

# SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 0436  
CALIBRATION DATE: 03-Mar-09

SBE19 TEMPERATURE CALIBRATION DATA  
ITS-90 TEMPERATURE SCALE

### ITS-90 COEFFICIENTS

g = 4.19987471e-003  
h = 6.09453622e-004  
i = 5.65099484e-006  
j = -1.75876636e-006  
f0 = 1000.0

### IPTS-68 COEFFICIENTS

a = 3.64763607e-003  
b = 5.94813138e-004  
c = 1.05104505e-005  
d = -1.75820256e-006  
f0 = 2499.564

BATH TEMP (ITS-90)	INSTRUMENT FREQ (Hz)	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	2499.564	0.9999	-0.00008
4.5000	2700.809	4.5002	0.00017
14.9999	3372.966	14.9996	-0.00028
18.4999	3620.974	18.5000	0.00005
24.0000	4036.077	24.0004	0.00041
29.0000	4441.172	28.9996	-0.00042
32.5000	4741.118	32.5002	0.00015

Temperature ITS-90 =  $1/\{g + h[\ln(f_0/f)] + i[\ln^2(f_0/f)] + j[\ln^3(f_0/f)]\} - 273.15$  (°C)

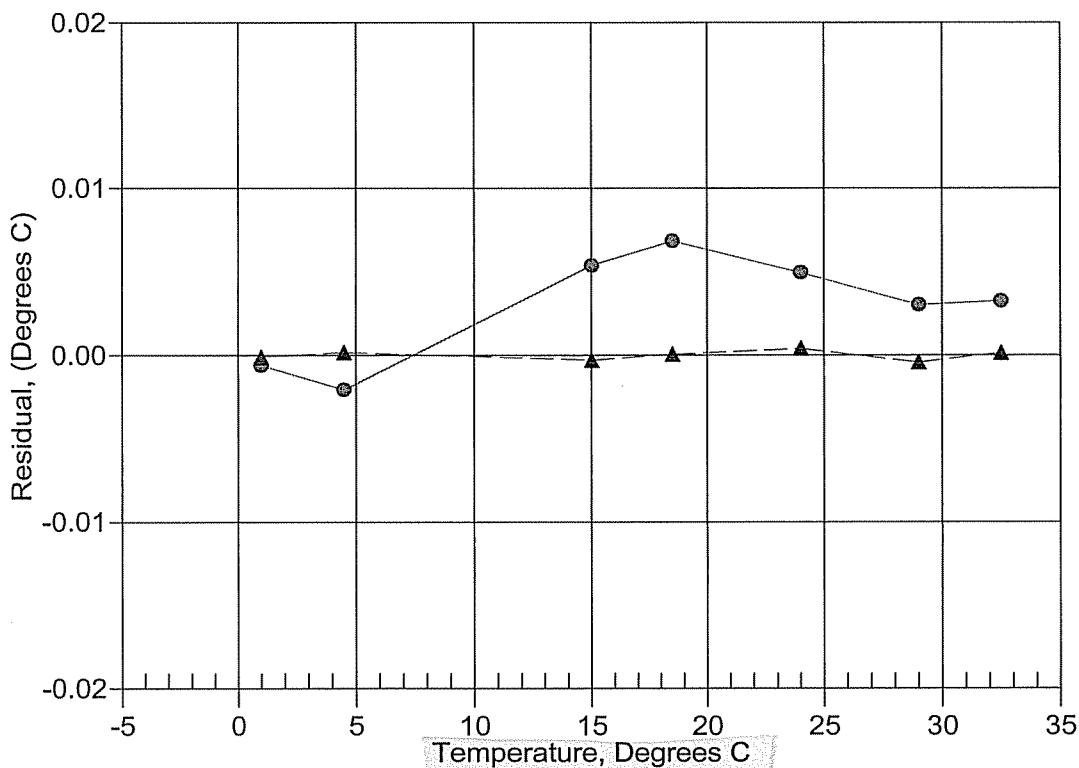
Temperature IPTS-68 =  $1/\{a + b[\ln(f_0/f)] + c[\ln^2(f_0/f)] + d[\ln^3(f_0/f)]\} - 273.15$  (°C)

Following the recommendation of JPOTS:  $T_{68}$  is assumed to be  $1.00024 * T_{90}$  (-2 to 35 °C)

Residual = instrument temperature - bath temperature

Date, Offset(mdeg C)

● 06-Nov-07 2.97  
▲ 03-Mar-09 -0.00



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SENSOR SERIAL NUMBER: 0436  
CALIBRATION DATE: 18-Feb-09

SBE19 TEMPERATURE CALIBRATION DATA  
ITS-90 TEMPERATURE SCALE

### ITS-90 COEFFICIENTS

g = 4.19918350e-003  
h = 6.07464648e-004  
i = 3.88274377e-006  
j = -2.26836118e-006  
f0 = 1000.0

### IPTS-68 COEFFICIENTS

a = 3.64763694e-003  
b = 5.94779657e-004  
c = 1.01431045e-005  
d = -2.26789912e-006  
f0 = 2499.723

BATH TEMP (ITS-90)	INSTRUMENT FREQ (Hz)	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	2499.723	0.9999	-0.00015
4.5000	2700.994	4.5003	0.00028
15.0000	3373.145	14.9998	-0.00020
18.5000	3621.121	18.4998	-0.00024
24.0000	4036.267	24.0006	0.00056
29.0000	4441.431	28.9997	-0.00030
32.5000	4741.455	32.5000	0.00004

$$\text{Temperature ITS-90} = 1/\{g + h[\ln(f_0/f)] + i[\ln^2(f_0/f)] + j[\ln^3(f_0/f)]\} - 273.15 \text{ (}^\circ\text{C)}$$

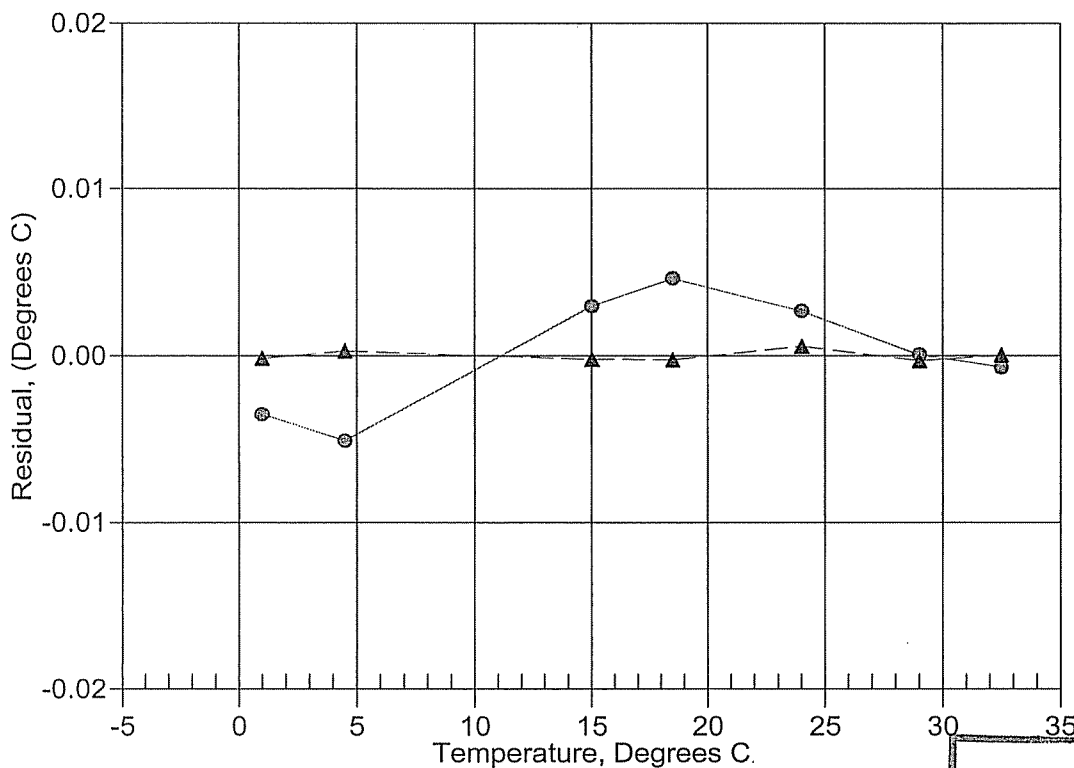
$$\text{Temperature IPTS-68} = 1/\{a + b[\ln(f_0/f)] + c[\ln^2(f_0/f)] + d[\ln^3(f_0/f)]\} - 273.15 \text{ (}^\circ\text{C)}$$

Following the recommendation of JPOTS:  $T_{68}$  is assumed to be  $1.00024 * T_{90}$  (-2 to 35 °C)

Residual = instrument temperature - bath temperature

Date, Offset(mdeg C)

● 06-Nov-07 0.15  
▲ 18-Feb-09 -0.00



**POST CRUISE  
CALIBRATION**



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## Temperature Calibration Report

Customer:	USGS/Glacier Bay National Park		
Job Number:	53627	Date of Report:	3/3/2009
Model Number:	SBE 19-03	Serial Number:	193353-0436

*Temperature sensors are normally calibrated 'as received', without adjustments, allowing a determination sensor drift. If the calibration identifies a problem, then a second calibration is performed after work is completed. The 'as received' calibration is not performed if the sensor is damaged or non-functional, or by customer request.*

*An 'as received' calibration certificate is provided, listing coefficients to convert sensor frequency to temperature. Users must choose whether the 'as received' calibration or the previous calibration better represents the sensor condition during deployment. In SEASOFT enter the chosen coefficients using the program SEACON. The coefficient 'offset' allows a small correction for drift between calibrations (consult the SEASOFT manual). Calibration coefficients obtained after a repair apply only to subsequent data.*

### 'AS RECEIVED CALIBRATION'

Performed  Not Performed

Date: 2/18/2009

Drift since last cal: -0.00012 Degrees Celsius/year

Comments:

### 'FINAL CALIBRATION'

Performed  Not Performed

Date: 3/3/2009

Drift since Last cal: -0.00225 Degrees Celsius/year

Comments: