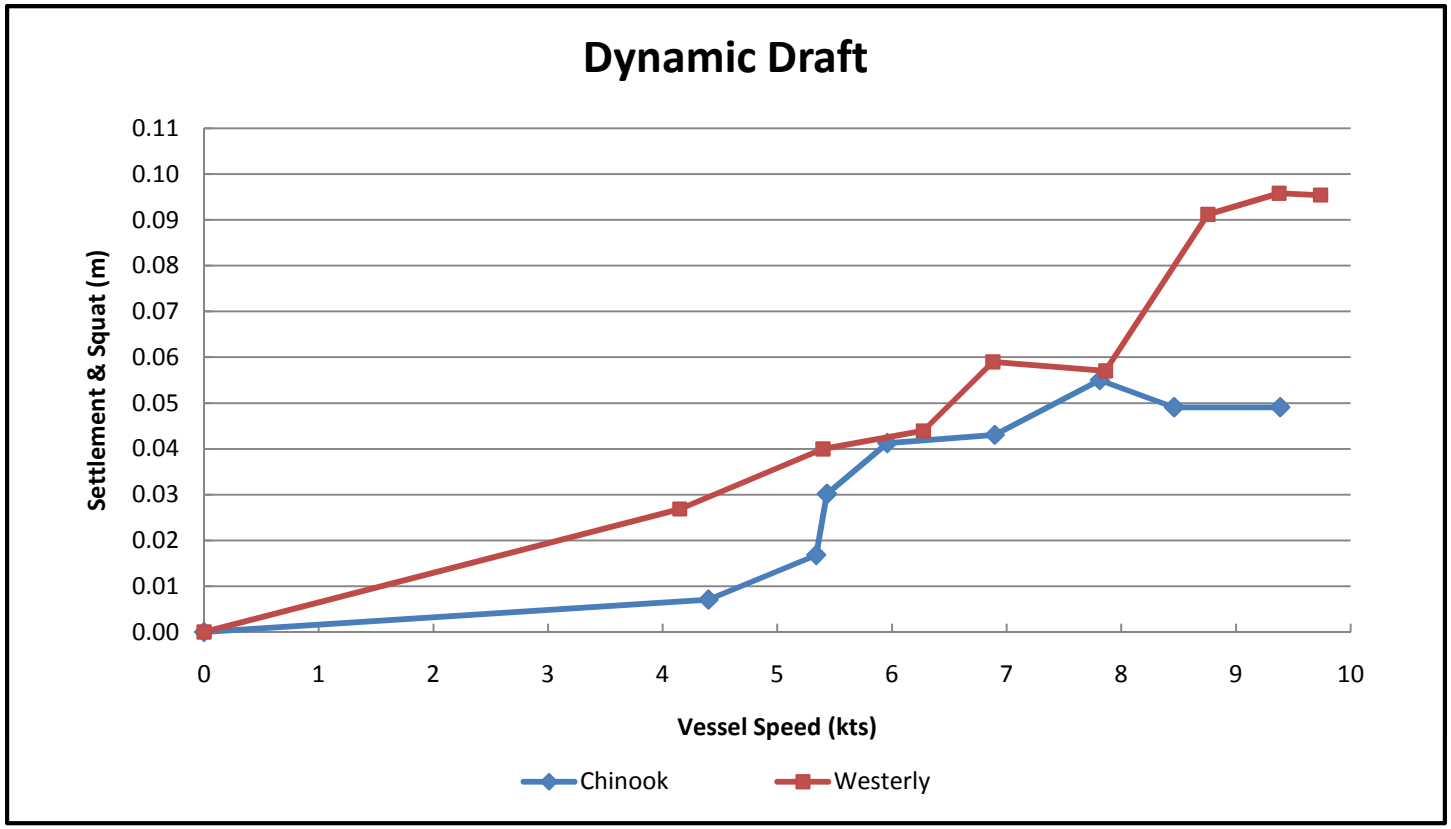
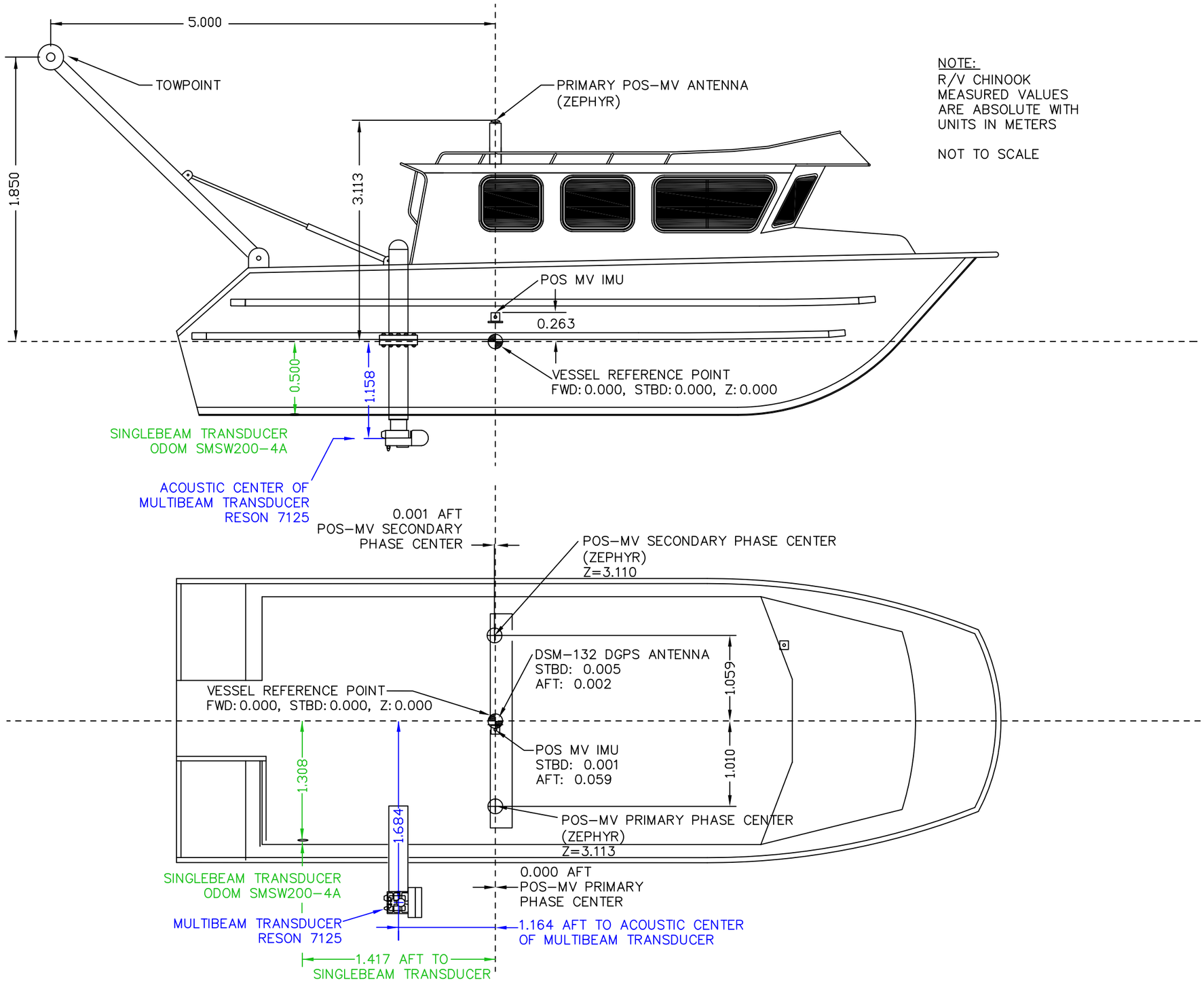
APPENDIX I
VESSEL REPORTS



Dynamic Draft			
R/V *Chinook*		R/V *Westerly*	
Speed (kts)	Settlement & Squat (m)	Speed (kts)	Settlement & Squat (m)
0.000	0.000	0.000	0.000
4.399	0.007	4.148	0.027
5.338	0.017	5.396	0.040
5.433	0.030	6.273	0.044
5.958	0.041	6.879	0.059
6.895	0.043	7.863	0.057
7.812	0.055	8.755	0.091
8.460	0.049	9.377	0.096
9.385	0.049	9.739	0.095



NOTE:
R/V CHINOOK
MEASURED VALUES
ARE ABSOLUTE WITH
UNITS IN METERS

NOT TO SCALE

OPR-J348-KR-11

CHINOOK OFFSETS

NOAA
APPROACHES TO MISSISSIPPI SOUND, MS

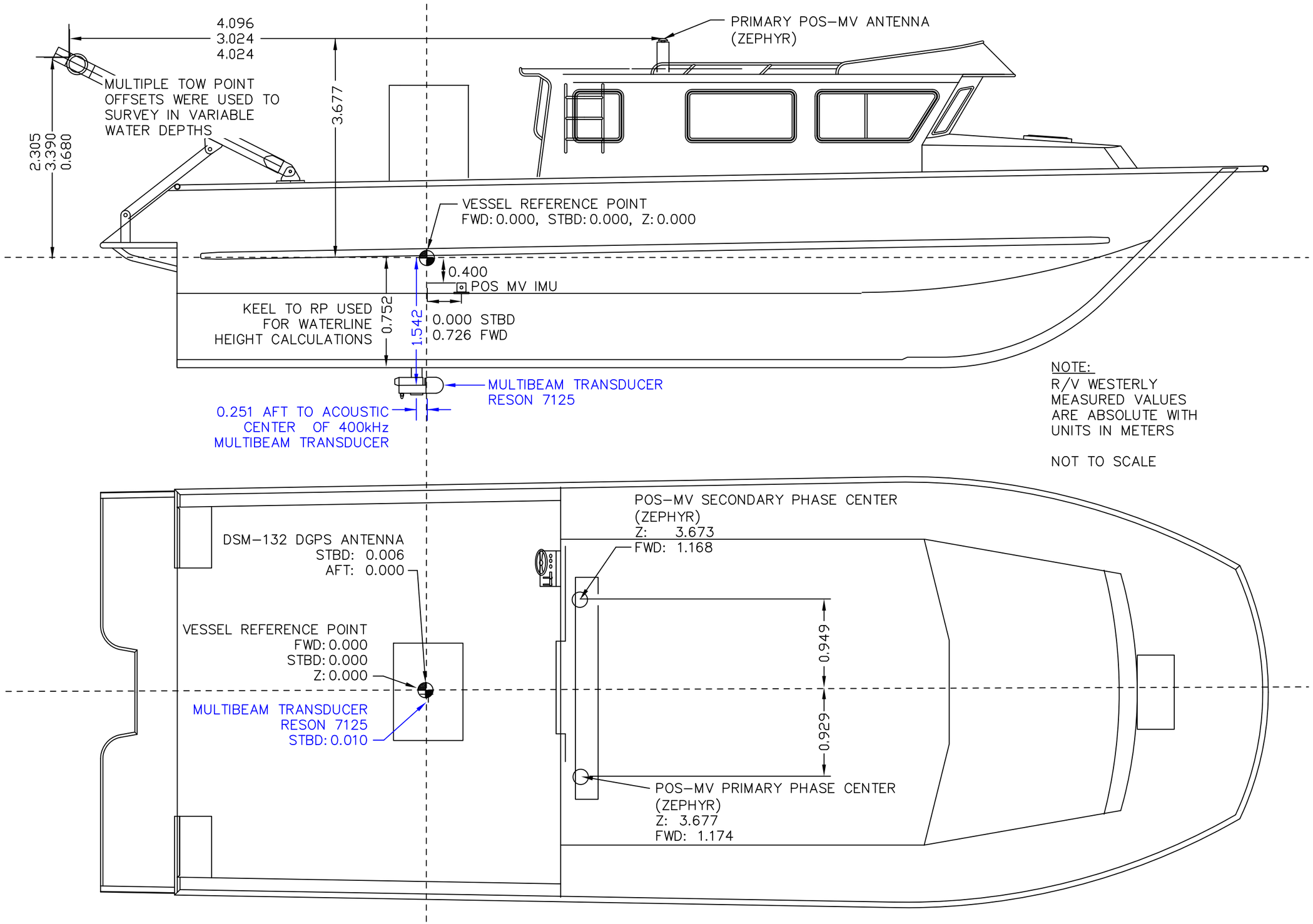
DATE: 2/10/12
DESIGN: MJCH
DRAWN: MJCH
CHECKED: SNA
REVISION NUMBER:

SCALE: N.T.S.

PROJECT NUMBER:
OPR-J348-KR-11

DRAWING FILE:
CHINOOK OFFSETS

SHEET NO.
1
OF 1



OPR-J348-KR-11

WESTERLY OFFSETS

NOAA
APPROACHES TO MISSISSIPPI SOUND, MS

DATE: 2/10/12
DESIGN: MJCH
DRAWN: MJCH
CHECKED: SNA
REVISION NUMBER:

SCALE: N.T.S.

PROJECT NUMBER:
OPR-J348-KR-11

DRAWING FILE:
WESTERLY OFFSETS

SHEET NO.
1
OF 1

Layback Calculation Methodology

Multiple towpoint offsets were utilized in order to optimize towfish tow characteristics in variable water depths for both survey vessels. The side scan sonar was primarily deployed from the stern A-frame of each vessel when water depth allowed it and was towed using a close-to-stern setup for shallow water. Each change in towpoint was entered into the acquisition log and recorded digitally in the XTF file. A Measurement Technology Northwest cable counter was used to provide a digital output of tow cable length during side scan operations. The cable counter was calibrated using preset marks along the side-scan cable at the beginning of each survey day and at any change in towpoint. Changes in the amount of cable out were recorded in the acquisition log and digitally in the XTF file.

Layback was calculated from towpoint offset, cable out, and towfish depth using the Pythagorean Theorem, and applied along a heading determined by course-made-good to determine towfish position. For the close-to-stern shallow water tow, variable cable out was not used and a fixed layback distance was directly recorded into the XTF file.

APPENDIX II
ECHOSOUNDER REPORTS

OPR-J348-KR-11

Patch Test Processing Log Summary

David Evans and Associates, Inc.
2801 SE Columbia Way, Ste 130
Vancouver, WA 98661
Phone: 360-314-3200
Fax: 360-314-3250

R/V Westerly 400kHz

Acquisition Time		Final Values			
Day	Date	Latency	Pitch	Roll	Yaw
194	07/13/2011	0.000	-0.507	-0.225	0.575
226	08/17/2011	0.000	unable to determine	-0.160	0.850
238	08/26/2011	0.000	-0.375	-0.184	1.060
250	09/07/2011	0.000	-0.423	-0.200	1.200
315	11/11/12011	0.000	-0.393	-0.248	1.000

	Latency	Pitch	Roll	Yaw
Average	0.000	-0.435	-0.192	0.921
Average St Deviation	0.000	0.067	0.027	0.272
Values for HVF (Swath 1)	**0.000**	**-0.441**	**-0.190**	**0.955**
Values for HVF (TPU Aligment)		**0.027**		**0.099**

R/V CHINOOK 400Hz

Acquisition Time		Final Values			
Day	Date	Latency	Pitch	Roll	Yaw
198	07/17/2011	0.000	1.775	0.774	3.783
227	08/15/2011	0.000	1.600	0.702	4.050
251	09/08/2011	0.000	1.173	0.690	4.400
258	09/15/2011	0.000	0.905	0.745	4.050
263	09/20/2011	0.000	1.470	0.740	4.080

	Latency	Pitch	Roll	Yaw
Average	0.000	1.385	0.730	4.073
Average St Deviation	0.000	0.397	0.039	0.253
Values for HVF (Swath 1)	**0.000**	**1.516**	**0.722**	**4.078**
Values for HVF (TPU Aligment)		**0.039**		**0.175**

David Evans and Associates, Inc.
2801 SE Columbia Way, Ste 130
Vancouver, WA 98661
Phone: 360-314-3200
Fax: 360-314-3250

OPR-J348-KR-11
R/V Chinook WEEKLY MBES BAR CHECK

Week of	Day No.	Line Name	Bar Depth (m)	Raw Multibeam Depth (m)	Draft (m)	SV at MBES Head (m/s)	Corrected Multibeam Depth (m)	Difference (m)	Comments
07/17/2011	198	2011CH1981234	3.000	1.840	1.163	1530.9	3.003	0.003	
07/24/2011	206	2011CH2061236	3.000	1.800	1.183	1528.9	2.983	-0.017	
07/31/2011	214	2011CH2111450	3.000	1.800	1.191	1528.5	2.991	-0.009	
08/07/2011	221	2011CH2211057	3.000	1.860	1.176	1534.5	3.036	0.036	
08/14/2011	227	2011CH2272210	3.000	1.320	1.178	1537.8	2.498	--	Invalid Check
08/21/2011	234	2011CH2342154	3.000	1.790	1.208	1539.3	2.998	-0.002	
08/28/2011	241	2011CH2412123	3.000	1.817	1.168	1540.0	2.985	-0.015	
09/04/2011	249	2011CH2491646	3.000	1.824	1.168	1507.9	2.992	-0.008	
09/11/2011	257	2011CH2571049	3.000	1.820	1.173	1529.9	2.993	-0.007	
09/18/2011	262	2011CH2621607	3.000	1.830	1.158	1525.9	2.988	-0.012	
09/25/2011	--	--	--	--	--	--	--	--	No field operations
10/02/2011	--	--	--	--	--	--	--	--	No field operations
10/09/2011	283	2011CH2832129	3.000	1.824	1.173	1517.7	2.997	-0.003	
							MEAN*	0.003	
							STD. DEV.*	0.023	

*Invalid check week of 08/14/2011 excluded from mean and standard deviation computations.

David Evans and Associates, Inc.
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Vancouver, WA 98661
Phone: 360-314-3200
Fax: 360-314-3250

OPR-J348-KR-11
R/V Westerly WEEKLY MBES BAR CHECK

Week of	Day No.	Line Name	Bar Depth (m)	Raw Multibeam Depth (m)	Draft (m)	SV at MBES Head (m/s)	Corrected Multibeam Depth (m)	Difference (m)	Comments
07/10/2011	190	2011WE1902123	3.000	1.432	1.568	1535.5	3.000	0.000	
07/17/2011	198	2011WE1981221	3.000	1.462	1.550	1530.1	3.012	-0.012	
07/24/2011	206	2011WE2061229	3.000	1.443	1.565	1530.0	3.008	-0.008	
07/31/2011	213	2011WE2132138	3.000	1.423	1.570	1533.7	2.993	0.007	
08/07/2011	221	2011WE2211118A	3.000	1.458	1.550	1534.5	3.008	-0.008	
08/14/2011	227	2011WE2272235	3.000	1.439	1.565	1537.7	3.004	-0.004	
08/21/2011	234	2011WE2342227A	3.000	1.451	1.553	1540.5	3.004	-0.004	
08/28/2011	241	2011WE2412149	3.000	1.437	1.570	1539.4	3.007	-0.007	
09/04/2011	249	2011WE2491819	3.000	1.446	1.565	1516.7	3.011	-0.011	
09/11/2011	256	2011WE2562215	3.000	1.440	1.575	1531.1	3.015	-0.015	
09/18/2011	263	2011WE2631631	3.000	1.424	1.560	1523.2	2.984	0.016	
09/25/2011	269	2011WE2691805	3.000	1.420	1.580	1524.5	3.000	0.000	
10/02/2011	276	2011WE2731443	3.000	1.424	1.570	1516.1	2.994	0.006	
10/09/2011	--	--	--	--	--	--	--	--	No field operations
10/16/2011	291	2011WE2911434	3.000	1.426	1.565	1523.3	2.991	0.009	
10/23/2011	--	--	--	--	--	--	--	--	No field operations
10/30/2011	--	--	--	--	--	--	--	--	No field operations
11/06/2011	309	2011WE3091821	3.000	1.430	1.560	1502.0	2.990	0.010	
11/13/2011	316	2011WE3161755	3.000	1.420	1.560	1495.4	2.980	0.020	
							MEAN	0.000	
							STD. DEV.	0.010	

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OPR-J348-KR-11
R/V Chinook WEEKLY SBES BAR CHECK

Week of	Day No.	Line Name	Bar Depth (m)	Raw Singlebeam Depth (m)	Static Draft (m)	Draft (m)	SV Corrector (m)	Corrected Singlebeam Depth (m)	Difference (m)	Comments
07/17/2011	197	2011CH1971613	3.000	3.000	0.500	-0.005	0.000	2.995	-0.005	
07/17/2011	197	2011CH1971623	3.000	2.950	0.500	-0.005	0.052	2.997	-0.003	
07/24/2011	206	2011CH2061248	3.000	2.940	0.500	-0.025	0.048	2.963	-0.037	
07/24/2011	206	2011CH2061300	3.000	2.943	0.500	-0.018	0.048	2.973	-0.027	
07/31/2011	214	2011CH2141538	3.000	2.940	0.500	-0.025	0.047	2.961	-0.039	
08/07/2011	221	2011CH2211101	3.000	2.970	0.500	-0.018	0.058	3.010	0.010	
08/14/2011	227	2011CH2272218	3.000	2.470	0.500	-0.020	0.058	2.508	--	Invalid Check
08/21/2011	234	2011CH2342107	3.000	2.940	0.500	-0.010	0.065	2.995	-0.005	
08/28/2011	241	2011CH2412131	3.000	2.950	0.500	-0.010	0.067	3.007	0.007	
09/04/2011	249	2011CH2491654	3.000	3.000	0.500	-0.010	0.013	3.003	0.003	
09/11/2011	257	2011CH2571055	3.000	2.950	0.500	-0.015	0.050	2.985	-0.015	
09/18/2011	262	2011CH2621605	3.000	2.940	0.500	0.000	0.043	2.983	-0.017	
09/25/2011	--	--	--	--		--	--	--	--	No field operations
10/02/2011	--	--	--	--		--	--	--	--	No field operations
10/09/2011	283	2011CH2832134	3.000	2.950	0.500	-0.015	0.029	2.964	-0.036	
--	--	--	--	--	--	--	--	--	--	
--	--	--	--	--	--	--	--	--	--	
--	--	--	--	--	--	--	--	--	--	
--	--	--	--	--	--	--	--	--	--	

*Invalid check week of 08/14/2011 excluded from mean and standard deviation computations.

MEAN*	-0.014
STD. DEV.*	0.017

APPENDIX III
POSITIONING AND ATTITUDE SYSTEM REPORTS

David Evans and Associates, Inc.
2801 SE Columbia Way, Ste 130
Vancouver, WA 98661
Phone: 360-314-3200

OPR-J348-KR-11
R/V Chinook GAMS Calibration

SYSTEM INFORMATION

Date: 7/17/2011 **DN:** 198

Personnel: MLHI, AMBI

PCS Serial # 2357

IP Address: 192.100.1.231

POS controller Version (Use Menu Help > About) 5.1.0.2

POS Version (Use Menu View > Statistics) MV-320 Ver4

GPS Receivers

Primary Receiver SN 4533A59355

Secondary Receiver SN 4526A59115

CALIBRATION AREA

Location: Approaches to Mississippi Sound

		D	M	S
Approximate Position:	**Lat**	30	21	2.65
	Lon	88	54	9.15

DGPS Beacon Station: English Turn, LA

Frequency: 293 kHZ

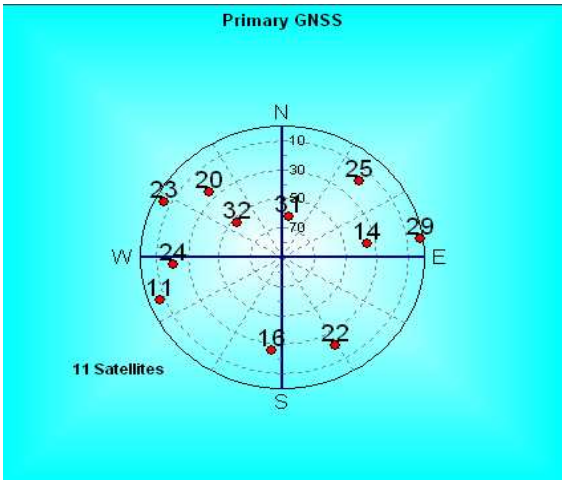
Satellite Constellation
Primary GPS (Port Antenna)

HDOP: 0.727

VDOP: 1.188

Sattelites in Use: 11

PDOP 1.352



Note: Secondary GPS satellite constellation and number of satellites were exactly the same as the Primary GPS

POS/MV CONFIGURATION

Settings

Gams Parameter Setup

User Entries, Pre-Calibration		Baseline Vector	
2.069	Two Antenna Separation (m)	**0.001**	X Component (m)
0.300	Heading Calibration Threshold	**-2.069**	YComponent (m)
0.000	Heading Correction	**0.003**	Z Component (m)

Configuration Notes:

POS/MV CALIBRATION

Calibration Procedure:

Start time: 14:21:14 UTC

End time: 14:22:24 UTC

Heading accuracy achieved for calibration: 0.018

Calibration Results:

Gams Parameter Setup

POS/MV Post-Calibration Values		Baseline Vector	
2.066	Two Antenna Separation (m)	**-0.001**	X Component (m)
0.300	Heading Calibration Threshold	**-2.066**	YComponent (m)
0	Heading Correction	**0.013**	Z Component (m)

GAMS Status Online? X

Save Settings? X

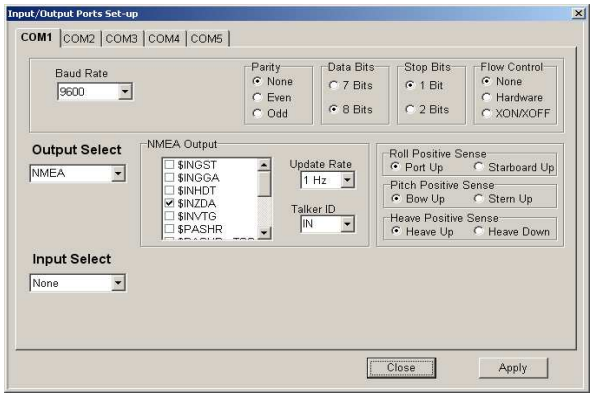
Calibration Notes:

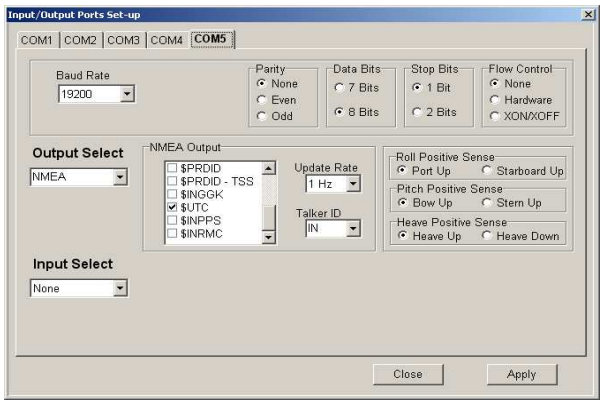
Save POS Settings on PC

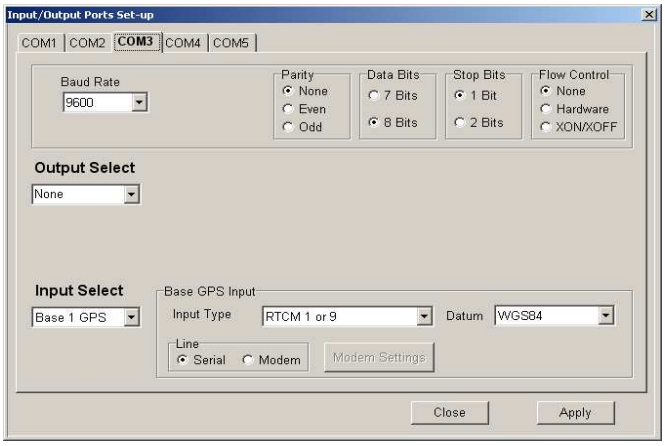
File Name: DN198_CH_GAMS.nvm

SETTINGS

Input/Output Ports

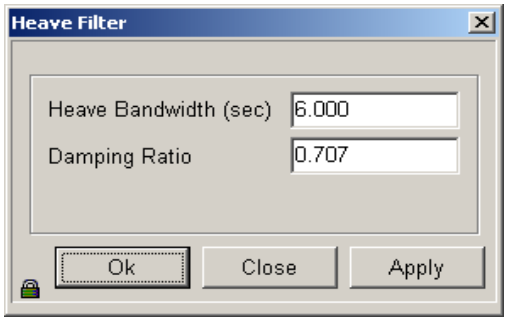




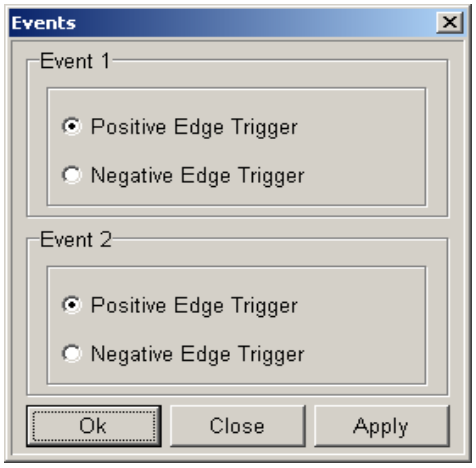


NOTE: COM2 and COM4 are not used.

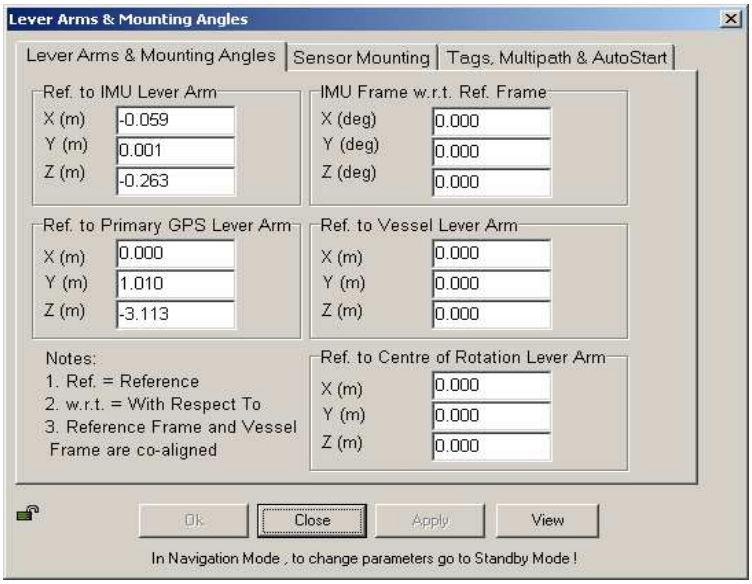
Heave Filter



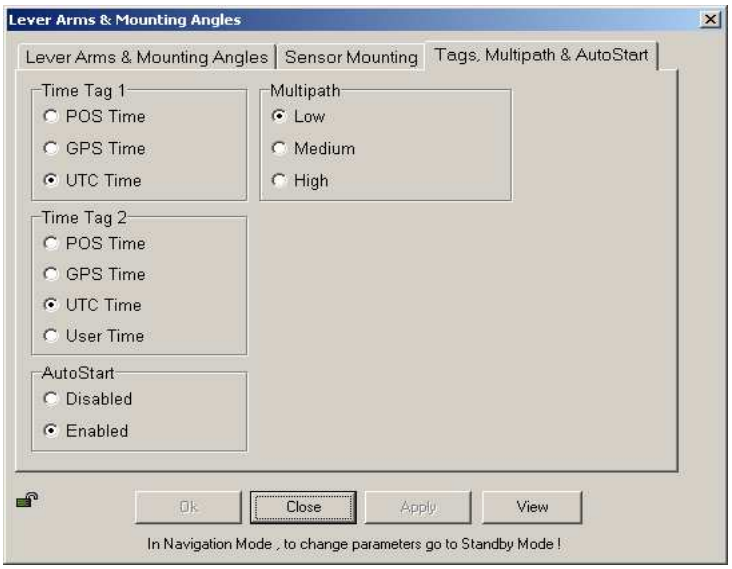
Events



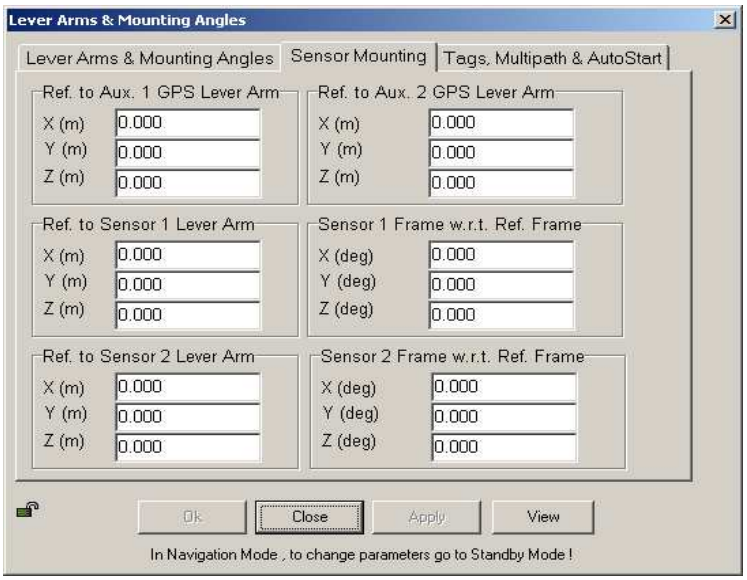
Installation



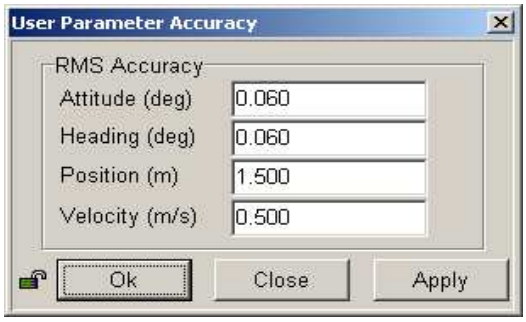
Tags, Multipath and Auto Start



Sensor Mounting

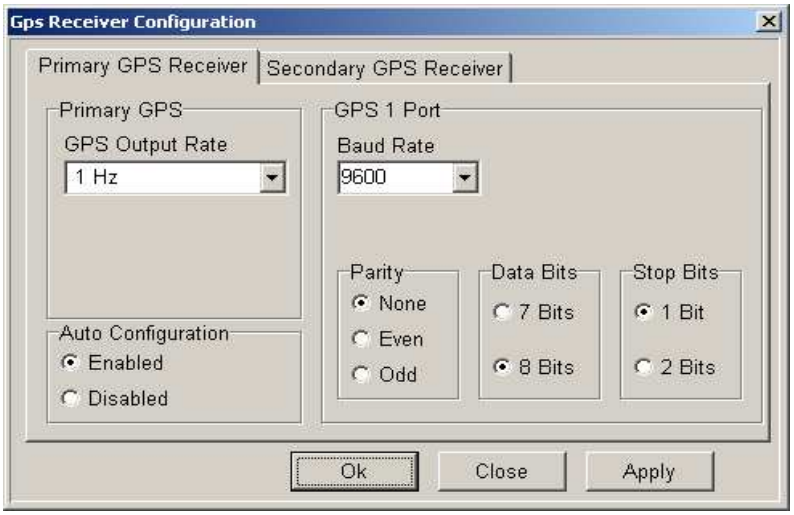


User Parameter Accuracy

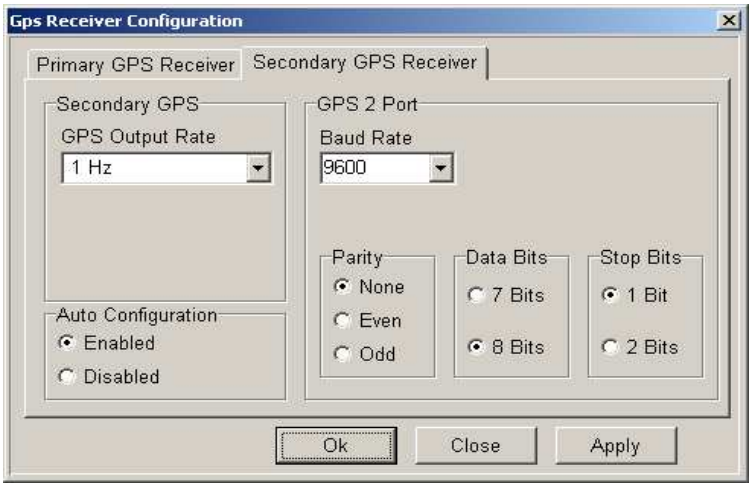


GPS Receiver Configuration

Primary GPS Receiver



Secondary GPS Receiver



David Evans and Associates, Inc.
2801 SE Columbia Way, Ste 130
Vancouver, WA 98661
Phone: 360-314-3200

OPR-J348-KR-11
R/V Westerly GAMS Calibration

SYSTEM INFORMATION

Date: 7/13/2011 **DN:** DN194

Personnel: JXST, KST

PCS Serial # 786

IP Address: 129.100.1.231

POS controller Version (Use Menu Help > About) 5.1.0.2

POS Version (Use Menu View > Statistics) MV320 VER4

GPS Receivers

Primary Receiver SN 4808A98943

Secondary Receiver SN 4808A98930

CALIBRATION AREA

Location: Approaches to Mississippi Sound

		D	M	S
Approximate Position:	**Lat**	30	15	17
	Lon	88	49	52

DGPS Beacon Station: English Turn, LA

Frequency: 293 kHZ

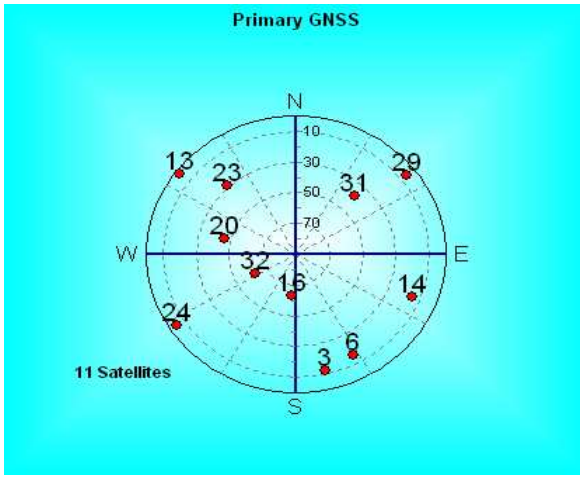
Satellite Constellation
Primary GPS (Port Antenna)

HDOP: 0.72

VDOP: 1.088

Sattelites in Use: 8

PDOP 1.352



Note: Secondary GPS satellite constellation and number of satellites were exactly the same as the Primary GPS

POS/MV CONFIGURATION

Settings

Gams Parameter Setup

User Entries, Pre-Calibration		Baseline Vector	
1.874	Two Antenna Separation (m)	**0.007**	X Component (m)
0.300	Heading Calibration Threshold	**-1.874**	YComponent (m)
0.000	Heading Correction	**0.000**	Z Component (m)

Configuration Notes:

POS/MV CALIBRATION

Calibration Procedure:

Start time: 15:48 UTC

End time: 15:49 UTC

Heading accuracy achieved for calibration: 0.02

Calibration Results:

Gams Parameter Setup

POS/MV Post-Calibration Values		Baseline Vector	
1.880	Two Antenna Separation (m)	**0.006**	X Component (m)
0.300	Heading Calibration Threshold	**-1.880**	YComponent (m)
0.000	Heading Correction	**-0.001**	Z Component (m)

GAMS Status Online? X

Save Settings? X

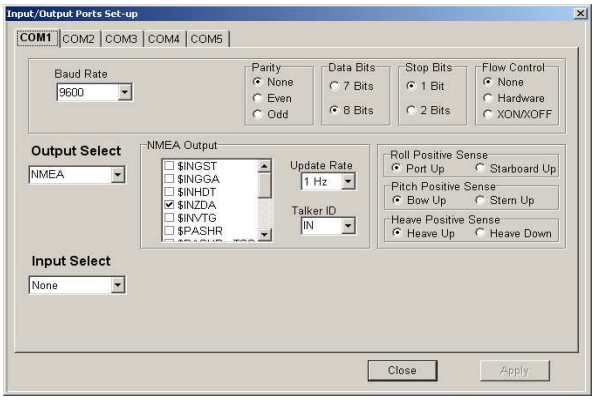
Calibration Notes:

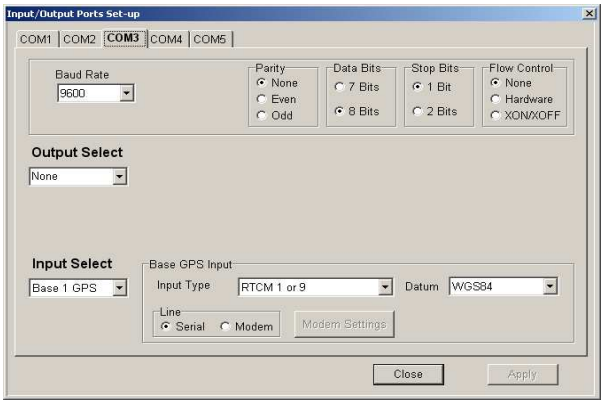
Save POS Settings on PC

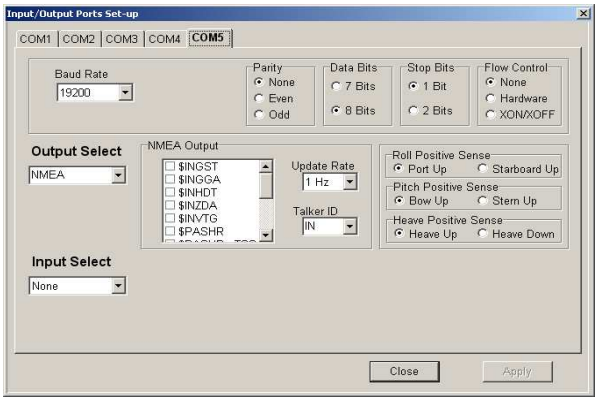
File Name: POSMV_09012004.nvm

SETTINGS

Input/Output Ports

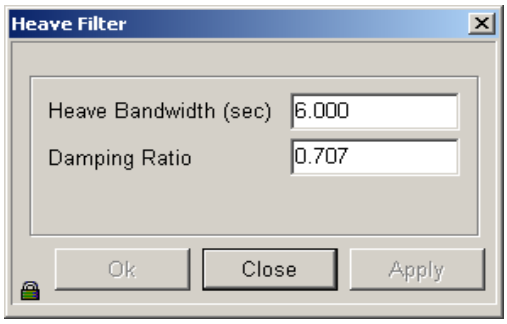




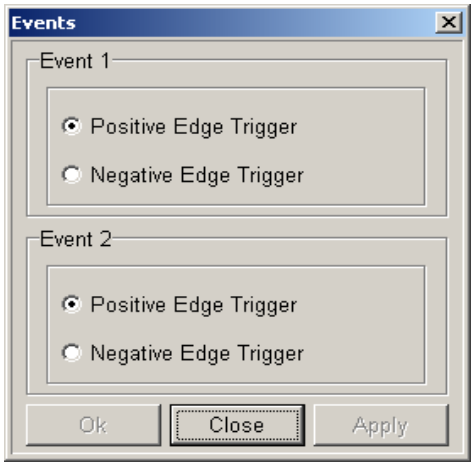


NOTE: COM2 and 4 are not used.

Heave Filter

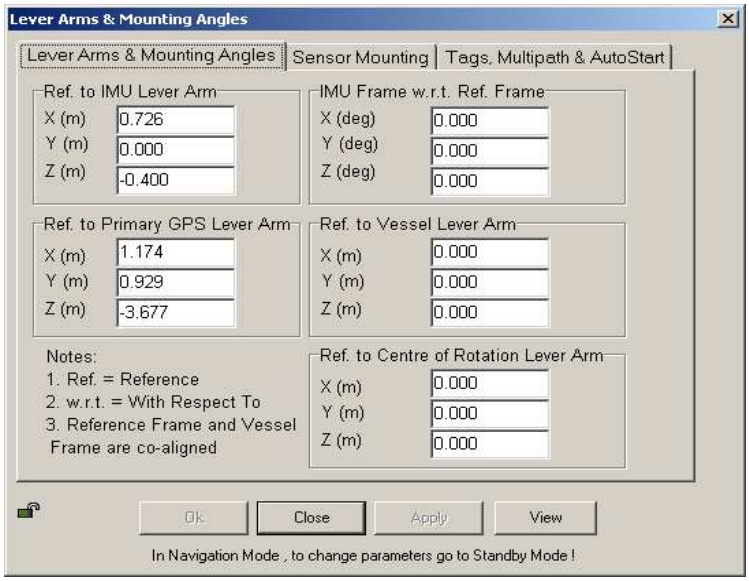


Events

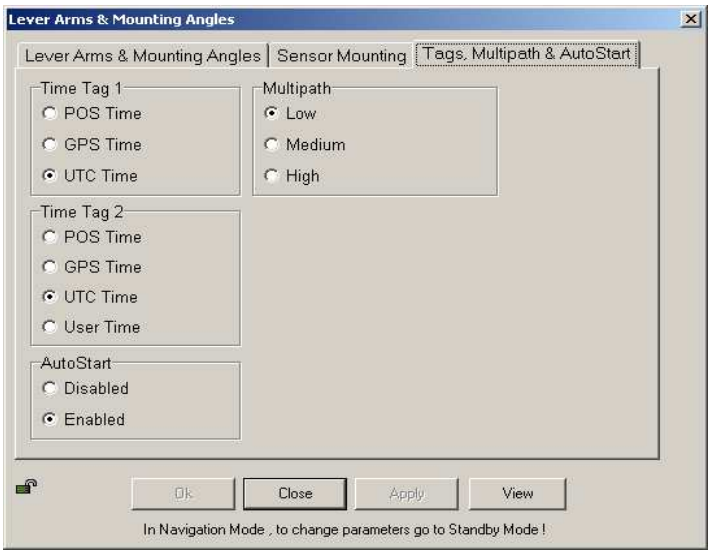


Time Sync

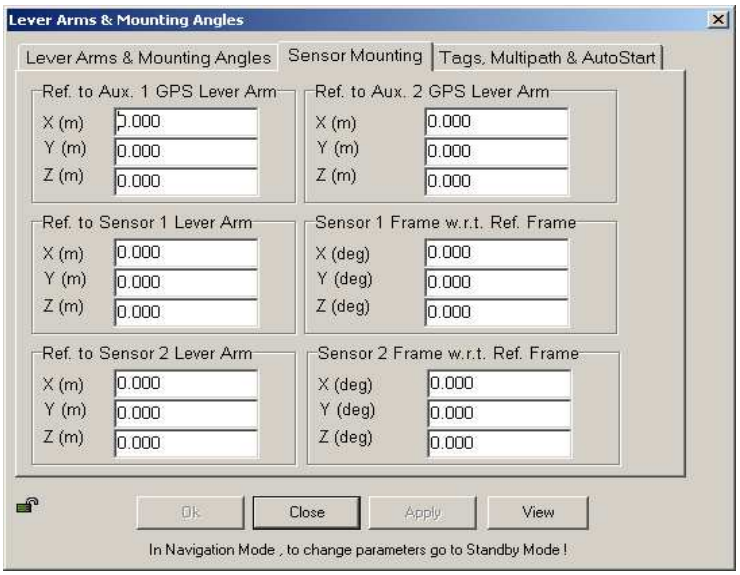
Installation



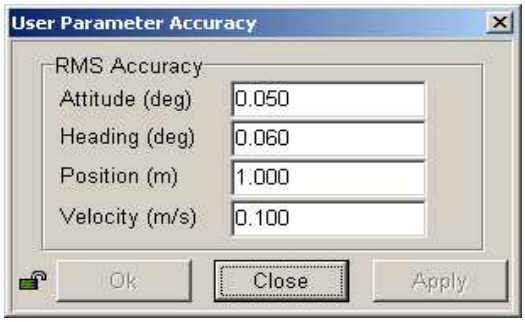
Tags, Multipath and Auto Start



Sensor Mounting

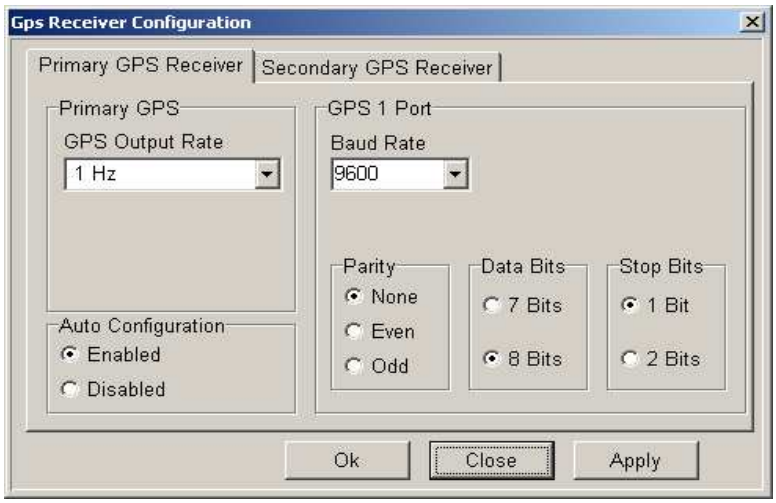


User Parameter Accuracy

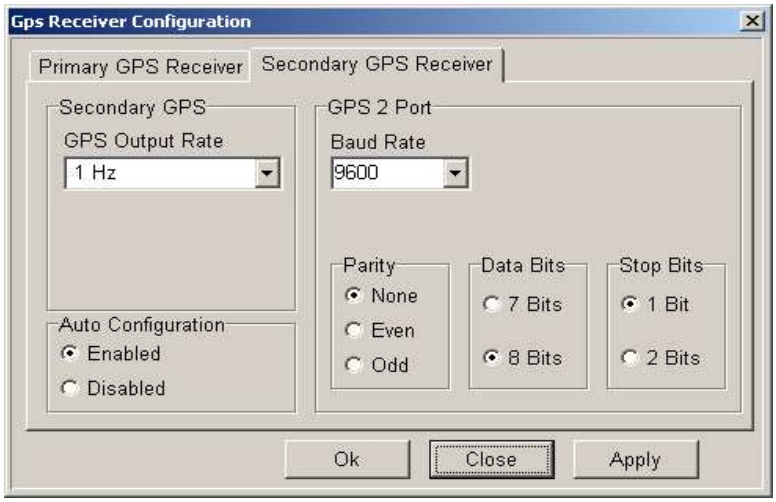


GPS Receiver Configuration

Primary GPS Receiver



Secondary GPS Receiver



APPENDIX IV
SOUND SPEED SENSOR REPORTS

SEA-BIRD ELECTRONICS, INC.

13431 NE 20th Street, Bellevue, Washington, 98005-2010 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 2691
CALIBRATION DATE: 16-Mar-11

SBE19 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

ITS-90 COEFFICIENTS

```
g =  4.26256015e-003
h =  6.17277718e-004
i =  1.10467403e-005
j = -3.13928177e-007
f0 = 1000.0
```

IPTS-68 COEFFICIENTS

```
a =  3.64763566e-003
b =  5.94020305e-004
c =  1.20287902e-005
d = -3.13051627e-007
f0 = 2759.797
```

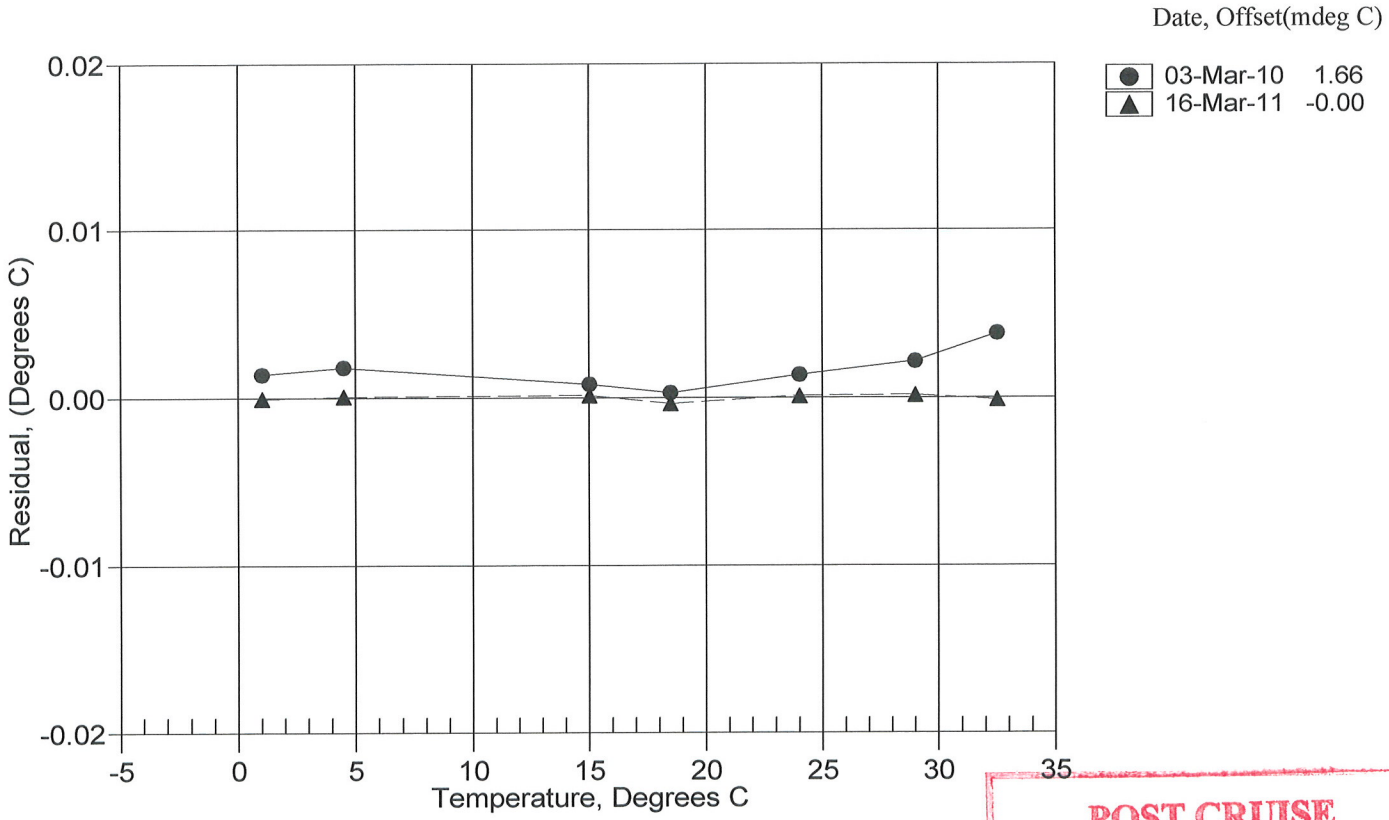
BATH TEMP (ITS-90)	INSTRUMENT FREO (Hz)	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	2759.797	0.9999	-0.00005
4.4999	2982.331	4.5000	0.00008
15.0000	3726.295	15.0001	0.00014
18.5000	4000.864	18.4997	-0.00034
24.0000	4460.611	24.0001	0.00012
29.0000	4909.378	29.0002	0.00017
32.5000	5241.492	32.4999	-0.00012

Temperature ITS-90 = $1/\{g + h[ln(f_0/f)] + i[ln^2(f_0/f)] + j[ln^3(f_0/f)]\} - 273.15$ (°C)

Temperature IPTS-68 = $1/\{a + b[ln(f_0/f)] + c[ln^2(f_0/f)] + d[ln^3(f_0/f)]\} - 273.15$ (°C)

Following the recommendation of JPOTS: T_{68} is assumed to be 1.00024 * T_{90} (-2 to 35 °C)

Residual = instrument temperature - bath temperature



POST CRUISE CALIBRATION

SEA-BIRD ELECTRONICS, INC.
13431 NE 20th St. Bellevue, Washington 98005 USA
Phone: (425) 643-9866 Fax: (425) 643-9954 www.seabird.com

Temperature Calibration Report

Customer:	David Evans & Associates		
Job Number:	63480	**Date of Report:**	3/16/2011
Model Number	SBE 19	**Serial Number:**	1919847-2691

Temperature sensors are normally calibrated 'as received', without adjustments, allowing a determination sensor drift. If the calibration identifies a problem, then a second calibration is performed after work is completed. The 'as received' calibration is not performed if the sensor is damaged or non-functional, or by customer request.

An 'as received' calibration certificate is provided, listing coefficients to convert sensor frequency to temperature. Users must choose whether the 'as received' calibration or the previous calibration better represents the sensor condition during deployment. In SEASOFT enter the chosen coefficients using the program SEACON. The coefficient 'offset' allows a small correction for drift between calibrations (consult the SEASOFT manual). Calibration coefficients obtained after a repair apply only to subsequent data.

'AS RECEIVED CALIBRATION' ☑ Performed ☐ Not Performed

Date: 3/16/2011 Drift since last cal: -0.00161 Degrees Celsius/year

Comments:

'CALIBRATION AFTER REPAIR' ☐ Performed ☑ Not Performed

Date: Drift since Last cal: Degrees Celsius/year

Comments:

SEA-BIRD ELECTRONICS, INC.

13431 NE 20th Street, Bellevue, Washington, 98005-2010 USA
Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 2691
CALIBRATION DATE: 16-Mar-11

SBE19 CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Seimens/meter

GHIJ COEFFICIENTS

```
g = -4.05686424e+000
h =  4.85197076e-001
i =  7.41662386e-004
j = -8.67129530e-006
CPcor = -9.5700e-008 (nominal)
CTcor =  3.2500e-006 (nominal)
```

ABCDM COEFFICIENTS

```
a =  2.39729477e-003
b =  4.82120905e-001
c = -4.04987866e+000
d = -8.55643042e-005
m =  2.6
CPcor = -9.5700e-008 (nominal)
```

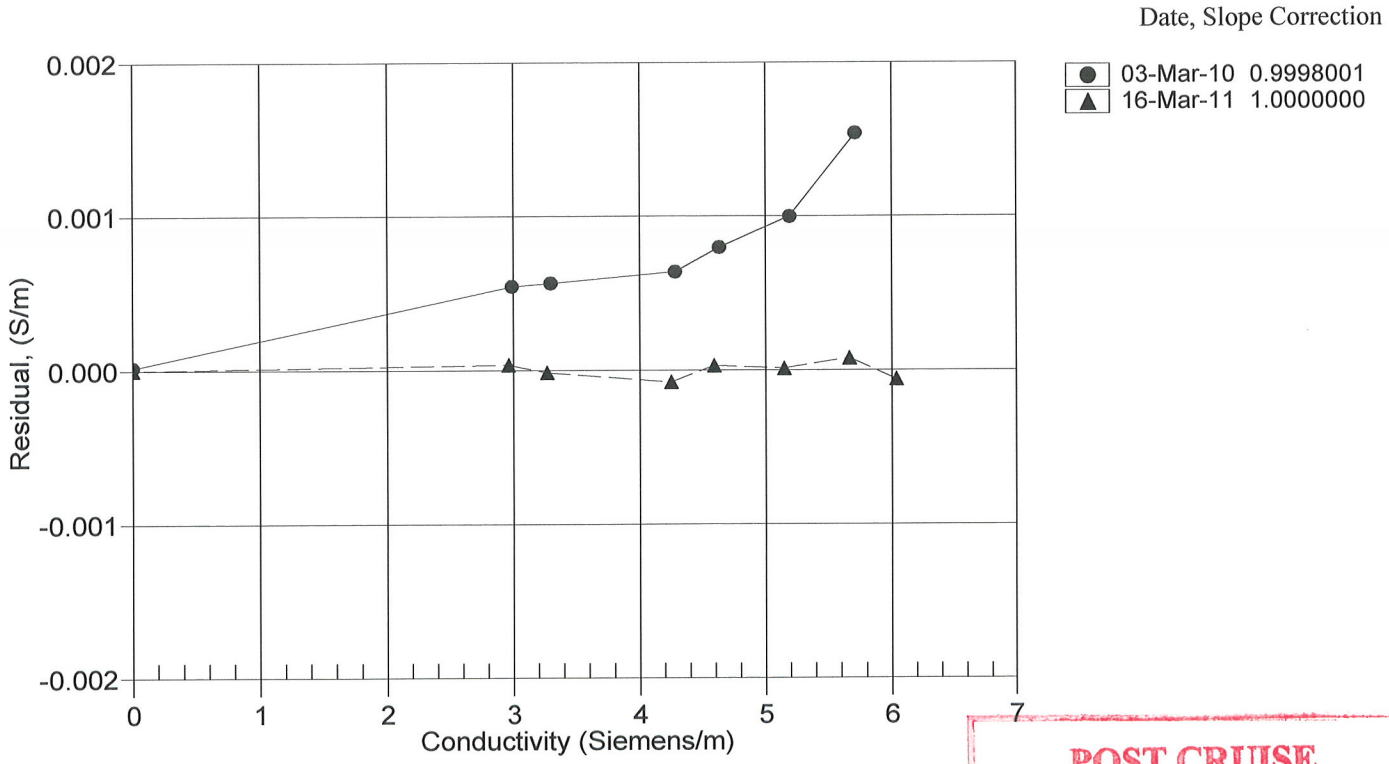
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREO (kHz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2.88544	0.00000	0.00000
1.0000	34.6471	2.96288	8.28508	2.96291	0.00003
4.4999	34.6273	3.26864	8.65099	3.26862	-0.00002
15.0000	34.5847	4.24620	9.72788	4.24612	-0.00008
18.5000	34.5753	4.58984	10.07890	4.58986	0.00003
24.0000	34.5643	5.14527	10.62123	5.14528	0.00001
29.0000	34.5557	5.66442	11.10394	5.66450	0.00008
32.5000	34.5484	6.03453	11.43529	6.03447	-0.00006

Conductivity = $(g + hf^2 + if^3 + jf^4) / 10(1 + \delta t + \varepsilon p)$ Siemens/meter

Conductivity = $(af^m + bf^2 + c + dt) / [10 (1 + \varepsilon p)$ Siemens/meter

t = temperature[°C)]; p = pressure[decibars]; δ = CTcor; ε = CPcor;

Residual = (instrument conductivity - bath conductivity) using g, h, i, j coefficients



POST CRUISE CALIBRATION

SEA-BIRD ELECTRONICS, INC.
13431 NE 20th Street Bellevue, Washington 98005 USA
Phone: (425) 643-9866 Fax: (425) 643-9954 www.seabird.com

Conductivity Calibration Report

Customer:	David Evans & Associates		
Job Number:	63480	**Date of Report:**	3/16/2011
Model Number	SBE 19	**Serial Number:**	1919847-2691

Conductivity sensors are normally calibrated 'as received', without cleaning or adjustments, allowing a determination of sensor drift. If the calibration identifies a problem or indicates cell cleaning is necessary, then a second calibration is performed after work is completed. The 'as received' calibration is not performed if the sensor is damaged or non-functional, or by customer request.

An 'as received' calibration certificate is provided, listing the coefficients used to convert sensor frequency to conductivity. Users must choose whether the 'as received' calibration or the previous calibration better represents the sensor condition during deployment. In SEASOFT enter the chosen coefficients using the program SEACON. The coefficient 'slope' allows small corrections for drift between calibrations (consult the SEASOFT manual). Calibration coefficients obtained after a repair or cleaning apply only to subsequent data.

'AS RECEIVED CALIBRATION' ☑ Performed ☐ Not Performed

Date: 3/16/2011 Drift since last cal: -0.00050 PSU/month

Comments:

'CALIBRATION AFTER CLEANING & REPLATINIZING' ☐ Performed ☑ Not Performed

Date: Drift since Last cal: PSU/month

Comments:

**Measured at 3.0 S/m*

Cell cleaning and electrode replatinizing tend to 'reset' the conductivity sensor to its original condition. Lack of drift in post-cleaning-calibration indicates geometric stability of the cell and electrical stability of the sensor circuit.

SEA-BIRD ELECTRONICS, INC.

13431 NE 20th Street, Bellevue, Washington, 98005-2010 USA
Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 2691
CALIBRATION DATE: 21-Mar-11

SBE19 PRESSURE CALIBRATION DATA
500 psia S/N 190774 TCV: -218

QUADRATIC COEFFICIENTS:

```
PA0 =    2.369730e+002
PA1 =   -6.527863e-002
PA2 =    5.113664e-008
```

STRAIGHT LINE FIT:

```
M = -6.528724e-002
B =  2.372715e+002
```

PRESSURE PSIA	INST OUTPUT(N)	COMPUTED PSIA	ERROR %FS	LINEAR PSIA	ERROR %FS
14.38	3421.0	14.25	-0.03	13.92	-0.09
104.59	2035.0	104.34	-0.05	104.41	-0.04
204.61	500.0	204.35	-0.05	204.63	0.00
304.64	-1033.0	304.46	-0.04	304.71	0.01
404.65	-2560.0	404.42	-0.05	404.41	-0.05
504.63	-4088.0	504.69	0.01	504.17	-0.09
404.65	-2565.0	404.75	0.02	404.73	0.02
304.66	-1040.0	304.92	0.05	305.17	0.10
204.64	491.0	204.93	0.06	205.22	0.11
104.64	2027.0	104.86	0.04	104.93	0.06
14.38	3417.0	14.51	0.03	14.18	-0.04

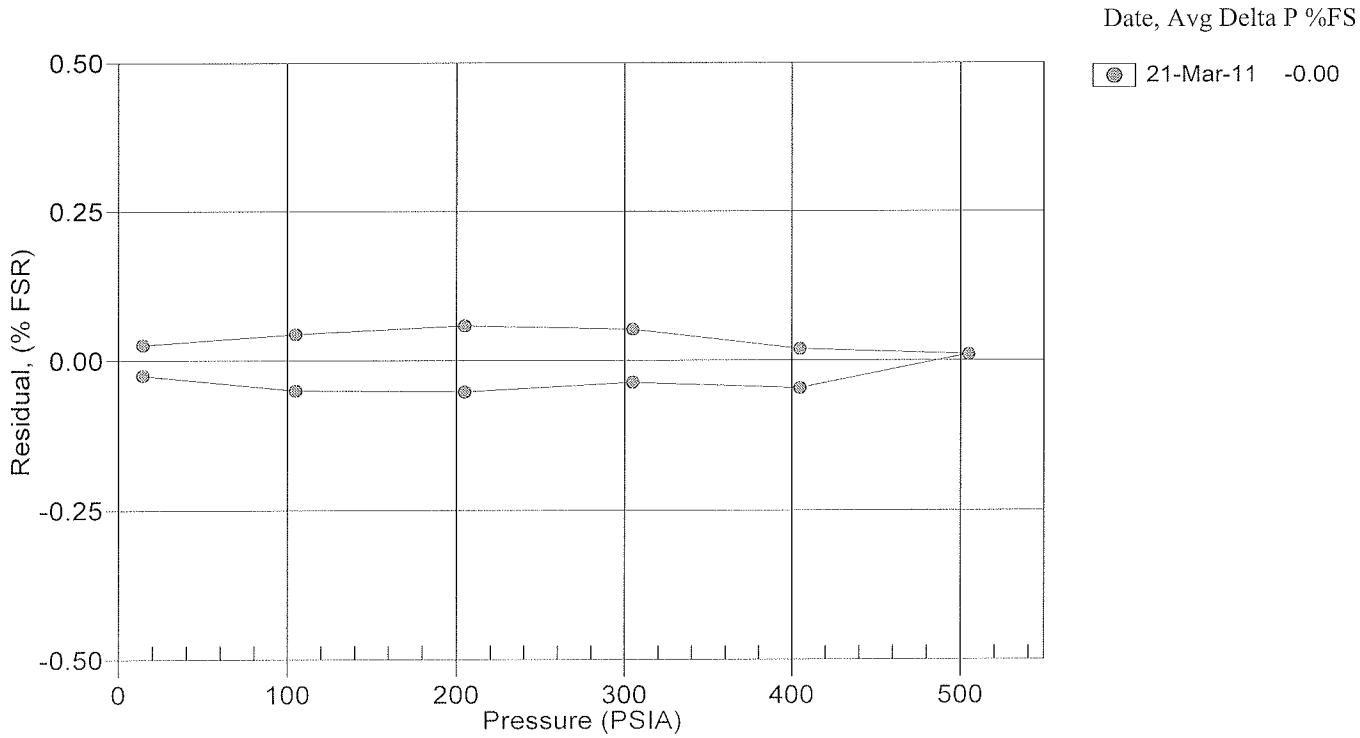
Straight Line Fit:

Pressure (psia) = M * N + B (N = binary output)

Quadratic Fit:

pressure (psia) = PA0 + PA1 * N + PA2 * N^2

Residual = (instrument pressure - true pressure) * 100 / Full Scale Range



Certificate of Calibration

003592

Customer:	David Evans & Associates
Asset Serial Number:	003592
Asset Type:	003592 (SV Plus v2)
Calibrated Pressure Range:	200 dBar

Certification Date: 24/08/2010 (dd/mm/yyyy)

Certified By:

Robert Haydock,
President
AML Oceanographic

AML Oceanographic certifies that the equipment described above has been calibrated with equipment referenced to traceable standards. Any repairs / calibrations completed on this instrument were approved by the instrument owner under purchase order.

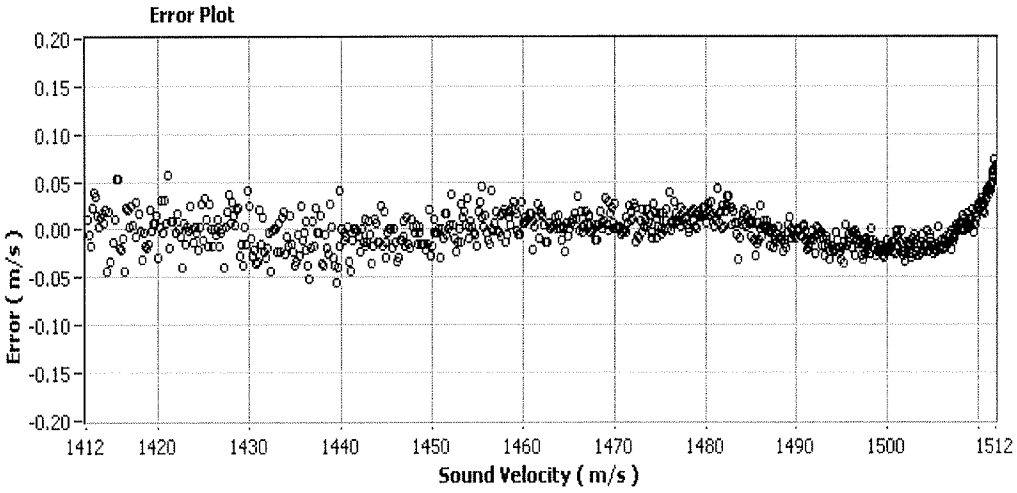
This instrument has been recalibrated. Please be sure to update your records. Please also ensure that you update the instrument's coefficient values in any post-processing software (ie. Smart Talk) that you use. Instrument configuration files are available at our Client Service & Support Portal (see web address below).

For a complete service history of this instrument, please consult our on-line Client Service & Support Portal at http://www.AMLoceanographic.com/customers/index.htm

AML Oceanographic
2071 Malaview Avenue
Sidney, B.C. V8L 5X6 CANADA
Tel: +1-250-656-0771 Fax: +1-250-655-3655

Sound Velocity Calibration

Date	08/23/10
S/N	003592
Calibrator	Les Woodland
RMS Error	0.019
Range	1400 to 1600 m/s



m/s=A+B*((NH-N)/(NH-NL))+C*((NH-N)/(NH-NL))^2+D*((NH-N)/(NH-NL))^3

A=7.152362E-4	G=0.000000E+00
B=-8.032563E-5	H=0.000000E+00
C=-1.332756E-6	I=0.000000E+00
D=7.962909E-7	J=0.000000E+00
E=0.000000E+00	K=0.000000E+00
F=0.000000E+00	L=0.000000E+00

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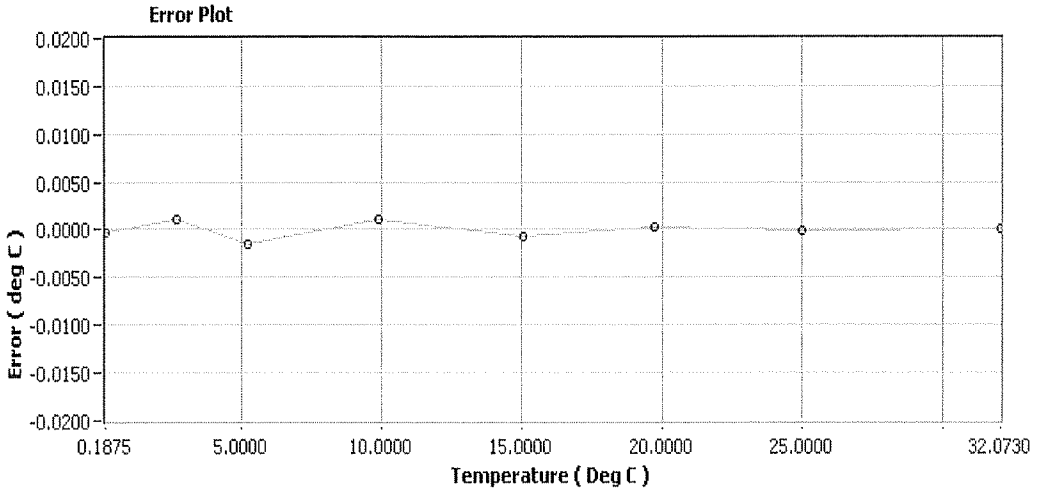
Xchange your old ideas

2071 Malaview Ave West, Sidney, British Columbia, Canada V8L 5X6
Phone: (250) 656-0771 Fax: (250) 655-3655
Canada & USA: 800-663-8721
Email: info@amloceanographic.com Web: http://www.amloceanographic.com

Temperature Calibration

Date	08/23/10
S/N	003592
Calibrator	Les Woodland
RMS Error	0.0008
Range	0 to +32 Dec C



Deg C=A+B*Raw+C*Raw^2+D*Raw^3+E*Raw^4+F*Raw^5+G*Raw^6

A=-4.357967E+0	G=2.385516E-29
B=7.179215E-4	H=0.000000E+00
C=-4.804446E-9	I=0.000000E+00
D=7.006686E-14	J=0.000000E+00
E=-3.383344E-19	K=0.000000E+00
F=-7.946397E-25	L=0.000000E+00

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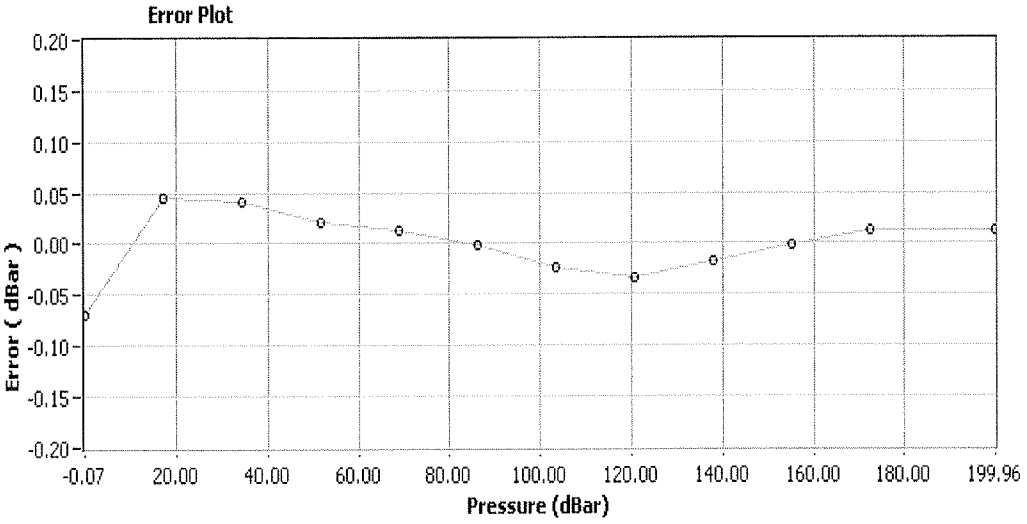
Canada & USA: 800-663-8721
Email: info@amloceanographic.com Web: http://www.amloceanographic.com

Pressure Calibration

Date	08/24/10
S/N	003592
Calibrator	Les Woodland
RMS Error	0.031
Range	200 dBar



dBar=A+B*T+C*T^2+D*T^3+(E+F*T+G*T^2+H*T^3)*Raw+(I+J*T+K*T^2+L*T^3)*Raw^2

A=-3.684090E+3	G=-4.441339E-11
B=2.421073E-1	H=2.722308E-16
C=-5.266572E-6	I=-2.348323E-7
D=3.780845E-11	J=1.601768E-11
E=-3.762685E-2	K=-3.624513E-16
F=2.368159E-6	L=2.722832E-21

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Canada & USA: 800-663-8721
Email: info@amloceanographic.com Web: http://www.amloceanographic.com

Certificate of Calibration

Customer:	David Evans & Associates
Asset Serial Number:	200790 SV•Xchange™ Calibrated Sensor - v2
Asset Product Type:	Sensor : Xchange : SV•Xchange™ Calibrated Sensor - v2 XCH-SV-ENG
Calibration Type:	Sound Velocity
Calibration Range:	1375 to 1625 m/s
Calibration RMS Error:	.001
Calibration ID:	200790 SV•Xchange™ Calibration
Installed On:	008083 Micro X-Series, Primary Only, 500m Housing

---

Coefficient A:	0.000000E+0	Coefficient G:	0.000000E+0
Coefficient B:	0.000000E+0	Coefficient H:	0.000000E+0
Coefficient C:	6.908667e-7	Coefficient I:	0.000000E+0
Coefficient D:	1.946072e-7	Coefficient J:	0.000000E+0
Coefficient E:	-1.863367e-5	Coefficient K:	0.000000E+0
Coefficient F:	1.954885e-7	Coefficient L:	0.000000E+0
		Coefficient M:	

Calibration Date (dd/mm/yyyy): 17/5/2011

Certified By:

Robert Haydock

President, AML Oceanographic

AML Oceanographic certifies that the asset described above has been calibrated or recalibrated with equipment referenced to traceable standards. Please note that Xchange™ sensor-heads may be installed on assets other than the one listed above; this calibration certificate will still be valid when used on other such assets. If this instrument or sensor has been recalibrated, please be sure to update your records. Please also ensure that you update the instrument's coefficient values in any post-processing software that you use, if necessary. Older generation instruments may require configuration files, which are available for download at our Customer Centre at www.AMLoceanographic.com/support

AML Oceanographic
2071 Malaview Avenue, Sidney B.C. V8L 5X6 CANADA
T: +1-250-656-0771 F: +1-250-655-3655 Email: service@AMLoceanographic.com

Certificate of Calibration

Customer:	David Evans & Associates
Asset Serial Number:	005110
Asset Product Type:	Smart SV&P for Brooke MVP - PDC-A0200-OEM-Brooke
Calibration Type:	Sound Velocity
Calibration Range:	1400 to 1550 m/s
Calibration RMS Error:	.0237
Calibration ID:	005110 139269 S18805 140311 212550
Installed On:	

Coefficient A:	1.546968E+3	Coefficient G:	0.000000E+0
Coefficient B:	-1.164764E+2	Coefficient H:	0.000000E+0
Coefficient C:	1.064777E+1	Coefficient I:	0.000000E+0
Coefficient D:	-1.178065E+0	Coefficient J:	0.000000E+0
Coefficient E:	0.000000E+0	Coefficient K:	0.000000E+0
Coefficient F:	0.000000E+0	Coefficient L:	0.000000E+0
		Coefficient M:	

Calibration Date (dd/mm/yyyy): 14/3/2011

Certified By:

Robert Haydock

President, AML Oceanographic

AML Oceanographic certifies that the asset described above has been calibrated or recalibrated with equipment referenced to traceable standards. Please note that Xchange™ sensor-heads may be installed on assets other than the one listed above; this calibration certificate will still be valid when used on other such assets. If this instrument or sensor has been recalibrated, please be sure to update your records. Please also ensure that you update the instrument's coefficient values in any post-processing software that you use, if necessary. Older generation instruments may require configuration files, which are available for download at our Customer Centre at www.AMLoceanographic.com/support

AML Oceanographic
2071 Malaview Avenue, Sidney B.C. V8L 5X6 CANADA
T: +1-250-656-0771 F: +1-250-655-3655 Email: service@AMLoceanographic.com

Certificate of Calibration

Customer:	David Evans & Associates
Asset Serial Number:	007561
Asset Product Type:	Micro X-Series, Primary Only, 500m Housing PDC-MIX-P1S0-05
Calibration Type:	Sound Velocity
Calibration Range:	1400-1600 m/s
Calibration RMS Error:	.006
Calibration ID:	Xchange 200264 2011-03-14 18:28:00Z
Installed On:	

Coefficient A:	0.000000E-01	Coefficient G:	
Coefficient B:	0.000000E-01	Coefficient H:	
Coefficient C:	-1.134467E-07	Coefficient I:	
Coefficient D:	1.938080E-07	Coefficient J:	
Coefficient E:	-1.835992E-05	Coefficient K:	
Coefficient F:	1.942865E-07	Coefficient L:	
		Coefficient M:	

Calibration Date (dd/mm/yyyy): 14/3/2011

Certified By:

Robert Haydock
President, AML Oceanographic

AML Oceanographic certifies that the asset described above has been calibrated or recalibrated with equipment referenced to traceable standards. Please note that Xchange™ sensor-heads may be installed on assets other than the one listed above; this calibration certificate will still be valid when used on other such assets. If this instrument or sensor has been recalibrated, please be sure to update your records. Please also ensure that you update the instrument's coefficient values in any post-processing software that you use, if necessary. Older generation instruments may require configuration files, which are available for download at our Customer Centre at www.AMLoceanographic.com/support

AML Oceanographic
2071 Malaview Avenue, Sidney B.C. V8L 5X6 CANADA
T: +1-250-656-0771 F: +1-250-655-3655 Email: service@AMLoceanographic.com

Certificate of Calibration

Customer:	David Evans & Associates
Asset Serial Number:	201077
Asset Product Type:	SV•Xchange™ Calibrated Sensor - v2
Calibration Type:	Sound Velocity
Calibration Range:	1375 to 1625 m/s
Calibration RMS Error:	.012
Calibration ID:	201077 999999 201077 140911 091010
Installed On:	008099

Coefficient A:	0.000000E+0	Coefficient G:	0.000000E+0
Coefficient B:	0.000000E+0	Coefficient H:	0.000000E+0
Coefficient C:	4.842877E-8	Coefficient I:	0.000000E+0
Coefficient D:	1.948436E-7	Coefficient J:	0.000000E+0
Coefficient E:	-1.797336E-5	Coefficient K:	0.000000E+0
Coefficient F:	1.953956E-7	Coefficient L:	0.000000E+0
		Coefficient M:	0.000000E+0

Calibration Date (dd/mm/yyyy): 14/9/2011

Certified By:

Robert Haydock

President, AML Oceanographic

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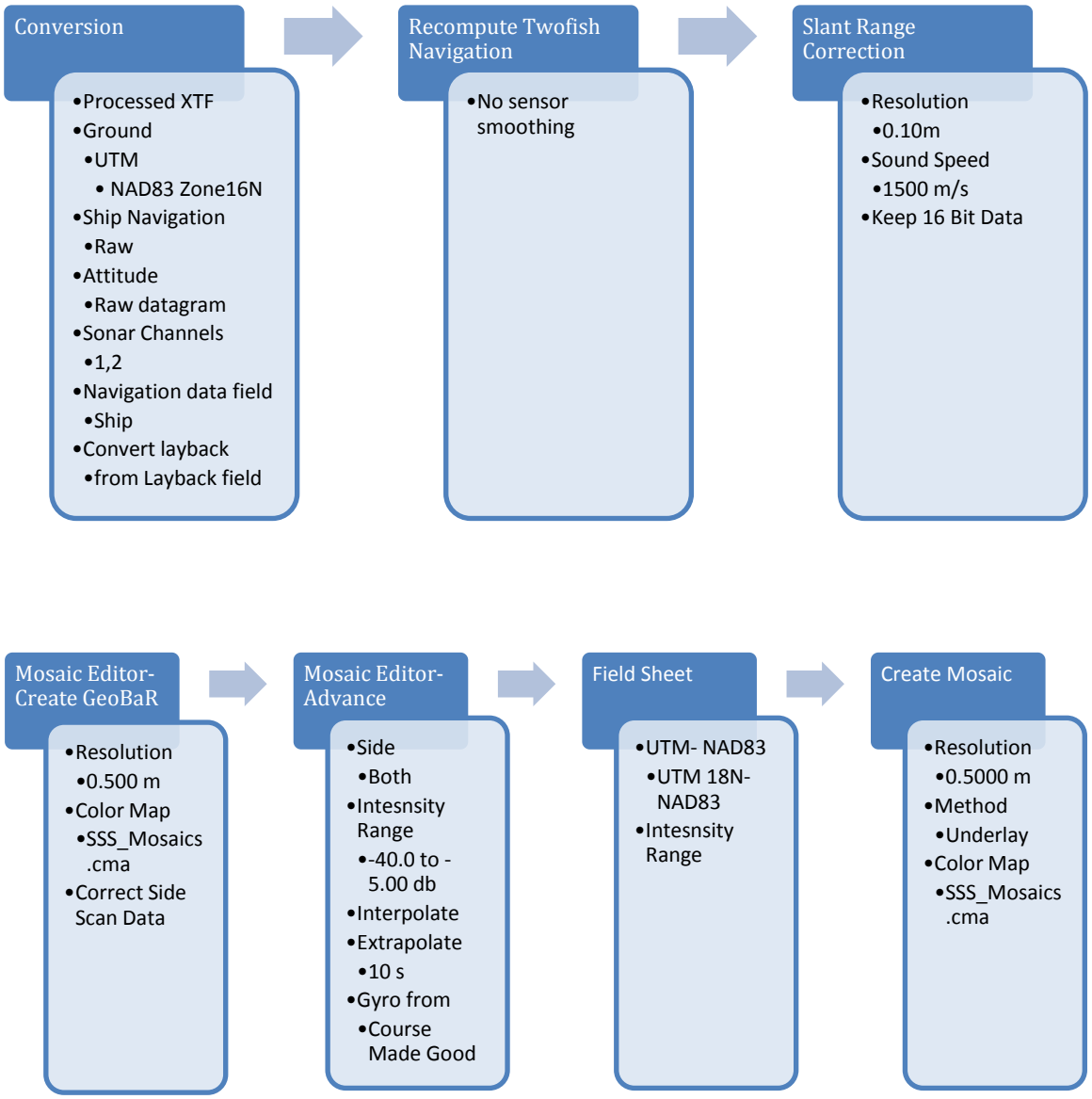
APPENDIX V
CARIS SIPS SIDE SCAN PROCESSING GUIDANCE

CARIS SIPS Side Scan Data Processing Guidance

As described in Section B6 of this document, side scan sonar contacts were selected in Triton ISIS and mosaics of the survey area were created using Chesapeake SonarWiz. XTF data were bottom tracked and towfish layback was applied in SonarWiz. These "Processed" XTFs, were used for the conversion procedures listed below.

The following diagram outlines the processing sequence for the creation of seafloor mosaics using CARIS HIPS and SIPS.