

# 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: 9036  
 CALIBRATION DATE: 11-Sep-12

SLOCUM PAYLOAD CTD  
 TEMPERATURE CALIBRATION DATA  
 ITS-90 TEMPERATURE SCALE

ITS-90 COEFFICIENTS

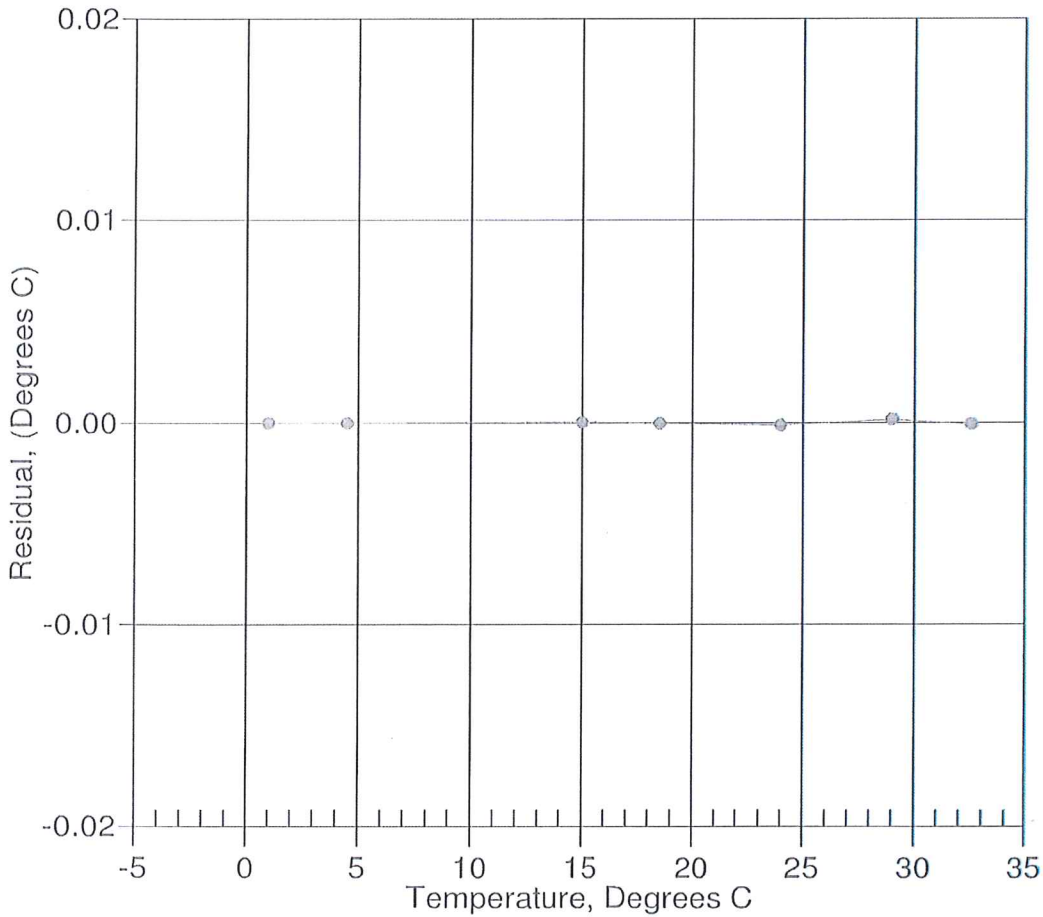
a0 = -1.344757e-004  
 a1 = 3.060250e-004  
 a2 = -4.124492e-006  
 a3 = 1.938646e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	568868.4	1.0000	0.0000
4.5000	487603.2	4.5000	-0.0000
15.0000	313085.6	15.0001	0.0001
18.5000	271775.0	18.5000	-0.0000
23.9940	218930.4	23.9939	-0.0001
29.0000	180868.0	29.0002	0.0002
32.5000	158784.8	32.4999	-0.0001

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

Residual = instrument temperature - bath temperature

Date, Delta T (mdeg C)



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

COEFFICIENTS:

g = -9.827434e-001  
h = 1.339608e-001  
i = -1.836311e-004  
j = 3.035909e-005

CPcor = -9.5700e-008  
CTcor = 3.2500e-006  
WBOTC = -9.2197e-008

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	2711.30	0.00000	0.00000
1.0000	34.9818	2.98876	5446.91	2.98876	-0.00000
4.5000	34.9619	3.29710	5653.76	3.29710	0.00000
15.0000	34.9189	4.28286	6268.69	4.28286	-0.00000
18.5000	34.9096	4.62941	6470.72	4.62941	0.00000
23.9940	34.8991	5.18896	6783.95	5.18896	-0.00000
29.0000	34.8925	5.71339	7064.61	5.71339	0.00000


$$f = \text{INST FREQ} * \text{sqrt}(1.0 + \text{WBOTC} * t) / 1000.0$$

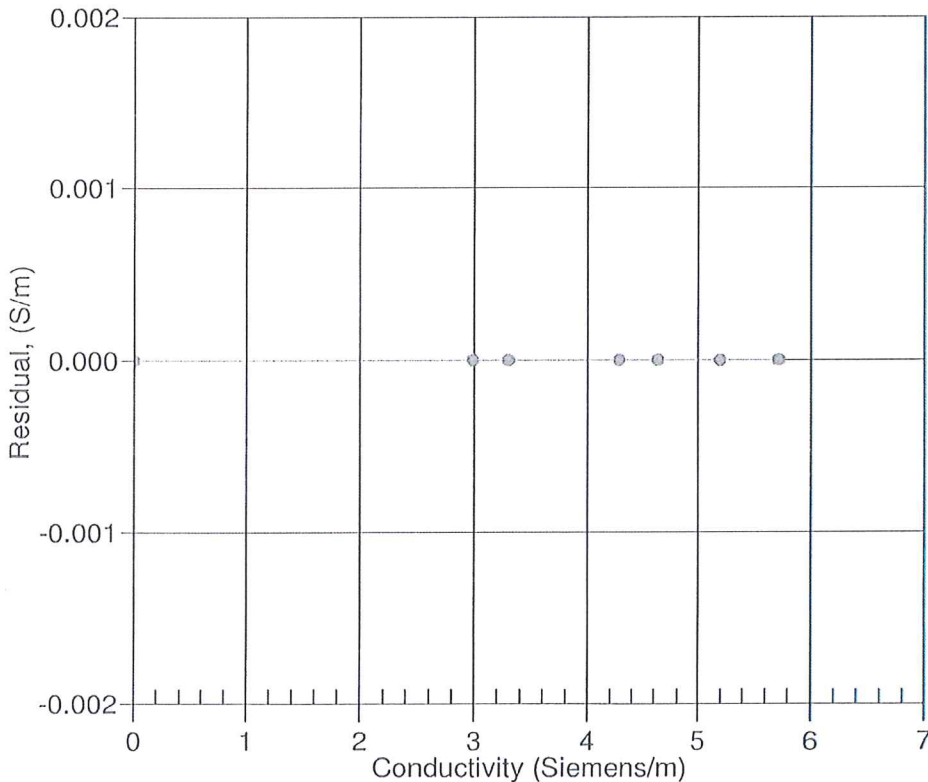
$$\text{Conductivity} = (g + hf^2 + if^3 + jf^4) / (1 + \delta t + \epsilon p) \text{ Siemens/meter}$$

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

Residual = instrument conductivity - bath conductivity

Date, Slope Correction

 11-Sep-12 1.0000000



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SENSOR SERIAL NUMBER: 9036  
 CALIBRATION DATE: 05-Sep-12

SLOCUM PAYLOAD CTD  
 PRESSURE CALIBRATION DATA  
 1450 psia S/N 3648533

**COEFFICIENTS:**

PA0 = 7.227370e-002  
 PA1 = 4.918044e-003  
 PA2 = -2.846388e-011  
 PTEMPA0 = -6.806985e+001  
 PTEMPA1 = 5.240308e-002  
 PTEMPA2 = -5.127791e-007

PTCA0 = 5.248290e+005  
 PTCA1 = 9.592249e-001  
 PTCA2 = -3.250630e-003  
 PTCB0 = 2.520137e+001  
 PTCB1 = 8.750000e-004  
 PTCB2 = 0.000000e+000

**PRESSURE SPAN CALIBRATION**

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FSR
14.61	527812.0	1739.0	14.64	0.00
315.00	588950.0	1741.0	314.97	-0.00
615.00	650063.0	1743.0	614.97	-0.00
914.98	711225.0	1744.0	915.00	0.00
1214.96	772419.0	1744.0	1214.97	0.00
1464.98	823443.0	1745.0	1464.93	-0.00
1214.96	772425.0	1747.0	1215.00	0.00
914.98	711230.0	1746.0	915.02	0.00
615.02	650071.0	1747.0	615.01	-0.00
315.03	588953.0	1747.0	314.98	-0.00
14.61	527810.0	1749.0	14.63	0.00

**THERMAL CORRECTION**

TEMP ITS90	THERMISTOR OUTPUT	INST OUTPUT
32.50	1957	527878.20
29.00	1887	527875.40
23.99	1788	527874.00
18.50	1680	527868.40
15.00	1611	527862.60
4.50	1404	527854.60
1.00	1336	527852.60
TEMP (ITS90)		SPAN (mV)
-5.00		25.20
35.00		25.23

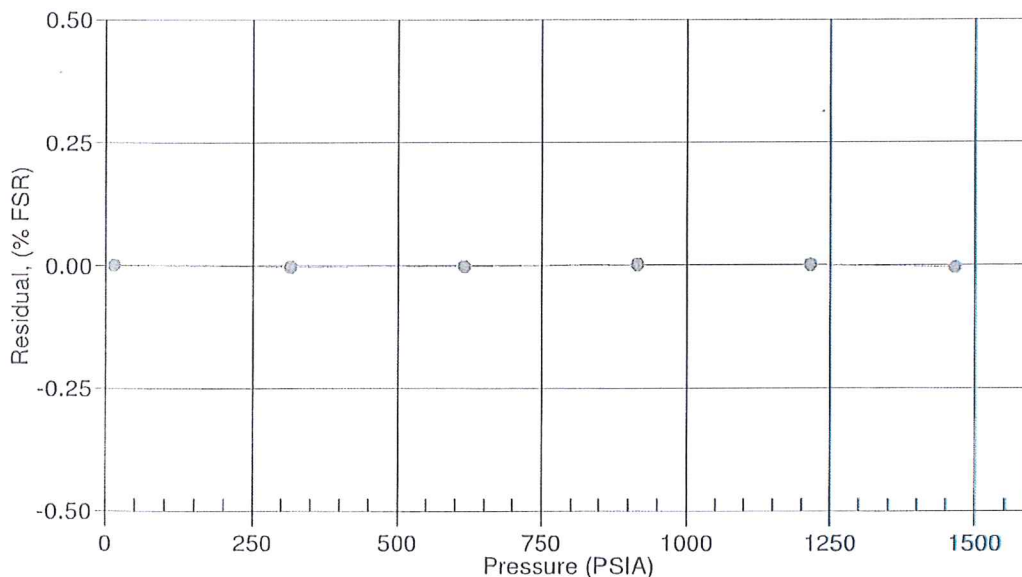
$$y = \text{thermistor output}; t = PTEMPA0 + PTEMPA1 * y + PTEMPA2 * y^2$$

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

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

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

Date, Avg Delta P %FS



05-Sep-12 -0.00