

OPR-N360-NRT3-09
Data Acquisition and Processing Report

APPENDICES

APPENDIX I
Software Versions and Hardware Serial Numbers

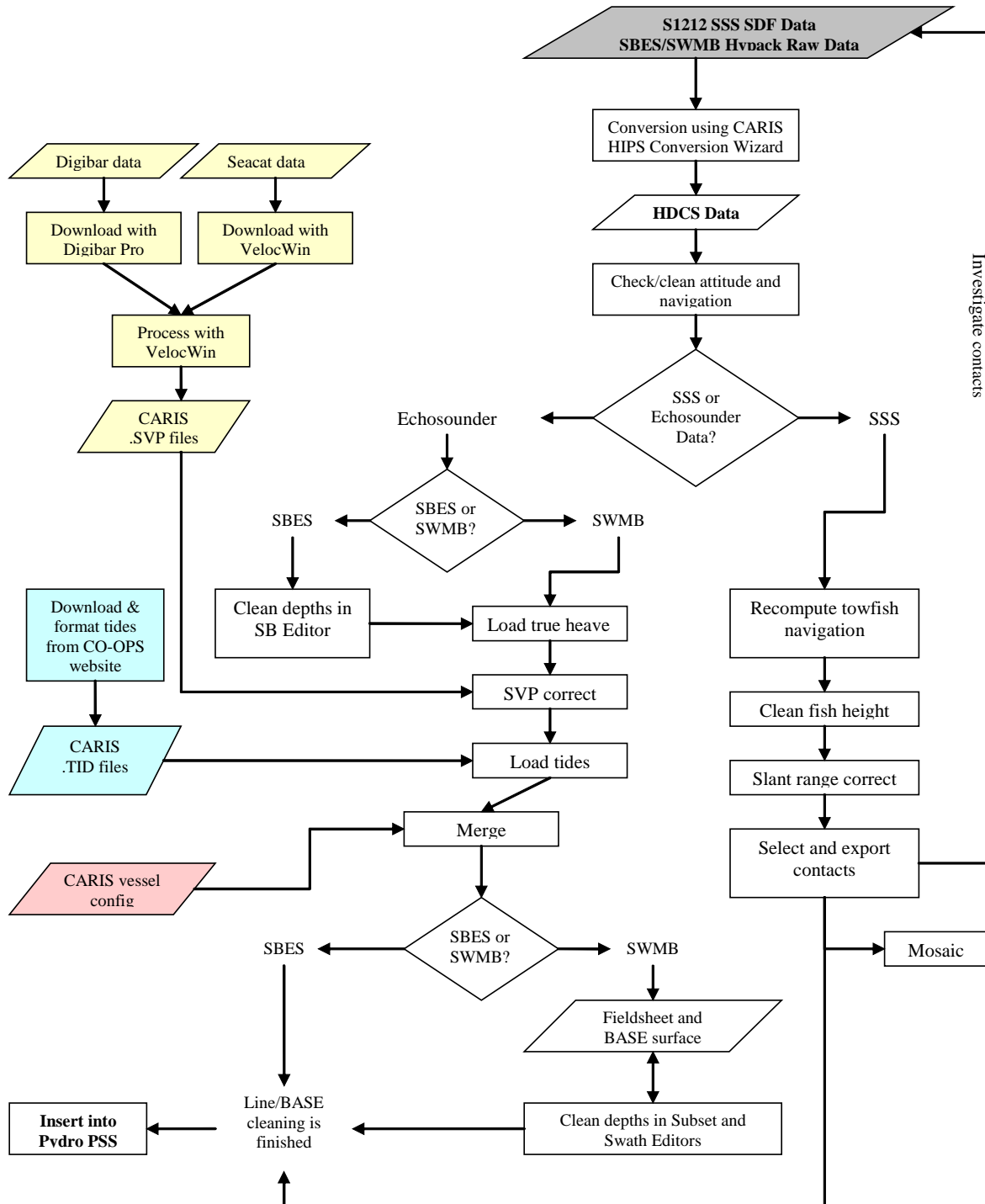
In-service date	Software	Version
Acquisition		
04/20/2009	<u>Hypack Max</u>	2009
03/15/2008	Klein 3000 Sonar Pro	11.2
08/01/2006	TSIP Talker	2.0
08/01/2006	POS MV Controller	3.3.0.1
08/01/2006	EM3000 Controller	1.0.91
08/01/2006	Echotrac Control Software	3.08
Processing		
04/14/2009	Pydro	9.4
08/01/2006	KapConv	5.7.3
10/15/2008	MapInfo	9.5
01/29/2007	HydroMI	6.10.2
08/01/2006	Vertical Mapper	2.0
03/19/2009	Caris HIPS/SIPS	6.1, SP2
03/03/2004	CARIS GIS	4.4a
07/19/2007	Nobeltec Tides & Currents	3.5.107
Sound Velocity		
05/21/2007	VelocWin	8.86
03/31/2005	Digibar Pro Log	2.3
05/01/2007	Sea Term	1.57

In-service date	Equipment	Serial Number
Survey Launch 1212		
03/03/2004	Klein 3000 Dual Frequency Towfish (Model 3210)	456
03/03/2004	Klein 3000 TPU	312
03/03/2004	Klein 3000 Workstation	22-291
03/03/2004	Trimble DSM212L	0220164491
03/03/2004	Trimble Antenna	0220330095
03/03/2004	Dynapar Max Count Cable Counter	N/A
03/31/2005	Odom Digibar Pro DB-200 Controller	98308
08/01/2007	Odom Digibar Pro DB-200 Probe	98314
05/18/2007 through 08/01/2007	Odom Digibar Pro DB-200 Probe	98206
10/24/2005	Odom ETCVX2 (EchoTrac CV)	23015
01/28/2009	POS MV Controller	A014934
08/01/2006	POS MV IMU	Unknown
08/01/2006	Trimble Zephyr Antennas	Port 60080830 Stbd 60069001
08/01/2006	Simrad EM 3000 Multibeam Sonar	358
08/01/2006	Simrad EM 3000 Controller	1534 Dongle 040131
08/01/2006	New Hypack Computer from PHB	B7F8M41
09/05/2006	SBE 19 Seacat	1913768-2039
10/10/2006	SBE 19 Plus Seacat	19P44126-4778
NRT3 Office		
08/01/2006	NRT3-1 Data Processing CPU	9VQLKB1
08/01/2006	NRT3-2 Data Processing CPU	BVQLKB1
08/01/2006	NRT3-3 Data Processing CPU(Hard Disk Failure 04/09/09)	H5TYT61
10/01/2008	NRT Data Processing CPU	1K5N2H1
Trimble Handheld GPS Unit		
07/26/2006	GeoXT 12 Channel GPS Receiver/Handheld	SN 4428E01847 / PN 50950-20
07/26/2006	Beacon-on-a-Belt Differential Receiver/Antenna	SN 0440111069 / PN 38508-00

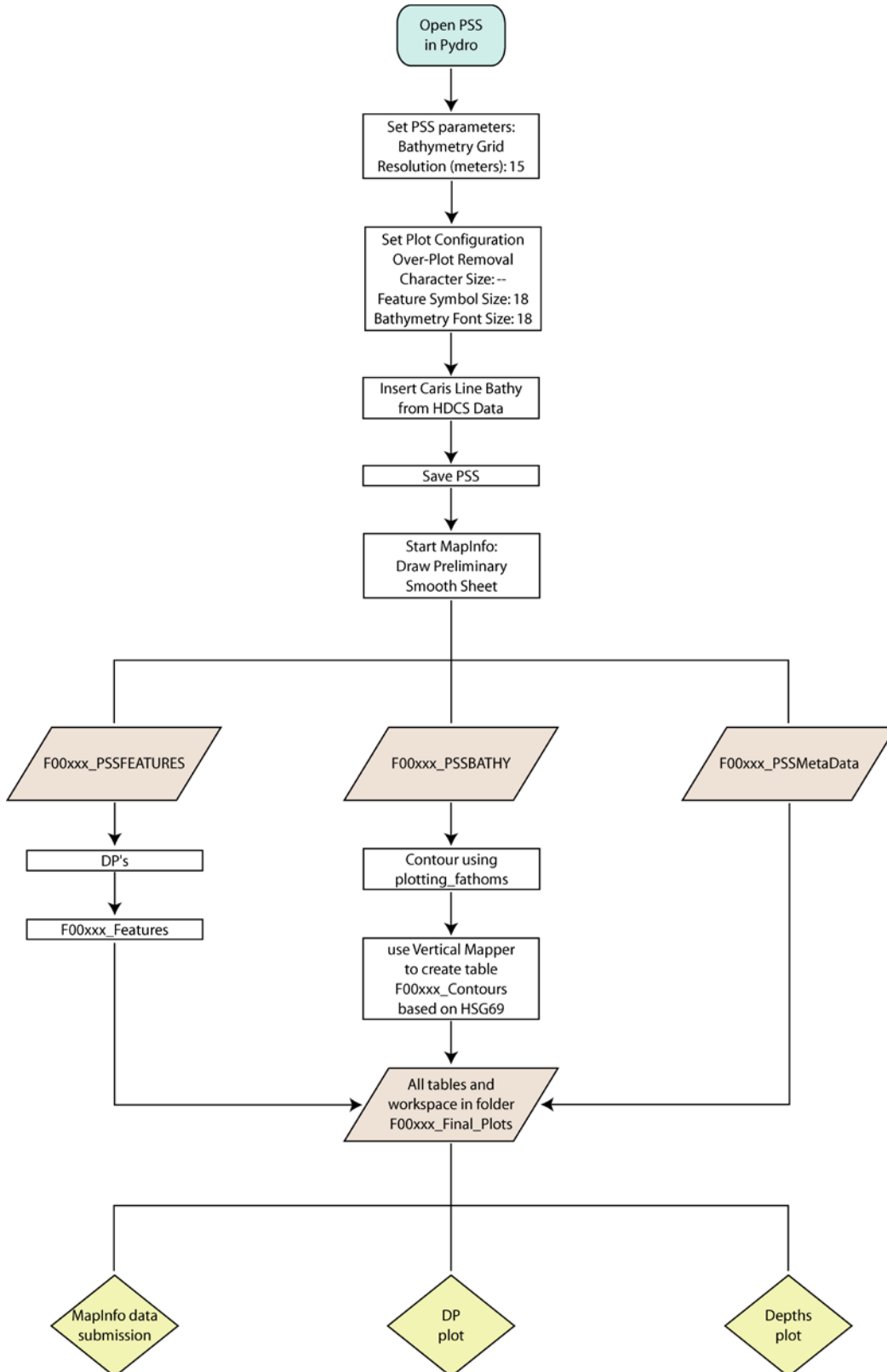
APPENDIX II

Processing Flow Diagrams

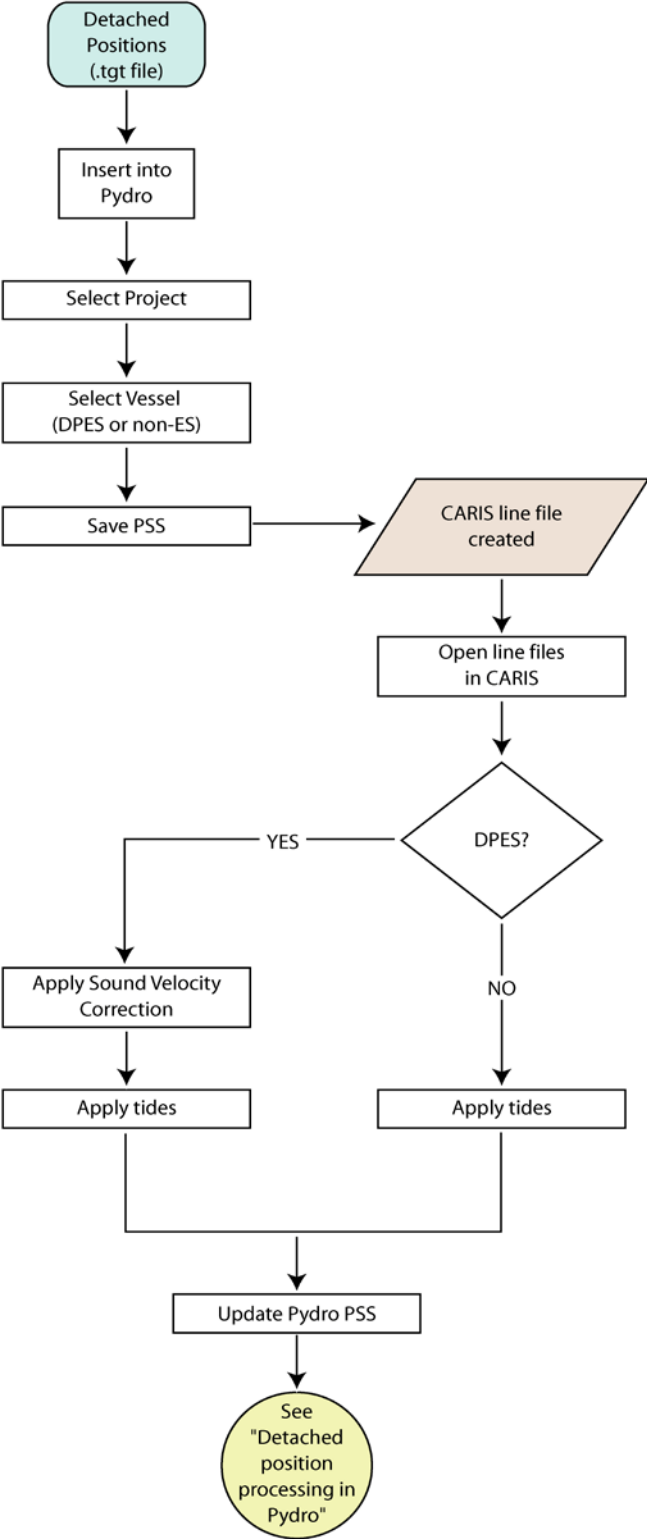
Raw SSS/Hypack Data to Pydro



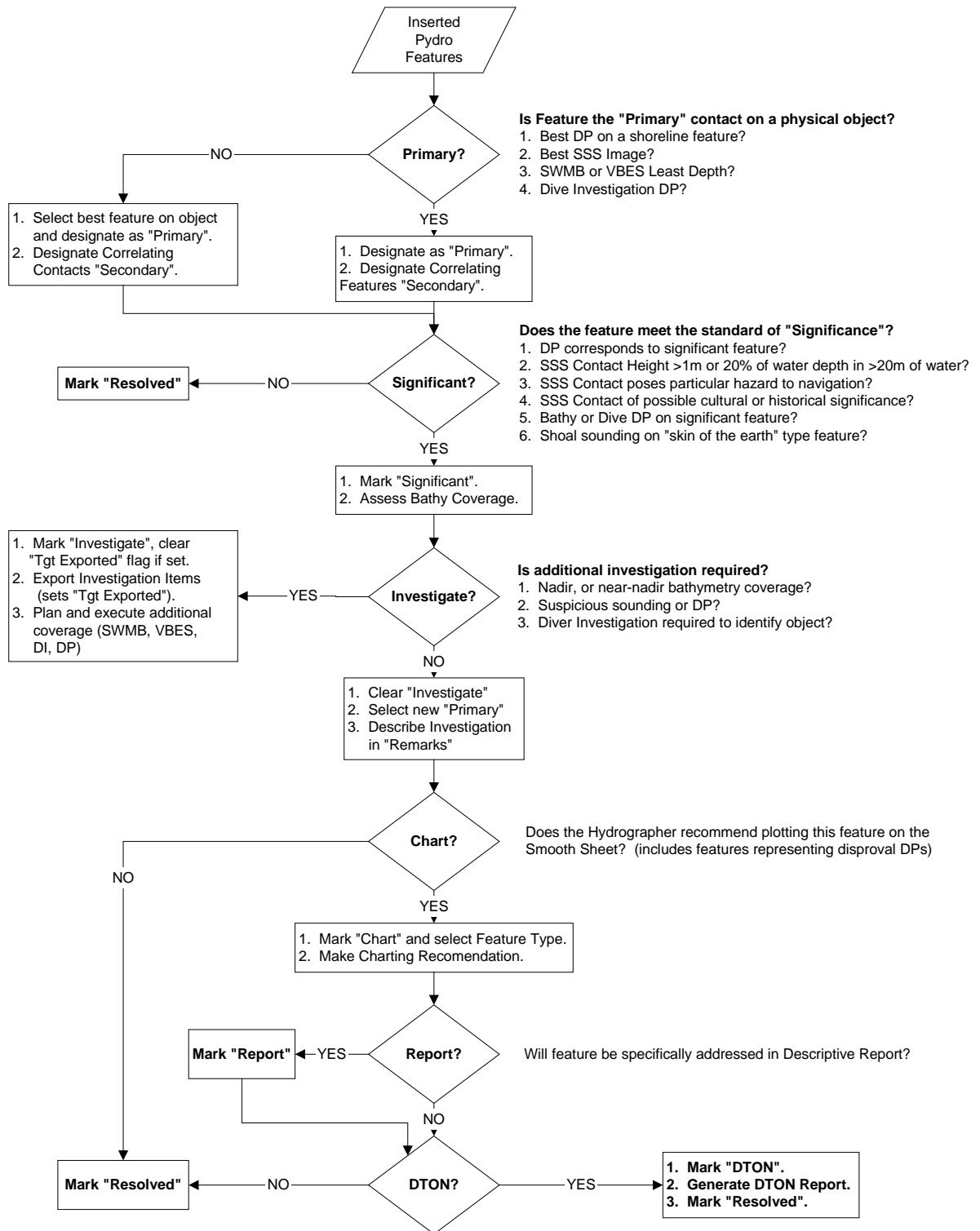
Caris Data to MapInfo Plot



Detached Position Processing

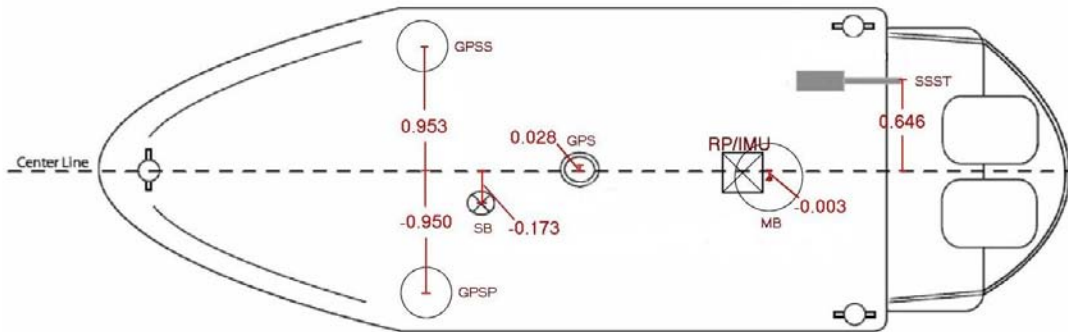


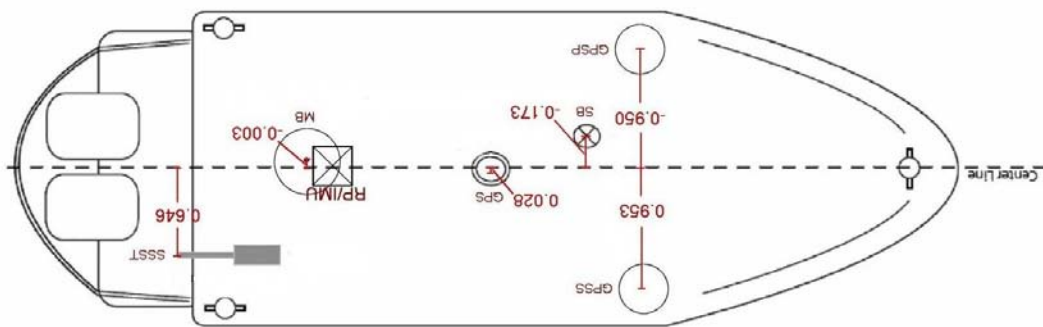
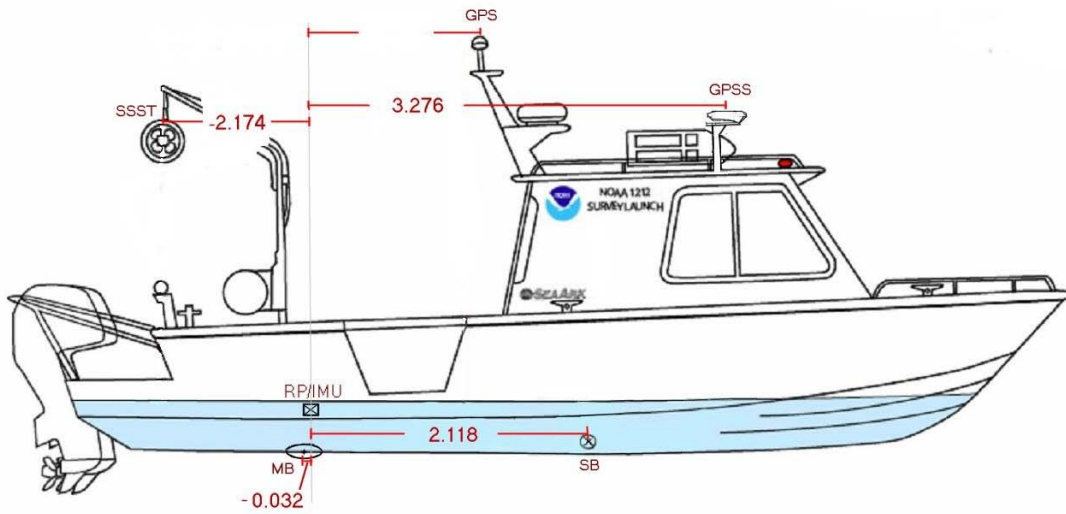
Detached Position processing in Pydro



APPENDIX III

Vessel Offsets





CARIS HIPS Vessel Configuration Files

S1212 SBES HIPS Vessel File

Vessel Name: 1212sb.hvf

Vessel created: October 23, 2006

Depth Sensor:

Sensor Class: Swath
Time Stamp: 2004-274 00:00

Transducer #1:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

Manufacturer:
Model: Unknown
Serial Number:

Depth Sensor:

Sensor Class: Swath
Time Stamp: 2006-103 00:00

Transducer #1:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

Manufacturer:
Model: Unknown
Serial Number:

Depth Sensor:

Sensor Class: Swath
Time Stamp: 2006-228 00:00

Transducer #1:

Pitch Offset: 0.000
Roll Offset: 0.000

Azimuth Offset: 0.000

DeltaX: -0.173

DeltaY: 2.118

DeltaZ: 0.419

Manufacturer: Odom

Model: Unknown

Serial Number: Echotrac CV--23015

Navigation Sensor:

Time Stamp: 2004-274 00:00

Comments

Latency 0.000

DeltaX: 0.170

DeltaY: -0.720

DeltaZ: -3.940

Manufacturer:

Model:

Serial Number:

Time Stamp: 2006-103 00:00

Comments

Latency 0.000

DeltaX: 0.170

DeltaY: -0.720

DeltaZ: -3.940

Manufacturer:

Model:

Serial Number:

Time Stamp: 2006-228 00:00

Comments RP to IMU

Latency 0.000

DeltaX: 0.000

DeltaY: 0.000

DeltaZ: 0.000

Manufacturer: Trimble/Applanix

Model: Zephyr/POSMV4

Serial Number:

Gyro Sensor:

Time Stamp: 2004-274 00:00

Comments
Latency 0.000

Time Stamp: 2006-103 00:00

Comments
Latency 0.000

Time Stamp: 2006-228 00:00

Comments
Latency 0.000

Heave Sensor:

Time Stamp: 2006-228 00:00

Comments
Apply Yes
Latency 0.000
DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000
Offset: 0.000

Manufacturer: Applanix
Model: POSMV4
Serial Number:

Pitch Sensor:

Time Stamp: 2006-228 00:00

Comments
Apply Yes
Latency 0.000
Pitch offset: 0.000

Manufacturer: Applanix
Model: POSMV4
Serial Number:

Roll Sensor:

Time Stamp: 2006-228 00:00

Comments
Apply Yes
Latency 0.000
Roll offset: 0.000

Manufacturer: Applanix
Model: POSMV4
Serial Number:

Draft Sensor:

Time Stamp: 2004-274 00:00

**Apply Yes
Comments**

Entry 1) Draft: 0.000	Speed: 3.100
Entry 2) Draft: 0.045	Speed: 4.900
Entry 3) Draft: 0.099	Speed: 5.500
Entry 4) Draft: 0.149	Speed: 6.300
Entry 5) Draft: 0.128	Speed: 7.000
Entry 6) Draft: 0.117	Speed: 7.600
Entry 7) Draft: 0.098	Speed: 8.100
Entry 8) Draft: 0.091	Speed: 8.300
Entry 9) Draft: 0.079	Speed: 8.700
Entry 10) Draft: 0.043	Speed: 9.400
Entry 11) Draft: 0.029	Speed: 10.100
Entry 12) Draft: 0.025	Speed: 10.800
Entry 13) Draft: -0.023	Speed: 11.800
Entry 14) Draft: -0.063	Speed: 12.900
Entry 15) Draft: -0.058	Speed: 13.800
Entry 16) Draft: -0.073	Speed: 15.000
Entry 17) Draft: -0.044	Speed: 15.800

Time Stamp: 2006-103 00:00

**Apply Yes
Comments**

Entry 1) Draft: 0.000	Speed: 3.100
Entry 2) Draft: 0.045	Speed: 4.900
Entry 3) Draft: 0.099	Speed: 5.499
Entry 4) Draft: 0.149	Speed: 6.300
Entry 5) Draft: 0.128	Speed: 7.000
Entry 6) Draft: 0.117	Speed: 7.600
Entry 7) Draft: 0.098	Speed: 8.100
Entry 8) Draft: 0.091	Speed: 8.300
Entry 9) Draft: 0.079	Speed: 8.701
Entry 10) Draft: 0.043	Speed: 9.400
Entry 11) Draft: 0.029	Speed: 10.100
Entry 12) Draft: 0.025	Speed: 10.800
Entry 13) Draft: -0.023	Speed: 11.799
Entry 14) Draft: -0.063	Speed: 12.899
Entry 15) Draft: -0.058	Speed: 13.799
Entry 16) Draft: -0.073	Speed: 15.001
Entry 17) Draft: -0.044	Speed: 15.800

Time Stamp: 2006-228 00:00

**Apply Yes
Comments**

Entry 1) Draft: 0.000	Speed: 4.599
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Entry 2) Draft: -0.003	Speed: 5.171
Entry 3) Draft: 0.029	Speed: 5.853
Entry 4) Draft: 0.028	Speed: 6.685
Entry 5) Draft: 0.044	Speed: 7.361
Entry 6) Draft: 0.014	Speed: 8.013
Entry 7) Draft: 0.032	Speed: 8.421
Entry 8) Draft: -0.013	Speed: 9.251
Entry 9) Draft: -0.064	Speed: 10.503
Entry 10) Draft: -0.048	Speed: 11.848
Entry 11) Draft: -0.140	Speed: 14.153

Time Stamp: 2009-118 00:00

Apply Yes

Comments

Entry 1) Draft: 0.000	Speed: 3.075
Entry 2) Draft: 0.014	Speed: 4.675
Entry 3) Draft: 0.009	Speed: 5.332
Entry 4) Draft: 0.023	Speed: 5.985
Entry 5) Draft: 0.032	Speed: 6.778
Entry 6) Draft: 0.032	Speed: 7.394
Entry 7) Draft: 0.036	Speed: 7.935
Entry 8) Draft: 0.036	Speed: 8.162
Entry 9) Draft: 0.037	Speed: 8.627
Entry 10) Draft: 0.020	Speed: 9.334
Entry 11) Draft: -0.011	Speed: 10.536
Entry 12) Draft: -0.049	Speed: 12.415

TPE

Time Stamp: 2004-274 00:00

Comments

Offsets

Motion sensing unit to the transducer 1

X Head 1 0.000

Y Head 1 0.000

Z Head 1 0.000

Motion sensing unit to the transducer 2

X Head 2 0.000

Y Head 2 0.000

Z Head 2 0.000

Navigation antenna to the transducer 1

X Head 1 -0.170

Y Head 1 0.720

Z Head 1 3.940

Navigation antenna to the transducer 2

X Head 2 0.000

Y Head 2 0.000

Z Head 2 0.000

Roll offset of transducer number 1 0.000

Roll offset of transducer number 2 0.000

Heave Error: 0.000 or 0.000" of heave amplitude.

Measurement errors: 0.020
Motion sensing unit alignment errors
Gyro:0.000 Pitch:0.000 Roll:0.000
Gyro measurement error: 0.000
Roll measurement error: 0.000
Pitch measurement error: 0.000
Navigation measurement error: 0.000
Transducer timing error: 0.000
Navigation timing error: 0.100
Gyro timing error: 0.000
Heave timing error: 0.000
PitchTimingStdDev: 0.000
Roll timing error: 0.000
Sound Velocity speed measurement error: 0.000
Surface sound speed measurement error: 0.000
Tide measurement error: 0.000
Tide zoning error: 0.000
Speed over ground measurement error: 0.030
Dynamic loading measurement error: 0.030
Static draft measurement error: 0.050
Delta draft measurement error: 0.010
StDev Comment: 0>,,J □ †J@3†Jp4†J 1†J0□...J .†J0^,,J}€J°□ †Ja

Time Stamp: 2006-228 00:00

Comments
Offsets

Motion sensing unit to the transducer 1

X Head 1 -0.173
Y Head 1 2.118
Z Head 1 0.419

Motion sensing unit to the transducer 2

X Head 2 0.000
Y Head 2 0.000
Z Head 2 0.000

Navigation antenna to the transducer 1

X Head 1 -0.173
Y Head 1 2.118
Z Head 1 0.419

Navigation antenna to the transducer 2

X Head 2 0.000
Y Head 2 0.000
Z Head 2 0.000

Roll offset of transducer number 1 0.000
Roll offset of transducer number 2 0.000

Heave Error: 0.050 or 5.000" of heave amplitude.

Measurement errors: 0.020
Motion sensing unit alignment errors
Gyro:1.000 Pitch:1.000 Roll:1.000
Gyro measurement error: 0.020
Roll measurement error: 0.020
Pitch measurement error: 0.020
Navigation measurement error: 0.700

Transducer timing error: 0.010
Navigation timing error: 0.001
Gyro timing error: 0.001
Heave timing error: 0.001
PitchTimingStdDev: 0.001
Roll timing error: 0.001
Sound Velocity speed measurement error: 0.000
Surface sound speed measurement error: 0.000
Tide measurement error: 0.000
Tide zoning error: 0.000
Speed over ground measurement error: 0.030
Dynamic loading measurement error: 0.030
Static draft measurement error: 0.050
Delta draft measurement error: 0.010
StdDev Comment: 0>,,J □ †J@3†Jp4†J 1†J0□...J .†J0^,,J }€J°□ †Ja

Svp Sensor:

Time Stamp: 2004-274 00:00

Comments

Svp #1:

Pitch Offset: 0.000

Roll Offset: 0.000

Azimuth Offset: 0.000

DeltaX: 0.000

DeltaY: 0.000

DeltaZ: 0.000

SVP #2:

Pitch Offset: 0.000

Roll Offset: 0.000

Azimuth Offset: 0.000

DeltaX: 0.000

DeltaY: 0.000

DeltaZ: 0.000

Time Stamp: 2006-103 00:00

Comments

Svp #1:

Pitch Offset: 0.000

Roll Offset: 0.000

Azimuth Offset: 0.000

DeltaX: 0.000

DeltaY: 0.000

DeltaZ: 0.000

SVP #2:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

Time Stamp: 2006-228 00:00

Comments

Svp #1:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: -0.173
DeltaY: 2.118
DeltaZ: 0.419

SVP #2:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

WaterLine:

Time Stamp: 2004-274 00:00

Comments

Apply Yes
WaterLine -0.400

Time Stamp: 2006-103 00:00

Comments

Apply Yes
WaterLine -0.400

Time Stamp: 2006-228 00:00

Comments RP to "mean water level" as surveyed

Apply Yes
WaterLine 0.022

S1212 SSS HIPS Vessel File

Vessel Name: S1212sss_100.hvf
Vessel created: March 06, 2007

Depth Sensor:

Sensor Class: Swath
Time Stamp: 2002-084 00:00

Transducer #1:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

Manufacturer:
Model: Unknown
Serial Number:

Depth Sensor:

Sensor Class: Swath
Time Stamp: 2004-147 00:00

Transducer #1:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

Manufacturer:
Model: Unknown
Serial Number:

Depth Sensor:

Sensor Class: Swath
Time Stamp: 2004-274 00:00

Transducer #1:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

Manufacturer:
Model: Unknown
Serial Number:

Depth Sensor:

Sensor Class: Swath
Time Stamp: 2006-103 00:00

Transducer #1:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

Manufacturer:
Model: Unknown
Serial Number:

Depth Sensor:

Sensor Class: Swath
Time Stamp: 2006-228 00:00

Transducer #1:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: -0.173
DeltaY: 2.118
DeltaZ: 0.419

Manufacturer: Odom
Model: Unknown
Serial Number: Echotrac CV--23015

Navigation Sensor:

Time Stamp: 2006-103 00:00

Comments
Latency 0.000
DeltaX: 0.170
DeltaY: -0.720
DeltaZ: -3.940

Manufacturer:
Model:
Serial Number:

Time Stamp: 2006-228 00:00

Comments RP to IMU

Latency 0.000

DeltaX: 0.000

DeltaY: 0.000

DeltaZ: 0.000

Manufacturer: Trimble/Applanix
Model: Zephyr/POSMV4
Serial Number:

Gyro Sensor:

Time Stamp: 2002-084 00:00

Comments

Latency 0.000

Entry 0) Draft: 0.000 Speed: 0.000

Time Stamp: 2004-147 00:00

Comments

Latency 0.000

Entry 0) Draft: 0.000 Speed: 0.000

Time Stamp: 2004-274 00:00

Comments

Latency 0.000

Time Stamp: 2006-103 00:00

Comments

Latency 0.000

Time Stamp: 2006-228 00:00

Comments

Latency 0.000

Heave Sensor:

Time Stamp: 2006-228 00:00

Comments
Apply Yes
Latency 0.000
DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000
Offset: 0.000

Manufacturer: Applanix
Model: POSMV4
Serial Number:

Pitch Sensor:

Time Stamp: 2006-228 00:00

Comments
Apply Yes
Latency 0.000
Pitch offset: 0.000

Manufacturer: Applanix
Model: POSMV4
Serial Number:

Roll Sensor:

Time Stamp: 2006-228 00:00

Comments
Apply Yes
Latency 0.000
Roll offset: 0.000

Manufacturer: Applanix
Model: POSMV4
Serial Number:

Draft Sensor:

Time Stamp: 2002-084 00:00

Apply Yes
Comments
Entry 1) Draft: 0.000 Speed: 5.300
Entry 2) Draft: -0.100 Speed: 5.400
Entry 3) Draft: -0.200 Speed: 7.500
Entry 4) Draft: -0.300 Speed: 20.000

Time Stamp: 2004-147 00:00

Apply Yes

Comments

Entry 1) Draft: 0.017	Speed: 4.600
Entry 2) Draft: 0.000	Speed: 5.500
Entry 3) Draft: 0.032	Speed: 5.900
Entry 4) Draft: 0.026	Speed: 6.700
Entry 5) Draft: 0.041	Speed: 7.200
Entry 6) Draft: 0.110	Speed: 7.700
Entry 7) Draft: 0.007	Speed: 7.800
Entry 8) Draft: 0.020	Speed: 8.300
Entry 9) Draft: 0.011	Speed: 9.200
Entry 10) Draft: 0.030	Speed: 10.000
Entry 11) Draft: 0.010	Speed: 11.900
Entry 12) Draft: -0.012	Speed: 13.900
Entry 13) Draft: -0.047	Speed: 20.200

Time Stamp: 2004-274 00:00

Apply Yes

Comments

Entry 1) Draft: 0.000	Speed: 3.100
Entry 2) Draft: 0.045	Speed: 4.900
Entry 3) Draft: 0.099	Speed: 5.500
Entry 4) Draft: 0.149	Speed: 6.300
Entry 5) Draft: 0.128	Speed: 7.000
Entry 6) Draft: 0.117	Speed: 7.600
Entry 7) Draft: 0.098	Speed: 8.100
Entry 8) Draft: 0.091	Speed: 8.300
Entry 9) Draft: 0.079	Speed: 8.700
Entry 10) Draft: 0.043	Speed: 9.400
Entry 11) Draft: 0.029	Speed: 10.100
Entry 12) Draft: 0.025	Speed: 10.800
Entry 13) Draft: -0.023	Speed: 11.800
Entry 14) Draft: -0.063	Speed: 12.900
Entry 15) Draft: -0.058	Speed: 13.800
Entry 16) Draft: -0.073	Speed: 15.000
Entry 17) Draft: -0.044	Speed: 15.800

Time Stamp: 2006-103 00:00

Apply Yes

Comments

Entry 1) Draft: 0.000	Speed: 3.100
Entry 2) Draft: 0.045	Speed: 4.900
Entry 3) Draft: 0.099	Speed: 5.499
Entry 4) Draft: 0.149	Speed: 6.300
Entry 5) Draft: 0.128	Speed: 7.000
Entry 6) Draft: 0.117	Speed: 7.600
Entry 7) Draft: 0.098	Speed: 8.100
Entry 8) Draft: 0.091	Speed: 8.300
Entry 9) Draft: 0.079	Speed: 8.701
Entry 10) Draft: 0.043	Speed: 9.400
Entry 11) Draft: 0.029	Speed: 10.100
Entry 12) Draft: 0.025	Speed: 10.800
Entry 13) Draft: -0.023	Speed: 11.799
Entry 14) Draft: -0.063	Speed: 12.899
Entry 15) Draft: -0.058	Speed: 13.799

Entry 16) Draft: -0.073 Speed: 15.001
Entry 17) Draft: -0.044 Speed: 15.800

Time Stamp: 2006-228 00:00

Apply Yes

Comments

Entry 1) Draft: 0.000 Speed: 4.599
Entry 2) Draft: -0.003 Speed: 5.171
Entry 3) Draft: 0.029 Speed: 5.853
Entry 4) Draft: 0.028 Speed: 6.685
Entry 5) Draft: 0.044 Speed: 7.361
Entry 6) Draft: 0.014 Speed: 8.013
Entry 7) Draft: 0.032 Speed: 8.421
Entry 8) Draft: -0.013 Speed: 9.251
Entry 9) Draft: -0.064 Speed: 10.503
Entry 10) Draft: -0.048 Speed: 11.848
Entry 11) Draft: -0.140 Speed: 14.153

Time Stamp: 2009-118 00:00

Apply Yes

Comments

Entry 1) Draft: 0.000 Speed: 3.075
Entry 2) Draft: 0.014 Speed: 4.675
Entry 3) Draft: 0.009 Speed: 5.332
Entry 4) Draft: 0.023 Speed: 5.985
Entry 5) Draft: 0.032 Speed: 6.778
Entry 6) Draft: 0.032 Speed: 7.394
Entry 7) Draft: 0.036 Speed: 7.935
Entry 8) Draft: 0.036 Speed: 8.162
Entry 9) Draft: 0.037 Speed: 8.627
Entry 10) Draft: 0.020 Speed: 9.334
Entry 11) Draft: -0.011 Speed: 10.536
Entry 12) Draft: -0.049 Speed: 12.415

Tow Point:

Time Stamp: 2002-084 00:00

Comments

Latency 0.000

DeltaX: 0.760

DeltaY: -4.200

DeltaZ: -2.800

Manufacturer:

Model:

Serial Number:

Time Stamp: 2004-147 00:00

Comments

Latency 0.000

DeltaX: 0.760

DeltaY: -4.200
DeltaZ: -2.800

Manufacturer:
Model:
Serial Number:

Time Stamp: 2004-274 00:00

Comments
Latency 0.000
DeltaX: 0.760
DeltaY: -4.200
DeltaZ: -2.800

Manufacturer:
Model:
Serial Number:

Time Stamp: 2006-103 00:00

Comments
Latency 0.000
DeltaX: 0.760
DeltaY: -4.200
DeltaZ: -2.800

Manufacturer:
Model:
Serial Number:

Time Stamp: 2006-228 00:00

Comments
Latency 0.000
DeltaX: 0.646
DeltaY: -2.174
DeltaZ: -2.567

Manufacturer:
Model:
Serial Number:

Svp Sensor:

Time Stamp: 2002-084 00:00

Comments
Svp #1:

Pitch Offset: 0.000
Roll Offset: 0.000

Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

SVP #2:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

Time Stamp: 2004-147 00:00

Comments

Svp #1:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

SVP #2:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

Time Stamp: 2004-274 00:00

Comments

Svp #1:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

SVP #2:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

Time Stamp: 2006-103 00:00

Comments

Svp #1:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

SVP #2:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

Time Stamp: 2006-228 00:00

Comments

Svp #1:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: -0.173
DeltaY: 2.118
DeltaZ: 0.419

SVP #2:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

WaterLine:

Time Stamp: 2002-084 00:00

**Comments
Apply Yes
WaterLine -0.400**

Time Stamp: 2004-147 00:00

**Comments
Apply Yes
WaterLine -0.400**

Time Stamp: 2004-274 00:00

**Comments
Apply Yes
WaterLine -0.400**

Time Stamp: 2006-103 00:00

**Comments
Apply Yes
WaterLine -0.400**

Time Stamp: 2006-228 00:00

**Comments RP to "mean water level" as surveyed
Apply Yes
WaterLine 0.022**

S1212 SWMB HIPS Vessel File

**Vessel Name: S1212_Simrad.hvf
Vessel created: February 22, 2007**

Depth Sensor:

**Sensor Class: Swath
Time Stamp: 2006-234 00:00**

Transducer #1:

**Pitch Offset: 0.000
Roll Offset: -0.060
Azimuth Offset: 0.000**

**DeltaX: -0.003
DeltaY: -0.032
DeltaZ: 0.631**

Manufacturer: Kongsberg
Model: em3000
Serial Number:

Depth Sensor:

Sensor Class: Swath
Time Stamp: 2008-114 00:00

Transducer #1:

Pitch Offset: 0.000
Roll Offset: -0.060
Azimuth Offset: 0.000

DeltaX: -0.003
DeltaY: -0.032
DeltaZ: 0.631

Manufacturer: Kongsberg
Model: em3000
Serial Number:

Depth Sensor:

Sensor Class: Swath
Time Stamp: 2009-110 00:00

Transducer #1:

Pitch Offset: 0.000
Roll Offset: -0.060
Azimuth Offset: 0.000

DeltaX: -0.003
DeltaY: -0.032
DeltaZ: 0.631

Manufacturer: Kongsberg
Model: em3000
Serial Number:

Navigation Sensor:

Time Stamp: 2006-234 00:00

Comments RP
Latency 0.000
DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

Manufacturer: Applanix
Model: POS/MV4
Serial Number: (null)

Gyro Sensor:

Time Stamp: 2006-234 00:00

Comments (null)

Latency 0.000

Heave Sensor:

Time Stamp: 2006-234 00:00

Comments (null)

Apply Yes

Latency 0.000

DeltaX: 0.000

DeltaY: 0.000

DeltaZ: 0.000

Offset: 0.000

Manufacturer: Applanix

Model: POS/MV4

Serial Number: (null)

Pitch Sensor:

Time Stamp: 2006-234 00:00

Comments (null)

Apply Yes

Latency 0.000

Pitch offset: 0.000

Manufacturer: Applanix

Model: POS/MV4

Serial Number: (null)

Roll Sensor:

Time Stamp: 2006-234 00:00

Comments (null)

Apply Yes

Latency 0.000

Roll offset: 0.000

Manufacturer: Applanix

Model: POS/MV4

Serial Number: (null)

Draft Sensor:

Time Stamp: 2006-234 00:00

Apply Yes

Comments (null)

Entry 1) Draft: 0.000	Speed: 4.599
Entry 2) Draft: -0.003	Speed: 5.171
Entry 3) Draft: 0.029	Speed: 5.853
Entry 4) Draft: 0.028	Speed: 6.685
Entry 5) Draft: 0.044	Speed: 7.361
Entry 6) Draft: 0.014	Speed: 8.013
Entry 7) Draft: 0.032	Speed: 8.421
Entry 8) Draft: -0.013	Speed: 9.251
Entry 9) Draft: -0.064	Speed: 10.503
Entry 10) Draft: -0.048	Speed: 11.848
Entry 11) Draft: -0.140	Speed: 14.153

Time Stamp: 2009-118 00:00

Apply Yes

Comments

Entry 1) Draft: 0.000	Speed: 3.076
Entry 2) Draft: 0.014	Speed: 4.674
Entry 3) Draft: 0.009	Speed: 5.332
Entry 4) Draft: 0.023	Speed: 5.986
Entry 5) Draft: 0.032	Speed: 6.777
Entry 6) Draft: 0.032	Speed: 7.394
Entry 7) Draft: 0.036	Speed: 7.936
Entry 8) Draft: 0.036	Speed: 8.162
Entry 9) Draft: 0.037	Speed: 8.626
Entry 10) Draft: 0.020	Speed: 9.334
Entry 11) Draft: -0.011	Speed: 10.535
Entry 12) Draft: -0.049	Speed: 12.416

TPE

Time Stamp: 2006-234 00:00

Comments

Offsets

Motion sensing unit to the transducer 1

X Head 1 -0.003

Y Head 1 -0.032

Z Head 1 0.631

Motion sensing unit to the transducer 2

X Head 2 0.000

Y Head 2 0.000

Z Head 2 0.000

Navigation antenna to the transducer 1

X Head 1 -0.947

Y Head 1 3.288

Z Head 1 3.376

Navigation antenna to the transducer 2

X Head 2 0.000

Y Head 2 0.000

Z Head 2 0.000

Roll offset of transducer number 1 0.000

Roll offset of transducer number 2 0.000

Heave Error: 0.050 or 5.000'' of heave amplitude.

Measurement errors: 0.020

Motion sensing unit alignment errors

Gyro:1.000 Pitch:1.000 Roll:1.000

Gyro measurement error: 0.020

Roll measurement error: 0.020

Pitch measurement error: 0.020

Navigation measurement error: 0.700

Transducer timing error: 0.010

Navigation timing error: 0.001

Gyro timing error: 0.001

Heave timing error: 0.001

PitchTimingStdDev: 0.001

Roll timing error: 0.001

Sound Velocity speed measurement error: 0.000

Surface sound speed measurement error: 0.000

Tide measurement error: 0.000

Tide zoning error: 0.000

Speed over ground measurement error: 0.030

Dynamic loading measurement error: 0.030

Static draft measurement error: 0.050

Delta draft measurement error: 0.010

StDev Comment: 0>,,J □ †J@3†Jp4†J 1†J0□...J .†J0^,,J}€J°□ †Ja

Svp Sensor:

Time Stamp: 2006-234 00:00

Comments

Svp #1:

Pitch Offset: 0.000

Roll Offset: 0.000

Azimuth Offset: 0.000

DeltaX: -0.003

DeltaY: -0.032

DeltaZ: 0.631

SVP #2:

Pitch Offset: 0.000

Roll Offset: 0.000

Azimuth Offset: 0.000

DeltaX: 0.000

DeltaY: 0.000

DeltaZ: 0.000

Time Stamp: 2006-248 00:00

Comments (null)

Svp #1:

Pitch Offset: 0.000

Roll Offset: 0.000

Azimuth Offset: 0.000

DeltaX: -0.003

DeltaY: -0.032

DeltaZ: 0.631

SVP #2:

Pitch Offset: 0.000

Roll Offset: 0.000

Azimuth Offset: 0.000

DeltaX: 0.000

DeltaY: 0.000

DeltaZ: 0.000

Time Stamp: 2008-114 00:00

Comments

Svp #1:

Pitch Offset: 0.000

Roll Offset: 0.000

Azimuth Offset: 0.000

DeltaX: -0.003

DeltaY: -0.032

DeltaZ: 0.631

SVP #2:

Pitch Offset: 0.000

Roll Offset: 0.000

Azimuth Offset: 0.000

DeltaX: 0.000

DeltaY: 0.000

DeltaZ: 0.000

Time Stamp: 2009-110 00:00

Comments

Svp #1:

Pitch Offset: 0.000

Roll Offset: 0.000

Azimuth Offset: 0.000

DeltaX: -0.003
DeltaY: -0.032
DeltaZ: 0.631

SVP #2:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

WaterLine:

Time Stamp: 2006-234 00:00

Comments RP to WL as surveyed
Apply Yes
WaterLine 0.020

S1212 Non-Echosounder DP HIPS Vessel File

Vessel Name: 1212DPnonES.hvf
Vessel created: October 10, 2006

Depth Sensor:

Sensor Class: Swath
Time Stamp: 2004-274 00:00

Transducer #1:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

Manufacturer: Odom
Model:
Serial Number:

Depth Sensor:

Sensor Class: Swath
Time Stamp: 2006-234 00:00

Transducer #1:

Pitch Offset: 0.000
Roll Offset: -0.060
Azimuth Offset: 0.000

DeltaX: -0.003
DeltaY: -0.032
DeltaZ: 0.631

Manufacturer: Kongsberg
Model: em3000
Serial Number:

Navigation Sensor:

Time Stamp: 2004-274 00:00

Comments SB Xducer to Trimble
Latency 0.000
DeltaX: 0.170
DeltaY: -0.720
DeltaZ: -3.940

Manufacturer:
Model:
Serial Number:

Time Stamp: 2006-234 00:00

Comments RP to IMU
Latency 0.000
DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

Manufacturer: Applanix
Model: POS/MV4
Serial Number: (null)

Gyro Sensor:

Time Stamp: 2004-274 00:00

Comments No POS
Latency 0.000

Time Stamp: 2006-234 00:00

Comments (null)
Latency 0.000

Heave Sensor:

Time Stamp: 2004-274 00:00

Comments No POS

Apply No

Latency 0.000

DeltaX: 0.000

DeltaY: 0.000

DeltaZ: 0.000

Offset: 0.000

Manufacturer:

Model:

Serial Number:

Time Stamp: 2006-234 00:00

Comments (null)

Apply Yes

Latency 0.000

DeltaX: 0.000

DeltaY: 0.000

DeltaZ: 0.000

Offset: 0.000

Manufacturer: Applanix

Model: POS/MV4

Serial Number: (null)

Pitch Sensor:

Time Stamp: 2004-274 00:00

Comments No POS

Apply No

Latency 0.000

Pitch offset: 0.000

Manufacturer:

Model:

Serial Number:

Time Stamp: 2006-234 00:00

Comments (null)

Apply Yes

Latency 0.000

Pitch offset: 0.000

Manufacturer: Applanix

Model: POS/MV4

Serial Number: (null)

Roll Sensor:

Time Stamp: 2004-274 00:00

Comments No POS

Apply No

Latency 0.000

Roll offset: 0.000

Manufacturer:

Model:

Serial Number:

Time Stamp: 2006-234 00:00

Comments (null)

Apply Yes

Latency 0.000

Roll offset: 0.000

Manufacturer: Applanix

Model: POS/MV4

Serial Number: (null)

Draft Sensor:

Time Stamp: 2004-274 00:00

Apply No

Comments

Entry 1) Draft: 0.000	Speed: 3.100
Entry 2) Draft: 0.045	Speed: 4.900
Entry 3) Draft: 0.099	Speed: 5.499
Entry 4) Draft: 0.149	Speed: 6.300
Entry 5) Draft: 0.128	Speed: 7.000
Entry 6) Draft: 0.117	Speed: 7.600
Entry 7) Draft: 0.098	Speed: 8.100
Entry 8) Draft: 0.091	Speed: 8.300
Entry 9) Draft: 0.079	Speed: 8.701
Entry 10) Draft: 0.043	Speed: 9.400
Entry 11) Draft: 0.029	Speed: 10.100
Entry 12) Draft: 0.025	Speed: 10.800
Entry 13) Draft: -0.023	Speed: 11.799
Entry 14) Draft: -0.063	Speed: 12.899
Entry 15) Draft: -0.058	Speed: 13.799
Entry 16) Draft: -0.073	Speed: 15.001
Entry 17) Draft: -0.044	Speed: 15.800

Time Stamp: 2006-234 00:00

Apply No

Comments (null)

Entry 1) Draft: 0.000	Speed: 4.599
Entry 2) Draft: -0.003	Speed: 5.171
Entry 3) Draft: 0.029	Speed: 5.853
Entry 4) Draft: 0.028	Speed: 6.685
Entry 5) Draft: 0.044	Speed: 7.361
Entry 6) Draft: 0.014	Speed: 8.013
Entry 7) Draft: 0.032	Speed: 8.421
Entry 8) Draft: -0.013	Speed: 9.251
Entry 9) Draft: -0.064	Speed: 10.503
Entry 10) Draft: -0.048	Speed: 11.848
Entry 11) Draft: -0.140	Speed: 14.153

Time Stamp: 2009-118 00:00

Apply No

Comments

Entry 1) Draft: 0.000	Speed: 3.075
Entry 2) Draft: 0.014	Speed: 4.675
Entry 3) Draft: 0.009	Speed: 5.332
Entry 4) Draft: 0.023	Speed: 5.985
Entry 5) Draft: 0.032	Speed: 6.778
Entry 6) Draft: 0.032	Speed: 7.394
Entry 7) Draft: 0.036	Speed: 7.935
Entry 8) Draft: 0.036	Speed: 8.162
Entry 9) Draft: 0.037	Speed: 8.627
Entry 10) Draft: 0.020	Speed: 9.334
Entry 11) Draft: -0.011	Speed: 10.536
Entry 12) Draft: -0.049	Speed: 12.415

TPE

Time Stamp: 2006-234 00:00

Comments

Offsets

Motion sensing unit to the transducer 1

X Head 1 -0.003

Y Head 1 -0.032

Z Head 1 0.631

Motion sensing unit to the transducer 2

X Head 2 0.000

Y Head 2 0.000

Z Head 2 0.000

Navigation antenna to the transducer 1

X Head 1 -0.947

Y Head 1 3.288

Z Head 1 3.376

Navigation antenna to the transducer 2

X Head 2 0.000

Y Head 2 0.000

Z Head 2 0.000

Roll offset of transducer number 1 0.000

Roll offset of transducer number 2 0.000

Heave Error: 0.050 or 5.000" of heave amplitude.
 Measurement errors: 0.020
 Motion sensing unit alignment errors
 Gyro:1.000 Pitch:1.000 Roll:1.000
 Gyro measurement error: 0.020
 Roll measurement error: 0.020
 Pitch measurement error: 0.020
 Navigation measurement error: 0.700
 Transducer timing error: 0.010
 Navigation timing error: 0.001
 Gyro timing error: 0.001
 Heave timing error: 0.001
 PitchTimingStdDev: 0.001
 Roll timing error: 0.001
 Sound Velocity speed measurement error: 0.000
 Surface sound speed measurement error: 0.000
 Tide measurement error: 0.000
 Tide zoning error: 0.000
 Speed over ground measurement error: 0.030
 Dynamic loading measurement error: 0.030
 Static draft measurement error: 0.050
 Delta draft measurement error: 0.010
 StDev Comment: 0>,,J □ †J@3†Jp4†J 1†J0□...J .†J0^,,J}€J°□ †Ja

Svp Sensor:

Time Stamp: 2004-274 00:00

Comments

Svp #1:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

SVP #2:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

Time Stamp: 2006-234 00:00

Comments

Svp #1:

Pitch Offset: 0.000

Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: -0.003
DeltaY: -0.032
DeltaZ: 0.631

SVP #2:

Pitch Offset: 0.000
Roll Offset: 0.000
Azimuth Offset: 0.000

DeltaX: 0.000
DeltaY: 0.000
DeltaZ: 0.000

WaterLine:

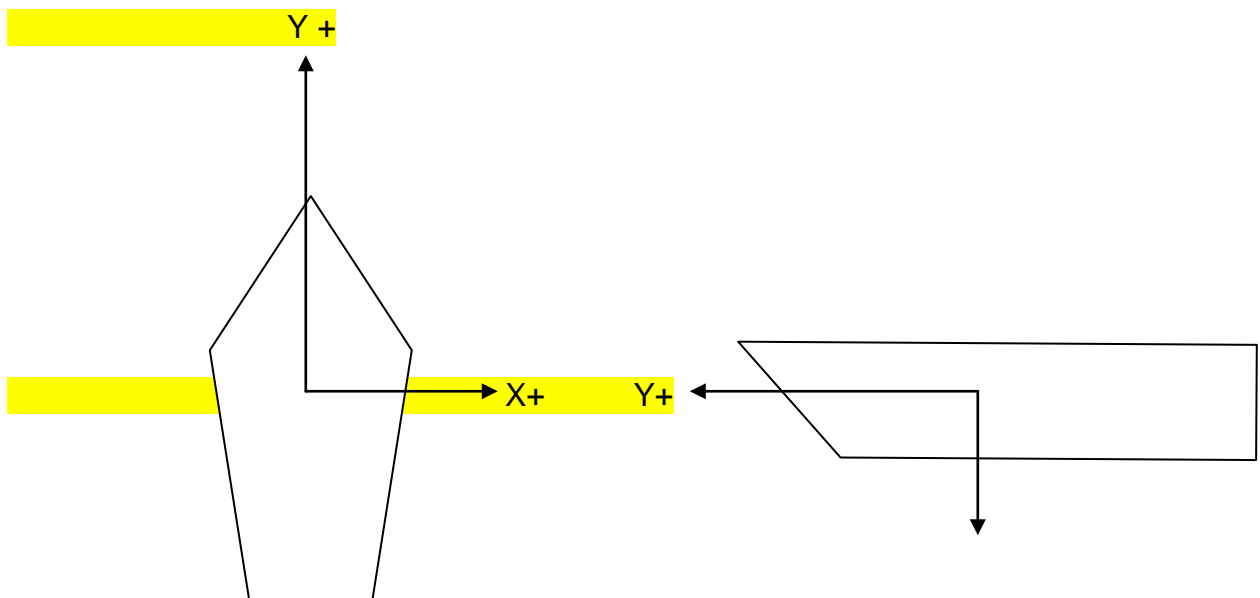
Time Stamp: 2004-274 00:00

Comments SB Xducer to WL
Apply No
WaterLine -0.400

Time Stamp: 2006-234 00:00

Comments RP to WL as surveyed
Apply No
WaterLine 0.022

CARIS Offset Sign Conventions



APPENDIX IV

Calibration Reports

Date:
Feb 06, 2009

Serial #:
98314-020609

DIGIBAR CALIBRATION REPORT

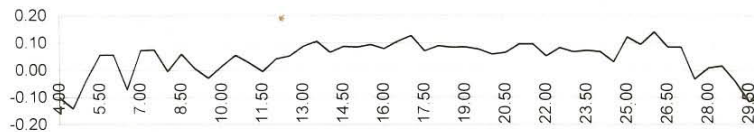
version 1.0 (c) 2004

ODOM HYDROGRAPHIC SYSTEMS, Inc



STANDARD DEL GROSSO H²O

TEMP	VELOCITY	MEASURED	RES_VEL	OBS-CAL	TEMP	VELOCITY	MEASURED	RES_VEL	OBS-CAL
FREQUENCY					FREQUENCY				
4.00	1421.62	5540.41	1421.52	-0.10	17.50	1474.38	5743.26	1474.45	0.07
4.50	1423.90	5548.99	1423.76	-0.14	18.00	1476.01	5749.58	1476.10	0.09
5.00	1426.15	5558.03	1426.12	-0.03	18.50	1477.62	5755.72	1477.70	0.08
5.50	1428.38	5566.91	1428.43	0.06	19.00	1479.21	5761.81	1479.29	0.09
6.00	1430.58	5575.34	1430.83	0.06	19.50	1480.77	5767.78	1480.85	0.08
6.50	1432.75	5583.18	1432.68	-0.07	20.00	1482.32	5773.63	1482.38	0.06
7.00	1434.90	5591.96	1434.97	0.07	20.50	1483.84	5779.50	1483.91	0.07
7.50	1437.02	5600.10	1437.10	0.07	21.00	1485.35	5785.38	1485.44	0.10
8.00	1439.12	5607.83	1439.11	0.00	21.50	1486.83	5791.07	1486.93	0.10
8.50	1441.19	5616.01	1441.25	0.06	22.00	1488.29	5796.51	1488.35	0.05
9.00	1443.23	5623.65	1443.24	0.01	22.50	1489.74	5802.16	1489.82	0.08
9.50	1445.25	5631.26	1445.23	-0.03	23.00	1491.16	5807.56	1491.23	0.07
10.00	1447.25	5639.08	1447.27	0.02	23.50	1492.56	5812.96	1492.64	0.07
10.50	1449.22	5646.79	1449.28	0.06	24.00	1493.95	5818.25	1494.02	0.07
11.00	1451.17	5654.15	1451.20	0.03	24.50	1495.32	5823.34	1495.35	0.03
11.50	1453.09	5661.40	1453.09	0.00	25.00	1496.66	5828.85	1496.78	0.12
12.00	1454.99	5668.86	1455.04	0.04	25.50	1497.99	5833.83	1498.08	0.10
12.50	1456.87	5676.09	1456.92	0.05	26.00	1499.30	5839.02	1499.44	0.14
13.00	1458.72	5683.33	1458.81	0.09	26.50	1500.59	5843.75	1500.67	0.09
13.50	1460.55	5690.41	1460.66	0.11	27.00	1501.86	5848.62	1501.94	0.09
14.00	1462.36	5697.18	1462.43	0.07	27.50	1503.11	5852.97	1503.08	-0.03
14.50	1464.14	5704.10	1464.23	0.09	28.00	1504.35	5857.86	1504.35	0.01
15.00	1465.91	5710.84	1465.99	0.09	28.50	1505.56	5862.55	1505.58	0.02
15.50	1467.65	5717.54	1467.74	0.09	29.00	1506.76	5866.92	1506.72	-0.04
16.00	1469.36	5724.06	1469.44	0.08	29.50	1507.94	5871.16	1507.82	-0.12
16.50	1471.06	5730.66	1471.16	0.11	30.00	1509.10	5875.67	1509.00	-0.10
17.00	1472.73	5737.15	1472.86	0.13					



Odom Hydrographic Systems, Inc.

1450 Seaboard Avenue, Baton Rouge, Louisiana 70810-6261 USA

Telephone: (225)-769-3051 Facsimile: (225)-766-5122

E-mail: email@odomhydrographic.com HTTP: www.odomhydrographic.com

Date:
Feb 06, 2009

Serial #:
98314-020609

DIGIBAR CALIBRATION REPORT

version 1.0 (c) 2004

ODOM HYDROGRAPHIC SYSTEMS, Inc

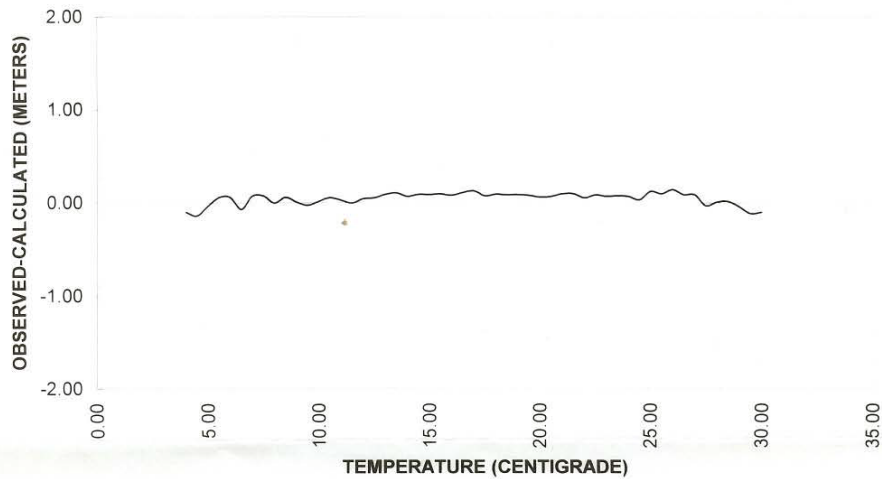


Burn these numbers to EPROM:

Gradient
Intercept

3340
242

Calibration Graph



The instruments used in this calibration have been calibrated to the published manufacturer specifications using standards traceable to NIST, to consensus standards, to ratio methods, or to acceptable values of natural physical constants that meets the requirements of ANSI/NC SL Z540-1, ISO 9001, ISO 10012 and ISO 17025. Certificate/traceability numbers: 0002-2655.00-23491-001, 0002-2655.00-23491-002, ID#s: 294, 295, 762, 172, 56



Odom Hydrographic Systems, Inc.

1450 SeaBoard Avenue, Baton Rouge, Louisiana 70810-6261 USA
Telephone: (225)-769-3051 Facsimile: (225)-766-5122
E-mail: email@odomhydrographic.com HTTP: www.odomhydrographic.com



Sea-Bird Electronics, Inc.
1808 136th Place NE
Bellevue, WA 98005
USA

Phone: (425) 643-9866
Fax: (425) 643-9954
E-mail: seabird@seabird.com
Web: www.seabird.com

APPLICATION NOTE NO. 42

Revised September 2001

ITS-90 TEMPERATURE SCALE

Beginning January 1995, Sea-Bird temperature calibration certificates list a new set of coefficients labeled *g, h, i, j*, and *F0*. These coefficients correspond to ITS90 (T90) temperatures and should be entered by those researchers working with SEASOFT-DOS Versions 4.208 and higher (and all versions of SEASOFT-Win32). For the convenience of users who prefer to use older SEASOFT versions, the new certificates also list *a, b, c, d*, and *F0* coefficients corresponding to IPTS68 (T68) temperatures as required by SEASOFT-DOS versions older than 4.208.

It is important to note that the international oceanographic research community will continue to use T68 for computation of salinity and other seawater properties. Therefore, following the recommendations of Saunders (1990) and as supported by the Joint Panel on Oceanographic Tables and Standards (1991), SEASOFT-DOS 4.200 and later and all versions of SEASOFT-Win32 convert between T68 and T90 according to the linear relationship:

$$T_{68} = 1.00024 * T_{90}$$

The use of T68 for salinity and other seawater calculations is automatic in all SEASOFT programs. However, when selecting **temperature** as a display/output variable, you will be prompted to specify which standard (T90 or T68) is to be used to compute temperature. SEASOFT recognizes whether you have entered T90 or T68 coefficients in the configuration (.con) file, and computes T90 temperature directly or calculates it from the Saunders linear approximation, depending on which coefficients were used and which display variable type is selected.

For example, if *g, h, i, j, F0* coefficients (T90) are entered in the .con file and you select temperature variable type as T68, SEASOFT computes T90 temperature directly and multiplies it by 1.00024 to display T68. Conversely, if *a, b, c, d*, and *F0* coefficients (T68) are entered in the .con file and you select temperature variable type as T90, SEASOFT computes T68 directly and divides by 1.00024 to display T90.

Note: The CTD configuration (.con) file is edited using the Configure menu (in SEASAVE or SBE Data Processing in our SEASOFT-Win32 suite of programs) or SEACON (in SEASOFT-DOS).

Also beginning January 1995, Sea-Bird's own temperature metrology laboratory (based upon water triple-point and gallium melt cell, SPRT, and ASL F18 Temperature Bridge) converted to T90. These T90 standards are now employed in calibrating *all* Sea-Bird temperature sensors, and as the reference temperature used in conductivity calibrations. Accordingly, all calibration certificates show T90 (*g, h, i, j*) coefficients that result directly from T90 standards, and T68 coefficients (*a, b, c, d*) computed using the Saunders linear approximation.



SEA-BIRD ELECTRONICS, INC.

1808 - 136th Place Northeast, Bellevue, Washington 98005 USA

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

Conductivity Calibration Report

Customer:	NOAA / NRT3 Pier 7, port of Tacoma		
Job Number:	53373	Date of Report:	1/27/2009
Model Number:	SBE 19	Serial Number:	1913768-2039

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: Drift since last cal: 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.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

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

SENSOR SERIAL NUMBER: 2039
CALIBRATION DATE: 05-Feb-09

SBE19 PRESSURE CALIBRATION DATA
300 psia S/N 133248 TCV: 489

QUADRATIC COEFFICIENTS:
PA0 = 1.484759e+002
PA1 = -3.906832e-002
PA2 = 2.488827e-008

STRAIGHT LINE FIT:
M = -3.906597e-002
B = 1.486159e+002

PRESSURE PSIA	INST OUTPUT(N)	COMPUTED PSIA	ERROR %FS	LINEAR PSIA	ERROR %FS
14.52	3437.0	14.49	-0.01	14.35	-0.06
59.75	2277.0	59.65	-0.03	59.66	-0.03
119.75	740.0	119.58	-0.06	119.71	-0.02
179.76	-798.0	179.67	-0.03	179.79	0.01
239.77	-2332.0	239.72	-0.02	239.72	-0.02
299.77	-3862.0	299.73	-0.01	299.49	-0.09
239.77	-2336.0	239.88	0.03	239.87	0.03
179.79	-805.0	179.94	0.05	180.06	0.09
119.79	732.0	119.89	0.03	120.02	0.08
59.77	2272.0	59.84	0.02	59.86	0.03
14.51	3435.0	14.57	0.02	14.42	-0.03

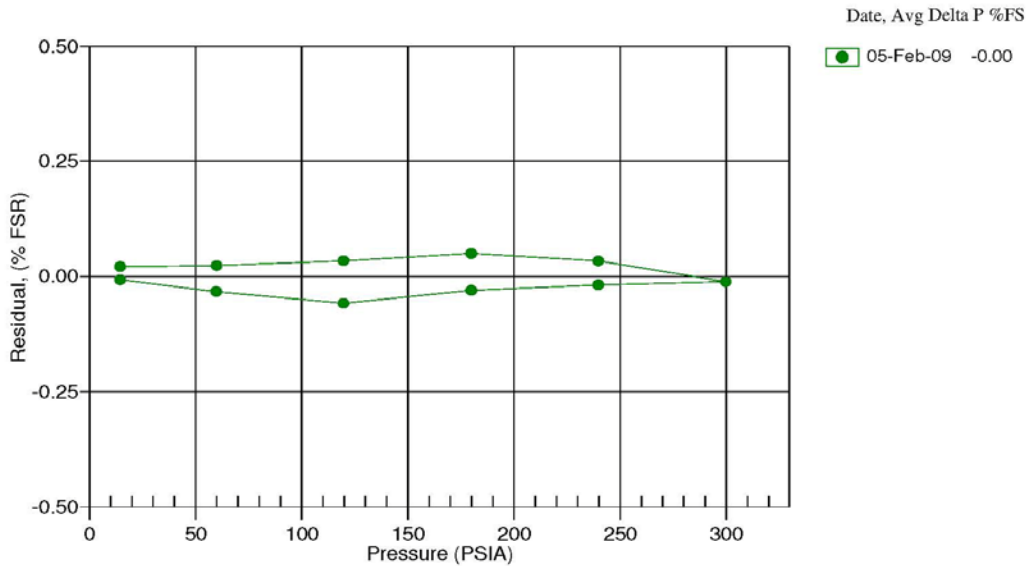
Straight Line Fit:

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

Quadratic Fit:

pressure (psia) = PA0 + PA1 * N + PA2 * N²

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



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

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

SENSOR SERIAL NUMBER: 2039
CALIBRATION DATE: 27-Jan-09

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

GHJ COEFFICIENTS

g = -3.94727054e+000
h = 4.70847089e-001
i = 1.21889622e-003
j = -3.18344406e-005
CPcor = -9.5700e-008 (nominal)
CTcor = 3.2500e-006 (nominal)

ABCDM COEFFICIENTS

a = 4.81562341e-002
b = 4.19065980e-001
c = -3.93314675e+000
d = -1.26464007e-004
m = 2.1
CPcor = -9.5700e-008 (nominal)

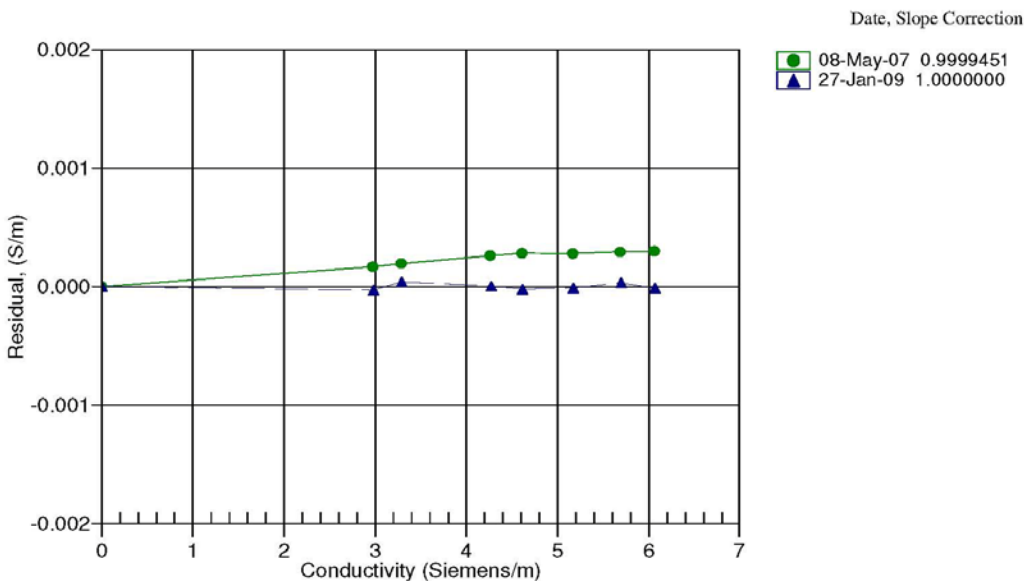
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (kHz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2.88545	0.00000	0.00000
0.9997	34.8445	2.97812	8.39275	2.97809	-0.00003
4.5000	34.8243	3.28540	8.76457	3.28544	0.00004
15.0000	34.7815	4.26780	9.85835	4.26780	0.00001
18.5000	34.7719	4.61311	10.21472	4.61309	-0.00002
23.9997	34.7599	5.17113	10.76550	5.17112	-0.00001
29.0000	34.7517	5.69293	11.25598	5.69296	0.00003
32.5001	34.7449	6.06496	11.59284	6.06494	-0.00001

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

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

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

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



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SENSOR SERIAL NUMBER: 2039
CALIBRATION DATE: 27-Jan-09

SBE19 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

ITS-90 COEFFICIENTS

g = 4.16950099e-003
h = 5.91721333e-004
i = 1.22144328e-006
j = -2.51456925e-006
f0 = 1000.0

IPTS-68 COEFFICIENTS

a = 3.64763673e-003
b = 5.83765990e-004
c = 7.93342019e-006
d = -2.51431112e-006
f0 = 2426.671

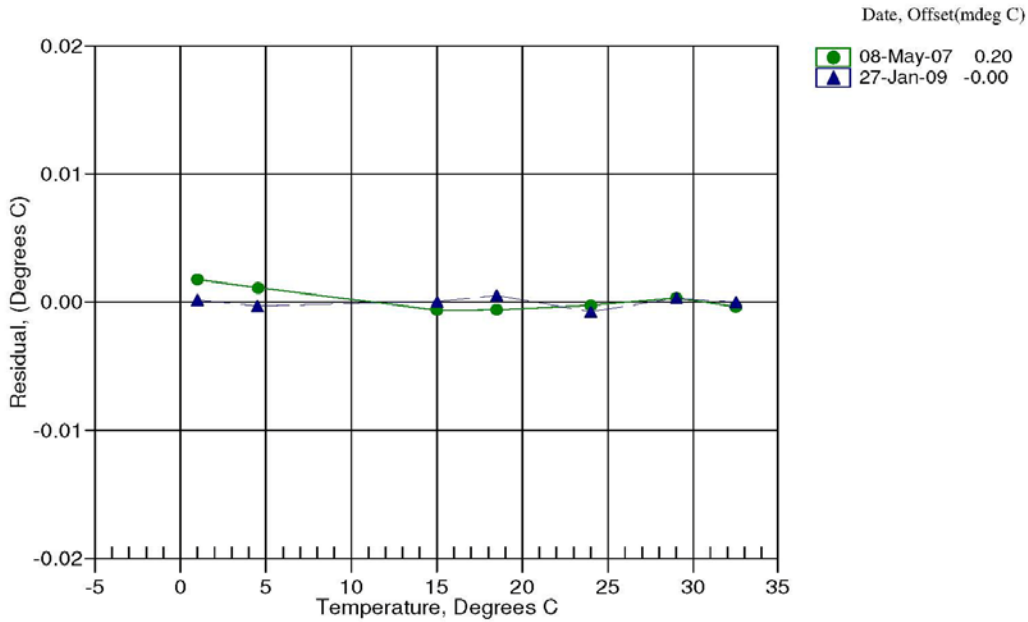
BATH TEMP (ITS-90)	INSTRUMENT FREQ (Hz)	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
0.9997	2426.671	0.9999	0.00017
4.5000	2625.808	4.4997	-0.00030
15.0000	3292.235	15.0001	0.00006
18.5000	3538.531	18.5005	0.00053
23.9997	3951.048	23.9990	-0.00074
29.0000	4354.459	29.0003	0.00029
32.5001	4653.278	32.5001	-0.00001

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





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Temperature Calibration Report

Customer:	NOAA / NRT3 Pier 7, port of Tacoma		
Job Number:	53373	Date of Report:	1/27/2009
Model Number:	SBE 19	Serial Number:	1913768-2039

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: Drift since last cal: Degrees Celsius/year

Comments:

'CALIBRATION AFTER REPAIR' Performed Not Performed

Date: Drift since Last cal: Degrees Celsius/year

Comments:

Pressure Test Certificate

Customer NOAA / NRT3 Pier 7, port of Tacoma

Job Number 53373

Date 1/24/2009

Technician JW

Serial Number 1913768-2039

Low Pressure (PSI) 50 PSI

Time (Minutes) 45 Minutes

High Pressure (PSI) N/A* PSI

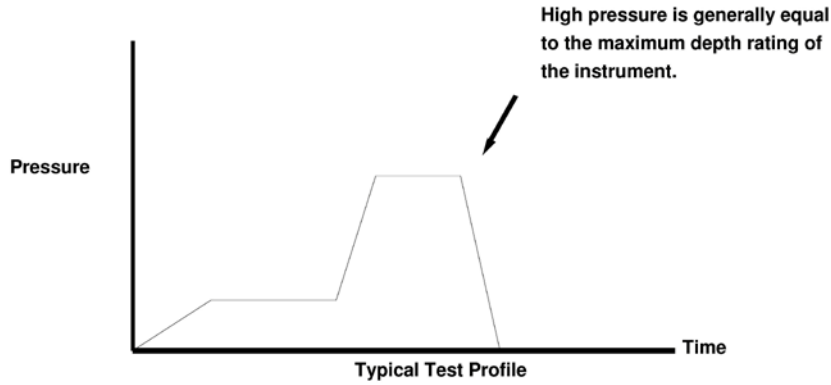
Time (Minutes) N/A* Minutes

Pass

Fail

Comments

Replaced the main piston "O"-Rings.





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Conductivity Calibration Report

Customer:	NOAA / NRT3 Pier 7, port of Tacoma		
Job Number:	53373	Date of Report:	1/27/2009
Model Number:	SBE 19Plus	Serial Number:	19P44126-4778

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: Drift since last cal: 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.

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

SENSOR SERIAL NUMBER: 4778
CALIBRATION DATE: 27-Jan-09

SBE19plus CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

g = -1.025531e+000
h = 1.568419e-001
i = -5.637711e-004
j = 6.667116e-005

CPcor = -9.5700e-008
CTcor = 3.2500e-006

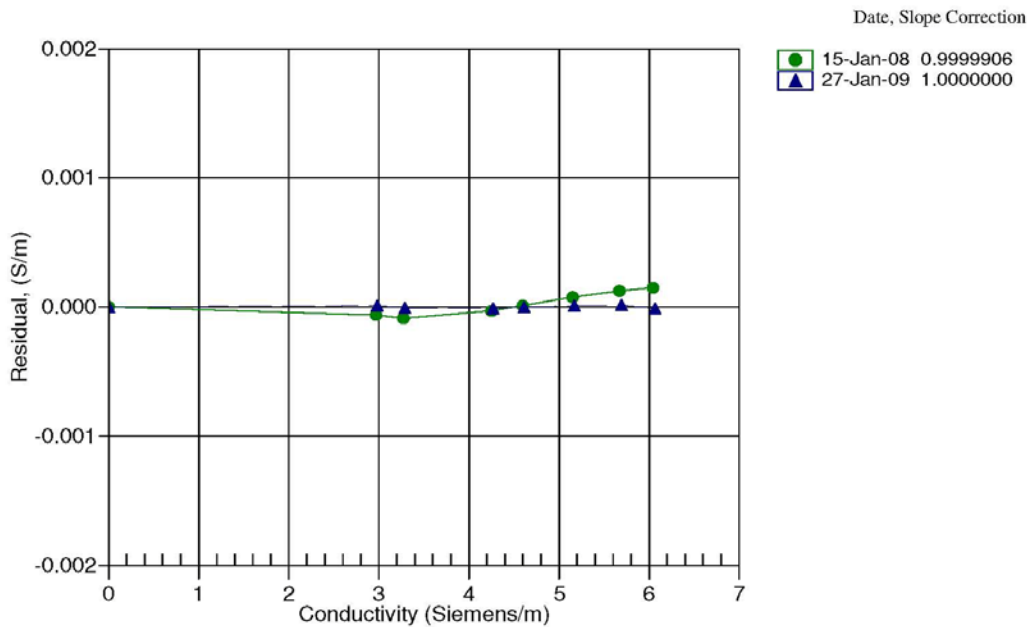
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2565.33	0.0000	0.00000
0.9997	34.8445	2.97812	5070.94	2.9781	0.00001
4.5000	34.8243	3.28540	5261.55	3.2854	-0.00001
15.0000	34.7815	4.26780	5828.54	4.2678	-0.00001
18.5000	34.7719	4.61311	6014.87	4.6131	-0.00000
23.9997	34.7599	5.17113	6304.03	5.1711	0.00001
29.0000	34.7517	5.69293	6562.53	5.6929	0.00001
32.5001	34.7449	6.06496	6740.56	6.0649	-0.00001

f = INST FREQ / 1000.0

Conductivity = (g + hf² + if³ + jf⁴) / (1 + δt + εp) Siemens/meter

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

Residual = instrument conductivity - bath conductivity



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

SENSOR SERIAL NUMBER: 4778
CALIBRATION DATE: 03-Feb-09

SBE19plus PRESSURE CALIBRATION DATA
508 psia S/N 6975

COEFFICIENTS:

PA0 = -2.055136e-001	PTCA0 = 5.333855e+005
PA1 = 1.550260e-003	PTCA1 = -3.448188e+000
PA2 = 8.071937e-012	PTCA2 = -9.467870e-002
PTEMPA0 = -7.399210e+001	PTCB0 = 2.569000e+001
PTEMPA1 = 4.813787e+001	PTCB1 = -2.000000e-004
PTEMPA2 = -2.199216e-001	PTCB2 = 0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FSR
14.66	542833.0	2.0	14.65	-0.00
104.89	601033.0	2.0	104.92	0.01
204.92	665455.0	2.0	204.91	-0.00
304.93	729833.0	2.0	304.90	-0.01
404.92	794173.0	2.0	404.90	-0.00
504.91	858481.0	2.0	504.91	0.00
404.93	794211.0	2.0	404.96	0.01
304.95	729868.0	2.0	304.95	0.00
204.94	665477.0	2.0	204.94	0.00
104.94	601060.0	2.0	104.95	0.00
14.66	542845.0	2.0	14.65	-0.00

THERMAL CORRECTION

TEMP ITS90	THERMISTOR OUTPUT	INST OUTPUT
32.50	2.23	543069.73
29.00	2.16	543105.97
24.00	2.06	543146.77
18.50	1.94	543189.35
15.00	1.87	543208.08
4.50	1.64	543264.99
1.00	1.57	543281.41
TEMP (ITS90)		SPAN (mV)
-5.00		25.69
35.00		25.68

$$y = \text{thermistor output}; t = PTEMPA0 + PTEMPA1 * y + PTEMPA2 * y^2$$

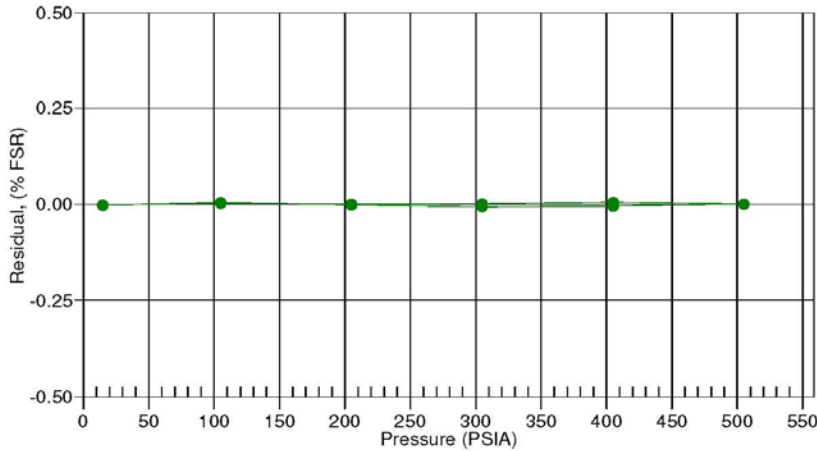
$$x = \text{pressure output} - PTCA0 - PTCA1 * t - PTCA2 * t^2$$

$$n = x * PTCB0 / (PTCB0 + PTCB1 * t + PTCB2 * t^2)$$

$$\text{pressure (psia)} = PA0 + PA1 * n + PA2 * n^2$$

Date, Avg Delta P %FS

03-Feb-09 -0.00



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SENSOR SERIAL NUMBER: 4778
CALIBRATION DATE: 27-Jan-09

SBE19plus TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

ITS-90 COEFFICIENTS

a0 = 1.250971e-003
a1 = 2.619698e-004
a2 = 4.102248e-008
a3 = 1.476518e-007

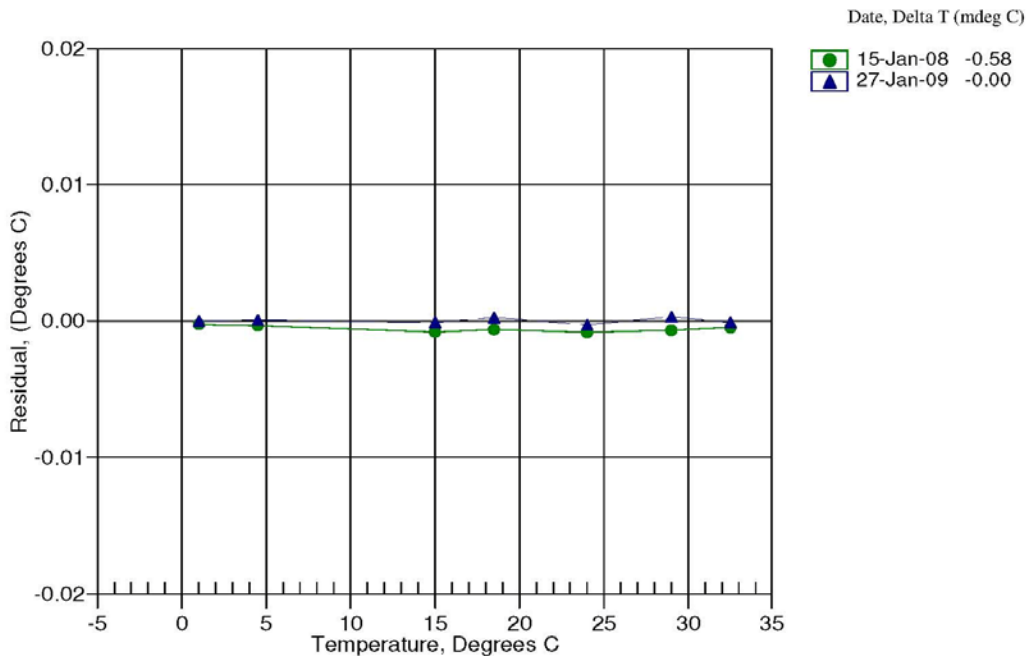
BATH TEMP (ITS-90)	INSTRUMENT OUTPUT(n)	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
0.9997	631217.833	0.9997	-0.0000
4.5000	560948.650	4.5000	0.0000
15.0000	386178.533	14.9999	-0.0001
18.5000	339153.783	18.5002	0.0002
23.9997	275269.133	23.9994	-0.0003
29.0000	226580.200	29.0003	0.0003
32.5001	197162.100	32.5000	-0.0001

$$MV = (n - 524288) / 1.6e+007$$

$$R = (MV * 2.900e+009 + 1.024e+008) / (2.048e+004 - MV * 2.0e+005)$$

$$\text{Temperature ITS-90} = 1 / \{a_0 + a_1[\ln(R)] + a_2[\ln^2(R)] + a_3[\ln^3(R)]\} - 273.15 \text{ (}^\circ\text{C)}$$

$$\text{Residual} = \text{instrument temperature} - \text{bath temperature}$$





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Temperature Calibration Report

Customer:	NOAA / NRT3 Pier 7, port of Tacoma		
Job Number:	53373	Date of Report:	1/27/2009
Model Number:	SBE 19Plus	Serial Number:	19P44126-4778

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: Drift since last cal: Degrees Celsius/year

Comments:

'CALIBRATION AFTER REPAIR' Performed Not Performed

Date: Drift since Last cal: Degrees Celsius/year

Comments:



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Service

Report

RMA Number

53373

Customer Information:

Company Date

Contact

PO Number

Serial Number
Model Number

Services Requested:

1. Evaluate/Repair Instrumentation.
2. Perform Routine Calibration Service.

Problems Found:

Services Performed:

1. Performed initial diagnostic evaluation.
2. Performed "Post Cruise" calibration of the temperature & conductivity sensors.
3. Calibrated the pressure sensor.
4. Performed complete system check and full diagnostic evaluation.

Special Notes:



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Service

Report

RMA Number

53373

Customer Information:

Company NOAA / NRT3 Pier 7, port of Tacoma **Date** 2/12/2009

Contact Philip Sparr

PO Number mastercard

Serial Number 05M0853
Model Number SBE 05MT

Services Requested:

1. Evaluate/Repair Instrumentation.

Problems Found:

Services Performed:

1. Performed initial diagnostic evaluation.

Special Notes:



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Service

Report

RMA Number

53373

Customer Information:

Company NOAA / NRT3 Pier 7, port of Tacoma Date 2/12/2009

Contact Philip Sparr

PO Number mastercard

Serial Number 1913768-2039
Model Number SBE 19

Services Requested:

1. Evaluate/Repair Instrumentation.
2. Perform Routine Calibration Service.

Problems Found:

1. The on/off magnet was found to have corrosion damage.
2. The CPU bus strip was found to be broken.
3. The housing was found to be cracked.

Services Performed:

1. Performed initial diagnostic evaluation.
2. Installed NEW switch magnet.
3. Replaced the BUS strip.
4. Installed NEW 600m plastic housing, 9-cell.
5. Performed internal inspection and O-ring replacement.
6. Performed hydrostatic pressure test.
7. Performed "Post Cruise" calibration of the temperature & conductivity sensors.
8. Calibrated the pressure sensor.
9. Performed complete system check and full diagnostic evaluation.

Special Notes:



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Service

Report

RMA Number

53373

Customer Information:

Company NOAA / NRT3 Pier 7, port of Tacoma Date 2/12/2009

Contact Philip Sparr

PO Number mastercard

Serial Number 19P44126-4778
Model Number SBE 19Plus

Services Requested:

1. Evaluate/Repair Instrumentation.
2. Perform Routine Calibration Service.

Problems Found:

Services Performed:

1. Performed initial diagnostic evaluation.
2. Performed "Post Cruise" calibration of the temperature & conductivity sensors.
3. Calibrated the pressure sensor.
4. Performed complete system check and full diagnostic evaluation.

Special Notes: