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: 9057
CALIBRATION DATE: 15-Mar-13

SLOCUM PAYLOAD CTD
TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

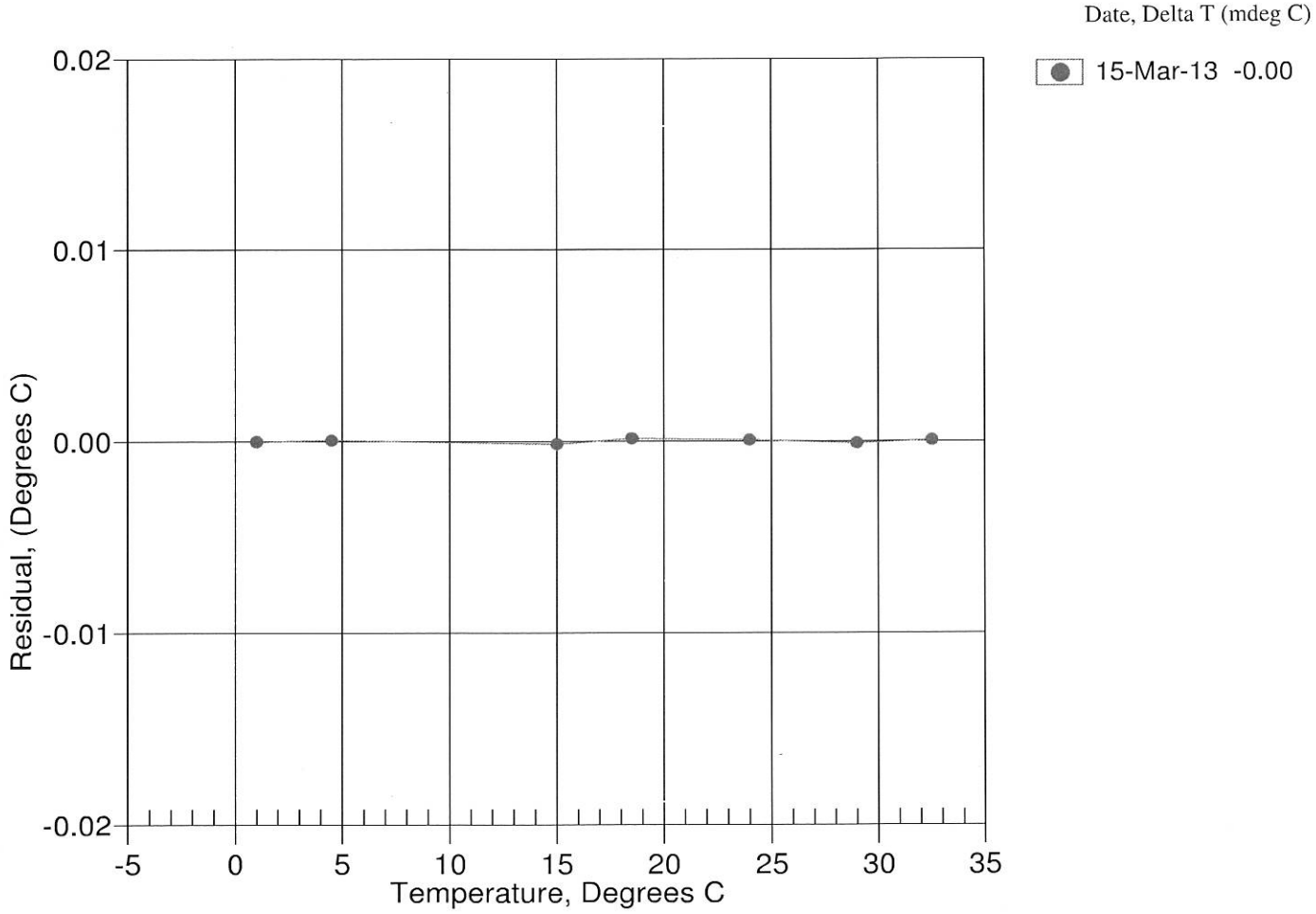
ITS-90 COEFFICIENTS

a0 = -8.320114e-006
a1 = 2.852743e-004
a2 = -2.823591e-006
a3 = 1.555459e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	587746.2	1.0000	-0.0000
4.4999	502133.4	4.5000	0.0001
15.0000	319402.2	14.9998	-0.0002
18.5000	276424.8	18.5001	0.0001
24.0000	221606.4	24.0001	0.0001
29.0000	182385.6	28.9999	-0.0001
32.5000	159672.6	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



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CALIBRATION DATE: 15-Mar-13

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

COEFFICIENTS:

```
g = -9.832016e-001
h =  1.328570e-001
i = -3.513002e-004
j =  4.232406e-005

CPcor = -9.5700e-008
CTcor =  3.2500e-006
WBOTC =  1.4056e-006
```

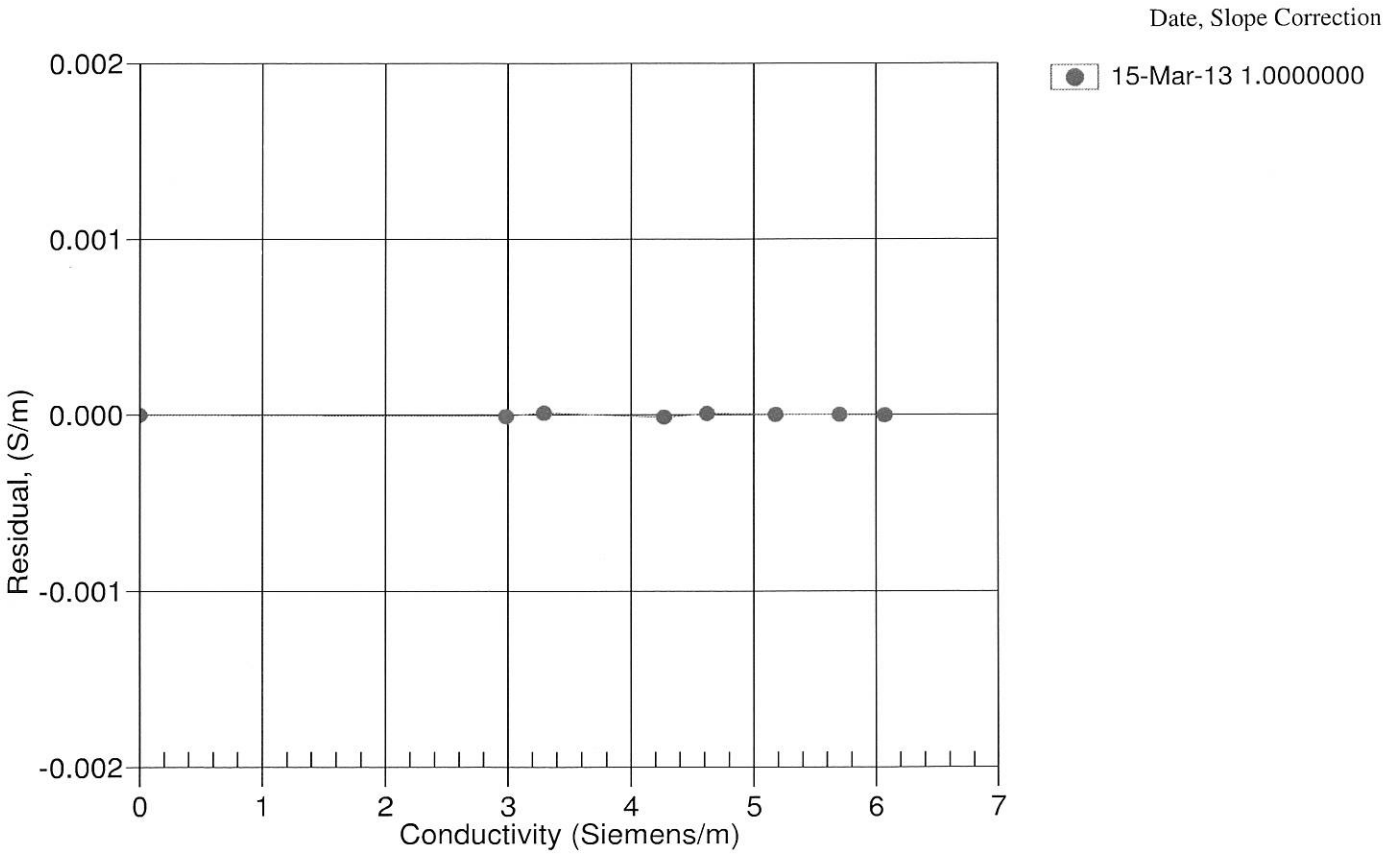
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2726.94	0.00000	0.00000
1.0000	34.8831	2.98113	5476.02	2.98112	-0.00001
4.4999	34.8631	3.28869	5683.96	3.28871	0.00001
15.0000	34.8199	4.27201	6302.01	4.27199	-0.00001
18.5000	34.8106	4.61769	6505.06	4.61770	0.00001
24.0000	34.8004	5.17652	6820.16	5.17652	0.00000
29.0000	34.7945	5.69915	7101.83	5.69915	0.00000
32.5000	34.7915	6.07215	7295.99	6.07215	-0.00000

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

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

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

Residual = instrument conductivity - bath conductivity



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SENSOR SERIAL NUMBER: 9057
CALIBRATION DATE: 08-Mar-13

SLOCUM PAYLOAD CTD
PRESSURE CALIBRATION DATA
1450 psia S/N 3791765

COEFFICIENTS:

PA0 =	1.750835e-001	PTCA0 =	5.249449e+005
PA1 =	4.559321e-003	PTCA1 =	1.608775e+000
PA2 =	-8.154174e-012	PTCA2 =	4.163765e-003
PTEMPA0 =	-6.886442e+001	PTCB0 =	2.533450e+001
PTEMPA1 =	5.206114e-002	PTCB1 =	-1.000000e-004
PTEMPA2 =	-4.834615e-007	PTCB2 =	0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FSR
14.65	528120.0	1782.0	14.48	-0.01
314.97	594024.0	1785.0	314.94	-0.00
614.96	659834.0	1785.0	614.91	-0.00
914.96	725680.0	1786.0	914.97	0.00
1214.97	791531.0	1787.0	1214.98	0.00
1465.04	846429.0	1788.0	1465.04	-0.00
1214.96	791524.0	1788.0	1214.95	-0.00
915.03	725699.0	1788.0	915.05	0.00
614.97	659854.0	1787.0	615.00	0.00
315.05	594050.0	1787.0	315.06	0.00
14.65	528199.0	1788.0	14.84	0.01

THERMAL CORRECTION

TEMP ITS90	THERMISTOR OUTPUT	INST OUTPUT
32.50	1984	528264.60
29.00	1914	528260.80
24.00	1814	528250.20
18.50	1705	528240.40
15.00	1636	528232.80
4.50	1428	528217.40
1.00	1359	528210.20

TEMP(ITS90)	SPAN(mV)
-5.00	25.34
35.00	25.33

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) = $PA0 + PA1 * n + PA2 * n^2$