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: 9015
CALIBRATION DATE: 23-Dec-14

Slocum Payload CTD TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

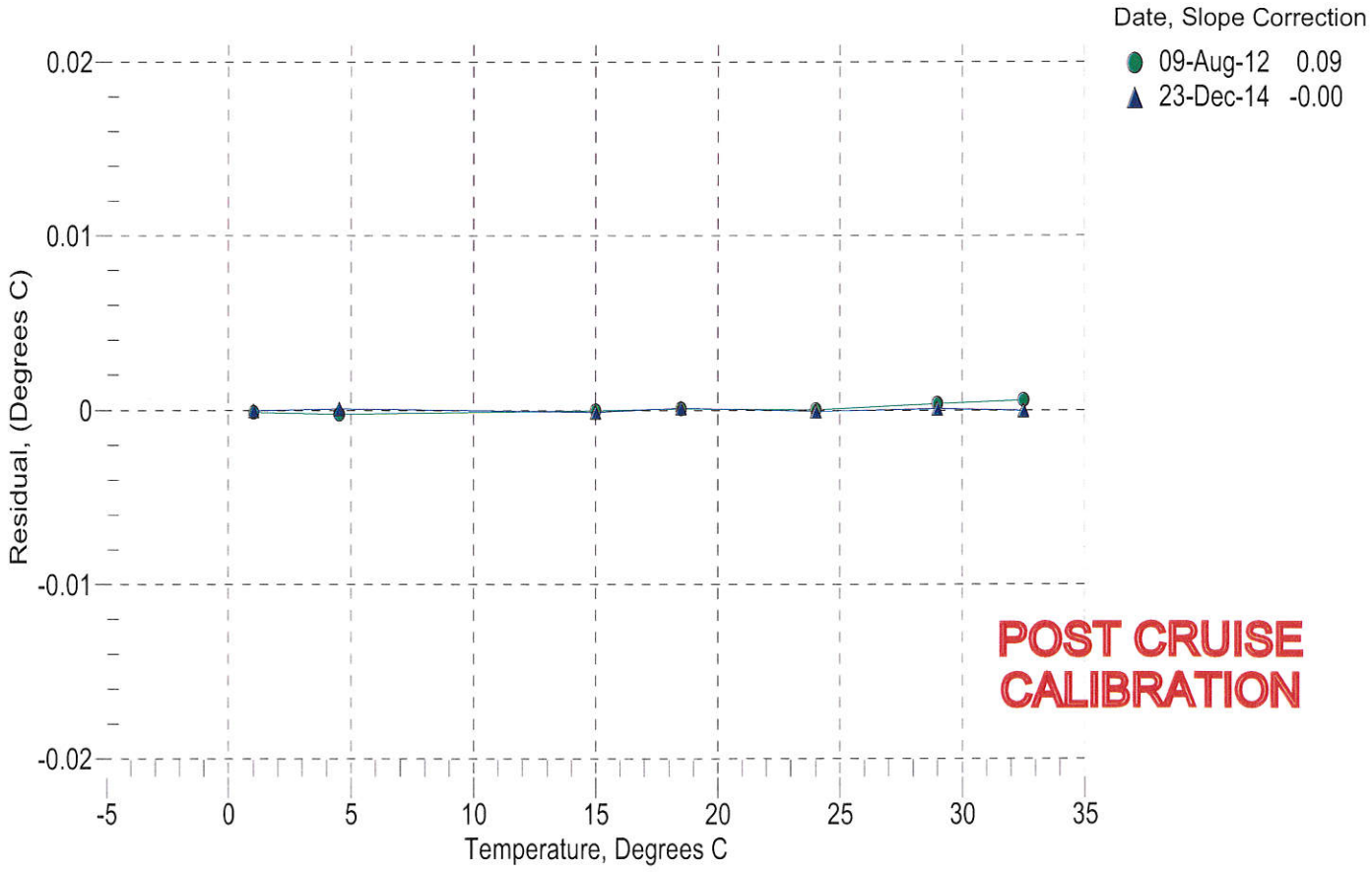
a0 = -1.292092e-004
a1 = 3.119697e-004
a2 = -4.838602e-006
a3 = 2.124698e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	565154.6	1.0000	-0.0000
4.5000	483599.6	4.5001	0.0001
15.0000	308989.8	14.9999	-0.0001
18.5000	267789.3	18.5001	0.0001
24.0000	215142.7	23.9999	-0.0001
29.0000	177396.2	29.0001	0.0001
32.5000	155505.6	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

n = instrument output



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SENSOR SERIAL NUMBER: 9015
CALIBRATION DATE: 19-Dec-14

Slocum Payload CTD PRESSURE CALIBRATION DATA
FSR: 1450 psia S/N 3626944

COEFFICIENTS:

PA0 =	5.969189e-001	PTCA0 =	5.248687e+005
PA1 =	4.855290e-003	PTCA1 =	1.007912e+001
PA2 =	-1.853051e-011	PTCA2 =	-2.049137e-001
PTEMPA0 =	-6.962622e+001	PTCB0 =	2.519613e+001
PTEMPA1 =	5.157931e-002	PTCB1 =	2.250000e-004
PTEMPA2 =	-4.604487e-007	PTCB2 =	0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FS
14.56	527876.0	1824.0	14.60	0.00
314.56	589753.0	1825.0	314.89	0.02
614.94	651600.0	1827.0	614.89	-0.00
914.95	713481.0	1827.0	914.92	-0.00
1214.92	775389.0	1828.0	1214.93	0.00
1464.94	826991.0	1828.0	1464.90	-0.00
1214.92	775396.0	1829.0	1214.97	0.00
914.95	713498.0	1828.0	915.00	0.00
614.95	651611.0	1828.0	614.94	-0.00
314.90	589756.0	1828.0	314.90	0.00
14.56	527863.0	1827.0	14.53	-0.00

THERMAL CORRECTION

TEMP ITS90	THERMISTOR OUTPUT	INST OUTPUT
32.50	2016	527936.70
29.00	1946	527954.50
24.00	1846	527957.60
18.50	1735	527945.80
15.00	1665	527930.80
4.50	1456	527871.70
1.00	1387	527840.70

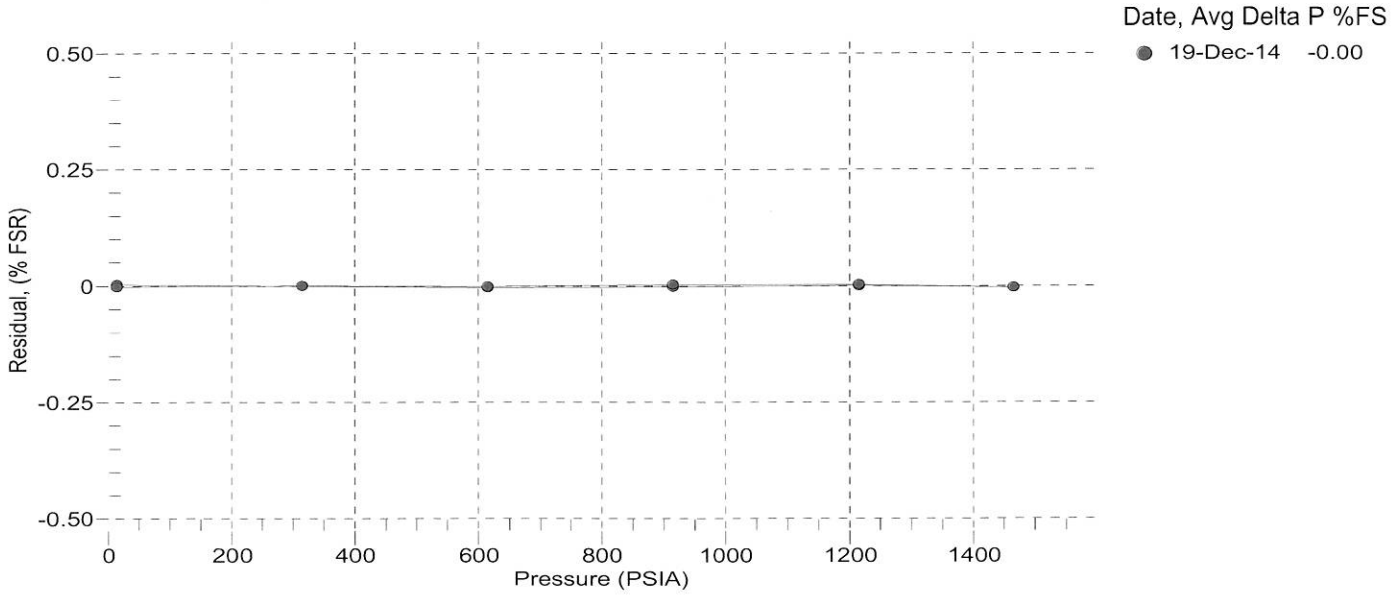
TEMP (ITS90)	SPAN (mV)
-5.00	25.20
35.00	25.20

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



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SENSOR SERIAL NUMBER: 9015
CALIBRATION DATE: 23-Dec-14

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

COEFFICIENTS:

```
g = -9.878740e-001
h =  1.354520e-001
i = -1.668583e-004
j =  2.985470e-005

CPcor = -9.5700e-008
CTcor =  3.2500e-006
WBOTC = -1.5415e-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	2702.92	0.00000	0.00000
1.0000	34.7014	2.96708	5404.14	2.96709	0.00001
4.5000	34.6816	3.27327	5608.76	3.27326	-0.00001
15.0000	34.6385	4.25210	6217.19	4.25210	-0.00001
18.5000	34.6293	4.59623	6417.14	4.59624	0.00001
24.0000	34.6193	5.15255	6727.52	5.15255	0.00000
29.0000	34.6137	5.67286	7005.07	5.67286	0.00000
32.5000	34.6100	6.04407	7196.36	6.04407	-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