



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	89690
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Customer Information:

Company	WEBB RESEARCH CORPORATION	Date	6/30/2016
Contact	CHARLES STILL		
PO Number	PW05088		

Serial Number	SLOCUM-9027
Model Number	SLOCUM

Services Requested:

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

Problems Found:

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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:

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SENSOR SERIAL NUMBER: 9027
 CALIBRATION DATE: 21-Jun-16

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

COEFFICIENTS:

g = -9.654794e-001
 h = 1.325150e-001
 i = -1.702956e-004
 j = 3.052263e-005

CPcor = -9.5700e-008
 CTcor = 3.2500e-006
 WBOTC = -5.8604e-007

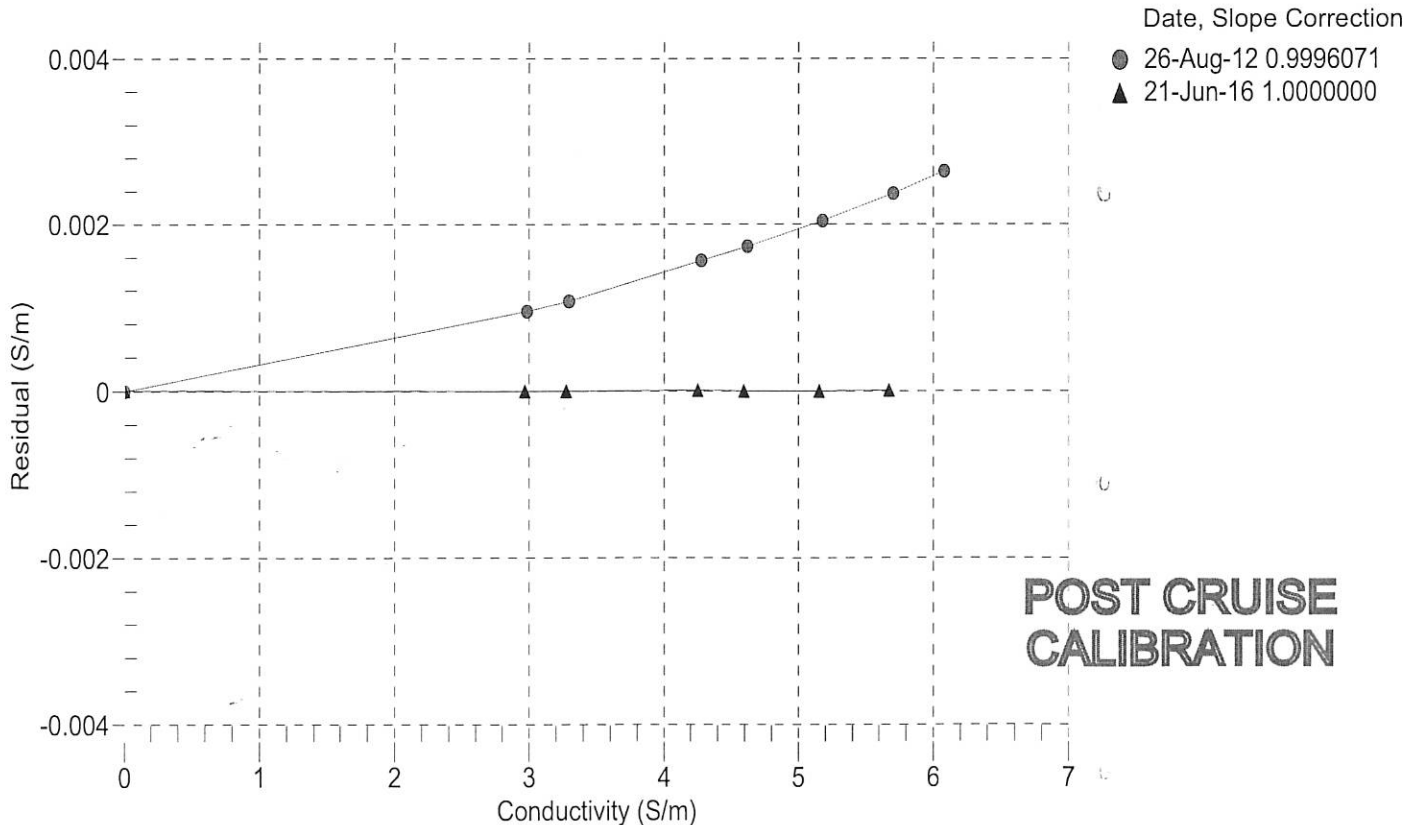
BATH TEMP (° C)	BATH SAL (PSU)	BATH COND (S/m)	INSTRUMENT OUTPUT (Hz)	INSTRUMENT COND (S/m)	RESIDUAL (S/m)
22.0000	0.0000	0.00000	2701.66	0.00000	0.00000
1.0000	34.6915	2.96631	5447.52	2.96631	-0.00000
4.5000	34.6717	3.27242	5654.90	3.27242	-0.00000
15.0000	34.6294	4.25110	6271.26	4.25111	-0.00001
18.5000	34.6208	4.59522	6473.75	4.59522	-0.00000
24.0000	34.6115	5.15152	6788.03	5.15151	-0.00001
29.0000	34.6070	5.67188	7069.04	5.67189	0.00000
32.4999	34.6052	6.04332	7262.81	6.04339	0.00007

$f = \text{Instrument Output(Hz)} * \text{sqrt}(1.0 + \text{WBOTC} * t) / 1000.0$

t = temperature (°C); p = pressure (decibars); $\delta = \text{CTcor}$; $\epsilon = \text{CPcor}$;

$\text{Conductivity (S/m)} = (g + h * f^2 + i * f^3 + j * f^4) / 10 (1 + \delta * t + \epsilon * p)$

$\text{Residual (Siemens/meter)} = \text{instrument conductivity} - \text{bath conductivity}$



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 CALIBRATION DATE: 21-Jun-16

Slocum Payload CTD TEMPERATURE CALIBRATION DATA
 ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

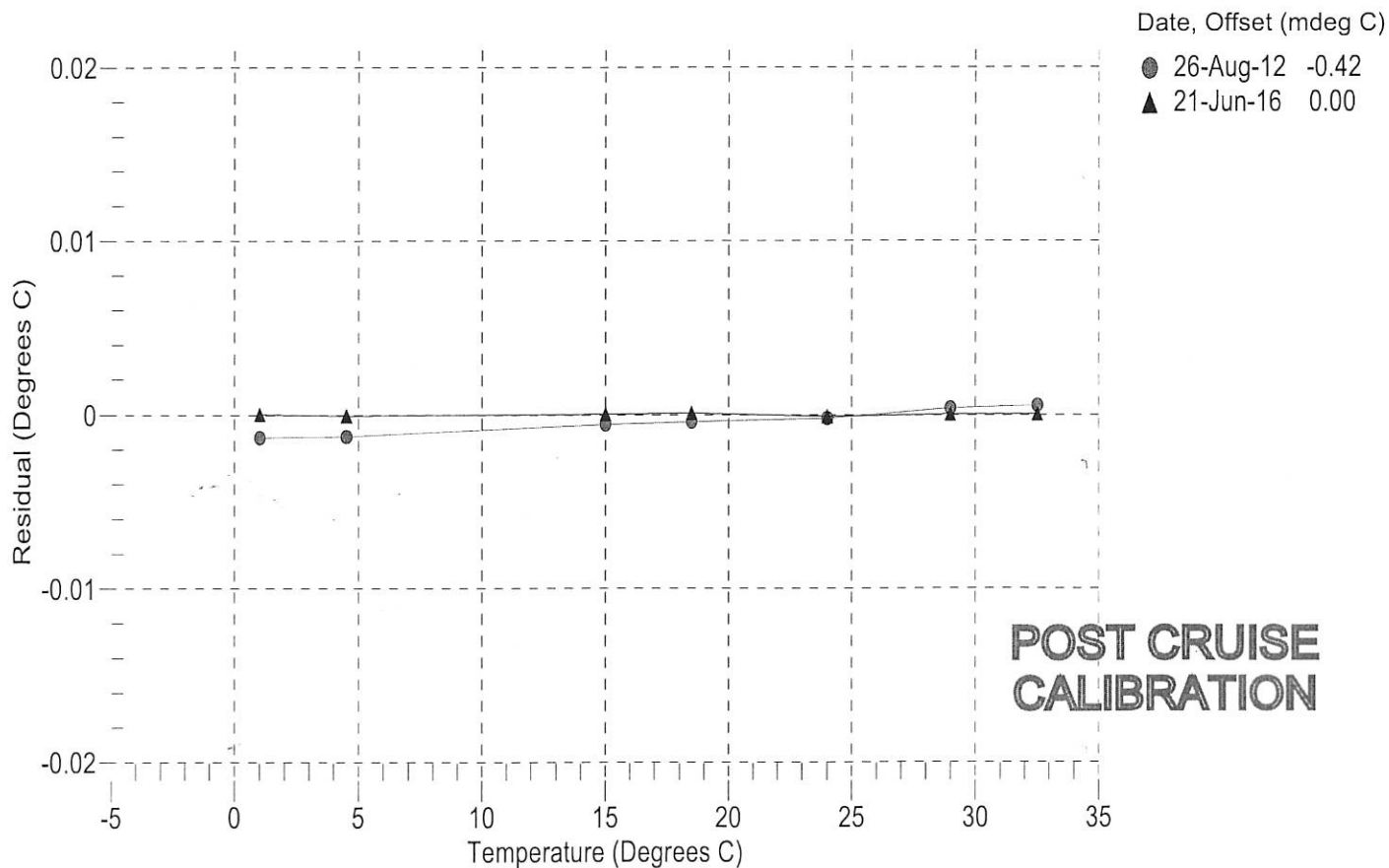
a0 = -7.794960e-005
 a1 = 3.033676e-004
 a2 = -4.280152e-006
 a3 = 1.968416e-007

BATH TEMP (° C)	INSTRUMENT OUTPUT (counts)	INST TEMP (° C)	RESIDUAL (° C)
1.0000	567117.1	1.0000	0.0000
4.5000	484766.1	4.4999	-0.0001
15.0000	308785.6	15.0000	0.0000
18.5000	267351.9	18.5001	0.0001
24.0000	214469.2	23.9999	-0.0001
29.0000	176606.0	29.0000	0.0000
32.4999	154671.7	32.4999	0.0000

n = Instrument Output (counts)

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

Residual (°C) = instrument temperature - bath temperature



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SENSOR SERIAL NUMBER: 9027
 CALIBRATION DATE: 16-Jun-16

Slocum Payload CTD PRESSURE CALIBRATION DATA
 1450 psia S/N 3648532

COEFFICIENTS:

PA0 =	5.044267e-002	PTCA0 =	5.239853e+005
PA1 =	4.612957e-003	PTCA1 =	-1.741919e-001
PA2 =	-2.167242e-011	PTCA2 =	3.889662e-002
PTEMPA0 =	-6.757890e+001	PTCB0 =	2.524513e+001
PTEMPA1 =	5.257741e-002	PTCB1 =	1.225000e-003
PTEMPA2 =	-6.305655e-007	PTCB2 =	0.000000e+000

PRESSURE SPAN CALIBRATION

THERMAL CORRECTION

PRESSURE (PSIA)	INSTRUMENT OUTPUT (counts)	THERMISTOR OUTPUT (volts)	COMPUTED PRESSURE (PSIA)	RESIDUAL (%FSR)	TEMP (°C)	THERMISTOR OUTPUT (volts)	INSTRUMENT OUTPUT (counts)
14.64	527176.0	1759.0	14.68	0.00	32.50	1949	527255.70
315.00	592353.0	1765.0	314.89	-0.01	29.00	1879	527246.80
614.88	657520.0	1765.0	614.88	0.00	24.00	1780	527236.60
914.88	722715.0	1767.0	914.81	-0.00	18.50	1671	527231.60
1215.49	787984.0	1767.0	1214.90	-0.04	15.00	1601	527224.60
1464.88	842380.0	1768.0	1464.85	-0.00	4.50	1394	527220.70
1214.92	787996.0	1767.0	1214.96	0.00	1.00	1326	527218.70
914.93	722749.0	1767.0	914.97	0.00			
614.92	657551.0	1767.0	615.02	0.01			
314.93	592353.0	1767.0	314.89	-0.00			
14.64	527175.0	1767.0	14.67	0.00			

TEMPERATURE (°C)	SPAN (mV)
-5.00	25.24
35.00	25.29

y = thermistor output (counts)

$$t = PTEMPA0 + PTEMPA1 * y + PTEMPA2 * y^2$$

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

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

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

$$\text{Residual (\%FSR)} = (\text{computed pressure} - \text{true pressure}) * 100 / \text{Full Scale Range}$$

Date, Offset (%FSR)

● 16-Jun-16 -0.00

