz:	39.5	38.3	37.4	38.0	dB
31.1 kHz:	39.7	38.2	37.5	38.0	dB
31.4 kHz:	38.5	38.1	37.9	38.8	dB
31.6 kHz:	37.7	37.9	37.8	39.4	dB
31.8 kHz:	38.1	37.5	37.5	38.9	dB
32.0 kHz:	38.2	38.3	37.3	38.8	dB
32.2 kHz:	37.9	37.7	36.9	38.1	dB
32.4 kHz:	39.2	39.4	38.0	38.4	dB
32.6 kHz:	41.7	41.1	40.2	39.8	dB
32.8 kHz:	44.0	43.0	40.9	41.3	dB
33.0 kHz:	45.3	43.4	40.7	41.0	dB
33.2 kHz:	44.3	41.8	39.4	40.3	dB
33.4 kHz:	40.9	38.8	37.4	37.9	dB
33.6 kHz:	37.8	36.2	36.5	37.2	dB
33.8 kHz:	37.3	36.8	36.8	37.7	dB
34.0 kHz:	37.1	36.7	37.0	38.1	dB

Maximum noise at Board 1 Frequency 33.0 kHz
Level: 45.3 dB

Spectral noise test

Average noise at Board 1 41.1 dB OK
Average noise at Board 2 39.2 dB OK
Average noise at Board 3 38.3 dB OK
Average noise at Board 4 39.5 dB OK

2009.10.27 04:19:44.901 101 10 OK

KONTRON CP6011
Clock 1795 MHz
Die 35 oC (peak: 39 oC @ 2009-10-27 - 04:17:05)
Board 30 oC (peak: 30 oC @ 2009-10-27 - 04:19:05)
Core 1.34 V
3V3 3.30 V
12V 12.05 V
-12V -12.04 V
BATT 3.49 V
Primary network: 157.237.14.60:0xffff0000
Secondary network: 192.168.2.20:0xffffff00

2009.10.27 04:19:45.001 101 15 OK

EM 302

BSP67B Master: 2.2.2 081216
BSP67B Slave: 2.2.2 081216
CPU: 1.4.5 090421
DDS: 3.4.9 070328
RX32 version : Apr 25 2008 Rev 1.11
TX36 version : Jul 21 2008 Rev 1.11

Appendix F: Passed BIST results October 27, 2009

Saved: 2009.10.28 04:47:54

Sounder Type: 302, Serial no.: 101

Date Time Ser. No. BIST Result

2009.10.28 04:39:35.912 101 0 OK

Number of BSP67B boards: 2
BSP 1 Master 2.2 081216 4.3 070913 4.3 070913
BSP 1 Slave 2.2 081216 6.0 080902
BSP 1 RXI FPGA 3.6 080821
BSP 1 DSP FPGA A 4.0 070531
BSP 1 DSP FPGA B 4.0 070531
BSP 1 DSP FPGA C 4.0 070531
BSP 1 DSP FPGA D 4.0 070531
BSP 1 PCI TO SLAVE A1 FIFO: ok
BSP 1 PCI TO SLAVE A2 FIFO: ok
BSP 1 PCI TO SLAVE A3 FIFO: ok
BSP 1 PCI TO SLAVE B1 FIFO: ok
BSP 1 PCI TO SLAVE B2 FIFO: ok
BSP 1 PCI TO SLAVE B3 FIFO: ok
BSP 1 PCI TO SLAVE C1 FIFO: ok
BSP 1 PCI TO SLAVE C2 FIFO: ok
BSP 1 PCI TO SLAVE C3 FIFO: ok
BSP 1 PCI TO SLAVE D1 FIFO: ok
BSP 1 PCI TO SLAVE D2 FIFO: ok
BSP 1 PCI TO SLAVE D3 FIFO: ok
BSP 1 PCI TO MASTER A HPI: ok
BSP 1 PCI TO MASTER B HPI: ok
BSP 1 PCI TO MASTER C HPI: ok
BSP 1 PCI TO MASTER D HPI: ok
BSP 1 PCI TO SLAVE A0 HPI: ok
BSP 1 PCI TO SLAVE A1 HPI: ok
BSP 1 PCI TO SLAVE A2 HPI: ok
BSP 1 PCI TO SLAVE B0 HPI: ok
BSP 1 PCI TO SLAVE B1 HPI: ok
BSP 1 PCI TO SLAVE B2 HPI: ok
BSP 1 PCI TO SLAVE C0 HPI: ok
BSP 1 PCI TO SLAVE C1 HPI: ok
BSP 1 PCI TO SLAVE C2 HPI: ok
BSP 1 PCI TO SLAVE D0 HPI: ok
BSP 1 PCI TO SLAVE D1 HPI: ok
BSP 1 PCI TO SLAVE D2 HPI: ok
BSP 2 Master 2.2 081216 4.3 070913 4.3 070913
BSP 2 Slave 2.2 081216 6.0 080902
BSP 2 RXI FPGA 3.6 080821
BSP 2 DSP FPGA A 4.0 070531
BSP 2 DSP FPGA B 4.0 070531
BSP 2 DSP FPGA C 4.0 070531
BSP 2 DSP FPGA D 4.0 070531
BSP 2 PCI TO SLAVE A1 FIFO: ok
BSP 2 PCI TO SLAVE A2 FIFO: ok
BSP 2 PCI TO SLAVE A3 FIFO: ok
BSP 2 PCI TO SLAVE B1 FIFO: ok
BSP 2 PCI TO SLAVE B2 FIFO: ok
BSP 2 PCI TO SLAVE B3 FIFO: ok
BSP 2 PCI TO SLAVE C1 FIFO: ok
BSP 2 PCI TO SLAVE C2 FIFO: ok
BSP 2 PCI TO SLAVE C3 FIFO: ok
BSP 2 PCI TO SLAVE D1 FIFO: ok
BSP 2 PCI TO SLAVE D2 FIFO: ok
BSP 2 PCI TO SLAVE D3 FIFO: ok
BSP 2 PCI TO MASTER A HPI: ok
BSP 2 PCI TO MASTER B HPI: ok
BSP 2 PCI TO MASTER C HPI: ok
BSP 2 PCI TO MASTER D HPI: ok
BSP 2 PCI TO SLAVE A0 HPI: ok
BSP 2 PCI TO SLAVE A1 HPI: ok
BSP 2 PCI TO SLAVE A2 HPI: ok
BSP 2 PCI TO SLAVE B0 HPI: ok
BSP 2 PCI TO SLAVE B1 HPI: ok
BSP 2 PCI TO SLAVE B2 HPI: ok
BSP 2 PCI TO SLAVE C0 HPI: ok
BSP 2 PCI TO SLAVE C1 HPI: ok
BSP 2 PCI TO SLAVE C2 HPI: ok
BSP 2 PCI TO SLAVE D0 HPI: ok
BSP 2 PCI TO SLAVE D1 HPI: ok
BSP 2 PCI TO SLAVE D2 HPI: ok

2009.10.28 04:39:35.981 101 1 OK

High Voltage Br. 1

TX36 Spec: 90.0 - 145.0
0-1 120.9
0-2 121.3
0-3 121.3
0-4 122.1
0-5 120.9
0-6 120.9
0-7 120.9
0-8 121.3
0-9 120.5
0-10 122.1
0-11 120.5
0-12 120.5
0-13 120.5
0-14 121.3
0-15 120.9
0-16 121.3
0-17 120.5
0-18 122.1
0-19 121.7
0-20 121.7
0-21 121.7
0-22 120.1
0-23 120.9
0-24 120.9

High Voltage Br. 2

TX36 Spec: 90.0 - 145.0
0-1 120.9
0-2 121.3
0-3 120.9
0-4 122.2
0-5 120.9
0-6 120.9
0-7 120.5
0-8 120.9
0-9 120.5
0-10 121.7
0-11 120.5
0-12 120.1
0-13 120.9
0-14 120.9
0-15 121.3
0-16 120.5
0-17 120.5
0-18 121.3
0-19 121.3
0-20 121.7
0-21 121.3
0-22 120.9
0-23 120.5
0-24 120.5

Input voltage 12V

TX36 Spec: 11.0 - 13.0
0-1 11.9
0-2 11.9
0-3 11.9
0-4 11.9
0-5 11.9
0-6 11.9
0-7 11.9
0-8 11.9
0-9 11.9
0-10 11.9
0-11 11.9
0-12 11.9
0-13 11.9
0-14 11.9
0-15 11.9
0-16 11.9
0-17 11.9
0-18 11.9
0-19 11.9
0-20 11.9
0-21 11.9
0-22 11.8
0-23 11.9
0-24 11.9

Digital 3.3V

TX36 Spec: 2.8 - 3.5
0-1 3.3
0-2 3.3
0-3 3.3
0-4 3.3
0-5 3.3
0-6 3.3

0-7 3.3
0-8 3.3
0-9 3.3
0-10 3.3
0-11 3.3
0-12 3.3
0-13 3.3
0-14 3.3
0-15 3.3
0-16 3.3
0-17 3.3
0-18 3.3
0-19 3.3
0-20 3.3
0-21 3.3
0-22 3.3
0-23 3.3
0-24 3.3

Digital 2.5V

TX36 Spec: 2.4 - 2.6
0-1 2.5
0-2 2.5
0-3 2.5
0-4 2.5
0-5 2.5
0-6 2.5
0-7 2.5
0-8 2.5
0-9 2.5
0-10 2.5
0-11 2.5
0-12 2.5
0-13 2.5
0-14 2.5
0-15 2.5
0-16 2.5
0-17 2.5
0-18 2.5
0-19 2.5
0-20 2.5
0-21 2.5
0-22 2.5
0-23 2.5
0-24 2.5

Digital 1.5V

TX36 Spec: 1.4 - 1.6
0-1 1.5
0-2 1.5
0-3 1.5
0-4 1.5
0-5 1.5
0-6 1.5
0-7 1.5
0-8 1.5
0-9 1.5
0-10 1.5
0-11 1.5
0-12 1.5
0-13 1.5
0-14 1.5
0-15 1.5
0-16 1.5
0-17 1.5
0-18 1.5
0-19 1.5
0-20 1.5
0-21 1.5
0-22 1.5
0-23 1.5
0-24 1.5

Temperature

TX36 Spec: 15.0 - 75.0
0-1 28.8
0-2 28.8
0-3 28.8
0-4 30.4
0-5 28.4
0-6 26.4
0-7 26.0
0-8 25.6
0-9 27.6
0-10 30.0
0-11 26.8
0-12 26.8
0-13 26.8
0-14 26.4
0-15 27.6
0-16 28.4
0-17 26.8
0-18 28.4
0-19 27.6
0-20 28.0
0-21 29.2
0-22 28.8
0-23 25.6
0-24 26.8

Input Current 12V

TX36 Spec: 0.3 - 1.5
0-1 0.9
0-2 0.7
0-3 0.7
0-4 0.7
0-5 0.7
0-6 0.6
0-7 0.7
0-8 0.7
0-9 0.7
0-10 0.7
0-11 0.7
0-12 0.7
0-13 0.7
0-14 0.6
0-15 0.6
0-16 0.6
0-17 0.6
0-18 0.7
0-19 0.6
0-20 0.6
0-21 0.7
0-22 0.7
0-23 0.8
0-24 0.6

TX36 power test passed

IO TX MB Embedded PPC Embedded PPC Download
1.11 Generic1.11 GenericDec 15 2005/1.06 Mar 6 2006/1.07 Jul 21 2008/1.11

TX36 unique firmware test OK

2009.10.28 04:39:50.716 101 2 OK

Input voltage 12V

RX32 Spec: 11.0 - 13.0
7-1 11.7
7-2 11.7
7-3 11.7
7-4 11.7

Input voltage 6V

RX32 Spec: 5.0 - 7.0
7-1 5.7
7-2 5.7
7-3 5.7
7-4 5.7

Digital 3.3V

RX32 Spec: 2.8 - 3.5
7-1 3.3
7-2 3.3
7-3 3.3
7-4 3.3

Digital 2.5V

RX32 Spec: 2.4 - 2.6
7-1 2.4
7-2 2.5
7-3 2.5
7-4 2.4

Digital 1.5V

RX32 Spec: 1.4 - 1.6
7-1 1.5
7-2 1.5
7-3 1.5
7-4 1.5

Temperature

RX32 Spec: 15.0 - 75.0
7-1 24.0
7-2 23.0
7-3 24.0
7-4 25.0

Input Current 12V

RX32 Spec: 0.4 - 1.5
7-1 0.7
7-2 0.7
7-3 0.7
7-4 0.7

Input Current 6V

RX32 Spec: 2.4 - 3.3
7-1 2.9
7-2 2.7
7-3 2.8
7-4 2.8

RX32 power test passed

IO RX MB Embedded PPC Embedded PPC Download
1.12 Generic1.14 GenericMay 5 2006/1.06 May 5 2006/1.07 Apr 25 2008/1.11

RX32 unique firmware test OK

2009.10.28 04:39:50.849 101 3 OK

High Voltage Br. 1

TX36 Spec: 90.0 - 145.0
0-1 120.5
0-2 121.3
0-3 121.3
0-4 121.7
0-5 120.9
0-6 120.9
0-7 120.9
0-8 121.3
0-9 120.5
0-10 122.1
0-11 120.5
0-12 120.1
0-13 120.5
0-14 120.9
0-15 120.9
0-16 121.3
0-17 120.5
0-18 121.7
0-19 121.3
0-20 121.7
0-21 121.7
0-22 120.1
0-23 120.9
0-24 120.9

High Voltage Br. 2

TX36 Spec: 90.0 - 145.0
0-1 120.9
0-2 121.3
0-3 120.9
0-4 121.7
0-5 120.9
0-6 120.9
0-7 120.5
0-8 120.9
0-9 120.5
0-10 121.7
0-11 120.1
0-12 120.1
0-13 120.9
0-14 120.9
0-15 121.3
0-16 120.5
0-17 120.5
0-18 121.3
0-19 121.3
0-20 121.7
0-21 121.3
0-22 120.9
0-23 120.5
0-24 120.5

Input voltage 12V

TX36 Spec: 11.0 - 13.0
0-1 11.9
0-2 11.9
0-3 11.9
0-4 11.9
0-5 11.9
0-6 11.9
0-7 11.9
0-8 11.9
0-9 11.9
0-10 11.9
0-11 11.9
0-12 11.9
0-13 11.9
0-14 11.9
0-15 11.9
0-16 11.9
0-17 11.9
0-18 11.9
0-19 11.9
0-20 11.9
0-21 11.9
0-22 11.8
0-23 11.9
0-24 11.9

RX32 Spec: 11.0 - 13.0
7-1 11.7
7-2 11.7
7-3 11.7
7-4 11.7

Input voltage 6V

RX32 Spec: 5.0 - 7.0
7-1 5.7
7-2 5.7
7-3 5.7
7-4 5.7

TRU power test passed

2009.10.28 04:39:51.032 101 4 OK

EM 302 High Voltage Ramp Test
Test Voltage:20.00 Measured Voltage: 18.00 PASSED
Test Voltage:40.00 Measured Voltage: 39.00 PASSED
Test Voltage:60.00 Measured Voltage: 59.00 PASSED
Test Voltage:80.00 Measured Voltage: 79.00 PASSED
Test Voltage:100.00 Measured Voltage: 101.00 PASSED
Test Voltage:120.00 Measured Voltage: 121.00 PASSED
Test Voltage:120.00 Measured Voltage: 120.00 PASSED
Test Voltage:100.00 Measured Voltage: 106.00 PASSED
Test Voltage:80.00 Measured Voltage: 85.00 PASSED
Test Voltage:60.00 Measured Voltage: 65.00 PASSED
Test Voltage:40.00 Measured Voltage: 45.00 PASSED

11 of 11 tests OK

2009.10.28 04:42:26.892 101 5 OK

BSP 1 RXI TO RAW FIFO: ok
BSP 2 RXI TO RAW FIFO: ok

2009.10.28 04:42:31.176 101 6 OK

Receiver impedance limits [600.0 1000.0] ohm

Board	1	2	3	4
1:	874.9	859.9	869.0	829.4
2:	871.7	834.1	850.2	834.0
3:	848.9	823.5	859.6	857.5
4:	854.0	843.6	843.4	850.2
5:	872.1	848.7	858.4	787.5
6:	840.2	855.0	865.9	840.5
7:	871.9	840.3	863.1	847.4
8:	795.6	847.8	857.6	860.7
9:	885.6	842.1	857.7	835.9

10:	857.8	825.5	864.7	793.4
11:	873.2	843.0	848.1	844.0
12:	873.8	853.3	829.9	837.5
13:	856.2	846.8	848.5	828.1
14:	863.5	833.5	852.9	865.4
15:	844.3	829.7	851.5	853.4
16:	891.3	852.4	842.7	862.4
17:	881.7	830.6	889.8	858.4
18:	853.8	849.5	864.9	864.7
19:	866.4	823.5	855.4	834.0
20:	876.6	837.9	878.6	856.9
21:	900.3	864.2	855.0	889.8
22:	840.1	882.8	858.4	847.2
23:	887.1	876.0	876.1	866.1
24:	878.7	884.5	888.9	882.5
25:	885.5	845.2	852.2	848.5
26:	875.7	847.5	853.1	856.8
27:	868.1	833.6	849.6	852.0
28:	866.4	826.3	850.1	827.0
29:	867.1	824.4	869.0	844.7
30:	865.5	860.3	848.6	850.0
31:	859.3	841.2	851.2	862.3
32:	888.8	859.5	884.2	861.2

Transducer impedance limits [250.0 2000.0] ohm

Board	1	2	3	4
1:	333.1	339.7	339.4	349.2
2:	343.0	356.2	345.8	354.8
3:	341.1	339.1	357.9	342.8
4:	342.8	343.1	366.6	344.9
5:	340.0	339.2	359.7	345.4
6:	343.2	336.4	344.5	345.9
7:	337.2	349.0	365.3	354.9
8:	358.2	324.9	357.2	346.7
9:	363.2	347.2	365.8	356.6
10:	347.0	346.7	353.4	358.5
11:	335.1	340.6	365.8	340.0
12:	341.1	349.9	361.1	347.3
13:	344.4	344.9	355.1	358.8
14:	357.4	344.8	359.3	346.1
15:	336.6	342.9	348.1	337.8
16:	327.3	343.2	371.3	352.6
17:	334.1	339.3	343.6	348.3
18:	355.6	331.9	360.0	349.8
19:	358.6	334.2	354.0	350.4
20:	345.2	337.0	346.4	341.7
21:	340.3	333.6	342.9	351.0
22:	350.1	353.7	350.8	352.5
23:	349.3	347.8	343.6	353.6
24:	347.1	359.1	343.3	341.1
25:	340.5	344.5	348.3	351.8
26:	341.2	351.1	367.8	346.8
27:	329.5	356.7	343.3	346.5
28:	339.5	367.5	356.1	334.9
29:	354.5	341.2	359.7	361.3
30:	336.9	330.7	336.6	347.0
31:	347.6	345.5	348.8	338.8
32:	341.7	336.7	350.4	339.8

Receiver Phase limits [-50.0 20.0] deg

Board	1	2	3	4
1:	-1.8	-1.4	1.2	4.4
2:	-3.1	2.0	0.8	3.3
3:	2.6	3.7	-2.3	-0.8
4:	0.7	0.2	2.9	0.8
5:	0.0	-0.4	0.7	8.5
6:	5.5	-2.4	-2.7	0.4
7:	-1.8	2.1	-0.3	2.3
8:	11.8	-1.8	-0.3	-3.9
9:	-1.9	-0.3	2.5	3.3
10:	-1.4	3.3	-2.3	7.7
11:	0.3	-2.2	2.4	-1.4
12:	-1.6	-1.5	3.9	0.6
13:	3.7	1.1	1.2	4.2
14:	0.0	2.3	-0.5	-0.7
15:	3.5	1.1	-2.4	-0.7
16:	-4.9	-1.7	2.9	-2.8
17:	-0.8	0.6	-3.2	-2.3
18:	2.6	-2.8	0.6	-3.2
19:	1.1	1.8	1.8	0.0
20:	0.3	1.5	-2.5	-1.2
21:	-3.6	-0.7	3.0	-6.1
22:	4.5	-2.5	-0.8	0.5
23:	-2.4	-0.3	-3.6	-1.5
24:	-2.9	-2.8	-2.2	-5.4
25:	-3.7	-0.1	2.1	1.3
26:	-3.1	-0.7	3.3	-3.5
27:	-2.9	1.7	-1.2	-0.6
28:	-0.4	5.1	-1.2	1.7
29:	2.5	2.5	0.6	1.0
30:	0.9	-3.3	-0.2	-0.8
31:	1.3	-0.2	-0.1	-2.7
32:	-5.1	-4.3	-4.3	-2.1

Transducer Phase limits [-100.0 0.0] deg

Board	1	2	3	4
1:	-31.5	-37.3	-32.8	-35.7
2:	-35.9	-35.4	-30.5	-41.1
3:	-30.5	-39.7	-33.5	-41.5
4:	-35.6	-36.4	-34.4	-34.9
5:	-35.5	-39.8	-39.0	-33.7
6:	-30.4	-34.7	-35.0	-36.9
7:	-33.3	-37.8	-36.2	-37.5
8:	-29.5	-40.3	-38.0	-39.7
9:	-36.3	-37.0	-32.9	-39.3
10:	-41.9	-35.4	-29.7	-31.8
11:	-34.8	-39.3	-38.5	-39.8
12:	-32.5	-37.7	-39.5	-39.5
13:	-32.7	-41.0	-31.6	-41.0
14:	-34.8	-40.6	-33.1	-38.8
15:	-26.5	-44.0	-34.9	-31.6
16:	-35.9	-39.9	-30.5	-34.7
17:	-27.1	-33.7	-37.2	-37.1
18:	-28.6	-35.9	-33.6	-39.5
19:	-35.5	-34.0	-29.6	-39.7
20:	-31.6	-37.5	-39.1	-39.7
21:	-31.8	-37.3	-28.5	-39.5
22:	-30.9	-39.9	-29.8	-36.9
23:	-34.3	-41.5	-32.9	-35.4
24:	-34.9	-38.4	-37.3	-34.4
25:	-28.3	-35.7	-32.7	-36.6
26:	-37.7	-38.4	-29.3	-41.6
27:	-31.4	-36.6	-31.6	-40.1
28:	-36.4	-34.5	-31.7	-35.9
29:	-36.2	-40.0	-33.7	-36.3
30:	-31.2	-40.0	-34.5	-33.8
31:	-37.6	-40.3	-30.6	-32.2
32:	-38.5	-39.0	-32.4	-39.1

Rx Channels test passed

2009.10.28 04:42:58.127 101 7 OK

Tx Channels test passed

2009.10.28 04:45:38.471 101 8 OK

RX NOISE LEVEL

Board No:	1	2	3	4	
0:	50.2	41.6	41.4	42.4	dB
1:	47.8	42.4	40.5	41.6	dB
2:	48.1	42.4	41.5	42.5	dB
3:	45.0	41.1	41.0	41.3	dB
4:	46.1	42.6	42.7	42.8	dB
5:	44.4	43.9	43.8	44.2	dB
6:	44.6	43.8	43.6	43.9	dB
7:	43.7	43.4	43.3	43.7	dB
8:	43.5	43.2	44.9	46.3	dB
9:	43.8	43.4	42.6	44.8	dB
10:	44.8	43.3	42.8	44.6	dB
11:	43.1	43.1	44.1	44.7	dB
12:	44.1	44.1	44.3	44.6	dB
13:	43.7	43.0	44.0	45.2	dB
14:	44.6	43.3	44.4	45.1	dB
15:	43.4	44.7	44.0	44.8	dB
16:	41.1	40.4	39.8	41.0	dB
17:	41.6	41.8	39.9	41.8	dB
18:	43.0	41.8	40.5	42.4	dB
19:	41.0	40.7	40.2	41.2	dB
20:	43.3	41.8	41.5	43.4	dB
21:	43.3	44.1	41.7	45.9	dB
22:	43.4	44.4	40.7	45.0	dB
23:	44.5	44.9	44.1	45.5	dB
24:	44.0	44.3	42.7	47.0	dB
25:	42.2	44.5	45.1	45.0	dB
26:	43.2	43.5	42.9	46.7	dB
27:	42.9	42.8	43.3	46.4	dB
28:	44.3	43.7	43.2	47.5	dB
29:	42.8	42.7	43.4	46.0	dB
30:	43.9	42.1	43.1	48.4	dB
31:	43.6	44.2	42.4	49.4	dB

Maximum noise at Board 1 Channel 0 Level: 50.2 dB

Broadband noise test

Average noise at Board 1 44.5 dB OK
Average noise at Board 2 43.2 dB OK
Average noise at Board 3 42.8 dB OK
Average noise at Board 4 45.0 dB OK

2009.10.28 04:45:44.104 101 9 OK

RX NOISE SPECTRUM

Board No:	1	2	3	4
26.1 kHz:	43.9	38.6	39.3	40.4 dB
26.3 kHz:	37.4	37.4	38.3	40.1 dB
26.5 kHz:	40.1	38.6	38.8	39.8 dB
26.7 kHz:	40.5	37.3	37.2	38.8 dB
26.9 kHz:	40.2	38.4	36.0	37.0 dB
27.1 kHz:	39.3	38.1	36.8	37.5 dB
27.3 kHz:	39.6	38.6	37.4	38.5 dB
27.5 kHz:	41.5	39.7	39.2	39.4 dB
27.7 kHz:	41.1	39.9	39.3	39.8 dB
27.9 kHz:	40.5	39.4	39.2	40.2 dB
28.1 kHz:	40.8	39.1	38.6	39.0 dB
28.3 kHz:	40.4	39.4	39.1	39.0 dB
28.5 kHz:	40.0	39.1	38.4	39.4 dB
28.7 kHz:	39.6	39.3	38.3	40.1 dB
28.9 kHz:	41.9	40.7	38.3	38.6 dB
29.1 kHz:	40.4	37.8	37.6	38.5 dB
29.3 kHz:	41.8	39.4	39.0	40.9 dB
29.5 kHz:	38.9	39.1	38.7	39.7 dB
29.7 kHz:	39.7	38.4	38.2	38.9 dB
29.9 kHz:	43.5	39.4	37.6	38.1 dB
30.1 kHz:	39.1	37.7	37.0	37.6 dB
30.3 kHz:	37.7	37.7	37.2	37.3 dB
30.5 kHz:	38.3	37.6	36.3	37.1 dB
30.7 kHz:	38.3	37.6	35.6	36.7 dB
30.9 kHz:	39.5	37.4	36.0	37.2 dB
31.1 kHz:	37.9	37.8	37.0	38.3 dB
31.4 kHz:	36.8	36.9	36.2	37.5 dB
31.6 kHz:	36.6	37.6	36.8	37.0 dB
31.8 kHz:	37.0	38.1	37.7	39.2 dB
32.0 kHz:	38.2	39.0	39.4	42.2 dB
32.2 kHz:	37.3	38.1	39.4	41.5 dB
32.4 kHz:	38.7	39.2	40.6	42.7 dB
32.6 kHz:	41.6	41.3	40.5	41.1 dB
32.8 kHz:	44.1	43.6	42.2	43.1 dB
33.0 kHz:	45.1	44.0	42.5	42.8 dB
33.2 kHz:	44.2	43.2	40.7	41.7 dB
33.4 kHz:	41.0	40.1	38.8	39.7 dB
33.6 kHz:	36.4	38.3	38.9	39.9 dB
33.8 kHz:	37.4	39.1	40.6	42.1 dB
34.0 kHz:	37.6	38.5	39.2	40.5 dB

Maximum noise at Board 1 Frequency 33.0 kHz Level: 45.1 dB

Spectral noise test

Average noise at Board 1   40.5 dB   OK
Average noise at Board 2   39.4 dB   OK
Average noise at Board 3   38.7 dB   OK
Average noise at Board 4   39.8 dB   OK

2009.10.28 04:45:49.571 101   10   OK

KONTRON CP6011
Clock 1795 MHz
Die   39 oC (peak: 39 oC @ 2009-10-28 - 04:45:41)
Board 32 oC (peak: 32 oC @ 2009-10-28 - 04:43:59)
Core 1.34 V
3V3   3.30 V
12V   12.11 V
-12V -12.04 V
BATT 3.50 V
Primary network: 157.237.14.60:0xffff0000
Secondary network: 192.168.2.20:0xffffff00

2009.10.28 04:45:49.671 101   15   OK

EM 302

BSP67B Master: 2.2.2 081216
BSP67B Slave: 2.2.2 081216
CPU: 1.4.5 090421
DDS: 3.4.9 070328
RX32 version : Apr 25 2008 Rev 1.11
TX36 version : Jul 21 2008 Rev 1.11

Appendix G: Failed BIST results October 28, 2009

Saved: 2009.10.29 05:59:23

Sounder Type: 302, Serial no.: 101

Date Time Ser. No. BIST Result

2009.10.29 05:52:38.152 101 0 OK

Number of BSP67B boards: 2
BSP 1 Master 2.2 081216 4.3 070913 4.3 070913
BSP 1 Slave 2.2 081216 6.0 080902
BSP 1 RXI FPGA 3.6 080821
BSP 1 DSP FPGA A 4.0 070531
BSP 1 DSP FPGA B 4.0 070531
BSP 1 DSP FPGA C 4.0 070531
BSP 1 DSP FPGA D 4.0 070531
BSP 1 PCI TO SLAVE A1 FIFO: ok
BSP 1 PCI TO SLAVE A2 FIFO: ok
BSP 1 PCI TO SLAVE A3 FIFO: ok
BSP 1 PCI TO SLAVE B1 FIFO: ok
BSP 1 PCI TO SLAVE B2 FIFO: ok
BSP 1 PCI TO SLAVE B3 FIFO: ok
BSP 1 PCI TO SLAVE C1 FIFO: ok
BSP 1 PCI TO SLAVE C2 FIFO: ok
BSP 1 PCI TO SLAVE C3 FIFO: ok
BSP 1 PCI TO SLAVE D1 FIFO: ok
BSP 1 PCI TO SLAVE D2 FIFO: ok
BSP 1 PCI TO SLAVE D3 FIFO: ok
BSP 1 PCI TO MASTER A HPI: ok
BSP 1 PCI TO MASTER B HPI: ok
BSP 1 PCI TO MASTER C HPI: ok
BSP 1 PCI TO MASTER D HPI: ok
BSP 1 PCI TO SLAVE A0 HPI: ok
BSP 1 PCI TO SLAVE A1 HPI: ok
BSP 1 PCI TO SLAVE A2 HPI: ok

BSP 1 PCI TO SLAVE B0 HPI: ok
BSP 1 PCI TO SLAVE B1 HPI: ok
BSP 1 PCI TO SLAVE B2 HPI: ok
BSP 1 PCI TO SLAVE C0 HPI: ok
BSP 1 PCI TO SLAVE C1 HPI: ok
BSP 1 PCI TO SLAVE C2 HPI: ok
BSP 1 PCI TO SLAVE D0 HPI: ok
BSP 1 PCI TO SLAVE D1 HPI: ok
BSP 1 PCI TO SLAVE D2 HPI: ok
BSP 2 Master 2.2 081216 4.3 070913 4.3 070913
BSP 2 Slave 2.2 081216 6.0 080902
BSP 2 RXI FPGA 3.6 080821
BSP 2 DSP FPGA A 4.0 070531
BSP 2 DSP FPGA B 4.0 070531
BSP 2 DSP FPGA C 4.0 070531
BSP 2 DSP FPGA D 4.0 070531
BSP 2 PCI TO SLAVE A1 FIFO: ok
BSP 2 PCI TO SLAVE A2 FIFO: ok
BSP 2 PCI TO SLAVE A3 FIFO: ok
BSP 2 PCI TO SLAVE B1 FIFO: ok
BSP 2 PCI TO SLAVE B2 FIFO: ok
BSP 2 PCI TO SLAVE B3 FIFO: ok
BSP 2 PCI TO SLAVE C1 FIFO: ok
BSP 2 PCI TO SLAVE C2 FIFO: ok
BSP 2 PCI TO SLAVE C3 FIFO: ok
BSP 2 PCI TO SLAVE D1 FIFO: ok
BSP 2 PCI TO SLAVE D2 FIFO: ok
BSP 2 PCI TO SLAVE D3 FIFO: ok
BSP 2 PCI TO MASTER A HPI: ok
BSP 2 PCI TO MASTER B HPI: ok
BSP 2 PCI TO MASTER C HPI: ok
BSP 2 PCI TO MASTER D HPI: ok
BSP 2 PCI TO SLAVE A0 HPI: ok
BSP 2 PCI TO SLAVE A1 HPI: ok
BSP 2 PCI TO SLAVE A2 HPI: ok
BSP 2 PCI TO SLAVE B0 HPI: ok
BSP 2 PCI TO SLAVE B1 HPI: ok
BSP 2 PCI TO SLAVE B2 HPI: ok
BSP 2 PCI TO SLAVE C0 HPI: ok
BSP 2 PCI TO SLAVE C1 HPI: ok
BSP 2 PCI TO SLAVE C2 HPI: ok
BSP 2 PCI TO SLAVE D0 HPI: ok
BSP 2 PCI TO SLAVE D1 HPI: ok
BSP 2 PCI TO SLAVE D2 HPI: ok

2009.10.29 05:52:38.222 101 1 Error

High Voltage Br. 1

TX36 Spec: 90.0 - 145.0
0-1 121.3
0-2 121.7
0-3 121.7
0-4 122.6
0-5 121.3
0-6 121.3
0-7 121.3
0-8 121.7
0-9 120.9
0-10 122.6
0-11 120.9
0-12 120.5
0-13 120.9
0-14 121.7
0-15 121.3
0-16 7.6 *
0-17 120.9
0-18 122.6
0-19 122.1
0-20 122.1
0-21 122.1
0-22 120.5
0-23 120.9
0-24 121.3

High Voltage Br. 2

TX36 Spec: 90.0 - 145.0
0-1 121.3
0-2 121.7
0-3 121.3
0-4 122.2
0-5 121.3
0-6 121.7
0-7 120.9
0-8 121.3
0-9 120.9
0-10 122.2
0-11 120.9
0-12 120.5
0-13 120.9
0-14 121.3
0-15 121.7
0-16 120.9
0-17 120.9
0-18 122.2
0-19 121.7
0-20 122.2
0-21 122.2
0-22 121.3
0-23 120.9
0-24 120.9

Input voltage 12V

TX36 Spec: 11.0 - 13.0
0-1 11.9
0-2 11.8
0-3 11.9
0-4 11.9
0-5 11.9
0-6 11.9
0-7 11.9
0-8 11.9
0-9 11.9
0-10 11.9
0-11 11.8
0-12 11.9
0-13 11.9
0-14 11.8
0-15 11.9
0-16 11.8
0-17 11.8
0-18 11.8
0-19 11.8
0-20 11.9
0-21 11.9
0-22 11.8
0-23 11.8
0-24 11.8

Digital 3.3V

TX36 Spec: 2.8 - 3.5
0-1 3.3
0-2 3.3
0-3 3.3
0-4 3.3
0-5 3.3
0-6 3.3
0-7 3.3
0-8 3.3
0-9 3.3
0-10 3.3
0-11 3.3
0-12 3.3
0-13 3.3
0-14 3.3
0-15 3.3
0-16 3.3
0-17 3.3
0-18 3.3
0-19 3.3
0-20 3.3
0-21 3.3
0-22 3.3
0-23 3.3
0-24 3.3

Digital 2.5V

TX36 Spec: 2.4 - 2.6
0-1 2.5
0-2 2.5
0-3 2.5
0-4 2.5
0-5 2.5
0-6 2.5
0-7 2.5
0-8 2.5
0-9 2.5
0-10 2.5
0-11 2.5
0-12 2.5
0-13 2.5
0-14 2.5
0-15 2.5
0-16 2.5
0-17 2.5
0-18 2.5
0-19 2.5
0-20 2.5
0-21 2.5
0-22 2.5
0-23 2.5
0-24 2.5

Digital 1.5V

TX36 Spec: 1.4 - 1.6
0-1 1.5
0-2 1.5
0-3 1.5
0-4 1.5
0-5 1.5
0-6 1.5
0-7 1.5
0-8 1.5
0-9 1.5
0-10 1.5
0-11 1.5
0-12 1.5
0-13 1.5
0-14 1.5
0-15 1.5
0-16 1.5
0-17 1.5
0-18 1.5
0-19 1.5
0-20 1.5
0-21 1.5
0-22 1.5
0-23 1.5
0-24 1.5

Temperature

TX36 Spec: 15.0 - 75.0
0-1 43.2
0-2 42.0
0-3 41.6
0-4 42.8
0-5 41.2
0-6 40.0
0-7 40.8
0-8 41.6
0-9 42.8
0-10 44.0
0-11 40.4
0-12 41.2
0-13 42.8
0-14 43.6
0-15 44.8
0-16 48.0
0-17 44.4
0-18 46.0
0-19 44.4
0-20 44.8
0-21 45.2
0-22 44.0
0-23 40.8
0-24 42.8

Input Current 12V

TX36 Spec: 0.3 - 1.5
0-1 0.9
0-2 0.7
0-3 0.7
0-4 0.6
0-5 0.7
0-6 0.7
0-7 0.7
0-8 0.7
0-9 0.7
0-10 0.7
0-11 0.7
0-12 0.7
0-13 0.7
0-14 0.6
0-15 0.7
0-16 1.8 *
0-17 0.6
0-18 0.7
0-19 0.7
0-20 0.7
0-21 0.7
0-22 0.7
0-23 0.8
0-24 0.6

TX36 power test failed

IO TX MB Embedded PPC Embedded
PPC Download
1.11 Generic1.11 GenericDec 15 2005/1.06 Mar
6 2006/1.07 Jul 21 2008/1.11

TX36 unique firmware test OK

2009.10.29 05:52:38.405 101 2 OK

Input voltage 12V

RX32 Spec: 11.0 - 13.0
7-1 11.7
7-2 11.6
7-3 11.7
7-4 11.7

Input voltage 6V

RX32 Spec: 5.0 - 7.0
7-1 5.7
7-2 5.7
7-3 5.7
7-4 5.7

Digital 3.3V

RX32 Spec: 2.8 - 3.5
7-1 3.3
7-2 3.3
7-3 3.3
7-4 3.3

Digital 2.5V

RX32 Spec: 2.4 - 2.6
7-1 2.4
7-2 2.5
7-3 2.5
7-4 2.4

Digital 1.5V

RX32 Spec: 1.4 - 1.6
7-1 1.5
7-2 1.5
7-3 1.5
7-4 1.5

Temperature

RX32 Spec: 15.0 - 75.0

7-1 46.0
7-2 47.0
7-3 48.0
7-4 48.0

Input Current 12V

RX32 Spec: 0.4 - 1.5
7-1 0.7
7-2 0.7
7-3 0.7
7-4 0.7

Input Current 6V

RX32 Spec: 2.4 - 3.3
7-1 2.9
7-2 2.7
7-3 2.8
7-4 2.8

RX32 power test passed

IO RX MB Embedded PPC Embedded PPC Download
1.12 Generic1.14 GenericMay 5 2006/1.06 May 5 2006/1.07 Apr 25 2008/1.11

RX32 unique firmware test OK

2009.10.29 05:52:38.539 101 3 Error

High Voltage Br. 1

TX36 Spec: 90.0 - 145.0
0-1 121.3
0-2 121.7
0-3 121.7
0-4 122.6
0-5 121.3
0-6 121.7
0-7 121.3
0-8 121.7
0-9 120.9
0-10 122.6
0-11 120.9
0-12 120.5
0-13 120.9
0-14 121.7
0-15 121.3
0-16 7.6 *
0-17 121.3
0-18 122.6
0-19 122.1
0-20 122.1
0-21 122.1
0-22 120.9
0-23 121.3
0-24 121.3

High Voltage Br. 2

TX36 Spec: 90.0 - 145.0
0-1 121.3
0-2 121.7
0-3 121.3
0-4 122.6
0-5 121.3
0-6 121.3
0-7 120.9
0-8 121.3
0-9 121.3
0-10 122.2
0-11 120.9
0-12 120.5
0-13 121.3
0-14 121.3
0-15 121.7
0-16 120.9
0-17 120.9
0-18 121.7
0-19 121.7
0-20 122.2
0-21 121.7
0-22 121.3
0-23 120.9
0-24 120.9

Input voltage 12V

TX36 Spec: 11.0 - 13.0
0-1 11.9
0-2 11.8
0-3 11.9
0-4 11.9
0-5 11.9
0-6 11.9
0-7 11.9
0-8 11.9
0-9 11.8
0-10 11.9
0-11 11.8
0-12 11.9
0-13 11.9
0-14 11.8
0-15 11.9
0-16 11.8
0-17 11.9
0-18 11.8
0-19 11.8
0-20 11.8
0-21 11.9
0-22 11.8
0-23 11.8
0-24 11.9

RX32 Spec: 11.0 - 13.0
7-1 11.7
7-2 11.6
7-3 11.7
7-4 11.7

Input voltage 6V

RX32 Spec: 5.0 - 7.0
7-1 5.7
7-2 5.7
7-3 5.7
7-4 5.7

TRU power test failed

2009.10.29 05:52:38.722 101 4 OK

EM 302 High Voltage Ramp Test
Test Voltage:20.00 Measured Voltage: 19.00
PASSED
Test Voltage:40.00 Measured Voltage: 39.00
PASSED
Test Voltage:60.00 Measured Voltage: 59.00
PASSED
Test Voltage:80.00 Measured Voltage: 79.00
PASSED
Test Voltage:100.00 Measured Voltage: 101.00
PASSED
Test Voltage:120.00 Measured Voltage: 121.00
PASSED
Test Voltage:120.00 Measured Voltage: 121.00
PASSED
Test Voltage:100.00 Measured Voltage: 106.00
PASSED
Test Voltage:80.00 Measured Voltage: 85.00
PASSED
Test Voltage:60.00 Measured Voltage: 65.00
PASSED
Test Voltage:40.00 Measured Voltage: 45.00
PASSED

11 of 11 tests OK

2009.10.29 05:55:14.581 101 5 OK

BSP 1 RXI TO RAW FIFO: ok
BSP 2 RXI TO RAW FIFO: ok

2009.10.29 05:55:18.864 101 6 OK

Receiver impedance limits [600.0 1000.0] ohm
Board 1 2 3 4
1: 860.9 863.4 860.6 822.5
2: 856.0 836.3 861.0 826.9

3:	835.6	826.8	854.7	852.5
4:	856.8	846.4	840.1	842.6
5:	859.5	852.5	853.3	807.8
6:	850.5	858.9	859.8	836.3
7:	856.0	842.0	855.8	838.6
8:	812.5	850.8	851.2	853.1
9:	869.5	843.0	850.0	829.9
10:	844.6	827.2	857.7	786.6
11:	858.7	844.4	840.4	836.7
12:	860.9	856.1	834.4	850.7
13:	842.7	848.6	843.4	821.9
14:	849.1	836.2	846.6	859.2
15:	828.6	831.1	844.3	844.3
16:	875.8	854.9	836.1	854.1
17:	869.1	834.3	881.5	859.5
18:	839.1	852.0	858.8	857.4
19:	852.9	826.0	848.3	845.4
20:	861.7	840.6	868.9	851.0
21:	886.6	867.4	852.0	878.0
22:	849.5	886.2	853.5	841.2
23:	872.4	878.0	869.2	860.7
24:	864.5	887.9	881.9	875.7
25:	872.8	847.2	845.6	842.6
26:	861.4	849.3	845.3	848.7
27:	853.8	835.6	844.3	844.2
28:	851.8	828.3	845.0	819.2
29:	852.4	826.9	862.5	839.2
30:	849.7	863.3	842.3	842.1
31:	849.4	843.4	843.8	850.9
32:	875.5	862.3	879.7	854.5

Transducer impedance limits [250.0 2000.0] ohm

Board	1	2	3	4
1:	328.0	338.1	340.1	350.2
2:	335.6	355.8	338.4	353.3
3:	335.9	338.8	356.4	339.7
4:	331.6	341.7	361.0	342.5
5:	334.8	339.7	359.0	336.3
6:	332.0	334.0	342.5	342.2
7:	332.3	348.1	362.7	349.4
8:	345.2	325.5	355.1	344.0
9:	356.3	346.1	365.5	354.8
10:	344.3	347.9	353.2	359.6
11:	329.9	338.8	363.7	351.1
12:	336.7	347.0	354.0	340.3
13:	341.2	343.4	352.1	357.9
14:	351.8	344.7	355.9	342.2
15:	333.6	343.1	346.0	334.3
16:	332.1	345.8	368.5	350.1
17:	329.4	341.2	343.0	342.7
18:	354.8	331.6	356.6	345.7
19:	352.4	333.1	351.0	340.5
20:	339.5	335.9	345.5	334.8
21:	333.5	333.7	340.7	354.4
22:	336.9	352.0	347.0	351.4
23:	342.5	347.1	342.2	350.3
24:	340.5	358.7	342.4	338.2
25:	335.0	344.3	345.7	346.9
26:	337.0	349.3	363.3	346.4
27:	327.1	356.4	339.6	346.6
28:	334.3	366.0	353.4	334.3
29:	349.7	339.6	356.5	361.8
30:	331.4	328.1	334.5	345.0
31:	340.8	344.6	345.8	338.4
32:	336.4	336.3	347.9	339.7

Receiver Phase limits [-50.0 20.0] deg

Board	1	2	3	4
1:	-1.3	-1.6	1.8	4.7
2:	-2.1	2.2	-3.4	3.6
3:	2.8	3.6	-2.5	-0.9
4:	-3.0	0.1	2.3	1.3
5:	0.4	-0.5	0.5	4.5
6:	1.2	-2.7	-2.5	0.2
7:	-0.8	2.3	0.2	3.0
8:	7.7	-1.9	0.1	-3.3
9:	-1.0	-0.1	2.8	3.3
10:	-0.8	3.4	-1.7	8.0
11:	0.8	-2.0	2.6	-0.8
12:	-1.4	-1.5	1.9	-3.6
13:	4.1	1.1	1.4	4.4
14:	0.8	2.2	-0.4	-0.8
15:	4.4	1.4	-1.9	0.0
16:	-3.9	-1.8	3.1	-2.0
17:	-0.5	0.5	-2.4	-3.8
18:	3.3	-2.9	0.5	-2.8
19:	1.6	1.9	2.0	-3.9
20:	1.0	1.6	-1.4	-1.1
21:	-3.2	-0.7	2.5	-4.3
22:	0.3	-2.7	-1.0	0.7
23:	-1.7	-0.1	-3.3	-1.4
24:	-2.2	-2.9	-1.7	-4.8
25:	-3.5	0.0	2.4	1.6
26:	-2.3	-0.5	3.6	-2.8
27:	-2.4	2.0	-1.1	0.1
28:	0.4	5.3	-1.4	2.3
29:	3.2	2.4	0.7	0.9
30:	1.8	-3.5	0.1	-0.1
31:	1.1	0.0	0.5	-0.9
32:	-4.6	-4.4	-4.3	-1.5

Transducer Phase limits [-100.0 0.0] deg

Board	1	2	3	4
1:	-32.3	-38.5	-34.2	-36.0
2:	-36.7	-36.2	-34.1	-41.5
3:	-31.4	-40.4	-35.4	-41.9
4:	-38.2	-37.7	-36.5	-35.9
5:	-36.2	-40.3	-40.0	-36.0
6:	-32.9	-36.4	-36.4	-38.1
7:	-33.9	-38.5	-37.4	-38.4
8:	-32.2	-40.6	-39.4	-40.3
9:	-37.2	-37.8	-34.5	-40.7
10:	-42.1	-35.9	-30.8	-37.3
11:	-35.2	-40.6	-39.8	-42.2
12:	-34.0	-39.2	-41.6	-42.0
13:	-32.8	-41.1	-33.2	-41.7
14:	-36.1	-41.4	-34.9	-39.6
15:	-27.4	-43.8	-36.1	-33.4
16:	-35.6	-40.6	-32.4	-36.0
17:	-28.1	-34.7	-37.5	-39.0
18:	-30.0	-37.3	-35.2	-40.8
19:	-36.3	-35.1	-31.0	-42.2
20:	-32.6	-38.6	-39.5	-40.7
21:	-33.1	-38.7	-30.3	-41.6
22:	-33.9	-40.9	-31.7	-37.4
23:	-35.1	-41.4	-34.2	-36.4
24:	-35.9	-39.9	-37.9	-35.3
25:	-29.8	-37.0	-33.7	-37.8
26:	-37.4	-39.5	-30.7	-43.1
27:	-32.8	-37.5	-33.3	-40.1
28:	-37.2	-35.9	-33.5	-36.4
29:	-37.1	-40.8	-34.6	-38.0
30:	-32.1	-41.0	-35.6	-34.9
31:	-38.7	-41.2	-31.9	-32.8
32:	-38.7	-39.8	-33.9	-39.0

Rx Channels test passed

2009.10.29 05:55:45.799 101 7 Error

Rack 0 Slot 1
Ch: 0 High Z
Ch: 1 High Z
Ch: 2 High Z

Rack 0 Slot 2
No channel errors

Rack 0 Slot 3
No channel errors

Rack 0 Slot 4
No channel errors

Rack 0 Slot 5
No channel errors

Rack 0 Slot 6
Ch: 21 High Z

Rack 0 Slot 7
No channel errors

Rack 0 Slot 8
No channel errors

Rack 0 Slot 9
No channel errors

Rack 0 Slot 10
No channel errors

Rack 0 Slot 11
Ch: 24 Open Z
Ch: 25 FFT err L
Ch: 26 FFT err L
Ch: 27 FFT err L
Ch: 28 FFT err L
Ch: 29 FFT err L
Ch: 30 FFT err L
Ch: 31 FFT err L

Rack 0 Slot 12
Ch: 2 High Z
Ch: 33 High Z
Ch: 34 High Z
Ch: 35 High Z

Rack 0 Slot 13

Ch: 0 High Z
Ch: 1 High Z
Ch: 2 High Z

Rack 0 Slot 14
No channel errors

Rack 0 Slot 15
No channel errors

Rack 0 Slot 16
Ch: 3 Low Voltage
Ch: 7 Low Voltage
Ch: 8 Low Voltage
Ch: 9 Low Voltage
Ch: 10 Low Voltage
Ch: 11 Low Voltage
Ch: 12 Low Voltage
Ch: 13 Low Voltage
Ch: 14 Low Voltage
Ch: 15 Low Voltage
Ch: 16 Low Voltage
Ch: 17 Low Voltage
Ch: 18 Low Voltage
Ch: 19 Low Voltage
Ch: 20 Low Voltage
Ch: 21 Low Voltage
Ch: 22 Low Voltage
Ch: 23 Low Voltage
Ch: 24 FFT err L
Ch: 25 FFT err L
Ch: 26 FFT err L
Ch: 27 FFT err L
Ch: 28 FFT err L
Ch: 29 FFT err L
Ch: 30 FFT err L
Ch: 31 FFT err L

Rack 0 Slot 17
No channel errors

Rack 0 Slot 18
No channel errors

Rack 0 Slot 19
No channel errors

Rack 0 Slot 20
No channel errors

Rack 0 Slot 21
No channel errors

Rack 0 Slot 22
No channel errors

Rack 0 Slot 23
No channel errors

Rack 0 Slot 24
Ch: 33 High Z
Ch: 34 High Z
Ch: 35 High Z

** Tx Channels test failed **

2009.10.29 05:58:26.142 101 8 OK

RX NOISE LEVEL

Board No:	1	2	3	4	
0:	54.4	47.5	46.6	50.4	dB
1:	52.4	47.5	46.0	49.8	dB
2:	51.0	46.4	46.3	49.6	dB
3:	47.9	45.9	48.2	51.2	dB
4:	48.7	48.4	48.7	51.9	dB
5:	47.2	46.8	47.0	51.4	dB
6:	46.9	46.4	47.2	52.6	dB
7:	46.4	46.3	47.2	50.9	dB
8:	46.6	48.4	50.1	55.9	dB
9:	45.9	46.2	46.1	54.0	dB
10:	46.7	46.8	47.8	50.8	dB
11:	45.9	48.0	47.3	50.7	dB
12:	46.4	47.3	46.9	52.0	dB
13:	46.1	46.2	46.8	50.4	dB
14:	45.8	47.2	46.0	51.0	dB
15:	46.7	47.7	48.4	51.6	dB
16:	44.8	45.8	45.7	50.3	dB
17:	45.1	46.5	44.4	48.7	dB
18:	45.5	45.7	44.6	50.3	dB
19:	46.3	45.5	44.5	52.8	dB
20:	46.1	45.6	46.0	49.4	dB
21:	45.9	44.8	43.6	47.0	dB
22:	47.3	45.3	43.6	47.5	dB
23:	47.1	45.4	43.8	47.5	dB
24:	47.6	44.6	45.1	52.4	dB
25:	45.9	44.9	43.7	51.3	dB
26:	46.8	45.1	43.5	56.3	dB
27:	46.3	45.1	43.6	58.8	dB
28:	47.4	45.3	44.7	56.4	dB
29:	46.2	44.8	43.8	53.8	dB
30:	45.7	44.3	45.2	53.5	dB
31:	46.8	45.9	45.3	52.6	dB

Maximum noise at Board 4 Channel 27 Level: 58.8 dB

Broadband noise test

Average noise at Board 1 47.7 dB OK
Average noise at Board 2 46.3 dB OK
Average noise at Board 3 46.2 dB OK
Average noise at Board 4 52.5 dB OK

2009.10.29 05:58:31.809 101 9 OK

RX NOISE SPECTRUM

Board No:	1	2	3	4	
26.1 kHz:	46.3	43.7	41.6	44.1	dB
26.3 kHz:	43.7	43.3	42.1	45.4	dB
26.5 kHz:	44.3	43.0	41.3	45.5	dB
26.7 kHz:	44.3	43.7	41.7	44.0	dB
26.9 kHz:	44.9	43.6	41.6	44.2	dB
27.1 kHz:	43.7	43.3	42.0	44.1	dB
27.3 kHz:	44.2	42.5	41.5	44.4	dB
27.5 kHz:	43.9	42.3	41.6	44.1	dB
27.7 kHz:	43.8	42.8	42.0	44.3	dB
27.9 kHz:	44.7	42.9	40.9	43.8	dB
28.1 kHz:	45.0	43.4	42.2	44.7	dB
28.3 kHz:	44.9	43.0	43.0	46.3	dB
28.5 kHz:	45.5	43.4	43.3	46.8	dB
28.7 kHz:	45.9	43.1	42.6	44.5	dB
28.9 kHz:	45.1	43.0	42.9	45.2	dB
29.1 kHz:	44.7	42.9	42.4	44.3	dB
29.3 kHz:	44.1	41.4	41.7	44.1	dB
29.5 kHz:	44.4	41.8	41.5	43.7	dB
29.7 kHz:	44.3	42.1	40.2	42.7	dB
29.9 kHz:	44.5	42.5	41.8	44.8	dB
30.1 kHz:	43.5	42.4	42.1	43.7	dB
30.3 kHz:	44.0	42.2	40.7	43.3	dB
30.5 kHz:	44.4	42.6	41.3	43.6	dB
30.7 kHz:	44.4	41.4	41.0	43.6	dB
30.9 kHz:	43.8	41.9	41.0	44.1	dB
31.1 kHz:	43.8	41.2	41.5	44.4	dB
31.4 kHz:	43.1	41.0	40.1	42.2	dB
31.6 kHz:	42.7	41.0	39.5	42.2	dB
31.8 kHz:	42.6	40.5	39.5	42.1	dB
32.0 kHz:	44.0	40.9	40.2	43.1	dB
32.2 kHz:	44.0	40.9	41.0	43.9	dB
32.4 kHz:	43.7	41.0	39.9	42.8	dB
32.6 kHz:	44.2	41.9	41.6	44.5	dB
32.8 kHz:	44.8	41.9	42.3	45.0	dB
33.0 kHz:	43.9	41.1	39.4	42.5	dB
33.2 kHz:	42.8	40.3	39.3	42.7	dB
33.4 kHz:	42.7	40.2	40.0	42.8	dB
33.6 kHz:	42.2	39.3	38.3	41.4	dB
33.8 kHz:	41.2	39.9	39.0	41.4	dB
34.0 kHz:	40.8	38.6	38.5	41.0	dB

Maximum noise at Board 4 Frequency 28.5 kHz Level: 46.8 dB

Spectral noise test

Average noise at Board 1 44.1 dB OK
Average noise at Board 2 42.1 dB OK
Average noise at Board 3 41.3 dB OK
Average noise at Board 4 44.0 dB OK

2009.10.29 05:58:37.309 101 10 OK

KONTRON CP6011
Clock 1795 MHz
Die 44 oC (peak: 60 oC @ 2009-10-29 - 00:29:15)
Board 46 oC (peak: 50 oC @ 2009-10-29 - 04:14:22)
Core 1.34 V
3V3 3.30 V
12V 12.05 V
-12V -12.04 V
BATT 3.50 V
Primary network: 157.237.14.60:0xffff0000
Secondary network: 192.168.2.20:0xffffff00

2009.10.29 05:58:37.409 101 15 OK

EM 302

BSP67B Master: 2.2.2 081216
BSP67B Slave: 2.2.2 081216
CPU: 1.4.5 090421
DDS: 3.4.9 070328
RX32 version : Apr 25 2008 Rev 1.11
TX36 version : Jul 21 2008 Rev 1.11

Appendix D: Failed BIST results 110309 after swapping boards 16 & 24 back to original slots
Saved: 2009.11.04 03:17:57

Sounder Type: 302, Serial no.: 101

Date Time Ser. No. BIST Result

2009.11.04 03:10:01.366 101 0 OK

Number of BSP67B boards: 2
BSP 1 Master 2.2 081216 4.3 070913 4.3 070913
BSP 1 Slave 2.2 081216 6.0 080902
BSP 1 RXI FPGA 3.6 080821
BSP 1 DSP FPGA A 4.0 070531
BSP 1 DSP FPGA B 4.0 070531
BSP 1 DSP FPGA C 4.0 070531
BSP 1 DSP FPGA D 4.0 070531
BSP 1 PCI TO SLAVE A1 FIFO: ok
BSP 1 PCI TO SLAVE A2 FIFO: ok
BSP 1 PCI TO SLAVE A3 FIFO: ok
BSP 1 PCI TO SLAVE B1 FIFO: ok
BSP 1 PCI TO SLAVE B2 FIFO: ok
BSP 1 PCI TO SLAVE B3 FIFO: ok
BSP 1 PCI TO SLAVE C1 FIFO: ok
BSP 1 PCI TO SLAVE C2 FIFO: ok
BSP 1 PCI TO SLAVE C3 FIFO: ok
BSP 1 PCI TO SLAVE D1 FIFO: ok
BSP 1 PCI TO SLAVE D2 FIFO: ok
BSP 1 PCI TO SLAVE D3 FIFO: ok
BSP 1 PCI TO MASTER A HPI: ok
BSP 1 PCI TO MASTER B HPI: ok
BSP 1 PCI TO MASTER C HPI: ok
BSP 1 PCI TO MASTER D HPI: ok
BSP 1 PCI TO SLAVE A0 HPI: ok
BSP 1 PCI TO SLAVE A1 HPI: ok
BSP 1 PCI TO SLAVE A2 HPI: ok
BSP 1 PCI TO SLAVE B0 HPI: ok
BSP 1 PCI TO SLAVE B1 HPI: ok
BSP 1 PCI TO SLAVE B2 HPI: ok
BSP 1 PCI TO SLAVE C0 HPI: ok
BSP 1 PCI TO SLAVE C1 HPI: ok
BSP 1 PCI TO SLAVE C2 HPI: ok
BSP 1 PCI TO SLAVE D0 HPI: ok
BSP 1 PCI TO SLAVE D1 HPI: ok
BSP 1 PCI TO SLAVE D2 HPI: ok
BSP 2 Master 2.2 081216 4.3 070913 4.3 070913
BSP 2 Slave 2.2 081216 6.0 080902
BSP 2 RXI FPGA 3.6 080821
BSP 2 DSP FPGA A 4.0 070531
BSP 2 DSP FPGA B 4.0 070531
BSP 2 DSP FPGA C 4.0 070531
BSP 2 DSP FPGA D 4.0 070531
BSP 2 PCI TO SLAVE A1 FIFO: ok
BSP 2 PCI TO SLAVE A2 FIFO: ok
BSP 2 PCI TO SLAVE A3 FIFO: ok
BSP 2 PCI TO SLAVE B1 FIFO: ok
BSP 2 PCI TO SLAVE B2 FIFO: ok
BSP 2 PCI TO SLAVE B3 FIFO: ok
BSP 2 PCI TO SLAVE C1 FIFO: ok
BSP 2 PCI TO SLAVE C2 FIFO: ok
BSP 2 PCI TO SLAVE C3 FIFO: ok
BSP 2 PCI TO SLAVE D1 FIFO: ok
BSP 2 PCI TO SLAVE D2 FIFO: ok
BSP 2 PCI TO SLAVE D3 FIFO: ok
BSP 2 PCI TO MASTER A HPI: ok
BSP 2 PCI TO MASTER B HPI: ok
BSP 2 PCI TO MASTER C HPI: ok
BSP 2 PCI TO MASTER D HPI: ok
BSP 2 PCI TO SLAVE A0 HPI: ok
BSP 2 PCI TO SLAVE A1 HPI: ok
BSP 2 PCI TO SLAVE A2 HPI: ok
BSP 2 PCI TO SLAVE B0 HPI: ok
BSP 2 PCI TO SLAVE B1 HPI: ok
BSP 2 PCI TO SLAVE B2 HPI: ok
BSP 2 PCI TO SLAVE C0 HPI: ok
BSP 2 PCI TO SLAVE C1 HPI: ok
BSP 2 PCI TO SLAVE C2 HPI: ok
BSP 2 PCI TO SLAVE D0 HPI: ok
BSP 2 PCI TO SLAVE D1 HPI: ok
BSP 2 PCI TO SLAVE D2 HPI: ok

2009.11.04 03:10:01.437 101 1 Error

High Voltage Br. 1

TX36 Spec: 90.0 - 145.0
0-1 120.1
0-2 120.9
0-3 120.5
0-4 121.3
0-5 120.5
0-6 120.5
0-7 120.5
0-8 120.9
0-9 120.1
0-10 121.7
0-11 120.1
0-12 119.7
0-13 120.1
0-14 120.5
0-15 120.5
0-16 6.4 *
0-17 120.1
0-18 121.7
0-19 120.9
0-20 120.9
0-21 120.9
0-22 119.7
0-23 120.5
0-24 120.1

High Voltage Br. 2

TX36 Spec: 90.0 - 145.0
0-1 120.5
0-2 120.9
0-3 120.1
0-4 121.3
0-5 120.1
0-6 120.5
0-7 120.1
0-8 120.1
0-9 120.1
0-10 121.3
0-11 119.7
0-12 119.7
0-13 120.5
0-14 120.1
0-15 120.9
0-16 119.7
0-17 120.1
0-18 120.9
0-19 120.9
0-20 121.3
0-21 120.9
0-22 120.1
0-23 120.1
0-24 119.7

Input voltage 12V

TX36 Spec: 11.0 - 13.0
0-1 11.9
0-2 11.8
0-3 11.9
0-4 11.9
0-5 11.9
0-6 11.9

0-7 11.9
0-8 11.9
0-9 11.9
0-10 11.9
0-11 11.9
0-12 11.9
0-13 11.9
0-14 11.9
0-15 11.9
0-16 11.8
0-17 11.8
0-18 11.9
0-19 11.9
0-20 11.9
0-21 11.9
0-22 11.8
0-23 11.9
0-24 11.9

Digital 3.3V

TX36 Spec: 2.8 - 3.5
0-1 3.3
0-2 3.3
0-3 3.3
0-4 3.3
0-5 3.3
0-6 3.3
0-7 3.3
0-8 3.3
0-9 3.3
0-10 3.3
0-11 3.3
0-12 3.3
0-13 3.3
0-14 3.3
0-15 3.3
0-16 3.3
0-17 3.3
0-18 3.3
0-19 3.3
0-20 3.3
0-21 3.3
0-22 3.3
0-23 3.3
0-24 3.3

Digital 2.5V

TX36 Spec: 2.4 - 2.6
0-1 2.5
0-2 2.5
0-3 2.5
0-4 2.5
0-5 2.5
0-6 2.5
0-7 2.5
0-8 2.5
0-9 2.5
0-10 2.5
0-11 2.5
0-12 2.5
0-13 2.5
0-14 2.5
0-15 2.5
0-16 2.5
0-17 2.5
0-18 2.5
0-19 2.5
0-20 2.5
0-21 2.5
0-22 2.5
0-23 2.5
0-24 2.5

Digital 1.5V

TX36 Spec: 1.4 - 1.6
0-1 1.5
0-2 1.5
0-3 1.5
0-4 1.5
0-5 1.5
0-6 1.5
0-7 1.5
0-8 1.5
0-9 1.5
0-10 1.5
0-11 1.5
0-12 1.5
0-13 1.5
0-14 1.5
0-15 1.5
0-16 1.5
0-17 1.5
0-18 1.5
0-19 1.5
0-20 1.5
0-21 1.5
0-22 1.5
0-23 1.5
0-24 1.5

Temperature

TX36 Spec: 15.0 - 75.0
0-1 31.2
0-2 30.4
0-3 30.0
0-4 31.2
0-5 29.6
0-6 28.4
0-7 29.6
0-8 30.0
0-9 31.6
0-10 33.2
0-11 29.6
0-12 29.6
0-13 30.4
0-14 30.0
0-15 31.2
0-16 35.6
0-17 32.8
0-18 34.0
0-19 33.2
0-20 33.6
0-21 34.0
0-22 32.8
0-23 30.0
0-24 31.2

Input Current 12V

TX36 Spec: 0.3 - 1.5
0-1 0.9
0-2 0.7
0-3 0.7
0-4 0.7
0-5 0.7
0-6 0.6
0-7 0.7
0-8 0.7
0-9 0.6
0-10 0.7
0-11 0.7
0-12 0.7
0-13 0.7
0-14 0.6
0-15 0.7
0-16 1.8 *
0-17 0.6
0-18 0.7
0-19 0.6
0-20 0.6
0-21 0.7
0-22 0.6
0-23 0.8
0-24 0.6

TX36 power test failed

IO TX MB Embedded PPC Embedded
PPC Download
1.11 Generic1.11 GenericDec 15 2005/1.06 Mar 6 2006/1.07 Jul 21 2008/1.11

TX36 unique firmware test OK

2009.11.04 03:10:01.770 101 2 OK

Input voltage 12V

RX32 Spec: 11.0 - 13.0
7-1 11.7
7-2 11.6
7-3 11.7
7-4 11.7

Input voltage 6V

RX32 Spec: 5.0 - 7.0
7-1 5.7
7-2 5.7
7-3 5.7
7-4 5.7

Digital 3.3V

RX32 Spec: 2.8 - 3.5
7-1 3.3
7-2 3.3
7-3 3.3
7-4 3.3

Digital 2.5V

RX32   Spec: 2.4 - 2.6
7-1   2.4
7-2   2.5
7-3   2.5
7-4   2.5

Digital 1.5V

RX32   Spec: 1.4 - 1.6
7-1   1.5
7-2   1.5
7-3   1.5
7-4   1.5

Temperature

RX32   Spec: 15.0 - 75.0
7-1   33.0
7-2   33.0
7-3   35.0
7-4   35.0

Input Current 12V

RX32   Spec: 0.4 - 1.5
7-1   0.7
7-2   0.7
7-3   0.7
7-4   0.7

Input Current 6V

RX32   Spec: 2.4 - 3.3
7-1   2.9
7-2   2.7
7-3   2.8
7-4   2.8

RX32   power test passed

IO   RX   MB Embedded   PPC Embedded
PPC Download
1.12 Generic1.14 GenericMay 5 2006/1.06
May 5 2006/1.07 Apr 25 2008/1.11

RX32 unique firmware test OK

2009.11.04 03:10:01.904 101   3   Error

High Voltage Br. 1

TX36   Spec: 90.0 - 145.0
0-1   120.1
0-2   120.9
0-3   120.5
0-4   121.3
0-5   120.5
0-6   120.5
0-7   120.5
0-8   120.9
0-9   120.1
0-10   121.7
0-11 120.1
0-12 119.7
0-13 120.1
0-14 120.5
0-15 120.5
0-16   6.0 *
0-17 120.1
0-18 121.7
0-19 120.9
0-20 120.9
0-21 120.9
0-22 119.7
0-23 120.1
0-24 120.5

High Voltage Br. 2

TX36   Spec: 90.0 - 145.0
0-1   120.5
0-2   120.9
0-3   120.1
0-4   121.3
0-5   120.5
0-6   120.5
0-7   119.7
0-8   120.1
0-9   120.1
0-10   120.9
0-11 119.3
0-12 119.7
0-13 120.5
0-14 120.1
0-15 120.9
0-16 119.7
0-17 119.7
0-18 120.9
0-19 120.9
0-20 121.3
0-21 120.9
0-22 120.1
0-23 120.1
0-24 119.7

Input voltage 12V

TX36   Spec: 11.0 - 13.0
0-1   11.9
0-2   11.8
0-3   11.9
0-4   11.9
0-5   11.9
0-6   11.9
0-7   11.9
0-8   11.9
0-9   11.9
0-10   11.9
0-11   11.9
0-12   11.9
0-13   11.9
0-14   11.9
0-15   11.9
0-16   11.8
0-17   11.8
0-18   11.9
0-19   11.8
0-20   11.9
0-21   11.9
0-22   11.8
0-23   11.9
0-24   11.9

RX32   Spec: 11.0 - 13.0
7-1   11.7
7-2   11.6
7-3   11.7
7-4   11.7

Input voltage 6V

RX32   Spec: 5.0 - 7.0
7-1   5.7
7-2   5.7
7-3   5.7
7-4   5.7

TRU power test failed

2009.11.04 03:10:02.087 101   4   OK

EM 302 High Voltage Ramp Test
Test Voltage:20.00 Measured Voltage: 18.00
PASSED
Test Voltage:40.00 Measured Voltage: 39.00
PASSED
Test Voltage:60.00 Measured Voltage: 59.00
PASSED
Test Voltage:80.00 Measured Voltage: 79.00
PASSED
Test Voltage:100.00 Measured Voltage: 101.00
PASSED
Test Voltage:120.00 Measured Voltage: 121.00
PASSED
Test Voltage:120.00 Measured Voltage: 120.00
PASSED
Test Voltage:100.00 Measured Voltage: 106.00
PASSED
Test Voltage:80.00 Measured Voltage: 85.00
PASSED
Test Voltage:60.00 Measured Voltage: 65.00
PASSED
Test Voltage:40.00 Measured Voltage: 45.00
PASSED

11 of 11 tests OK

2009.11.04 03:12:37.946 101 5 OK

BSP 1 RXI TO RAW FIFO: ok
BSP 2 RXI TO RAW FIFO: ok

2009.11.04 03:12:42.246 101 6 OK

Receiver impedance limits [600.0 1000.0] ohm

Board	1	2	3	4
1:	854.2	855.7	861.2	814.4
2:	855.6	828.3	854.1	818.1
3:	828.4	813.6	848.9	845.6
4:	847.3	840.5	833.5	836.8
5:	852.6	843.8	845.0	791.2
6:	834.1	852.0	855.6	829.2
7:	849.9	832.7	853.9	830.7
8:	794.6	842.4	846.3	850.2
9:	866.4	833.4	845.3	819.2
10:	837.0	817.2	857.7	778.3
11:	851.6	836.5	834.2	830.2
12:	855.7	846.8	824.6	842.4
13:	832.4	839.0	835.0	812.6
14:	844.2	824.4	840.6	852.7
15:	823.6	822.0	844.9	843.4
16:	877.4	846.4	829.8	848.2
17:	862.3	824.3	883.0	851.7
18:	832.2	846.0	851.8	854.9
19:	845.1	817.4	844.1	836.3
20:	855.1	830.2	872.1	845.9
21:	882.9	859.2	844.6	879.7
22:	832.6	876.5	851.3	833.8
23:	866.8	869.0	868.6	855.5
24:	860.4	879.7	884.6	873.6
25:	868.9	839.2	840.6	835.3
26:	855.4	842.0	838.7	844.8
27:	851.9	827.9	839.8	837.3
28:	843.9	817.0	839.8	810.9
29:	848.2	817.3	858.3	831.8
30:	846.8	855.8	837.2	840.8
31:	841.3	834.9	840.3	848.6
32:	873.5	855.8	879.6	854.3

Transducer impedance limits [250.0 2000.0] ohm

Board	1	2	3	4
1:	395.9	370.3	368.7	367.2
2:	380.5	420.3	363.1	354.9
3:	360.4	424.3	364.9	352.8
4:	560.0	359.8	380.5	361.5
5:	366.6	349.6	380.5	404.4
6:	428.2	368.7	357.6	362.9
7:	479.7	372.0	367.6	355.1
8:	507.4	472.5	422.0	465.6
9:	434.3	417.9	520.2	482.8
10:	398.3	466.6	663.3	716.5
11:	435.0	472.7	644.4	431.8
12:	419.2	398.6	421.0	405.1
13:	372.1	423.3	480.4	401.7
14:	387.0	537.0	391.5	360.9
15:	492.3	399.5	361.6	338.8
16:	328.6	344.3	401.8	358.8
17:	343.4	373.8	366.3	356.1
18:	394.5	384.4	396.0	465.1
19:	421.3	433.2	429.0	515.6
20:	422.5	419.6	426.4	508.0
21:	387.8	406.9	377.8	420.9
22:	361.2	463.9	432.0	516.8
23:	404.2	384.9	411.0	603.7
24:	402.5	378.1	445.7	542.1
25:	360.6	435.3	479.7	503.6
26:	396.5	389.6	478.7	389.3
27:	399.4	425.0	416.2	488.8
28:	357.4	587.6	411.8	396.3
29:	368.1	429.7	478.7	408.3
30:	344.0	490.4	484.6	412.8
31:	366.0	359.6	393.1	371.0
32:	368.2	380.1	434.9	361.1

Receiver Phase limits [-50.0 20.0] deg

Board	1	2	3	4
1:	-1.1	-1.7	0.8	4.6
2:	-3.3	1.8	-2.2	3.8
3:	2.8	4.0	-1.8	-0.6
4:	-1.8	-0.4	2.7	1.2
5:	0.3	-0.6	1.3	5.9
6:	3.1	-3.0	-2.3	0.4
7:	-0.7	2.2	-0.3	3.1
8:	8.9	-1.8	0.2	-3.6
9:	-1.6	0.2	2.8	3.9
10:	-0.5	3.5	-2.5	7.8
11:	0.9	-2.0	2.9	-0.7
12:	-1.5	-1.2	2.9	-2.6
13:	4.4	1.3	1.9	4.6
14:	0.4	2.6	0.1	-0.5
15:	3.8	1.3	-2.8	-0.9
16:	-5.5	-1.6	3.3	-1.9
17:	-0.4	0.7	-3.5	-3.0
18:	3.0	-3.2	1.2	-3.2
19:	1.7	1.7	2.0	-2.6
20:	0.9	1.8	-2.9	-1.1
21:	-3.4	-0.8	3.0	-5.7
22:	2.4	-2.3	-1.2	0.9
23:	-1.6	-0.1	-3.7	-1.4
24:	-2.4	-2.9	-3.1	-5.2
25:	-3.7	-0.2	2.3	1.6
26:	-2.1	-0.8	3.8	-2.9
27:	-3.0	1.6	-0.9	0.2
28:	0.6	5.3	-0.8	2.5
29:	2.4	2.5	0.8	1.2
30:	0.9	-3.4	0.4	-1.1
31:	1.3	-0.1	0.4	-1.8
32:	-5.2	-4.5	-4.9	-2.7

Transducer Phase limits [-100.0 0.0] deg

Board	1	2	3	4
1:	-39.7	-42.9	-40.4	-42.8
2:	-43.9	-42.3	-34.5	-43.1
3:	-36.1	-41.1	-37.5	-44.3
4:	-26.9	-35.9	-37.7	-38.2
5:	-40.1	-42.0	-41.9	-39.2
6:	-35.0	-37.4	-37.6	-41.5
7:	-33.4	-41.5	-38.0	-39.5
8:	-29.3	-37.9	-45.2	-40.8
9:	-38.9	-38.4	-39.8	-40.6
10:	-49.0	-38.8	-19.6	-10.2
11:	-42.4	-40.1	-38.1	-46.1
12:	-36.1	-41.5	-48.1	-45.3
13:	-37.6	-43.8	-34.5	-46.5
14:	-37.8	-16.6	-37.4	-44.7
15:	-30.0	-45.7	-39.1	-33.9
16:	-39.4	-41.3	-35.5	-37.8
17:	-29.2	-40.1	-43.8	-39.0
18:	-34.0	-39.6	-35.4	-37.5
19:	-37.8	-33.6	-28.1	-41.1
20:	-35.3	-43.2	-41.5	-40.5
21:	-35.3	-41.6	-27.4	-45.8
22:	-35.5	-46.1	-35.7	-36.6
23:	-39.7	-48.5	-33.8	-20.8
24:	-42.2	-42.8	-39.4	-31.5
25:	-32.0	-41.3	-31.0	-35.7
26:	-44.1	-43.1	-29.4	-44.4
27:	-35.6	-41.2	-30.0	-46.7
28:	-40.1	-27.0	-32.8	-43.5
29:	-39.6	-43.1	-35.6	-39.4
30:	-36.7	-36.9	-33.5	-37.4
31:	-41.0	-44.1	-34.7	-35.3
32:	-44.9	-43.9	-37.6	-44.4

Rx Channels test passed

2009.11.04 03:13:09.215 101 7 Error

Rack 0 Slot 1
Ch: 0 High Z
Ch: 1 High Z
Ch: 2 High Z

Rack 0 Slot 2
No channel errors

Rack 0 Slot 3
No channel errors

Rack 0 Slot 4
No channel errors

Rack 0 Slot 5
No channel errors

Rack 0 Slot 6
Ch: 21 High Z

Rack 0 Slot 7
No channel errors

Rack 0 Slot 8
No channel errors

Rack 0 Slot 9
No channel errors

Rack 0 Slot 10
No channel errors

Rack 0 Slot 11
Ch: 24 Open Z
Ch: 25 FFT err L
Ch: 26 FFT err L
Ch: 27 FFT err L
Ch: 28 FFT err L
Ch: 29 FFT err L
Ch: 30 FFT err L
Ch: 31 FFT err L

Rack 0 Slot 12
Ch: 2 High Z
Ch: 33 High Z
Ch: 34 High Z
Ch: 35 High Z

Rack 0 Slot 13
Ch: 0 High Z
Ch: 1 High Z
Ch: 2 High Z

Rack 0 Slot 14
No channel errors

Rack 0 Slot 15
No channel errors

Rack 0 Slot 16
Ch: 3 Low Voltage
Ch: 7 Low Voltage
Ch: 8 Low Voltage
Ch: 9 Low Voltage
Ch: 10 Low Voltage
Ch: 11 Low Voltage
Ch: 12 Low Voltage
Ch: 13 Low Voltage
Ch: 14 Low Voltage
Ch: 15 Low Voltage
Ch: 16 Low Voltage
Ch: 17 Low Voltage
Ch: 18 Low Voltage
Ch: 19 Low Voltage
Ch: 20 Low Voltage
Ch: 21 Low Voltage
Ch: 22 Low Voltage
Ch: 23 Low Voltage
Ch: 24 FFT err L
Ch: 25 FFT err L
Ch: 26 FFT err L
Ch: 27 FFT err L
Ch: 28 FFT err L
Ch: 29 FFT err L
Ch: 30 FFT err L
Ch: 31 FFT err L

Rack 0 Slot 17
Ch: 33 High Z

Rack 0 Slot 18
No channel errors

Rack 0 Slot 19
Ch: 0 High Z
Ch: 29 High Z
Ch: 30 High Z

Rack 0 Slot 20
Ch: 3 High Z
Ch: 7 High Z

Rack 0 Slot 21
Ch: 5 Hi phase

Rack 0 Slot 22
No channel errors

Rack 0 Slot 23
No channel errors

Rack 0 Slot 24
Ch: 33 High Z
Ch: 34 High Z
Ch: 35 High Z

** Tx Channels test failed **

2009.11.04 03:15:49.558 101 8 OK

RX NOISE LEVEL

Board No:	1	2	3	4	
0:	45.2	38.9	38.5	40.9	dB
1:	43.1	39.9	38.0	40.4	dB
2:	41.8	39.2	38.8	41.9	dB
3:	41.9	37.9	39.1	39.1	dB
4:	42.8	41.0	40.5	43.2	dB
5:	42.7	41.6	42.0	43.6	dB
6:	41.3	42.4	42.0	42.6	dB
7:	40.7	40.9	41.6	42.3	dB
8:	40.8	41.7	43.6	43.7	dB
9:	39.3	42.8	40.5	41.9	dB
10:	42.6	41.9	40.3	43.9	dB
11:	41.1	41.3	42.8	44.8	dB
12:	41.8	43.3	43.3	44.2	dB
13:	42.3	40.2	42.3	44.6	dB
14:	42.3	42.0	43.4	44.6	dB
15:	39.9	42.2	42.8	43.4	dB
16:	36.9	38.1	37.4	38.4	dB
17:	37.5	39.5	37.0	38.0	dB
18:	39.5	38.3	37.8	39.7	dB
19:	38.9	38.3	37.3	38.4	dB
20:	41.0	38.8	38.7	42.0	dB
21:	41.4	41.6	39.2	44.5	dB
22:	41.5	42.2	37.4	45.6	dB
23:	42.1	42.8	43.0	44.1	dB
24:	41.5	41.9	41.1	46.2	dB
25:	40.2	42.3	44.0	44.2	dB
26:	40.7	41.0	42.0	45.2	dB
27:	40.6	41.5	42.3	46.2	dB
28:	42.5	42.4	41.6	46.2	dB
29:	40.2	39.6	41.7	44.4	dB
30:	42.2	39.9	41.3	46.2	dB
31:	41.7	41.8	40.8	48.0	dB

Maximum noise at Board 4 Channel 31 Level: 48.0 dB

Broadband noise test

Average noise at Board 1 41.5 dB OK
Average noise at Board 2 41.1 dB OK
Average noise at Board 3 41.2 dB OK
Average noise at Board 4 43.9 dB OK

2009.11.04 03:15:55.225 101 9 OK

RX NOISE SPECTRUM

Board No:	1	2	3	4	
26.1 kHz:	52.8	57.8	38.9	41.5	dB
26.3 kHz:	51.7	57.3	39.2	41.8	dB
26.5 kHz:	51.6	56.5	38.5	40.7	dB
26.7 kHz:	51.1	55.7	37.2	40.9	dB
26.9 kHz:	50.4	54.7	38.2	41.3	dB
27.1 kHz:	49.8	53.7	38.1	40.6	dB
27.3 kHz:	49.0	52.8	37.5	40.5	dB
27.5 kHz:	48.2	51.9	37.9	40.7	dB
27.7 kHz:	47.0	50.7	37.7	41.4	dB
27.9 kHz:	45.9	49.8	37.1	40.4	dB
28.1 kHz:	45.1	48.8	38.2	41.2	dB
28.3 kHz:	44.3	47.9	38.1	40.9	dB
28.5 kHz:	44.0	47.9	38.4	40.7	dB
28.7 kHz:	43.6	47.8	38.5	40.7	dB
28.9 kHz:	43.3	48.1	39.0	41.6	dB
29.1 kHz:	44.0	48.6	38.6	41.7	dB
29.3 kHz:	44.1	48.5	38.7	41.4	dB
29.5 kHz:	43.6	47.9	37.5	40.8	dB
29.7 kHz:	43.5	47.3	37.3	40.7	dB
29.9 kHz:	43.3	46.8	37.8	41.1	dB
30.1 kHz:	43.1	46.4	37.9	41.3	dB
30.3 kHz:	42.8	46.2	38.0	40.8	dB
30.5 kHz:	42.6	46.2	37.3	40.7	dB
30.7 kHz:	42.4	45.7	36.8	40.4	dB
30.9 kHz:	42.7	45.3	37.0	39.4	dB
31.1 kHz:	42.2	45.1	37.8	40.8	dB
31.4 kHz:	41.8	44.6	37.5	39.9	dB
31.6 kHz:	41.4	44.6	37.1	39.9	dB
31.8 kHz:	41.6	44.8	38.5	40.8	dB
32.0 kHz:	41.0	44.7	38.1	40.8	dB
32.2 kHz:	41.0	44.6	38.0	40.6	dB
32.4 kHz:	41.8	44.8	38.2	40.4	dB
32.6 kHz:	46.1	46.0	43.0	43.6	dB
32.8 kHz:	49.2	47.4	46.6	45.9	dB
33.0 kHz:	50.3	48.2	47.9	47.1	dB
33.2 kHz:	49.1	47.4	47.0	46.3	dB

33.4 kHz:	45.1	44.6	43.2	42.5	dB
33.6 kHz:	39.7	41.0	37.6	38.9	dB
33.8 kHz:	40.8	41.8	39.0	40.3	dB
34.0 kHz:	41.5	41.3	37.8	39.7	dB

Maximum noise at Board 2 Frequency 26.1 kHz Level: 57.8 dB

Spectral noise test

Average noise at Board 1 46.7 dB OK
Average noise at Board 2 50.4 dB OK
Average noise at Board 3 40.2 dB OK
Average noise at Board 4 41.7 dB OK

2009.11.04 03:16:00.725 101 10 OK

KONTRON CP6011
Clock 1795 MHz
Die 40 oC (peak: 45 oC @ 2009-11-04 - 03:12:42)
Board 36 oC (peak: 36 oC @ 2009-11-04 - 03:04:30)
Core 1.34 V
3V3 3.30 V
12V 12.11 V
-12V -12.04 V
BATT 3.49 V
Primary network: 157.237.14.60:0xffff0000
Secondary network: 192.168.2.20:0xffffff00

2009.11.04 03:16:00.825 101 15 OK

EM 302

BSP67B Master: 2.2.2 081216
BSP67B Slave: 2.2.2 081216
CPU: 1.4.5 090421
DDS: 3.4.9 070328
RX32 version : Apr 25 2008 Rev 1.11
TX36 version : Jul 21 2008 Rev 1.11

Appendix H: Failed BIST Results 11 November 2009

Saved: 2009.11.11 20:03:28

Sounder Type: 302, Serial no.: 101

Date Time Ser. No. BIST Result

2009.11.11 19:55:35.480 101 0 OK

Number of BSP67B boards: 2
BSP 1 Master 2.2 081216 4.3 070913 4.3 070913
BSP 1 Slave 2.2 081216 6.0 080902
BSP 1 RXI FPGA 3.6 080821
BSP 1 DSP FPGA A 4.0 070531
BSP 1 DSP FPGA B 4.0 070531
BSP 1 DSP FPGA C 4.0 070531
BSP 1 DSP FPGA D 4.0 070531
BSP 1 PCI TO SLAVE A1 FIFO: ok
BSP 1 PCI TO SLAVE A2 FIFO: ok
BSP 1 PCI TO SLAVE A3 FIFO: ok
BSP 1 PCI TO SLAVE B1 FIFO: ok
BSP 1 PCI TO SLAVE B2 FIFO: ok
BSP 1 PCI TO SLAVE B3 FIFO: ok
BSP 1 PCI TO SLAVE C1 FIFO: ok
BSP 1 PCI TO SLAVE C2 FIFO: ok
BSP 1 PCI TO SLAVE C3 FIFO: ok
BSP 1 PCI TO SLAVE D1 FIFO: ok
BSP 1 PCI TO SLAVE D2 FIFO: ok
BSP 1 PCI TO SLAVE D3 FIFO: ok
BSP 1 PCI TO MASTER A HPI: ok
BSP 1 PCI TO MASTER B HPI: ok
BSP 1 PCI TO MASTER C HPI: ok
BSP 1 PCI TO MASTER D HPI: ok
BSP 1 PCI TO SLAVE A0 HPI: ok
BSP 1 PCI TO SLAVE A1 HPI: ok
BSP 1 PCI TO SLAVE A2 HPI: ok
BSP 1 PCI TO SLAVE B0 HPI: ok
BSP 1 PCI TO SLAVE B1 HPI: ok
BSP 1 PCI TO SLAVE B2 HPI: ok
BSP 1 PCI TO SLAVE C0 HPI: ok
BSP 1 PCI TO SLAVE C1 HPI: ok
BSP 1 PCI TO SLAVE C2 HPI: ok
BSP 1 PCI TO SLAVE D0 HPI: ok
BSP 1 PCI TO SLAVE D1 HPI: ok
BSP 1 PCI TO SLAVE D2 HPI: ok
BSP 2 Master 2.2 081216 4.3 070913 4.3 070913
BSP 2 Slave 2.2 081216 6.0 080902
BSP 2 RXI FPGA 3.6 080821
BSP 2 DSP FPGA A 4.0 070531
BSP 2 DSP FPGA B 4.0 070531
BSP 2 DSP FPGA C 4.0 070531
BSP 2 DSP FPGA D 4.0 070531
BSP 2 PCI TO SLAVE A1 FIFO: ok
BSP 2 PCI TO SLAVE A2 FIFO: ok
BSP 2 PCI TO SLAVE A3 FIFO: ok
BSP 2 PCI TO SLAVE B1 FIFO: ok
BSP 2 PCI TO SLAVE B2 FIFO: ok
BSP 2 PCI TO SLAVE B3 FIFO: ok
BSP 2 PCI TO SLAVE C1 FIFO: ok
BSP 2 PCI TO SLAVE C2 FIFO: ok
BSP 2 PCI TO SLAVE C3 FIFO: ok
BSP 2 PCI TO SLAVE D1 FIFO: ok
BSP 2 PCI TO SLAVE D2 FIFO: ok
BSP 2 PCI TO SLAVE D3 FIFO: ok
BSP 2 PCI TO MASTER A HPI: ok
BSP 2 PCI TO MASTER B HPI: ok
BSP 2 PCI TO MASTER C HPI: ok
BSP 2 PCI TO MASTER D HPI: ok
BSP 2 PCI TO SLAVE A0 HPI: ok
BSP 2 PCI TO SLAVE A1 HPI: ok
BSP 2 PCI TO SLAVE A2 HPI: ok
BSP 2 PCI TO SLAVE B0 HPI: ok
BSP 2 PCI TO SLAVE B1 HPI: ok
BSP 2 PCI TO SLAVE B2 HPI: ok
BSP 2 PCI TO SLAVE C0 HPI: ok
BSP 2 PCI TO SLAVE C1 HPI: ok
BSP 2 PCI TO SLAVE C2 HPI: ok
BSP 2 PCI TO SLAVE D0 HPI: ok
BSP 2 PCI TO SLAVE D1 HPI: ok
BSP 2 PCI TO SLAVE D2 HPI: ok

2009.11.11 19:55:35.550 101 1 Error

High Voltage Br. 1

TX36 Spec: 90.0 - 145.0
0-1 120.9
0-2 121.3
0-3 121.3
0-4 122.1
0-5 120.9
0-6 121.3
0-7 120.9
0-8 121.3
0-9 120.9
0-10 122.6
0-11 120.5
0-12 120.5
0-13 120.9
0-14 121.3
0-15 120.9
0-16 6.0 *
0-17 120.9
0-18 122.1
0-19 121.3
0-20 121.7
0-21 121.7
0-22 120.1
0-23 120.9
0-24 120.9

High Voltage Br. 2

TX36 Spec: 90.0 - 145.0
0-1 120.9
0-2 121.3
0-3 120.9
0-4 122.2
0-5 121.3
0-6 121.3
0-7 120.9
0-8 120.9
0-9 120.9
0-10 121.7
0-11 120.5
0-12 120.1
0-13 120.9
0-14 120.9
0-15 121.3
0-16 120.5
0-17 120.5
0-18 121.7
0-19 121.7
0-20 122.2
0-21 121.7
0-22 120.9
0-23 120.9
0-24 120.5

Input voltage 12V

TX36 Spec: 11.0 - 13.0
0-1 11.9
0-2 11.8
0-3 11.9
0-4 11.9
0-5 11.9
0-6 11.9
0-7 11.9
0-8 11.9
0-9 11.9
0-10 11.9
0-11 11.9
0-12 11.9
0-13 11.9
0-14 11.9
0-15 11.9
0-16 11.8
0-17 11.9
0-18 11.9
0-19 11.8
0-20 11.9
0-21 11.9
0-22 11.8
0-23 11.8

0-24 11.9

Digital 3.3V

TX36 Spec: 2.8 - 3.5
0-1 3.3
0-2 3.3
0-3 3.3
0-4 3.3
0-5 3.3
0-6 3.3
0-7 3.3
0-8 3.3
0-9 3.3
0-10 3.3
0-11 3.3
0-12 3.3
0-13 3.3
0-14 3.3
0-15 3.3
0-16 3.3
0-17 3.3
0-18 3.3
0-19 3.3
0-20 3.3
0-21 3.3
0-22 3.3
0-23 3.3
0-24 3.3

Digital 2.5V

TX36 Spec: 2.4 - 2.6
0-1 2.5
0-2 2.5
0-3 2.5
0-4 2.5
0-5 2.5
0-6 2.5
0-7 2.5
0-8 2.5
0-9 2.5
0-10 2.5
0-11 2.5
0-12 2.5
0-13 2.5
0-14 2.5
0-15 2.5
0-16 2.5
0-17 2.5
0-18 2.5
0-19 2.5
0-20 2.5
0-21 2.5
0-22 2.5
0-23 2.5
0-24 2.5

Digital 1.5V

TX36 Spec: 1.4 - 1.6
0-1 1.5
0-2 1.5
0-3 1.5
0-4 1.5
0-5 1.5
0-6 1.5
0-7 1.5
0-8 1.5
0-9 1.5
0-10 1.5
0-11 1.5
0-12 1.5
0-13 1.5
0-14 1.5
0-15 1.5
0-16 1.5
0-17 1.5
0-18 1.5
0-19 1.5
0-20 1.5
0-21 1.5
0-22 1.5
0-23 1.5
0-24 1.5

Temperature

TX36 Spec: 15.0 - 75.0
0-1 36.0
0-2 35.2
0-3 34.8
0-4 35.2
0-5 33.6
0-6 32.4
0-7 33.6
0-8 34.0
0-9 35.6
0-10 36.8
0-11 33.2
0-12 33.6
0-13 35.2
0-14 35.6
0-15 36.8
0-16 40.4
0-17 37.2
0-18 38.4
0-19 37.2
0-20 37.6
0-21 38.0
0-22 37.2
0-23 34.0
0-24 35.6

Input Current 12V

TX36 Spec: 0.3 - 1.5
0-1 0.9
0-2 0.7
0-3 0.7
0-4 0.6
0-5 0.7
0-6 0.6
0-7 0.7
0-8 0.7
0-9 0.6
0-10 0.7
0-11 0.7
0-12 0.7
0-13 0.7
0-14 0.6
0-15 0.7
0-16 1.8 *
0-17 0.6
0-18 0.7
0-19 0.6
0-20 0.6
0-21 0.7
0-22 0.7
0-23 0.8
0-24 0.6

TX36 power test failed

IO TX MB Embedded PPC Embedded PPC Download
1.11 Generic1.11 GenericDec 15 2005/1.06 Mar 6 2006/1.07 Jul 21 2008/1.11

TX36 unique firmware test OK

2009.11.11 19:55:35.733 101 2 OK

Input voltage 12V

RX32 Spec: 11.0 - 13.0
7-1 11.7
7-2 11.6
7-3 11.7
7-4 11.7

Input voltage 6V

RX32 Spec: 5.0 - 7.0
7-1 5.7
7-2 5.7
7-3 5.7
7-4 5.7

Digital 3.3V

RX32 Spec: 2.8 - 3.5
7-1 3.3
7-2 3.3
7-3 3.3
7-4 3.3

Digital 2.5V

RX32 Spec: 2.4 - 2.6
7-1 2.4
7-2 2.5
7-3 2.5
7-4 2.5

Digital 1.5V

RX32 Spec: 1.4 - 1.6
7-1 1.5
7-2 1.5

7-3 1.5
7-4 1.5

Temperature

RX32 Spec: 15.0 - 75.0
7-1 40.0
7-2 39.0
7-3 40.0
7-4 40.0

Input Current 12V

RX32 Spec: 0.4 - 1.5
7-1 0.7
7-2 0.7
7-3 0.7
7-4 0.7

Input Current 6V

RX32 Spec: 2.4 - 3.3
7-1 2.9
7-2 2.7
7-3 2.8
7-4 2.8

RX32 power test passed

IO RX MB Embedded PPC Embedded PPC Download
1.12 Generic1.14 GenericMay 5 2006/1.06 May 5 2006/1.07 Apr 25 2008/1.11

RX32 unique firmware test OK

2009.11.11 19:55:35.867 101 3
Error

High Voltage Br. 1

TX36 Spec: 90.0 - 145.0
0-1 120.9
0-2 121.3
0-3 121.3
0-4 122.1
0-5 121.3
0-6 120.9
0-7 120.9
0-8 121.3
0-9 120.9
0-10 122.1
0-11 120.9
0-12 120.5
0-13 120.9
0-14 121.3
0-15 121.3
0-16 6.0 *
0-17 120.9
0-18 122.1
0-19 121.7
0-20 121.7
0-21 121.7
0-22 120.1
0-23 120.9
0-24 120.9

High Voltage Br. 2

TX36 Spec: 90.0 - 145.0
0-1 121.3
0-2 121.7
0-3 120.9
0-4 122.2
0-5 121.3
0-6 121.3
0-7 120.9
0-8 120.9
0-9 120.9
0-10 121.7
0-11 120.5
0-12 120.1
0-13 120.9
0-14 120.9
0-15 121.3
0-16 120.5
0-17 120.5
0-18 121.7
0-19 121.3
0-20 122.2
0-21 121.7
0-22 120.9
0-23 120.9
0-24 120.5

Input voltage 12V

TX36 Spec: 11.0 - 13.0
0-1 11.9
0-2 11.8
0-3 11.9
0-4 11.9
0-5 11.9
0-6 11.9
0-7 11.9
0-8 11.9
0-9 11.9
0-10 11.9
0-11 11.9
0-12 11.9
0-13 11.9
0-14 11.9
0-15 11.9
0-16 11.8
0-17 11.8
0-18 11.9
0-19 11.9
0-20 11.9
0-21 11.9
0-22 11.8
0-23 11.9
0-24 11.9

RX32 Spec: 11.0 - 13.0
7-1 11.7
7-2 11.6
7-3 11.7
7-4 11.7

Input voltage 6V

RX32 Spec: 5.0 - 7.0
7-1 5.7
7-2 5.7
7-3 5.7
7-4 5.7

TRU power test failed

2009.11.11 19:55:36.050 101 4
OK

EM 302 High Voltage Ramp Test
Test Voltage:20.00 Measured Voltage: 19.00 PASSED
Test Voltage:40.00 Measured Voltage: 39.00 PASSED
Test Voltage:60.00 Measured Voltage: 59.00 PASSED
Test Voltage:80.00 Measured Voltage: 79.00 PASSED
Test Voltage:100.00 Measured Voltage: 101.00 PASSED
Test Voltage:120.00 Measured Voltage: 121.00 PASSED
Test Voltage:120.00 Measured Voltage: 121.00 PASSED
Test Voltage:100.00 Measured Voltage: 106.00 PASSED
Test Voltage:80.00 Measured Voltage: 85.00 PASSED
Test Voltage:60.00 Measured Voltage: 65.00 PASSED
Test Voltage:40.00 Measured Voltage: 45.00 PASSED

11 of 11 tests OK

2009.11.11 19:58:11.909 101 5
OK

BSP 1 RXI TO RAW FIFO: ok
BSP 2 RXI TO RAW FIFO: ok

2009.11.11 19:58:16.193 101 6
OK

Receiver impedance limits [600.0 1000.0] ohm

Board	1	2	3	4
1:	850.1	854.4	858.1	810.7
2:	852.0	826.4	856.7	814.3
3:	823.9	811.3	846.3	842.6
4:	849.6	839.6	830.6	832.6
5:	848.7	842.7	842.1	795.5
6:	837.7	851.4	852.6	826.0
7:	846.0	831.3	850.7	826.5
8:	800.1	840.7	843.0	846.9
9:	863.2	831.7	842.2	815.8
10:	833.1	815.2	855.4	774.8
11:	847.7	835.0	830.5	826.6
12:	852.8	845.5	824.8	845.5
13:	827.6	837.0	831.9	809.1
14:	840.4	822.6	837.2	849.3
15:	819.5	820.2	842.5	840.2
16:	874.6	845.1	825.5	845.2
17:	858.4	822.8	880.2	850.8
18:	827.7	844.5	848.3	850.7
19:	840.9	815.2	840.1	838.4
20:	850.6	828.1	868.8	842.5
21:	879.5	857.7	841.7	875.6
22:	837.0	874.9	848.7	829.8
23:	862.3	867.1	866.0	852.0
24:	856.4	878.5	882.6	870.7
25:	866.0	837.8	836.7	831.5
26:	851.4	839.9	834.4	841.5
27:	848.6	825.6	836.7	833.3
28:	839.5	814.3	837.0	806.7
29:	843.6	815.0	853.9	828.3
30:	842.6	854.4	833.4	837.6
31:	837.8	832.9	836.5	845.0
32:	870.6	854.7	877.8	851.5

Transducer impedance limits [250.0 2000.0] ohm

Board	1	2	3	4
1:	380.0	401.5	436.7	433.6
2:	340.4	403.7	370.1	426.8
3:	338.4	349.2	385.3	409.9
4:	336.8	346.7	399.0	405.3
5:	339.1	362.0	405.7	555.3
6:	341.0	363.0	381.9	430.1
7:	354.9	358.0	405.0	360.6
8:	373.0	344.4	408.2	426.8
9:	430.8	394.6	412.3	429.1
10:	420.8	416.0	436.1	428.9
11:	406.6	386.0	374.5	373.9
12:	401.4	394.9	375.3	368.4
13:	402.5	374.8	374.0	405.1
14:	388.1	351.9	367.2	413.9
15:	334.3	343.9	352.3	396.6
16:	322.7	344.4	372.5	418.0
17:	337.9	347.7	351.0	402.0
18:	382.9	331.9	360.9	367.7
19:	393.8	369.3	387.0	491.2
20:	371.7	357.4	372.9	505.8
21:	356.3	345.5	367.1	361.2
22:	350.3	357.7	370.5	435.5
23:	467.0	348.3	447.0	531.2
24:	437.9	482.7	426.3	473.1
25:	466.0	507.2	397.6	479.2
26:	519.9	571.8	496.4	542.6
27:	486.4	635.3	549.2	639.7
28:	569.7	662.8	616.9	597.9
29:	592.8	550.8	663.9	615.6
30:	379.9	530.1	510.6	530.0
31:	341.3	375.6	459.4	476.9
32:	331.0	394.6	540.6	591.6

Receiver Phase limits [-50.0 20.0] deg

Board	1	2	3	4
1:	-0.8	-1.8	0.8	4.7
2:	-3.1	1.8	-3.5	4.0
3:	3.0	4.0	-1.8	-0.5
4:	-3.0	-0.6	2.7	1.4
5:	0.5	-0.7	1.3	4.7
6:	1.8	-3.1	-2.1	0.5
7:	-0.5	2.1	-0.1	3.3
8:	7.5	-1.7	0.4	-3.5
9:	-1.5	0.1	2.8	3.9
10:	-0.3	3.5	-2.6	7.8
11:	1.0	-2.0	3.0	-0.5
12:	-1.5	-1.3	2.2	-3.9
13:	4.6	1.3	2.0	4.6
14:	0.6	2.5	0.2	-0.4
15:	3.9	1.3	-2.8	-0.9
16:	-5.4	-1.6	3.5	-1.8
17:	-0.2	0.7	-3.4	-3.4
18:	3.3	-3.2	1.2	-2.9
19:	1.9	1.8	2.1	-3.8
20:	1.2	1.8	-2.7	-1.0
21:	-3.2	-0.8	2.9	-5.3
22:	1.0	-2.2	-1.3	1.1
23:	-1.2	-0.1	-3.6	-1.3
24:	-2.1	-2.9	-3.1	-5.1
25:	-3.6	-0.2	2.5	1.8
26:	-1.8	-0.7	4.0	-2.7
27:	-2.9	1.7	-0.8	0.5
28:	0.8	5.4	-0.9	2.7
29:	2.7	2.6	1.0	1.2
30:	1.2	-3.4	0.6	-1.0
31:	1.4	0.0	0.6	-1.4
32:	-5.0	-4.5	-5.0	-2.6

Transducer Phase limits [-100.0 0.0] deg

Board	1	2	3	4
1:	-37.4	-39.4	-42.9	-45.6
2:	-40.2	-40.7	-37.1	-48.9
3:	-32.8	-42.7	-38.6	-49.9
4:	-38.6	-40.4	-40.3	-38.8
5:	-36.8	-45.0	-44.5	-36.3
6:	-37.8	-39.9	-43.0	-48.2
7:	-37.3	-41.3	-41.6	-41.3
8:	-36.0	-43.2	-40.4	-44.5
9:	-39.9	-40.4	-40.0	-46.8
10:	-50.0	-41.9	-34.8	-34.9
11:	-41.0	-45.1	-47.0	-46.0
12:	-37.9	-44.0	-41.9	-43.8
13:	-37.2	-45.8	-37.5	-47.3
14:	-38.9	-42.6	-37.8	-44.8
15:	-28.9	-45.9	-37.4	-35.6
16:	-38.0	-41.6	-31.6	-40.9
17:	-31.4	-35.6	-41.2	-42.1
18:	-32.3	-37.6	-37.2	-43.5
19:	-38.3	-41.6	-35.2	-43.5
20:	-35.8	-40.9	-46.0	-36.3
21:	-34.8	-40.0	-35.7	-41.4
22:	-35.1	-42.0	-33.1	-38.3
23:	-35.7	-43.3	-37.4	-28.8
24:	-35.5	-36.0	-43.9	-34.5
25:	-30.3	-37.6	-39.3	-38.7
26:	-32.7	-31.3	-30.0	-35.3
27:	-22.9	-17.4	-9.6	-17.8
28:	-23.9	-9.1	-13.4	-8.5
29:	-25.4	-34.9	-4.3	-6.2
30:	-36.9	-37.5	-34.0	-18.3
31:	-40.5	-44.3	-35.2	-31.8
32:	-41.3	-45.0	-29.1	-30.2

Rx Channels test passed

2009.11.11 19:58:43.144 101 7
Error

Rack 0 Slot 1
Ch: 0 High Z
Ch: 1 High Z
Ch: 2 High Z

Rack 0 Slot 2
Ch: 2 High Z
Ch: 5 Hi phase
Ch: 16 High Z
Ch: 17 High Z

Rack 0 Slot 3
Ch: 12 High Z

Rack 0 Slot 4
No channel errors

Rack 0 Slot 5
No channel errors

Rack 0 Slot 6
Ch: 21 High Z

Rack 0 Slot 7
No channel errors

Rack 0 Slot 8
Ch: 17 High Z

Rack 0 Slot 9
Ch: 35 High Z

Rack 0 Slot 10
Ch: 0 High Z

Rack 0 Slot 11
Ch: 24 Open Z

Ch: 25   High Z
Ch: 26   FFT err L
Ch: 27   FFT err L
Ch: 28   FFT err L
Ch: 29   FFT err L
Ch: 30   FFT err L
Ch: 31   FFT err L

Rack 0 Slot 12
Ch: 2   High Z
Ch: 33   High Z
Ch: 34   High Z
Ch: 35   High Z

Rack 0 Slot 13
Ch: 0   High Z
Ch: 1   High Z
Ch: 2   High Z

Rack 0 Slot 14
No channel errors

Rack 0 Slot 15
No channel errors

Rack 0 Slot 16
Ch: 3   Low Voltage
Ch: 7   Low Voltage
Ch: 8   Low Voltage
Ch: 9   Low Voltage
Ch: 10   Low Voltage
Ch: 11   Low Voltage
Ch: 12   Low Voltage
Ch: 13   Low Voltage
Ch: 14   Low Voltage
Ch: 15   Low Voltage
Ch: 16   Low Voltage
Ch: 17   Low Voltage
Ch: 18   Low Voltage
Ch: 19   Low Voltage
Ch: 20   Low Voltage
Ch: 21   Low Voltage
Ch: 22   Low Voltage
Ch: 23   Low Voltage
Ch: 24   FFT err L
Ch: 25   FFT err L
Ch: 26   FFT err L
Ch: 27   FFT err L
Ch: 28   FFT err L
Ch: 29   FFT err L
Ch: 30   FFT err L
Ch: 31   FFT err L

Rack 0 Slot 17
No channel errors

Rack 0 Slot 18
No channel errors

Rack 0 Slot 19
No channel errors

Rack 0 Slot 20
No channel errors

Rack 0 Slot 21
No channel errors

Rack 0 Slot 22
No channel errors

Rack 0 Slot 23
No channel errors

Rack 0 Slot 24
Ch: 33   High Z
Ch: 34   High Z
Ch: 35   High Z

** Tx Channels test failed **

2009.11.11 20:01:23.454 101 8
OK

RX NOISE LEVEL

Board No:	1	2	3	4	
0:	51.3	47.5	45.9	47.2	dB
1:	49.2	49.5	48.6	49.2	dB
2:	49.6	46.7	49.0	50.2	dB
3:	47.4	47.4	48.6	50.8	dB
4:	49.9	46.4	48.8	50.9	dB
5:	48.9	47.4	46.5	47.3	dB
6:	49.8	47.9	48.4	48.6	dB
7:	50.9	46.3	46.1	48.5	dB
8:	48.7	47.6	47.4	50.1	dB
9:	47.0	47.2	46.1	51.9	dB
10:	48.2	49.7	47.7	56.0	dB
11:	44.9	51.2	47.2	57.6	dB
12:	46.5	49.0	46.1	55.7	dB
13:	45.5	50.6	45.4	55.1	dB
14:	46.7	52.9	45.6	54.2	dB
15:	45.0	51.7	46.0	51.4	dB
16:	44.9	57.5	43.8	49.5	dB
17:	45.1	58.9	43.8	50.5	dB
18:	47.3	55.1	44.2	51.2	dB
19:	45.6	56.1	43.6	54.3	dB
20:	47.8	54.7	44.4	53.9	dB
21:	46.4	53.6	43.3	51.8	dB
22:	46.8	57.3	43.8	55.3	dB
23:	46.2	54.9	45.5	52.0	dB
24:	47.5	52.4	44.7	51.1	dB
25:	44.7	50.8	46.2	48.5	dB
26:	46.7	48.9	45.8	48.9	dB
27:	47.1	50.5	46.0	51.6	dB
28:	47.7	49.0	46.2	50.9	dB
29:	46.4	46.7	45.7	48.5	dB
30:	47.4	49.0	47.1	49.0	dB
31:	47.5	46.1	46.3	50.0	dB

Maximum noise at Board 2 Channel 17
Level: 58.9 dB

Broadband noise test

Average noise at Board 1   47.7 dB   OK
Average noise at Board 2   52.3 dB   OK
Average noise at Board 3   46.3 dB   OK
Average noise at Board 4   52.2 dB   OK

2009.11.11 20:01:29.121 101 9
OK

RX NOISE SPECTRUM

Board No:	1	2	3	4	
26.1 kHz:	46.5	42.3	43.5	49.2	dB
26.3 kHz:	44.4	38.7	39.2	46.6	dB
26.5 kHz:	44.0	38.0	38.2	47.1	dB
26.7 kHz:	44.3	38.3	37.4	46.7	dB
26.9 kHz:	44.4	38.2	37.6	45.9	dB
27.1 kHz:	43.6	39.2	37.9	46.4	dB
27.3 kHz:	43.1	39.0	37.6	46.3	dB
27.5 kHz:	43.0	38.8	37.1	45.4	dB
27.7 kHz:	42.6	39.0	38.1	46.2	dB
27.9 kHz:	42.7	39.4	38.3	46.3	dB

28.1 kHz: 42.6 38.3 37.5
45.1 dB
28.3 kHz: 42.1 38.7 37.0
45.3 dB
28.5 kHz: 41.9 39.6 37.5
45.4 dB
28.7 kHz: 42.4 39.9 37.8
44.6 dB
28.9 kHz: 41.9 39.1 37.7
44.2 dB
29.1 kHz: 41.6 39.7 37.7
44.3 dB
29.3 kHz: 41.3 39.4 37.7
43.7 dB
29.5 kHz: 40.9 39.2 37.9
42.8 dB
29.7 kHz: 41.7 39.2 37.0
42.8 dB
29.9 kHz: 41.5 39.0 38.4
43.0 dB
30.1 kHz: 42.1 39.1 38.8
43.4 dB
30.3 kHz: 41.1 39.3 38.5
43.0 dB
30.5 kHz: 40.8 38.2 37.0
42.6 dB
30.7 kHz: 41.3 38.8 37.3
42.6 dB
30.9 kHz: 41.2 38.9 37.6
43.0 dB
31.1 kHz: 41.5 38.9 36.5
42.0 dB
31.4 kHz: 40.5 38.0 37.0
42.6 dB
31.6 kHz: 40.0 37.6 37.1
42.0 dB
31.8 kHz: 39.9 38.1 35.9
42.2 dB
32.0 kHz: 39.5 38.1 35.9
42.2 dB
32.2 kHz: 39.9 37.6 35.8
42.0 dB
32.4 kHz: 39.6 37.3 36.2
42.0 dB
32.6 kHz: 39.6 37.3 36.6
42.2 dB
32.8 kHz: 38.7 37.6 36.3
41.7 dB
33.0 kHz: 38.8 37.3 36.4
42.5 dB
33.2 kHz: 38.9 38.0 37.2
42.5 dB
33.4 kHz: 37.7 36.9 35.7
41.7 dB
33.6 kHz: 38.6 37.0 36.3
42.3 dB
33.8 kHz: 37.3 36.2 35.5
41.9 dB
34.0 kHz: 37.4 36.2 35.5
41.9 dB

Maximum noise at Board 4 Frequency
26.1 kHz Level: 49.2 dB

Spectral noise test

Average noise at Board 1 41.8 dB OK
Average noise at Board 2 38.6 dB OK
Average noise at Board 3 37.6 dB OK
Average noise at Board 4 44.3 dB OK

2009.11.11 20:01:34.621 101 10
OK

KONTRON CP6011
Clock 1795 MHz
Die 37 oC (peak: 55 oC @ 2009-11-11 -
19:30:47)
Board 39 oC (peak: 43 oC @ 2009-11-11 -
14:22:04)
Core 1.34 V
3V3 3.30 V
12V 12.05 V
-12V -12.04 V
BATT 3.49 V
Primary network:
157.237.14.60:0xffff0000
Secondary network:
192.168.2.20:0xffffff00

2009.11.11 20:01:34.721 101 15
OK

EM 302

BSP67B Master: 2.2.2 081216
BSP67B Slave: 2.2.2 081216
CPU: 1.4.5 090421
DDS: 3.4.9 070328
RX32 version : Apr 25 2008 Rev 1.11
TX36 version : Jul 21 2008 Rev 1.11

Appendix I: Software versions in use during the cruise

Software	**Version**	**Purpose**
CARIS HIPS and SIPS	6.1 Service Pack 2	Multibeam processing
DP		Ship dynamic positioning
ECDIS		Ship line keeping
Fledermaus	6.7.0h Build 419 Professional	Multibeam QC
Hypack	9.0.0.22	Surveyplanning
Hypack	9.0.4.0	Realtime monitoring
Kongsberg SIS	1.04	EM302 data acquisition
Velociwin (NOAA)	8.92	XBT processing