SEA-BIRD SCIENTIFIC

Sea-Bird Electronics, Inc.
13431 NE 20th Street
Bellevue, WA 98005 United States

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www.seabird.com

SERVICE REPORT

Service Request 1005507783
Date 28-JUN-2019
Sales Order 315621426

CUSTOMER INFORMATION

Name: TELEDYNE WEBB RESEARCH
Account : 40280819
CHARLES STILL
CHARLES.STILL@TELEDYNE.COM
508-563-1000

PO Number:
208512

Bill To Address
ATTN: ACCOUNTS PAYABLE;1026 N. Williamson Blvd.;

Daytona Beach,FL,32114,US

Ship To Address
BUSINESS UNIT OF TELEDYNE INSTRUMENT INC;49 EDGERTON DRIVE;
NORTH FALMOUTH,MA,02556,US

PRODUCT INFORMATION

Item: SLOCUM.LEGACY
Item Description: (LEGACY) Slocum Glider
Serial: 9023

Special Notes
Services Requested:
Evaluate/Repair Instrumentation.
Perform Routine Calibration Service.

Problems Found:
The hardcoating on the endcap is getting thin/corroded. It is recommended to replace endcap during next service.

Services Performed:
Performed initial diagnostic evaluation.
Performed "POST" cruise calibration.
Performed pressure calibration.
Installed NEW AF24173 Anti-foulant cylinder.

Item	Item Description	Qty
CAL_SLOCUM	Calibrate SLOCUM conductivity and temperature sensors	1
CNCRTSLOCUM	Confirm & Re-certify Webb SLOCUM Glider CTD	1
REPLACEAF	Extra charge to install one antifoulant device, includes one 801542.1.	1
PCAL_SLOCUM	Calibrate SLOCUM pressure sensor	1

Unbilled Items

Item	Item Description	Qty
801542.1	AF24173 ANTI-FOULANT, SINGLE CYLINDER, V2	1

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SENSOR SERIAL NUMBER: 9023
CALIBRATION DATE: 31-May-19

Slocum Payload CTD TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

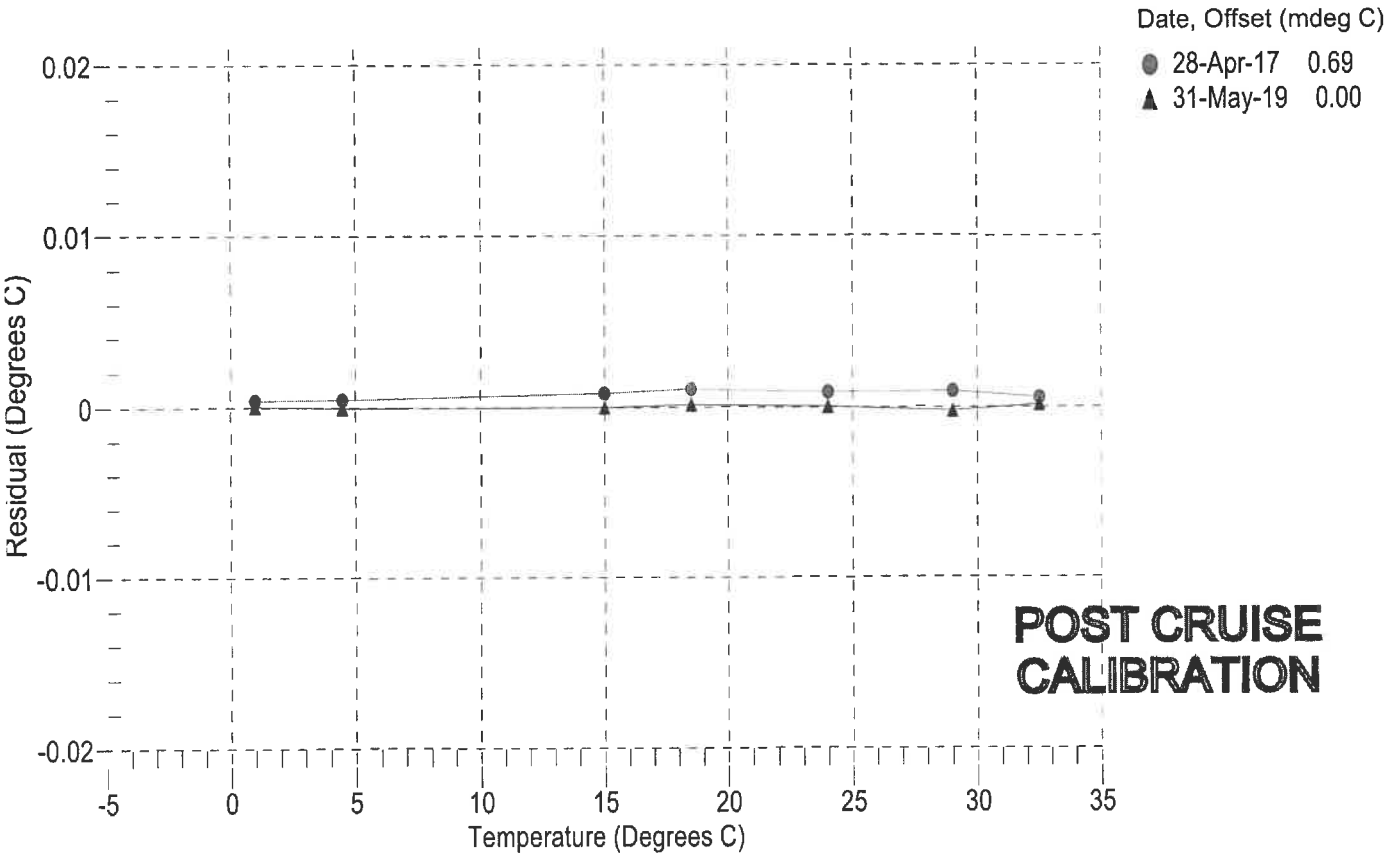
a0 = -1.080157e-004
a1 = 3.078367e-004
a2 = -4.543024e-006
a3 = 2.028552e-007

BATH TEMP (° C)	INSTRUMENT OUTPUT (counts)	INST TEMP (° C)	RESIDUAL (° C)
1.0000	572952.8	1.0000	0.0000
4.5000	489950.3	4.4999	-0.0001
15.0000	312457.7	15.0000	-0.0000
18.5000	270636.2	18.5001	0.0001
24.0000	217235.4	24.0000	0.0000
29.0000	178985.4	28.9998	-0.0002
32.4999	156813.8	32.5000	0.0001

n = Instrument Output (counts)

Temperature ITS-90 (°C) = $1/\{a0 + a1[ln(n)] + a2[ln^2(n)] + a3[ln^3(n)]\} - 273.15$

Residual (°C) = instrument temperature - bath temperature



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SENSOR SERIAL NUMBER: 9023
CALIBRATION DATE: 31-May-19

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

COEFFICIENTS:

```
g = -9.936690e-001
h =  1.401546e-001
i = -2.217543e-004
j =  3.600398e-005

CPcor = -9.5700e-008
CTcor =  3.2500e-006
WBOTC = -3.4385e-007
```

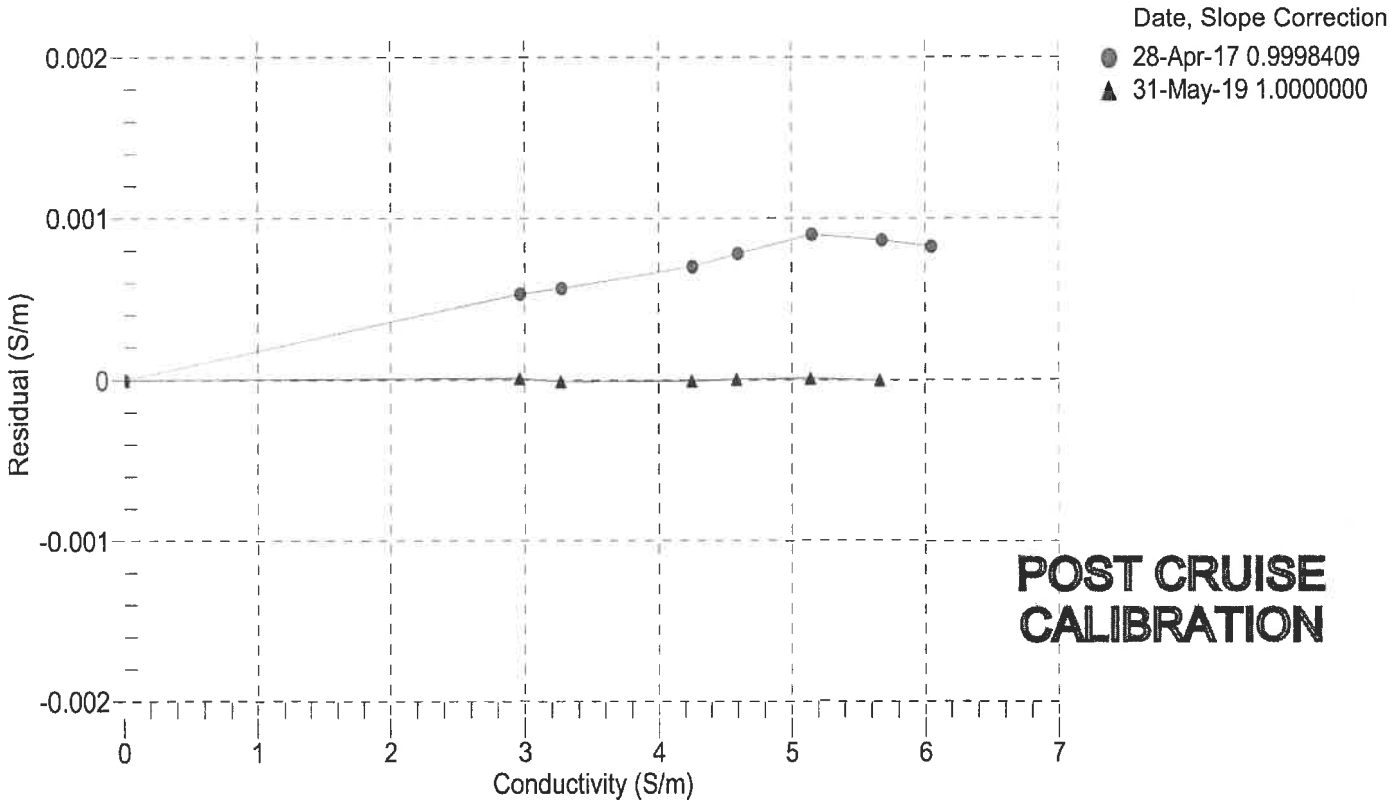
BATH TEMP (° C)	BATH SAL (PSU)	BATH COND (S/m)	INSTRUMENT OUTPUT (Hz)	INSTRUMENT COND (S/m)	RESIDUAL (S/m)
22.0000	0.0000	0.00000	2665.87	0.00000	0.00000
1.0000	34.6514	2.96321	5316.48	2.96322	0.00001
4.5000	34.6318	3.26903	5517.45	3.26902	-0.00001
15.0000	34.5893	4.24670	6115.08	4.24670	-0.00001
18.5000	34.5802	4.59042	6311.48	4.59042	0.00000
24.0000	34.5692	5.14592	6616.27	5.14592	0.00001
29.0000	34.5596	5.66499	6888.57	5.66498	-0.00000
32.4999	34.5496	6.03471	7075.76	6.03433	-0.00037

f = Instrument Output(Hz) * sqrt(1.0 + WBOTC * t) / 1000.0

t = temperature (°C); p = pressure (decibars); δ = CTcor; ε = CPcor;

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

Residual (Siemens/meter) = instrument conductivity - bath conductivity



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SENSOR SERIAL NUMBER: 9023
CALIBRATION DATE: 22-May-19

Slocum Payload CTD PRESSURE CALIBRATION DATA
1450 psia S/N 3647167

COEFFICIENTS:

PA0 =	-5.320865e-002	PTCA0 =	5.236884e+005
PA1 =	4.569282e-003	PTCA1 =	-8.642211e-001
PA2 =	-1.642226e-011	PTCA2 =	1.518158e-002
PTEMPA0 =	-6.910766e+001	PTCB0 =	2.539625e+001
PTEMPA1 =	5.235000e-002	PTCB1 =	-3.500000e-004
PTEMPA2 =	-6.021189e-007	PTCB2 =	0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE (PSIA)	INSTRUMENT OUTPUT (counts)	THERMISTOR OUTPUT (volts)	COMPUTED PRESSURE (PSIA)	RESIDUAL (%FSR)
14.59	526877.6	1778.1	14.58	-0.00
300.91	589534.5	1781.8	300.89	-0.00
588.17	652416.2	1782.9	588.10	-0.00
875.46	715343.1	1782.6	875.39	-0.00
1162.67	778286.2	1782.5	1162.62	-0.00
1450.01	841294.3	1782.1	1450.02	0.00
1162.73	778323.4	1781.2	1162.79	0.00
875.47	715368.4	1780.7	875.50	0.00
588.07	652411.0	1779.8	588.08	0.00
300.95	589577.0	1778.2	301.08	0.01
14.59	526873.6	1778.3	14.56	-0.00

THERMAL CORRECTION

TEMP (°C)	THERMISTOR OUTPUT (volts)	INSTRUMENT OUTPUT (counts)
32.50	1986	526922.70
29.00	1916	526925.20
24.00	1817	526925.90
18.50	1707	526924.20
15.00	1637	526925.70
4.50	1430	526933.10
1.00	1361	526935.30

TEMPERATURE (°C)	SPAN
-5.00	25.40
35.00	25.38

y = thermistor output (counts)

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

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

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

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

Residual (%FSR) = (computed pressure - true pressure) * 100 / Full Scale Range