

# CALIBRATION COEFFICIENTS

PAROSCIENTIFIC  
PRESSURE TRANSDUCER

*Corrected coefficients for SBE-9plus, SN 0905.*

Serial No: **107063**  
Original Cal Date: 9/11/2007  
Corrected Cal Date: 6/11/2008

MODEL: 410K-134      PRESSURE RANGE: 0 to 10000 psia      TEMP. RANGE: 0 to 125 deg C      PORT: oil filled

## PRESSURE COEFFICIENTS

U = temperature (deg C)

T = pressure period ( $\mu$ sec)

$$C = C_1 + C_2U + C_3U^2$$

$$D = D_1 + D_2U$$

$$T_0 = T_1 + T_2U + T_3U^2 + T_4U^3 + T_5U^4$$

pressure: (psia)

$$P = C(1 - (T_0^2/T^2))(1 - D(1 - (T_0^2/T^2)))$$

<i>C1</i>	<i>-45757.2</i>	<i>psia</i>
<i>C2</i>	<i>-5.86361E-01</i>	<i>psia/deg C</i>
<i>C3</i>	<i>1.2031E-02</i>	<i>psia/deg C<sup>2</sup></i>
<i>D1</i>	<i>0.035387</i>	
<i>D2</i>	<i>0</i>	
<i>T1</i>	<i>30.24771</i>	<i><math>\mu</math>sec</i>
<i>T2</i>	<i>-4.970043E-04</i>	<i><math>\mu</math>sec/deg C</i>
<i>T3</i>	<i>3.06636E-06</i>	<i><math>\mu</math>sec /deg C<sup>2</sup></i>
<i>T4</i>	<i>6.27625E-09</i>	<i><math>\mu</math>sec /deg C<sup>3</sup></i>
<i>T5</i>	<i>0</i>	



## Digiquartz Pressure Calibration Coefficients

Corrected at Sea-Bird Electronics on **11-Jun-2008**  
as per Paroscientific Calibration and SBE dP/dT tests.

*(Changed coefficients are posted in italics.)*

Secondary

# 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: 3451  
CALIBRATION DATE: 21-May-08

SBE4 CONDUCTIVITY CALIBRATION DATA  
PSS 1978: C(35,15,0) = 4.2914 Seimens/meter

### GHIJ COEFFICIENTS

g = -1.02504086e+001  
h = 1.59120914e+000  
i = -1.98567560e-003  
j = 2.45239335e-004  
CPcor = -9.5700e-008 (nominal)  
CTcor = 3.2500e-006 (nominal)

### ABCDM COEFFICIENTS

a = 1.38703170e-006  
b = 1.58633353e+000  
c = -1.02416538e+001  
d = -8.72418008e-005  
m = 5.9  
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)
0.0000	0.0000	0.00000	2.54086	0.00000	0.00000
-1.0000	34.9575	2.81489	4.91837	2.81489	-0.00000
1.0000	34.9584	2.98695	5.02728	2.98694	-0.00001
15.0000	34.9597	4.28734	5.78414	4.28737	0.00004
18.5000	34.9604	4.63542	5.97032	4.63540	-0.00001
29.0000	34.9604	5.72325	6.51770	5.72321	-0.00004
32.5000	34.9567	6.09769	6.69568	6.09773	0.00003

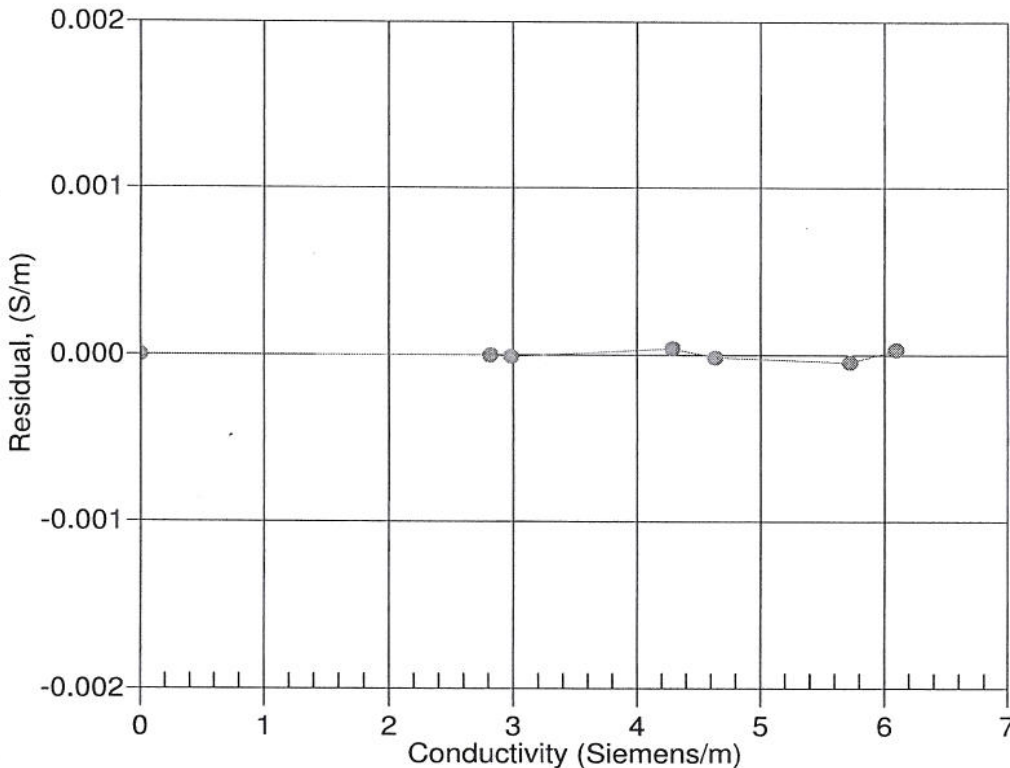
Conductivity =  $(g + hf^2 + if^3 + jf^4) / 10(1 + \delta t + \epsilon p)$  Siemens/meter

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

t = temperature[°C]; p = pressure[decibars];  $\delta$  = CTcor;  $\epsilon$  = CPcor;

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

Date, Slope Correction



Primary

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SENSOR SERIAL NUMBER: 3449  
CALIBRATION DATE: 21-May-08

SBE4 CONDUCTIVITY CALIBRATION DATA  
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

### GHIJ COEFFICIENTS

g = -1.00527845e+001  
h = 1.53289923e+000  
i = -1.90484328e-003  
j = 2.26753343e-004  
CPcor = -9.5700e-008 (nominal)  
CTcor = 3.2500e-006 (nominal)

### ABCDM COEFFICIENTS

a = 9.71103349e-007  
b = 1.52808656e+000  
c = -1.00437271e+001  
d = -8.63520333e-005  
m = 6.0  
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)
0.0000	0.0000	0.00000	2.56370	0.00000	0.00000
-1.0000	34.9575	2.81489	4.99840	2.81489	-0.00000
1.0000	34.9584	2.98695	5.10966	2.98694	-0.00001
15.0000	34.9597	4.28734	5.88254	4.28738	0.00004
18.5000	34.9604	4.63542	6.07259	4.63540	-0.00001
29.0000	34.9604	5.72325	6.63127	5.72321	-0.00005
32.5000	34.9567	6.09769	6.81290	6.09773	0.00003

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

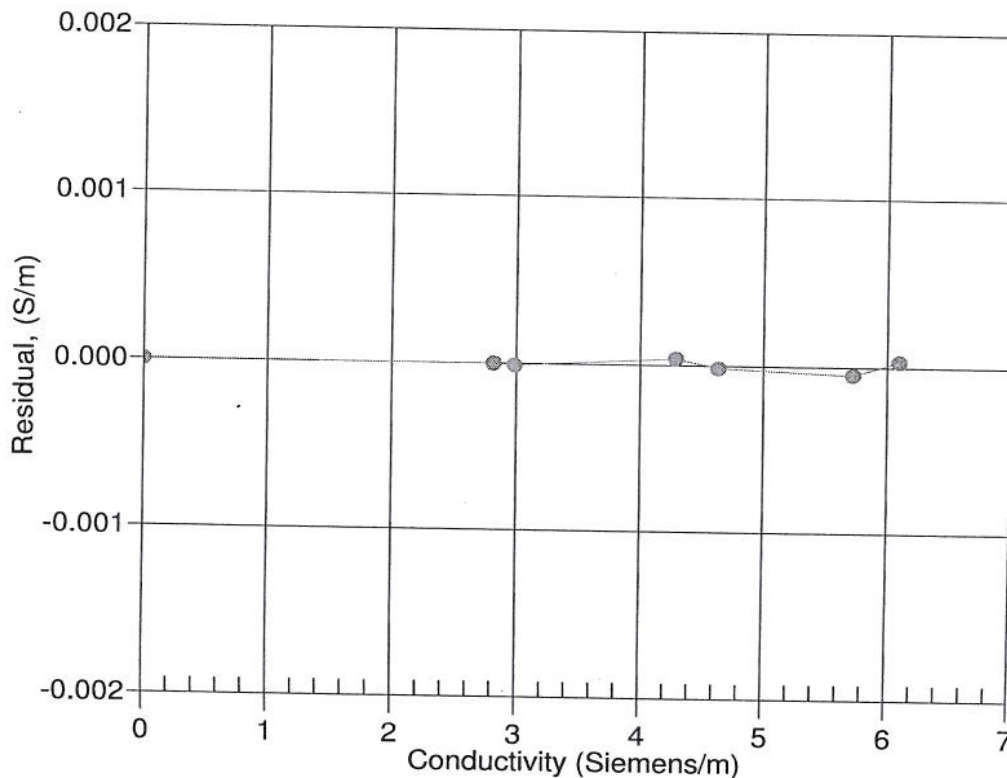
Conductivity =  $(af^m + bf^2 + c + dt) / [10(1 + \epsilon p)]$  Siemens/meter

t = temperature[°C]; p = pressure[decibars];  $\delta$  = CTcor;  $\epsilon$  = CPcor;

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

Date, Slope Correction

21-May-08 1.0000000



Primary

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

SENSOR SERIAL NUMBER: 5017  
CALIBRATION DATE: 29-May-08

SBE3 TEMPERATURE CALIBRATION DATA  
ITS-90 TEMPERATURE SCALE

### ITS-90 COEFFICIENTS

g = 4.33034847e-003  
h = 6.35923461e-004  
i = 2.12007008e-005  
j = 1.88568241e-006  
f0 = 1000.0

### IPTS-68 COEFFICIENTS

a = 3.68121222e-003  
b = 5.97650535e-004  
c = 1.52630808e-005  
d = 1.88711159e-006  
f0 = 2870.171

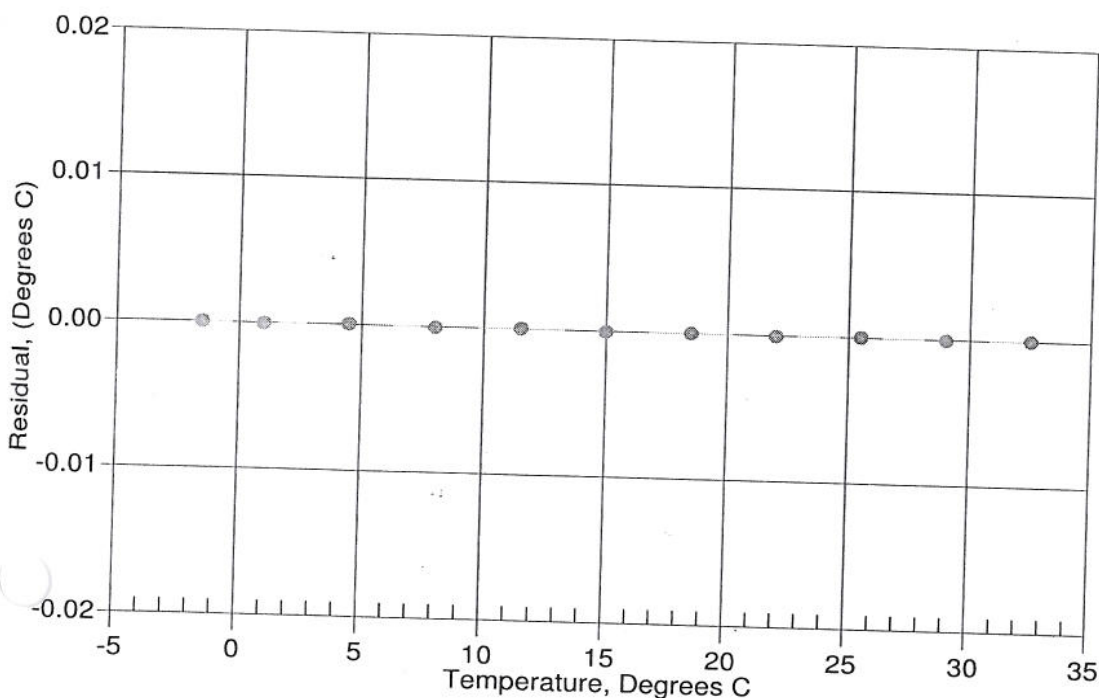
BATH TEMP (ITS-90)	INSTRUMENT FREQ (Hz)	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
-1.5000	2870.171	-1.5000	0.00001
1.0000	3036.281	1.0000	-0.00003
4.5000	3280.375	4.5000	0.00004
8.0000	3538.264	8.0000	-0.00002
11.5000	3810.342	11.5000	0.00001
15.0000	4096.964	15.0000	-0.00002
18.5000	4398.497	18.5000	0.00001
22.0000	4715.280	22.0000	-0.00001
25.5000	5047.656	25.5000	0.00002
29.0000	5395.937	29.0000	-0.00001
32.5000	5760.444	32.5000	-0.00000

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)

29-May-08 -0.00

Secondary

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

SENSOR SERIAL NUMBER: 5001  
CALIBRATION DATE: 30-May-08

SBE3 TEMPERATURE CALIBRATION DATA  
ITS-90 TEMPERATURE SCALE

### ITS-90 COEFFICIENTS

g = 4.41613111e-003  
h = 6.49769676e-004  
i = 2.27515630e-005  
j = 1.87488154e-006  
f0 = 1000.0

### IPTS-68 COEFFICIENTS

a = 3.68121213e-003  
b = 6.04225517e-004  
c = 1.61720834e-005  
d = 1.87639258e-006  
f0 = 3237.148

BATH TEMP (ITS-90)	INSTRUMENT FREQ (Hz)	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
-1.5000	3237.148	-1.5000	0.00001
1.0000	3422.412	1.0000	-0.00000
4.5000	3694.483	4.5000	-0.00002
8.0000	3981.753	8.0000	-0.00002
11.5000	4284.632	11.5000	0.00001
15.0000	4603.517	15.0000	0.00005
18.4999	4938.780	18.4999	0.00002
22.0000	5290.829	22.0000	-0.00004
25.5000	5660.010	25.5000	-0.00002
29.0000	6046.677	29.0000	0.00001
32.5000	6451.162	32.5000	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)

