

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: 2326
CALIBRATION DATE: 09-Sep-05

SBE16 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

ITS-90 COEFFICIENTS

g = 4.17578677e-003
h = 6.03358864e-004
i = 1.24076755e-006
j = -2.33853214e-006
f0 = 1000.0

ITS-68 COEFFICIENTS

a = 3.64763727e-003
b = 5.95890528e-004
c = 7.43661110e-006
d = -2.33828995e-006
f0 = 2409.868

BATH TEMP (ITS-90)	INSTRUMENT FREQ (Hz)	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	2409.868	0.9998	-0.00017
4.4999	2603.453	4.5002	0.00029
14.9999	3248.753	15.0000	0.00013
18.5000	3486.316	18.4994	-0.00062
24.0000	3883.574	24.0003	0.00028
29.0000	4270.732	29.0004	0.00040
32.5000	4556.900	32.4997	-0.00030

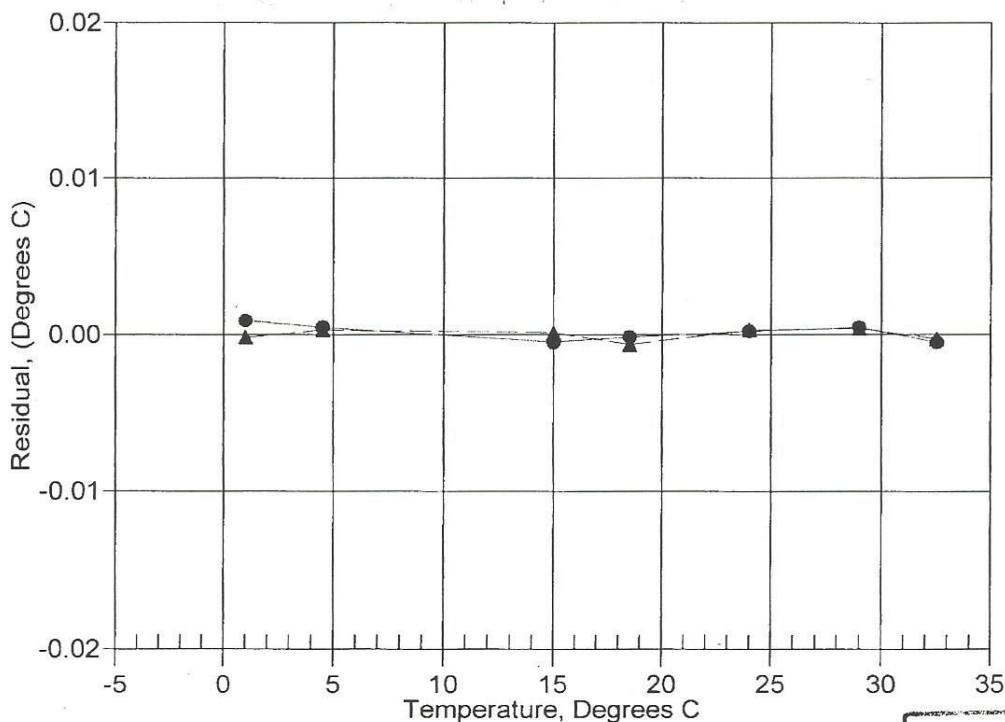
$$\text{Temperature ITS-90} = 1/\{g + h[\ln(f_0/f)] + i[\ln^2(f_0/f)] + j[\ln^3(f_0/f)]\} - 273.15 \text{ (}^\circ\text{C)}$$

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

Following the recommendation of JPOTS: T_{68} is assumed to be $1.00024 * T_{90}$ (-2 to 35 $^\circ\text{C}$)

Residual = instrument temperature - bath temperature

Date, Offset(mdeg C)



**POST CRUISE
CALIBRATION**



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Temperature Calibration Report

Customer:	Communications Technology SRL		
Job Number:	40474	Date of Report:	9/9/2005
Model Number:	SBE 16-04	Serial Number:	1611148-2326

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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SENSOR SERIAL NUMBER: 2326
CALIBRATION DATE: 09-Sep-05

SBE16 CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

GHIJ COEFFICIENTS

g = -4.06920326e+000
h = 4.84704099e-001
i = 1.53153134e-003
j = -4.10398487e-005
CPcor = -9.5700e-008 (nominal)
CTcor = 3.2500e-006 (nominal)

ABCDM COEFFICIENTS

a = 5.90403882e-002
b = 4.21403436e-001
c = -4.05310409e+000
d = -1.34962790e-004
m = 2.1
CPcor = -9.5700e-008 (nominal)

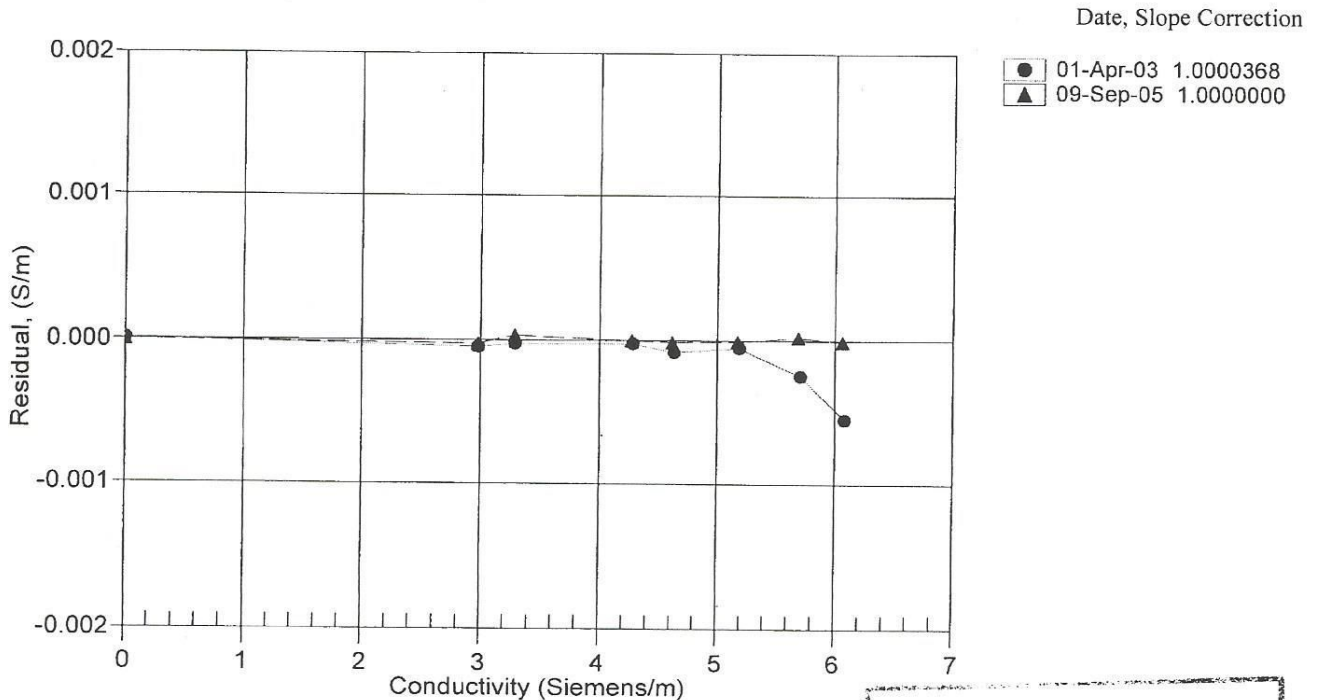
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (kHz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2.88534	0.00000	0.00000
1.0000	34.8143	2.97581	8.27031	2.97579	-0.00002
4.4999	34.7942	3.28284	8.63493	3.28287	0.00003
14.9999	34.7514	4.26448	9.70783	4.26448	-0.00000
18.5000	34.7423	4.60961	10.05754	4.60960	-0.00001
24.0000	34.7330	5.16760	10.59829	5.16759	-0.00001
29.0000	34.7285	5.68955	11.08002	5.68958	0.00002
32.5000	34.7260	6.06202	11.41119	6.06201	-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



FUTURE USE
 CALIBRATION



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Conductivity Calibration Report

Customer:	Communications Technology SRL		
Job Number:	40474	Date of Report:	9/9/2005
Model Number:	SBE 16-04	Serial Number:	1611148-2326

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.