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: 9288
CALIBRATION DATE: 26-Feb-15

Slocum Payload CTD TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

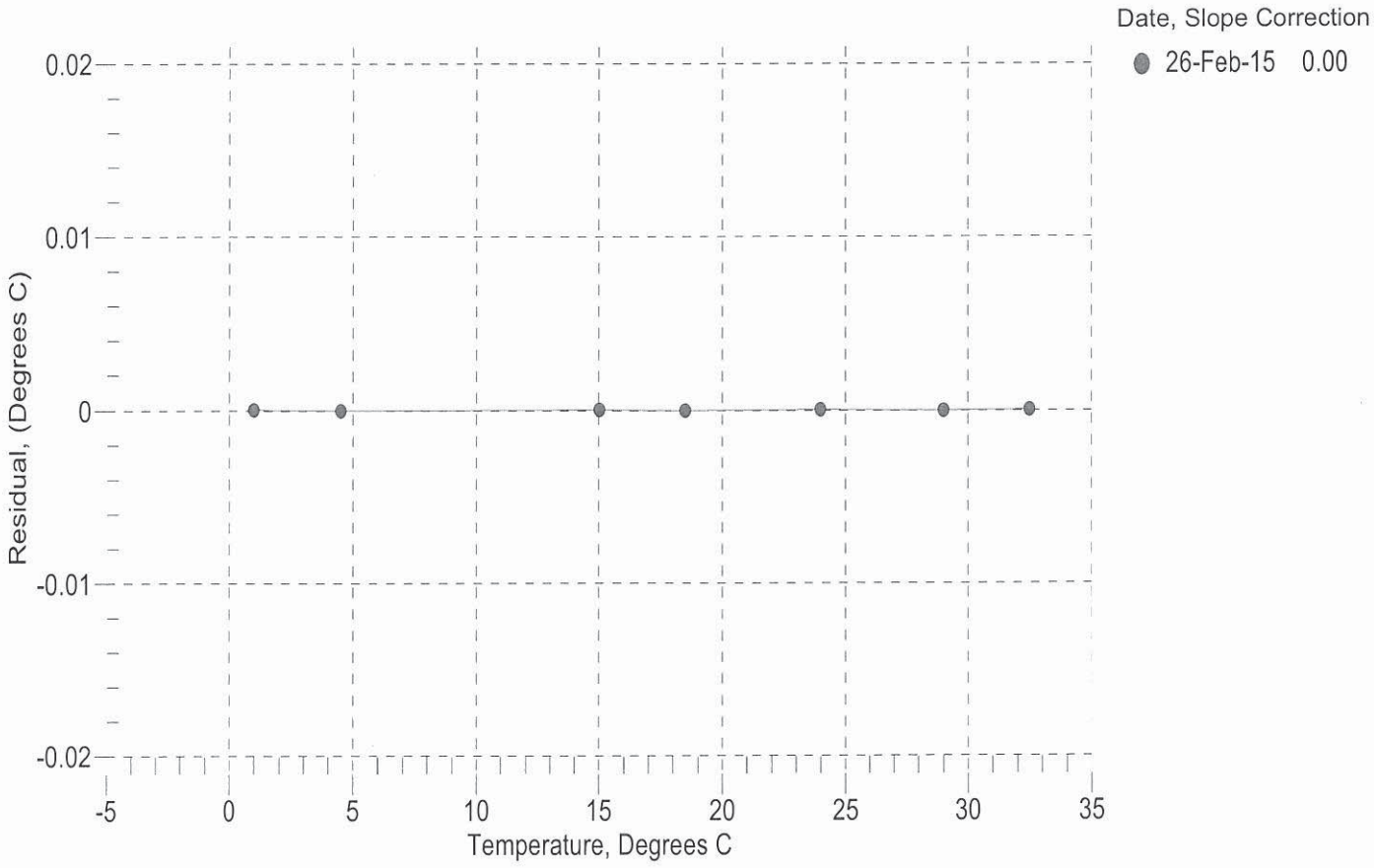
a0 = -1.636469e-004
a1 = 3.168003e-004
a2 = -5.135613e-006
a3 = 2.198139e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	575727.0	1.0000	0.0000
4.5000	492898.0	4.5000	-0.0000
15.0000	315393.3	15.0000	0.0000
18.5000	273473.0	18.5000	-0.0000
23.9940	219920.8	23.9940	0.0000
29.0000	181414.8	29.0000	-0.0000
32.5000	159100.0	32.5000	0.0000

Temperature ITS-90 = $1/\{a0 + a1[ln(n)] + a2[ln^2(n)] + a3[ln^3(n)]\} - 273.15$ (°C)

Residual = instrument temperature - bath temperature

n = instrument output



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CALIBRATION DATE: 26-Feb-15

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

COEFFICIENTS:

```
g = -9.830211e-001
h =  1.509796e-001
i = -8.585437e-005
j =  2.874494e-005

CPcor = -9.5700e-008
CTcor =  3.2500e-006
WBOTC =  9.7955e-008
```

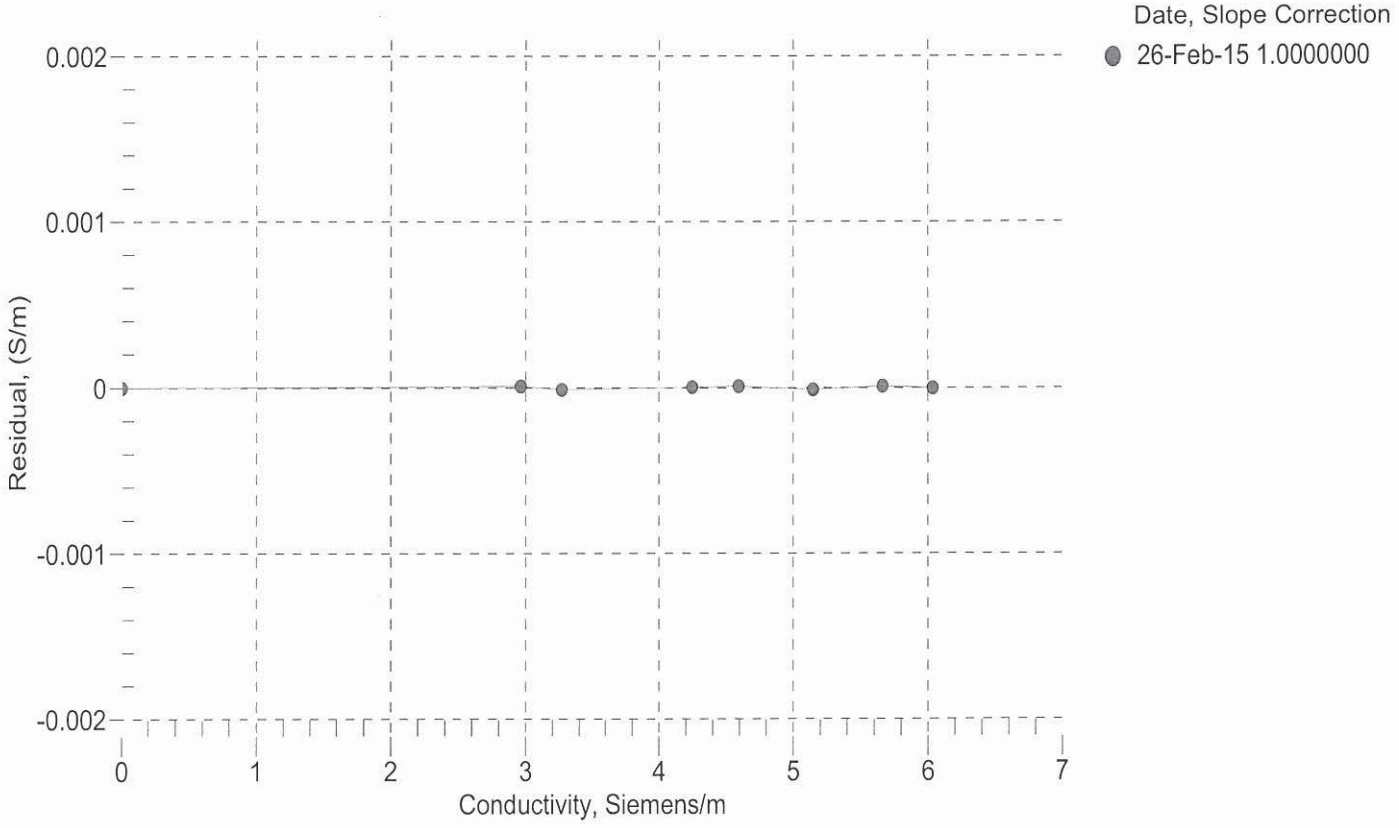
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2551.92	0.00000	0.00000
1.0000	34.6602	2.96389	5107.67	2.96390	0.00001
4.5000	34.6404	3.26976	5301.18	3.26975	-0.00001
15.0000	34.5971	4.24756	5876.56	4.24756	0.00000
18.5000	34.5868	4.59120	6065.59	4.59120	0.00001
23.9940	34.5717	5.14563	6358.46	5.14562	-0.00001
29.0000	34.5650	5.66577	6621.20	5.66578	0.00001
32.5000	34.5600	6.03633	6802.02	6.03633	-0.00000

f = INST FREQ * sqrt(1.0 + WBOTC * t) / 1000.0

Conductiv ity = $(g + h * f^2 + i * f^3 + j * f^4) / (1 + \delta * t + \varepsilon * p)$ Siemens / meter

t = temperatur e[°C)]; p = pressure[decibars]; δ = CTcor; ε = CPcor;

Residual = instrument conductivity - bath conductivity



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SENSOR SERIAL NUMBER: 9288
CALIBRATION DATE: 24-Feb-15

Slocum Payload CTD PRESSURE CALIBRATION DATA
FSR: 1450 psia S/N 4326844

COEFFICIENTS:

PA0 =	-7.571650e-002	PTCA0 =	5.245973e+005
PA1 =	4.544461e-003	PTCA1 =	-2.377949e+000
PA2 =	-2.023587e-011	PTCA2 =	7.345523e-002
PTEMPA0 =	1.476112e+002	PTCB0 =	2.511588e+001
PTEMPA1 =	-6.604377e-002	PTCB1 =	-2.250000e-004
PTEMPA2 =	2.712419e-007	PTCB2 =	0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FS
14.78	527867.0	1919.0	14.86	0.01
315.03	593919.0	1917.0	314.99	-0.00
615.01	659976.0	1916.0	614.97	-0.00
914.99	726087.0	1915.0	915.02	0.00
1214.92	792233.0	1914.0	1215.05	0.01
1464.89	847305.0	1910.0	1464.72	-0.01
1214.88	792229.0	1913.0	1215.03	0.01
915.04	726084.0	1914.0	915.01	-0.00
615.04	659981.0	1915.0	615.00	-0.00
315.08	593919.0	1917.0	314.99	-0.01
14.78	527853.0	1918.0	14.80	0.00

THERMAL CORRECTION

TEMP ITS90	THERMISTOR OUTPUT	INST OUTPUT
32.50	1756	527926.25
29.00	1809	527922.00
23.99	1886	527911.00
18.50	1971	527898.75
15.00	2025	527913.25
4.50	2187	527922.50
1.00	2241	527919.75

TEMP (ITS90)	SPAN (mV)
-5.00	25.12
35.00	25.11

y = thermistor output; $t = PTEMPA0 + PTEMPA1 * y + PTEMPA2 * y^2$

x = pressure output - $PTCA0 - PTCA1 * t - PTCA2 * t^2$

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

pressure (psia) = $PA0 + PA1 * n + PA2 * n^2$