Sea-Bird Electronics, Inc.

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

Phone: (+1) 425-643-9866 Fax (+1) 425-643-9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 0154
CALIBRATION DATE: 22-May-12

GliderAPL TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

ITS-90 COEFFICIENTS

g = 4.36457716e-003
h = 6.29449255e-004
i = 2.46267800e-005
j = 2.69516854e-006
f0 = 1000.0

IPTS-68 COEFFICIENTS

a = 3.64763480e-003
b = 5.82517597e-004
c = 1.50553505e-005
d = 2.69667199e-006
f0 = 3277.087

BATH TEMP (ITS-90)	INSTRUMENT FREQ (Hz)	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	3277.087	1.0000	0.00001
4.5000	3546.878	4.5000	-0.00002
15.0000	4452.910	15.0000	0.00005
18.5000	4788.590	18.5000	-0.00003
24.0000	5351.684	24.0000	-0.00002
29.0000	5902.444	29.0000	0.00003
32.4999	6310.569	32.4999	-0.00001

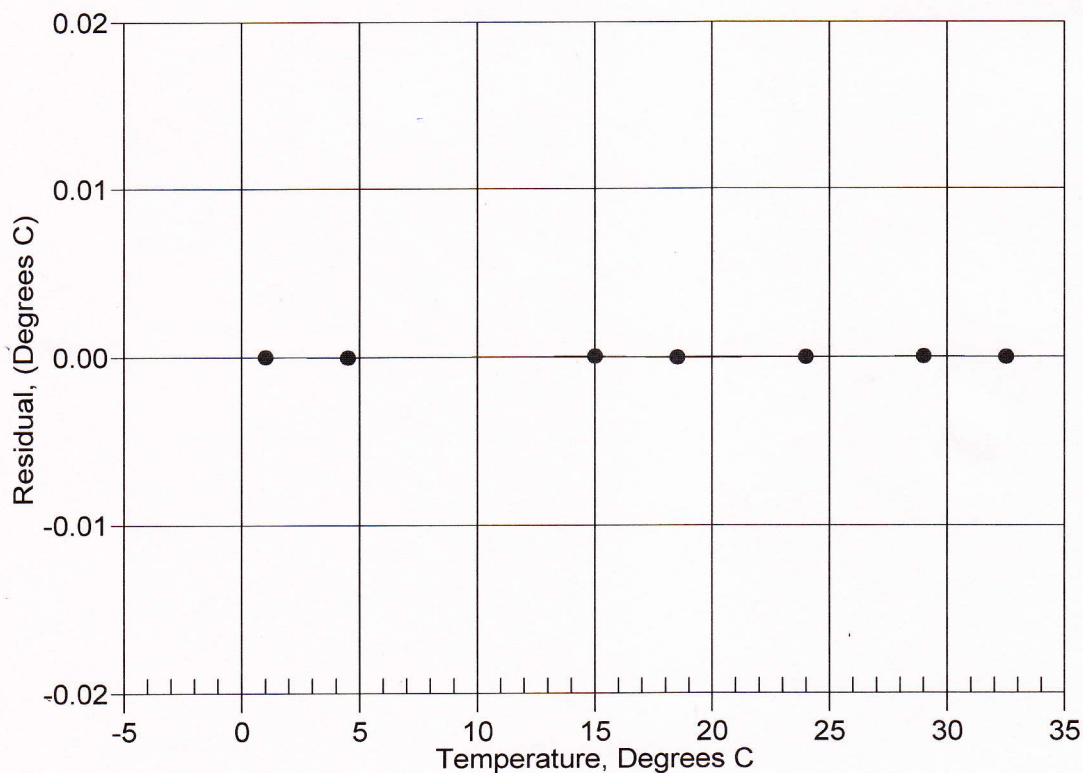Temperature ITS-90 = $1/\{g + h[ln(f_0/f)] + i[ln^2(f_0/f)] + j[ln^3(f_0/f)]\} - 273.15$ (°C)

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

Date, Offset(mdeg C)

● 22-May-12 0.00

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CALIBRATION DATE: 22-May-12

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

GHIJ COEFFICIENTS

g = -9.96983920e+000
h = 1.14875224e+000
i = -1.84010466e-003
j = 2.26321770e-004
CPcor = -9.5700e-008 (nominal)
CTcor = 3.2500e-006 (nominal)

ABCDM COEFFICIENTS

a = 7.49326809e-006
b = 1.14349070e+000
c = -9.95415867e+000
d = -8.65105658e-005
m = 5.1
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	2.95043	0.00000	0.00000
1.0000	34.8007	2.97476	5.88767	2.97475	-0.00000
4.5000	34.7801	3.28165	6.11041	3.28165	0.00000
15.0000	34.7364	4.26285	6.77291	4.26286	0.00001
18.5000	34.7268	4.60778	6.99065	4.60778	0.00000
24.0000	34.7164	5.16541	7.32870	5.16540	-0.00001
29.0000	34.7100	5.68686	7.63098	5.68686	-0.00000
32.4999	34.7061	6.05893	7.83937	6.05894	0.00001

$$\text{Conductivity} = (g + hf^2 + if^3 + jf^4)/10(1 + \delta t + \varepsilon p) \text{ Siemens/meter}$$
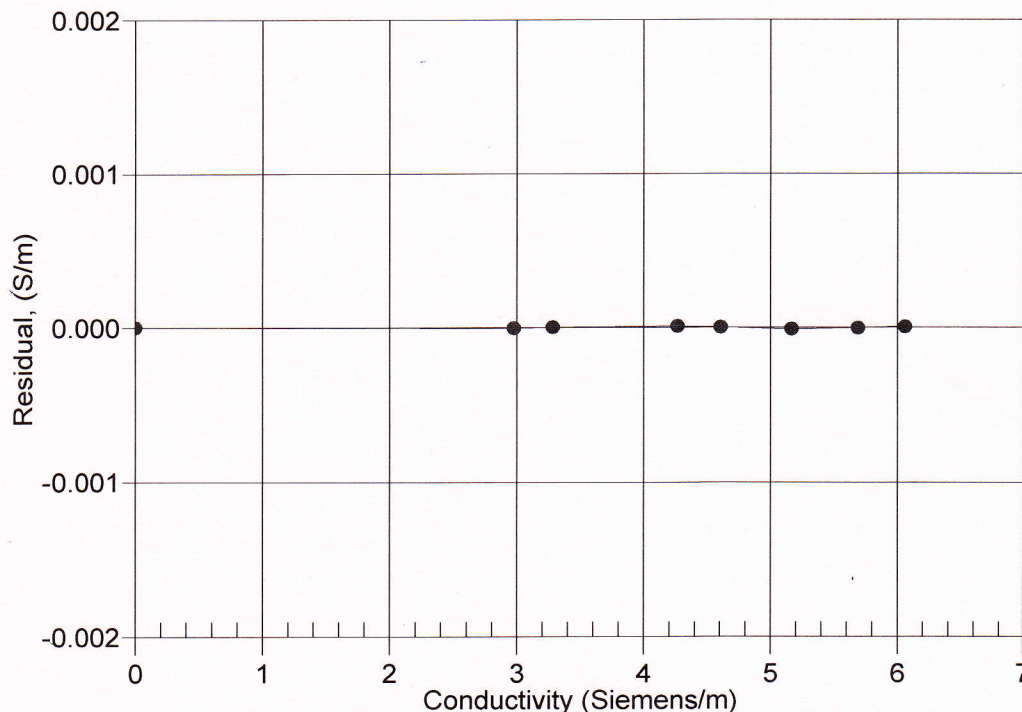
$$\text{Conductivity} = (af^m + bf^2 + c + dt) / [10 (1 + \varepsilon p) \text{ Siemens/meter}$$

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

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

Date, Slope Correction

● 22-May-12 1.0000000

Service Report

RMA Number	69322

Customer Information:

Company	SEAGLIDER FABRICATION CENTER	Date	7/30/2012
Contact	Karl Kunkle		
PO Number	TBD		

Serial Number	0154 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 "Final" calibration of the temperature & conductivity sensors.
3. Performed complete system check and full diagnostic evaluation.

Special Notes:

SBE SEA-BIRD ELECTRONICS, INC.

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

Conductivity Calibration Report

Customer:	SEAGLIDER FABRICATION CENTER		
Job Number:	69322	**Date of Report:**	5/24/2012
Model Number	Glider	**Serial Number:**	0154 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. 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 MODIFICATION'   ☑ Performed   ☐ Not Performed

Date: 5/22/2012   Drift since Last cal: [N/A] 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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Temperature Calibration Report

Customer:	SEAGLIDER FABRICATION CENTER	
Job Number:	69322	
Model Number	Glider	

Date of Report:	5/24/2012
Serial Number:	0154 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. 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 MODIFICATION'   ☑ Performed   ☐ Not Performed

Date: 5/22/2012   Drift since Last cal: N/A Degrees Celsius/year

Comments: