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: 0075
CALIBRATION DATE: 17-Mar-11

GliderAPL TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

ITS-90 COEFFICIENTS

g = 4.39973338e-003
h = 6.42991151e-004
i = 2.73283017e-005
j = 3.09133554e-006
f0 = 1000.0

IPTS-68 COEFFICIENTS

a = 3.64763608e-003
b = 5.90107325e-004
c = 1.59979564e-005
d = 3.09297594e-006
f0 = 3402.763

| BATH TEMP (ITS-90)	INSTRUMENT FREO (Hz)	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	3402.763	0.9999	-0.00008
4.5000	3679.197	4.5001	0.00015
15.0000	4605.814	14.9999	-0.00007
18.5000	4948.569	18.4999	-0.00007
24.0000	5522.906	24.0000	-0.00001
29.0000	6083.987	29.0002	0.00022
32.5000	6499.307	32.4999	-0.00014

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

Date, Offset(mdeg C)
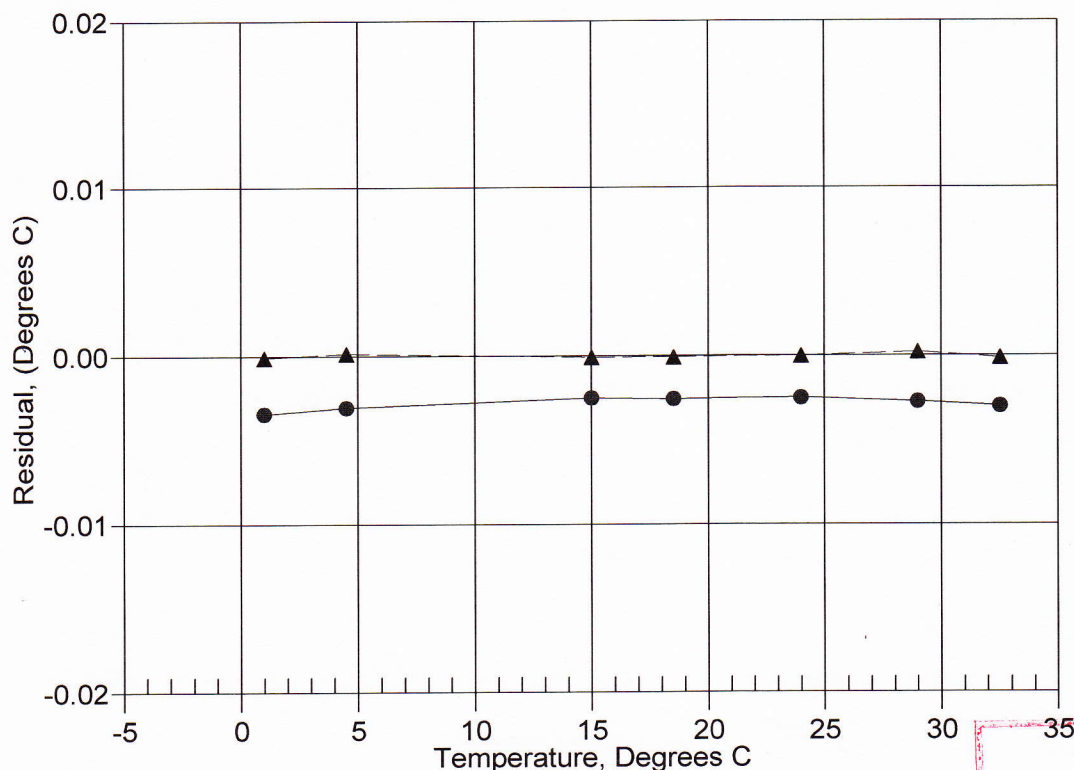
● 04-Nov-09 -2.84
▲ 17-Mar-11 -0.00

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SENSOR SERIAL NUMBER: 0075
CALIBRATION DATE: 17-Mar-11

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

GHIJ COEFFICIENTS

g = -1.01086669e+001
h = 1.14765762e+000
i = -2.10884105e-003
j = 2.39811430e-004
CPcor = -9.5700e-008 (nominal)
CTcor = 3.2500e-006 (nominal)

ABCDM COEFFICIENTS

a = 4.54835264e-006
b = 1.14143908e+000
c = -1.00898445e+001
d = -8.76562022e-005
m = 5.3
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	2.97322	0.00000	0.00000
1.0000	34.7828	2.97337	5.90259	2.97337	-0.00000
4.5000	34.7614	3.28005	6.12512	3.28005	-0.00000
15.0000	34.7167	4.26069	6.78721	4.26070	0.00001
18.5000	34.7076	4.60550	7.00490	4.60551	0.00001
24.0000	34.6977	5.16293	7.34291	5.16293	-0.00001
29.0000	34.6922	5.68428	7.64521	5.68425	-0.00002
32.5000	34.6893	6.05634	7.85368	6.05636	0.00002

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

Date, Slope Correction
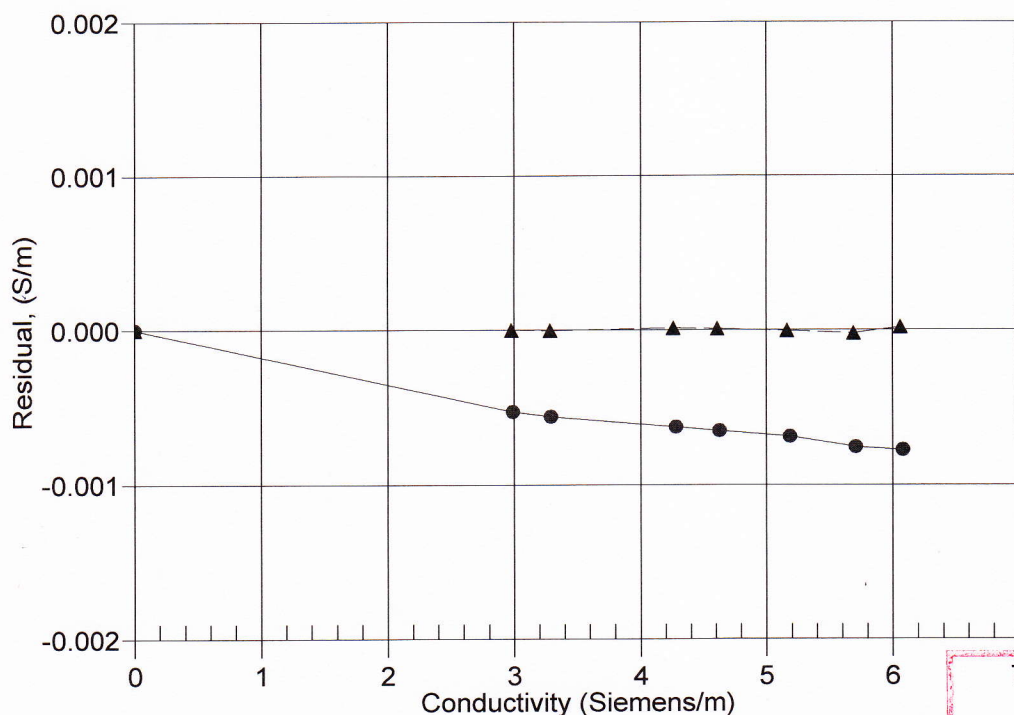
● 04-Nov-09 1.0001394
▲ 17-Mar-11 1.0000000

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Temperature Calibration Report

Customer:	SEAGLIDER FABRICATION CENTER		
Job Number:	63438	**Date of Report:**	3/17/2011
Model Number	Glider	**Serial Number:**	0075 Glider T/C Assembly

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: 3/17/2011   Drift since last cal: +0.00208   Degrees Celsius/year

Comments:

'CALIBRATION AFTER REPAIR'   ☐ Performed   ☑ Not Performed

Date: [ ]   Drift since Last cal: [ ]   Degrees Celsius/year

Comments:

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Conductivity Calibration Report

Customer:	SEAGLIDER FABRICATION CENTER		
Job Number:	63438	**Date of Report:**	3/17/2011
Model Number	Glider	**Serial Number:**	0075 Glider T/C Assembly

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: 3/17/2011   Drift since last cal: +0.00030 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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Service Report

RMA Number	63438

Customer Information:

Company	SEAGLIDER FABRICATION CENTER	Date	4/5/2011

Contact	Karl Kunkle
PO Number	100790

Serial Number	0075 Glider T/C Assembly
Model Number	Glider

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. Performed complete system check and full diagnostic evaluation.

Special Notes: