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: 9285
CALIBRATION DATE: 07-Mar-15

Slocum Payload CTD TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

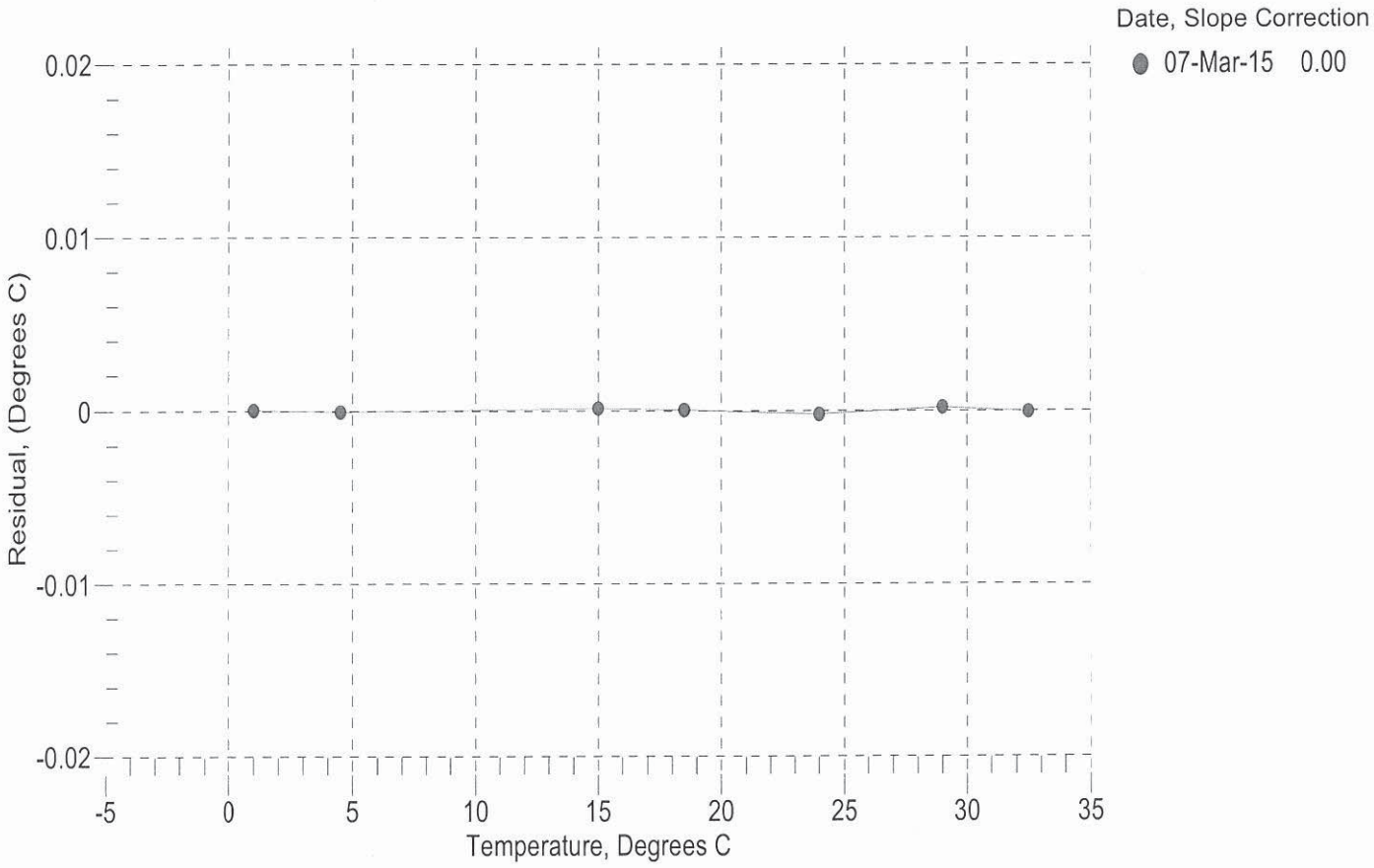
a0 = -8.274431e-005
a1 = 3.088440e-004
a2 = -4.856210e-006
a3 = 2.098755e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0001	573079.4	1.0001	0.0000
4.5000	489112.0	4.4999	-0.0001
15.0000	310175.4	15.0001	0.0001
18.5000	268178.4	18.5000	0.0000
24.0000	214670.2	23.9998	-0.0002
29.0000	176436.8	29.0002	0.0002
32.5000	154326.8	32.4999	-0.0001

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



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: 9285
CALIBRATION DATE: 07-Mar-15

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

COEFFICIENTS:

```
g = -9.902783e-001
h =  1.568274e-001
i = -1.801139e-004
j =  3.765629e-005

CPcor = -9.5700e-008
CTcor =  3.2500e-006
WBOTC =  1.3255e-007
```

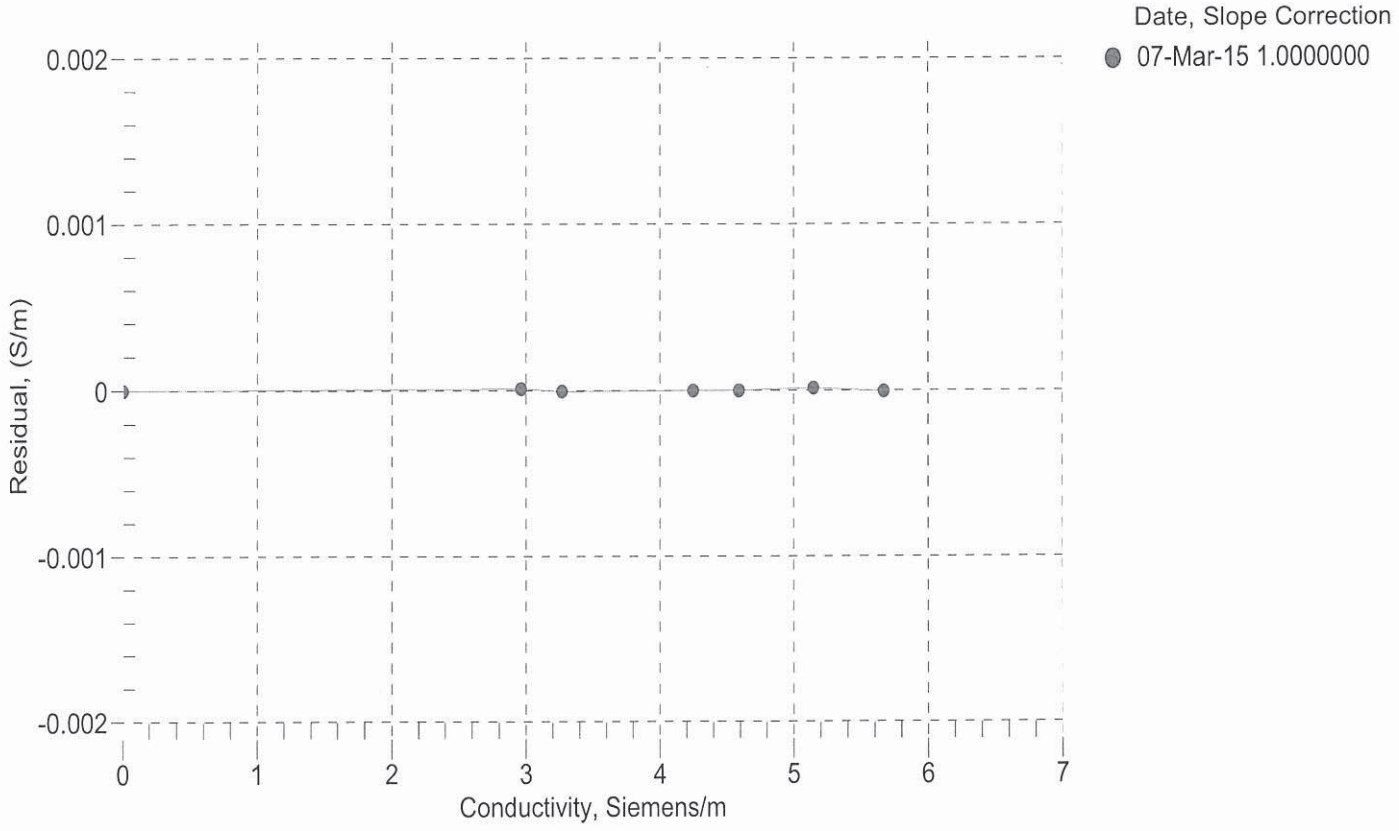
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2514.57	0.00000	0.00000
1.0001	34.6512	2.96320	5020.16	2.96321	0.00001
4.5000	34.6313	3.26898	5210.05	3.26898	-0.00001
15.0000	34.5883	4.24659	5774.77	4.24659	-0.00000
18.5000	34.5791	4.59029	5960.36	4.59028	-0.00000
24.0000	34.5689	5.14588	6248.48	5.14589	0.00001
29.0000	34.5636	5.66557	6506.14	5.66556	-0.00001
32.5000	34.5617	6.03659	6683.72	6.03629	-0.00030

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



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: 9285
CALIBRATION DATE: 24-Feb-15

Slocum Payload CTD PRESSURE CALIBRATION DATA
FSR: 1450 psia S/N 4333816

COEFFICIENTS:

PA0 =	9.296916e-003	PTCA0 =	5.243658e+005
PA1 =	4.610702e-003	PTCA1 =	-1.195399e+000
PA2 =	-2.417621e-011	PTCA2 =	5.823210e-002
PTEMPA0 =	1.361930e+002	PTCB0 =	2.504050e+001
PTEMPA1 =	-6.412924e-002	PTCB1 =	-1.000000e-004
PTEMPA2 =	1.678661e-008	PTCB2 =	0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FS
14.78	527589.0	1783.0	14.86	0.01
315.03	592705.0	1781.0	315.01	-0.00
615.01	657829.0	1779.0	614.98	-0.00
914.99	723012.0	1779.0	915.03	0.00
1214.92	788233.0	1776.0	1215.04	0.01
1464.89	842551.0	1774.0	1464.74	-0.01
1214.88	788227.0	1775.0	1215.01	0.01
915.04	723011.0	1776.0	915.02	-0.00
615.04	657830.0	1777.0	614.99	-0.00
315.08	592703.0	1779.0	315.00	-0.01
14.78	527573.0	1779.0	14.79	0.00

THERMAL CORRECTION

TEMP ITS90	THERMISTOR OUTPUT	INST OUTPUT
32.50	1618	527650.80
29.00	1672	527643.80
24.00	1750	527625.80
18.50	1836	527632.80
15.00	1891	527624.60
4.50	2055	527615.00
1.00	2109	527632.40

TEMP (ITS90)	SPAN (mV)
-5.00	25.04
35.00	25.04

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