



SEA-BIRD ELECTRONICS, INC.

13431 NE 20th St. Bellevue, Washington 98005 USA

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

Service
Report

RMA Number	72710
-------------------	-------

Customer Information:

Company	WEBB RESEARCH CORPORATION	Date	3/14/2013
Contact	Peter Collins		
PO Number	TWR7915		

Serial Number	WEBB Glider-0073
Model Number	WEBB Glider

Services Requested:

1. Evaluate/Repair Instrumentation.
2. Perform Routine Calibration Service.

Problems Found:

1. The anti-foulant devices appeared "dirty".

Services Performed:

1. Performed initial diagnostic evaluation.
2. Calibrated the pressure sensor.
3. Performed "Post Cruise" calibration of the temperature & conductivity sensors.
4. Installed NEW AF24173 Anti-foulant cylinder(s).
5. Performed complete system check and full diagnostic evaluation.

Special Notes:

--

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: 0073
CALIBRATION DATE: 07-Mar-13

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

COEFFICIENTS:

g = -9.900507e-001
h = 1.505569e-001
i = -3.758329e-004
j = 4.982290e-005

CPcor = -9.5700e-008
CTcor = 3.2500e-006
WBOTC = 1.5241e-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	2569.75	0.00000	0.00000
1.0000	34.8777	2.98071	5146.06	2.98071	-0.00000
4.5000	34.8576	3.28824	5341.12	3.28823	-0.00000
15.0000	34.8144	4.27140	5921.04	4.27141	0.00000
18.5000	34.8048	4.61701	6111.56	4.61701	0.00001
24.0000	34.7940	5.17568	6407.25	5.17567	-0.00001
29.0000	34.7875	5.69813	6671.60	5.69813	-0.00000
32.5000	34.7835	6.07092	6853.79	6.07092	0.00000

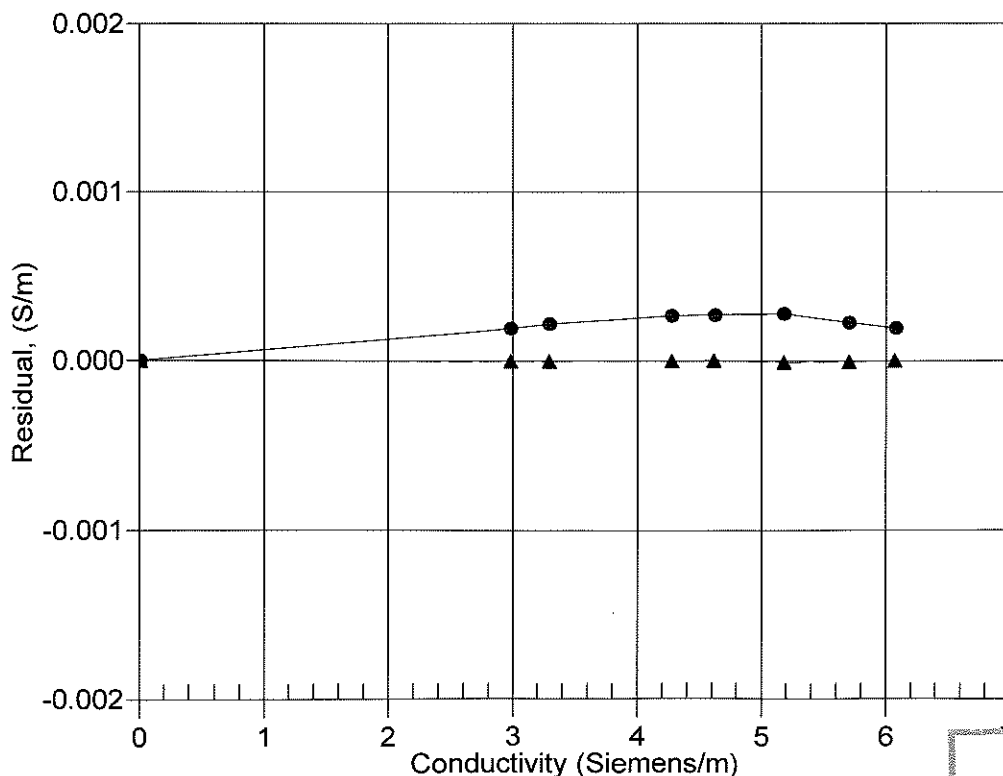
$$f = \text{INST FREQ} * \text{sqrt}(1.0 + \text{WBOTC} * t) / 1000.0$$

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

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

Residual = instrument conductivity - bath conductivity

Date, Slope Correction



**POST CRUISE
CALIBRATION**



SEA-BIRD ELECTRONICS, INC.

13431 NE 20th Street Bellevue, Washington 98005 USA

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

Conductivity Calibration Report

Customer:	WEBB RESEARCH CORPORATION		
Job Number:	72710	Date of Report:	3/7/2013
Model Number:	WEBB Glider	Serial Number:	WEBB Glider-0073

Conductivity sensors are normally calibrated 'as received', without cleaning or adjustments, allowing a determination of sensor drift. If the calibration identifies a problem or indicates cell cleaning is necessary, 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 the coefficients used to convert sensor frequency to conductivity. 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. The coefficient 'slope' allows small corrections for drift between calibrations (consult the SEASOFT manual). Calibration coefficients obtained after a repair or cleaning apply only to subsequent data.

'AS RECEIVED CALIBRATION'

Performed Not Performed

Date: 3/7/2013

Drift since last cal: -0.00010 PSU/month*

Comments:

'CALIBRATION AFTER CLEANING & REPLATINIZING'

Performed Not Performed

Date:

Drift since Last cal: PSU/month*

Comments:

**Measured at 3.0 S/m*

Cell cleaning and electrode replatinizing tend to 'reset' the conductivity sensor to its original condition. Lack of drift in post-cleaning-calibration indicates geometric stability of the cell and electrical stability of the sensor circuit.

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: 0073
CALIBRATION DATE: 07-Mar-13

SLOCUM PAYLOAD CTD
TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

ITS-90 COEFFICIENTS

a0 = -1.353393e-004
a1 = 3.149001e-004
a2 = -5.116429e-006
a3 = 2.181764e-007

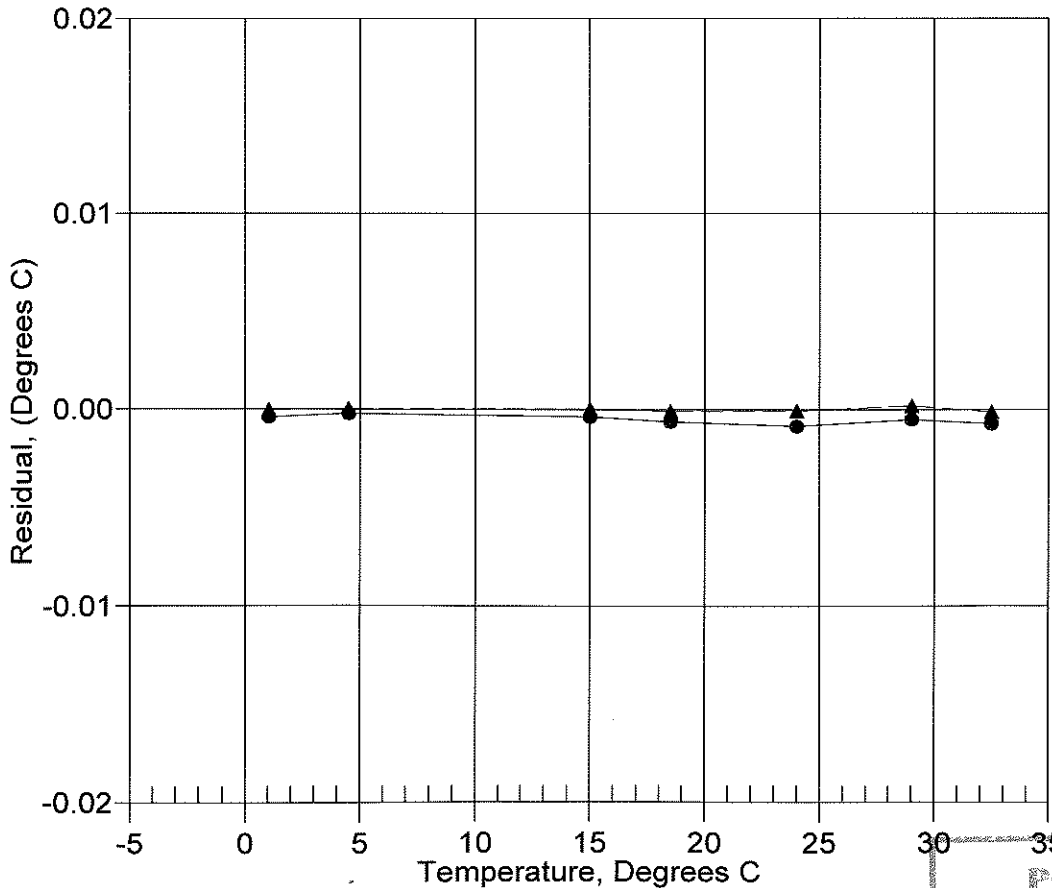
BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	570550.2	1.0000	-0.0000
4.5000	487866.2	4.5000	0.0000
15.0000	311076.4	15.0000	0.0000
18.5000	269427.2	18.4999	-0.0001
24.0000	216244.8	23.9999	-0.0001
29.0000	178152.0	29.0002	0.0002
32.5000	156079.4	32.4999	-0.0001

$$\text{Temperature ITS-90} = 1/\{a_0 + a_1[\ln(n)] + a_2[\ln^2(n)] + a_3[\ln^3(n)]\} - 273.15 \text{ (}^\circ\text{C)}$$

Residual = instrument temperature - bath temperature

Date, Delta T (mdeg C)

● 20-Jun-11 -0.53
▲ 07-Mar-13 -0.00



**POST CRUISE
CALIBRATION**



SEA-BIRD ELECTRONICS, INC.

13431 NE 20th St. Bellevue, Washington 98005 USA

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

Temperature Calibration Report

Customer:	WEBB RESEARCH CORPORATION		
Job Number:	72710	Date of Report:	3/7/2013
Model Number	WEBB Glider	Serial Number:	WEBB Glider-0073

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. 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:

Drift since last cal: Degrees Celsius/year

Comments:

'CALIBRATION AFTER REPAIR'

Performed Not Performed

Date:

Drift since Last cal: Degrees Celsius/year

Comments:

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: 0073
CALIBRATION DATE: 05-Mar-13

SLOCUM PAYLOAD CTD
PRESSURE CALIBRATION DATA
1450 psia S/N 3274633

COEFFICIENTS:

PA0 = 1.527914e-001
PA1 = 4.915641e-003
PA2 = -3.169188e-011
PTEMPA0 = -7.084832e+001
PTEMPA1 = 5.176035e-002
PTEMPA2 = -6.323831e-007

PTCA0 = 5.245495e+005
PTCA1 = 3.123701e+000
PTCA2 = -7.828677e-002
PTCB0 = 2.542563e+001
PTCB1 = -6.750000e-004
PTCB2 = 0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FSR
14.50	527499.0	1849.0	14.51	0.00
314.89	588586.0	1851.0	314.84	-0.00
614.95	649663.0	1851.0	614.89	-0.00
915.00	710799.0	1851.0	914.99	-0.00
1215.04	771970.0	1852.0	1215.03	-0.00
1465.08	822978.0	1852.0	1465.03	-0.00
1215.02	771979.0	1851.0	1215.07	0.00
915.00	710816.0	1850.0	915.07	0.01
614.98	649684.0	1850.0	614.99	0.00
314.92	588598.0	1850.0	314.90	-0.00
14.50	527506.0	1850.0	14.54	0.00

THERMAL CORRECTION

TEMP ITS90	THERMISTOR OUTPUT	INST OUTPUT
32.50	2048	527532.20
29.00	1976	527540.60
24.00	1875	527545.40
18.50	1764	527544.80
15.00	1694	527543.40
4.50	1483	527526.80
1.00	1412	527518.00
TEMP (ITS90)		SPAN (mV)
-5.00		25.43
35.00		25.40

$$y = \text{thermistor output}; t = PTEMPA0 + PTEMPA1 * y + PTEMPA2 * y^2$$

$$x = \text{pressure output} - PTCA0 - PTCA1 * t - PTCA2 * t^2$$

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

$$\text{pressure (psia)} = PA0 + PA1 * n + PA2 * n^2$$

Date, Avg Delta P %FS

● 05-Mar-13 -0.00

