

# 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: 9014  
CALIBRATION DATE: 09-Aug-12

SLOCUM PAYLOAD CTD  
TEMPERATURE CALIBRATION DATA  
ITS-90 TEMPERATURE SCALE

### ITS-90 COEFFICIENTS

a0 = -9.638750e-005

a1 = 3.052128e-004

a2 = -4.349547e-006

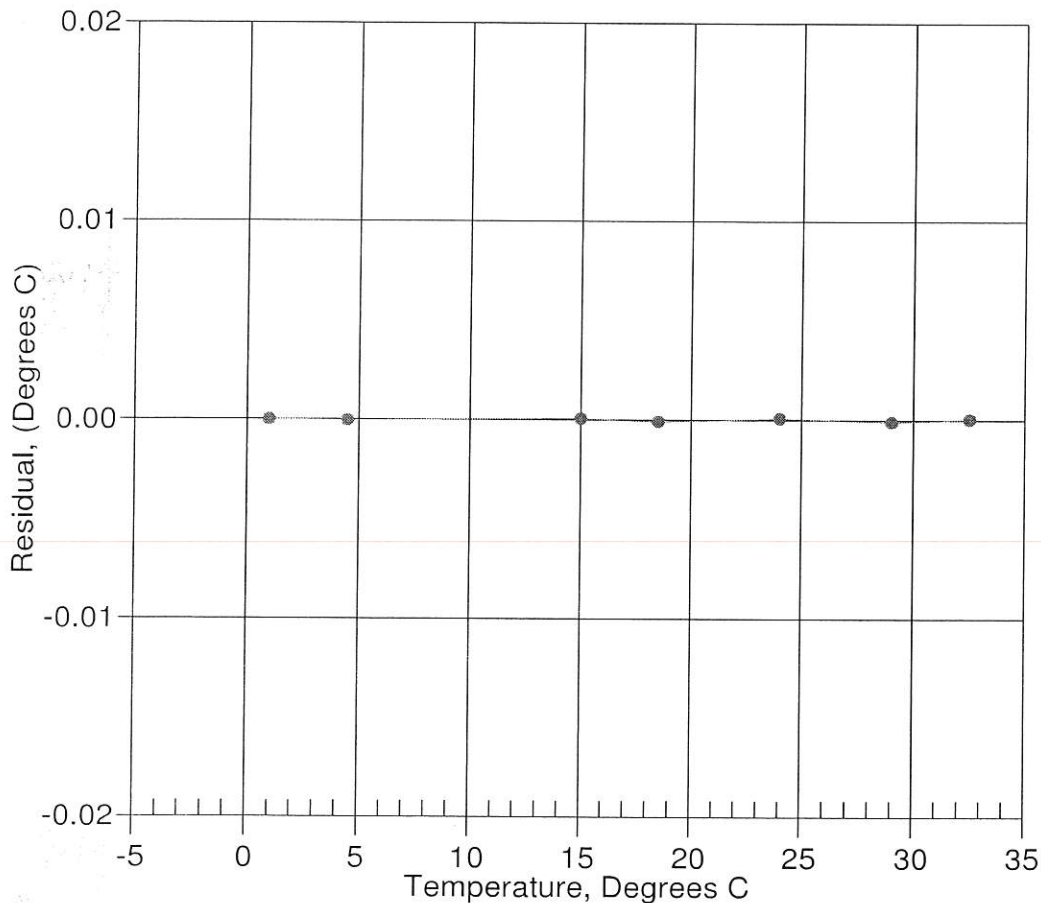
a3 = 1.979859e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	573926.5	1.0000	0.0000
4.4999	490770.4	4.4999	-0.0000
14.9999	312954.4	15.0000	0.0001
18.4999	271062.1	18.4998	-0.0001
24.0000	217563.7	24.0001	0.0001
29.0000	179246.9	28.9999	-0.0001
32.5000	157038.3	32.5000	0.0000

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

Residual = instrument temperature - bath temperature

Date, Delta T (mdeg C)



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CONDUCTIVITY CALIBRATION DATA

PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

**COEFFICIENTS:**

g = -9.788991e-001

h = 1.330210e-001

i = -1.344034e-004

j = 2.667962e-005

CPcor = -9.5700e-008

CTcor = 3.2500e-006

WBOTC = -3.6836e-007

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	2714.47	0.00000	0.00000
1.0000	34.7493	2.97078	5447.85	2.97080	0.00001
4.4999	34.7282	3.27722	5654.54	3.27721	-0.00001
14.9999	34.6817	4.25684	6269.06	4.25682	-0.00001
18.4999	34.6702	4.60106	6470.90	4.60107	0.00000
24.0000	34.6575	5.15761	6784.25	5.15762	0.00001
29.0000	34.6484	5.67791	7064.31	5.67790	-0.00000
32.5000	34.6409	6.04885	7257.22	6.04885	-0.00000

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

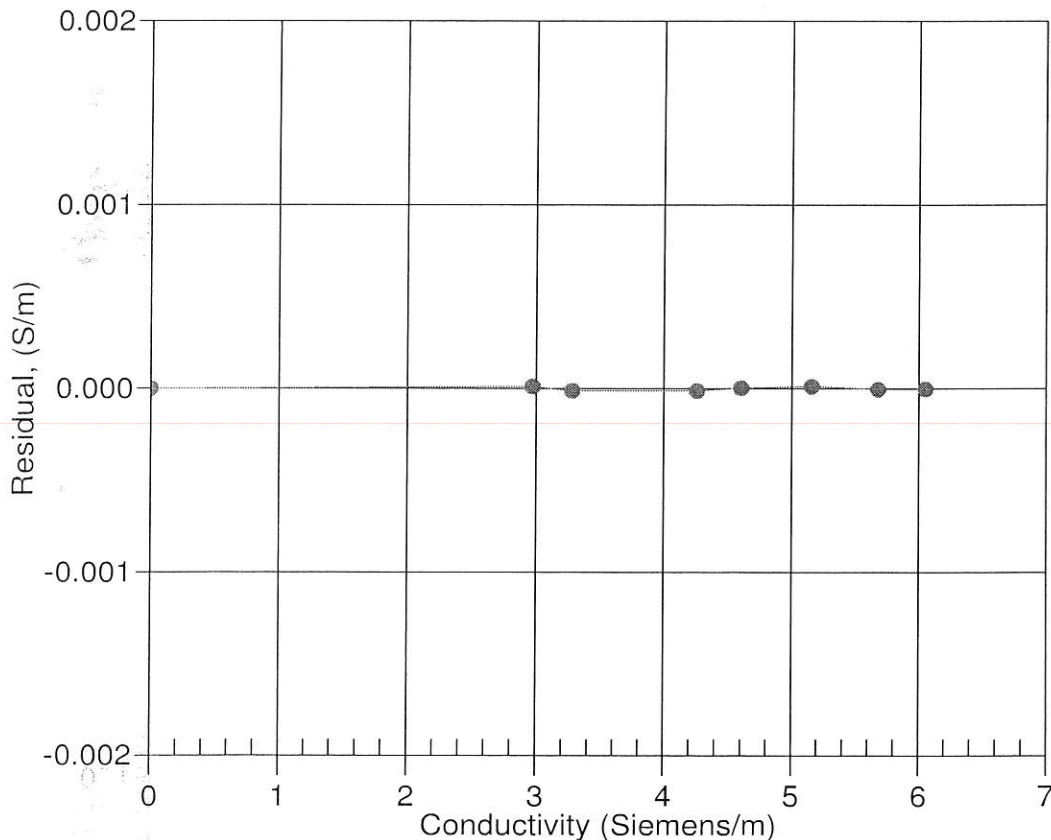
$$\text{Conductivity} = (g + hf^2 + if^3 + jf^4) / (1 + \delta t + \epsilon p) \text{ Siemens/meter}$$

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

Residual = instrument conductivity - bath conductivity

Date, Slope Correction

09-Aug-12 1.0000000



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SENSOR SERIAL NUMBER: 9014  
 CALIBRATION DATE: 06-Aug-12

SLOCUM PAYLOAD CTD  
 PRESSURE CALIBRATION DATA  
 1450 psia S/N 3626943

COEFFICIENTS:

PA0 = 2.485395e-001  
 PA1 = 4.801803e-003  
 PA2 = -2.052005e-011  
 PTEMPA0 = -7.305881e+001  
 PTEMPA1 = 5.011067e-002  
 PTEMPA2 = -3.533110e-007

PTCA0 = 5.249400e+005  
 PTCA1 = 5.638395e+000  
 PTCA2 = -1.486883e-001  
 PTCB0 = 2.550800e+001  
 PTCB1 = -2.000000e-004  
 PTCB2 = 0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FSR
14.65	527997.0	1948.0	14.69	0.00
314.96	590530.0	1952.0	314.93	-0.00
615.00	653056.0	1953.0	614.97	-0.00
915.00	715613.0	1956.0	915.01	0.00
1215.01	778203.0	1957.0	1215.04	0.00
1465.05	830375.0	1957.0	1465.00	-0.00
1215.01	778204.0	1957.0	1215.04	0.00
915.00	715619.0	1957.0	915.03	0.00
615.02	653062.0	1957.0	615.00	-0.00
314.99	590541.0	1957.0	314.98	-0.00
14.65	527989.0	1958.0	14.65	-0.00

THERMAL CORRECTION

TEMP ITS90	THERMISTOR OUTPUT	INST OUTPUT
32.50	2139	528046.10
29.00	2067	528045.80
24.00	1964	528050.10
18.50	1851	528069.40
15.00	1780	528070.30
4.50	1565	528036.50
1.00	1494	528014.30

TEMP (ITS90)	SPAN (mV)
-5.00	25.51
35.00	25.50

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

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

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

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

