

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: 9089
 CALIBRATION DATE: 29-Sep-16

Slocum Payload CTD TEMPERATURE CALIBRATION DATA
 ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

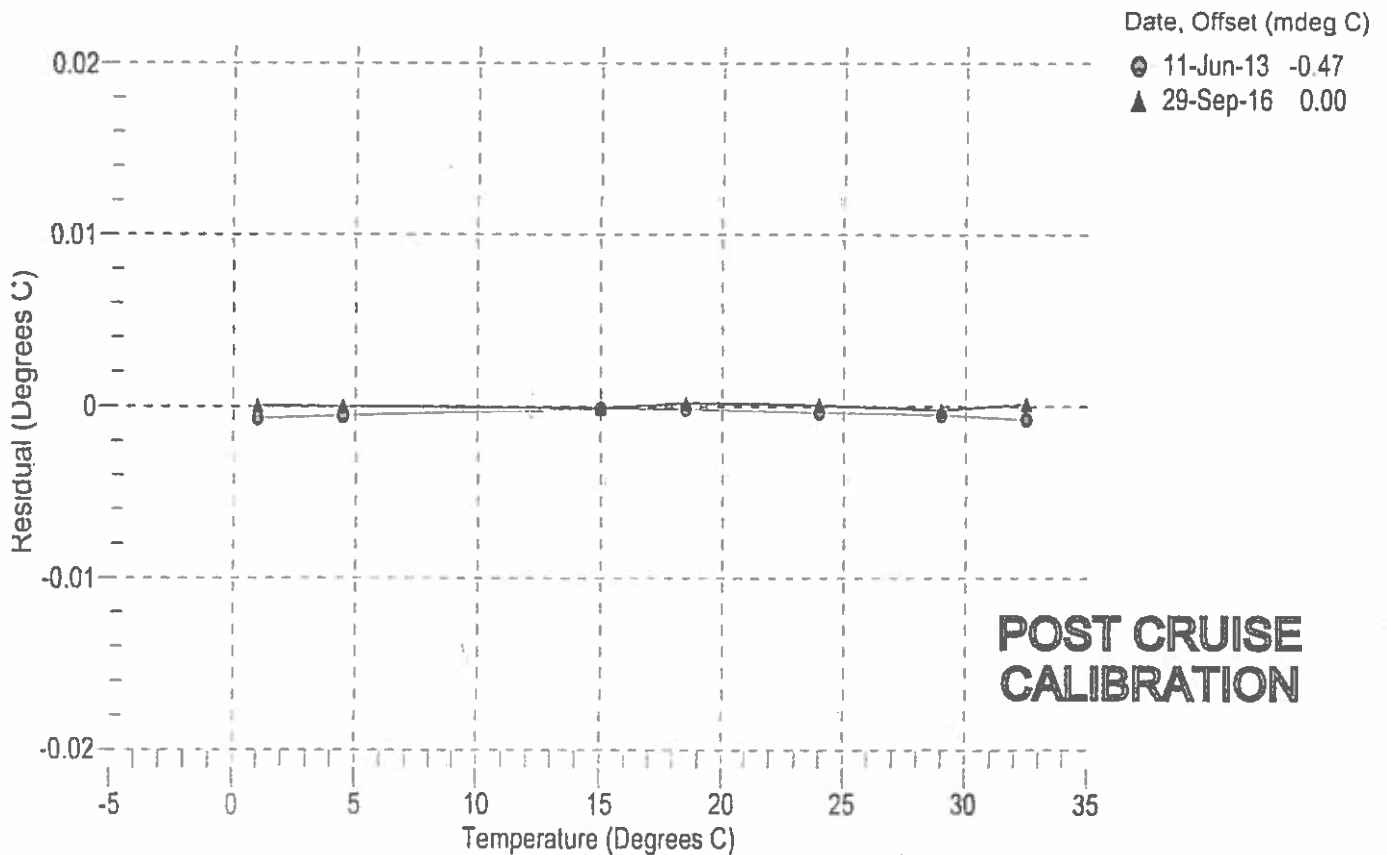
a0 = -1.372988e-004
 a1 = 3.149077e-004
 a2 = -5.092716e-006
 a3 = 2.161329e-007

| BATH TEMP (° C) | INSTRUMENT OUTPUT (counts) | INST TEMP (° C) | RESIDUAL (° C) |
|--------------------|-------------------------------|--------------------|-------------------|
| 1.0000 | 575329.4 | 1.0000 | 0.0000 |
| 4.4999 | 491858.4 | 4.4999 | -0.0000 |
| 15.0000 | 313454.2 | 14.9999 | -0.0001 |
| 18.5000 | 271439.0 | 18.5002 | 0.0002 |
| 24.0000 | 217810.0 | 24.0001 | 0.0001 |
| 29.0000 | 179411.0 | 28.9998 | -0.0002 |
| 32.5000 | 157158.8 | 32.5001 | 0.0001 |

n = Instrument Output (counts)

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

Residual (°C) = instrument temperature - bath temperature



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

COEFFICIENTS:

g = -9.846380e-001
h = 1.381477e-001
i = -2.926969e-004
j = 4.042900e-005

CPcor = -9.5700e-008
CTcor = 3.2500e-006
WBOTC = 6.2311e-008

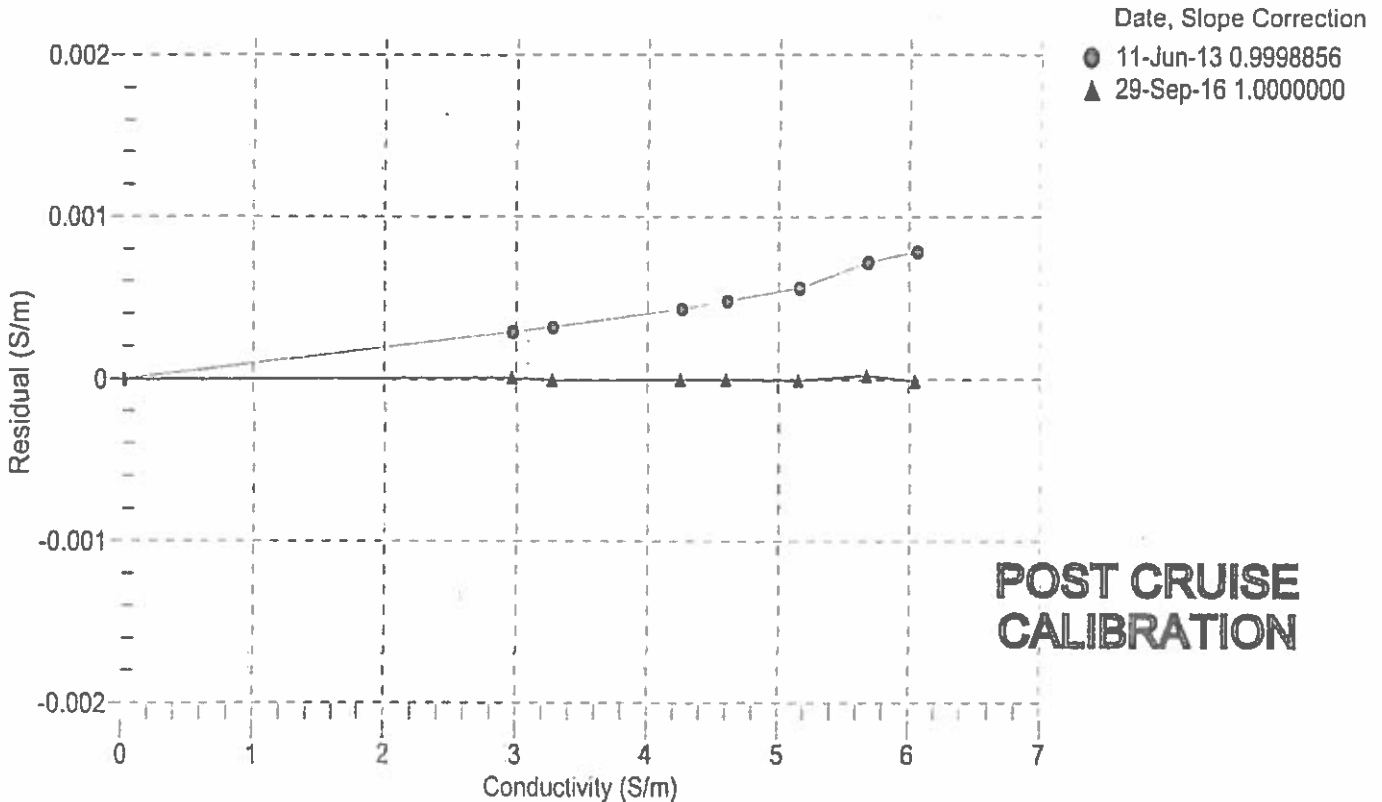
| BATH TEMP (° C) | BATH SAL (PSU) | BATH COND (S/m) | INSTRUMENT OUTPUT (Hz) | INSTRUMENT COND (S/m) | RESIDUAL (S/m) |
|--------------------|-------------------|--------------------|---------------------------|--------------------------|-------------------|
| 22.0000 | 0.0000 | 0.00000 | 2674.51 | 0.00000 | 0.00000 |
| 1.0000 | 34.7207 | 2.96857 | 5357.30 | 2.96858 | 0.00001 |
| 4.4999 | 34.7001 | 3.27483 | 5560.35 | 3.27483 | -0.00001 |
| 15.0000 | 34.6566 | 4.25409 | 6164.12 | 4.25409 | -0.00000 |
| 18.5000 | 34.6470 | 4.59833 | 6362.48 | 4.59833 | -0.00000 |
| 24.0000 | 34.6370 | 5.15489 | 6670.39 | 5.15489 | -0.00001 |
| 29.0000 | 34.6323 | 5.67556 | 6945.75 | 5.67559 | 0.00002 |
| 32.5000 | 34.6307 | 6.04728 | 7135.61 | 6.04726 | -0.00001 |

$f = \text{Instrument Output(Hz)} * \text{sqrt}(1.0 + \text{WBOTC} * t) / 1000.0$

t = temperature (°C); p = pressure (decibars); $\delta = \text{CTcor}$; $\epsilon = \text{CPcor}$;

$\text{Conductivity (S/m)} = (g + h * f^2 + i * f^3 + j * f^4) / (1 + \delta * t + \epsilon * p)$

$\text{Residual (Siemens/meter)} = \text{instrument conductivity} - \text{bath conductivity}$



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CALIBRATION DATE: 28-Sep-16

Slocum Payload CTD PRESSURE CALIBRATION DATA
1450 psia S/N 3819476

COEFFICIENTS:

| | | | |
|-----------|----------------|---------|----------------|
| PA0 = | -1.711083e-001 | PTCA0 = | 5.244077e+005 |
| PA1 = | 4.626799e-003 | PTCA1 = | -2.709206e+000 |
| PA2 = | -2.006782e-011 | PTCA2 = | 4.795570e-002 |
| PTEMPA0 = | -7.279963e+001 | PTCB0 = | 2.539825e+001 |
| PTEMPA1 = | 5.145326e-002 | PTCB1 = | 5.000000e-005 |
| PTEMPA2 = | -5.351470e-007 | PTCB2 = | 0.000000e+000 |

PRESSURE SPAN CALIBRATION

THERMAL CORRECTION

| PRESSURE (PSIA) | INSTRUMENT OUTPUT (counts) | THERMISTOR OUTPUT (volts) | COMPUTED PRESSURE (PSIA) | RESIDUAL (%FSR) | TEMP (°C) | THERMISTOR OUTPUT (volts) | INSTRUMENT OUTPUT (counts) |
|-----------------|----------------------------|---------------------------|--------------------------|-----------------|-----------|---------------------------|----------------------------|
| 14.66 | 527581.0 | 1897.0 | 14.68 | 0.00 | 32.50 | 2092 | 527620.00 |
| 314.96 | 592505.0 | 1899.0 | 314.96 | 0.00 | 29.00 | 2021 | 527619.40 |
| 614.97 | 657396.0 | 1900.0 | 614.93 | -0.00 | 24.00 | 1920 | 527623.00 |
| 914.97 | 722337.0 | 1901.0 | 914.95 | -0.00 | 18.50 | 1808 | 527624.20 |
| 1214.93 | 787308.0 | 1901.0 | 1214.94 | 0.00 | 15.00 | 1738 | 527626.00 |
| 1464.96 | 841475.0 | 1901.0 | 1464.92 | -0.00 | 4.50 | 1526 | 527647.80 |
| 1214.93 | 787321.0 | 1901.0 | 1215.00 | 0.00 | 1.00 | 1457 | 527655.00 |
| 915.01 | 722347.0 | 1901.0 | 915.00 | -0.00 | | | |
| 614.96 | 657406.0 | 1901.0 | 614.97 | 0.00 | | | |
| 314.96 | 592508.0 | 1901.0 | 314.98 | 0.00 | | | |
| 14.66 | 527572.0 | 1901.0 | 14.64 | -0.00 | | | |

| TEMPERATURE (°C) | SPAN (mV) |
|------------------|-----------|
| -5.00 | 25.40 |
| 35.00 | 25.40 |

y = thermistor output (counts)

$$t = PTEMPA0 + PTEMPA1 * y + PTEMPA2 * y^2$$

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

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

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

$$\text{Residual (\%FSR)} = (\text{computed pressure} - \text{true pressure}) * 100 / \text{Full Scale Range}$$

Date, Offset (%FSR)

● 28-Sep-16 -0.00

