



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

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 www.seabird.com

SERVICE REPORT

Service Request
Date
Sales Order

1005508277
 13-AUG-2019
 315676495

CUSTOMER INFORMATION

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

PO Number:
 214614

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.50
 Item Description: SLOCUM GLIDER CTD, 1000 dBar, DIRECT GROUND
 Serial: 712-9354

Special Notes

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

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

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



Sea-Bird Scientific
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SENSOR SERIAL NUMBER: 9354
 CALIBRATION DATE: 30-Jun-19

Slocum Payload CTD TEMPERATURE CALIBRATION DATA
 ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

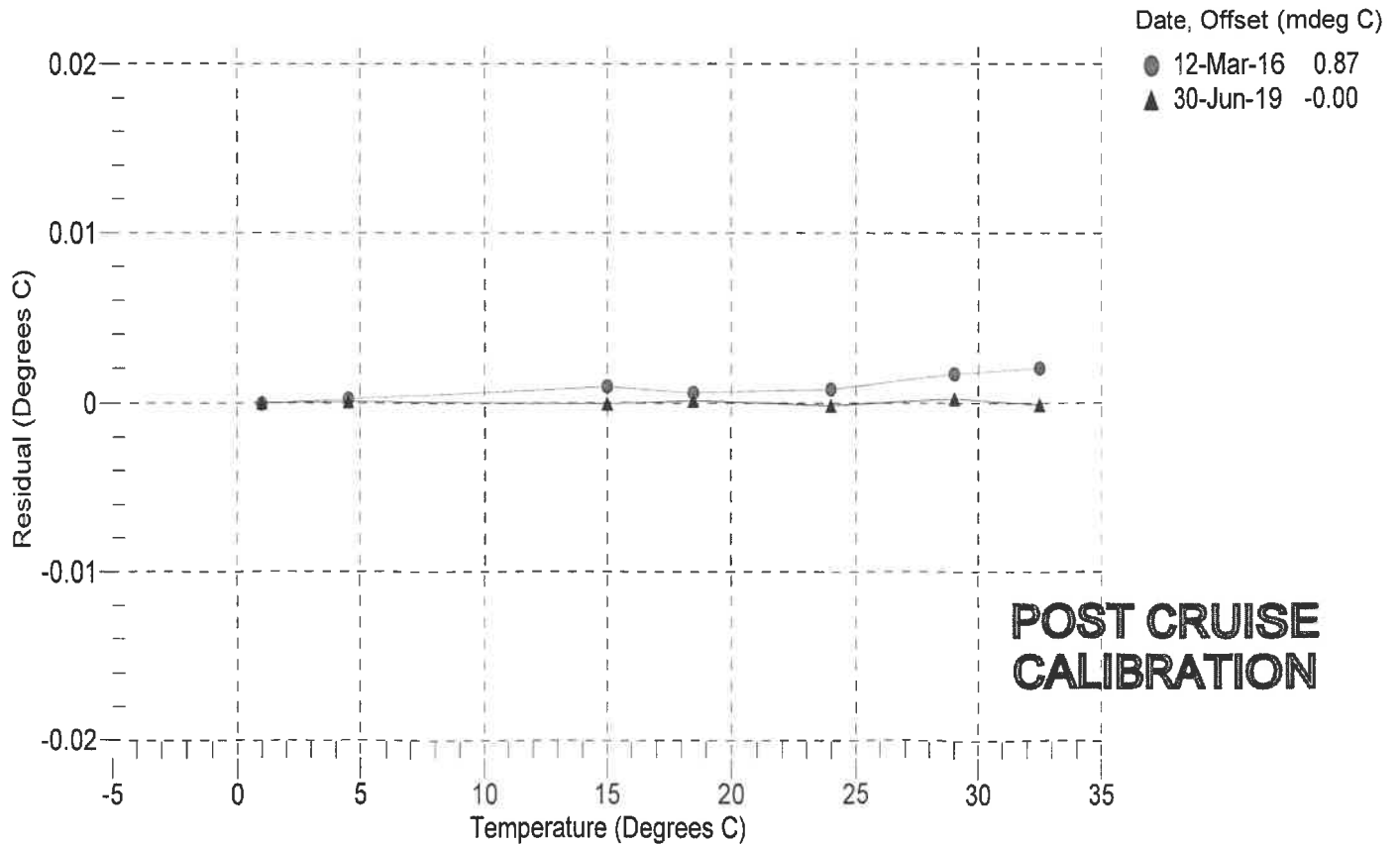
a0 = -2.377967e-004
 a1 = 3.352071e-004
 a2 = -6.532023e-006
 a3 = 2.553259e-007

BATH TEMP (° C)	INSTRUMENT OUTPUT (counts)	INST TEMP (° C)	RESIDUAL (° C)
1.0000	561935.3	1.0000	-0.0000
4.5000	481071.1	4.5001	0.0001
15.0000	307803.8	14.9999	-0.0001
18.5000	266886.8	18.5001	0.0001
24.0000	214579.1	23.9998	-0.0002
29.0000	177052.9	29.0002	0.0002
32.5001	155282.9	32.5000	-0.0001

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: 9354
 CALIBRATION DATE: 30-Jun-19

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

COEFFICIENTS:

g = -9.911535e-001 CPcor = -9.5700e-008
 h = 1.305779e-001 CTcor = 3.2500e-006
 i = -1.266479e-004 WBOTC = 6.0454e-008
 j = 2.644644e-005

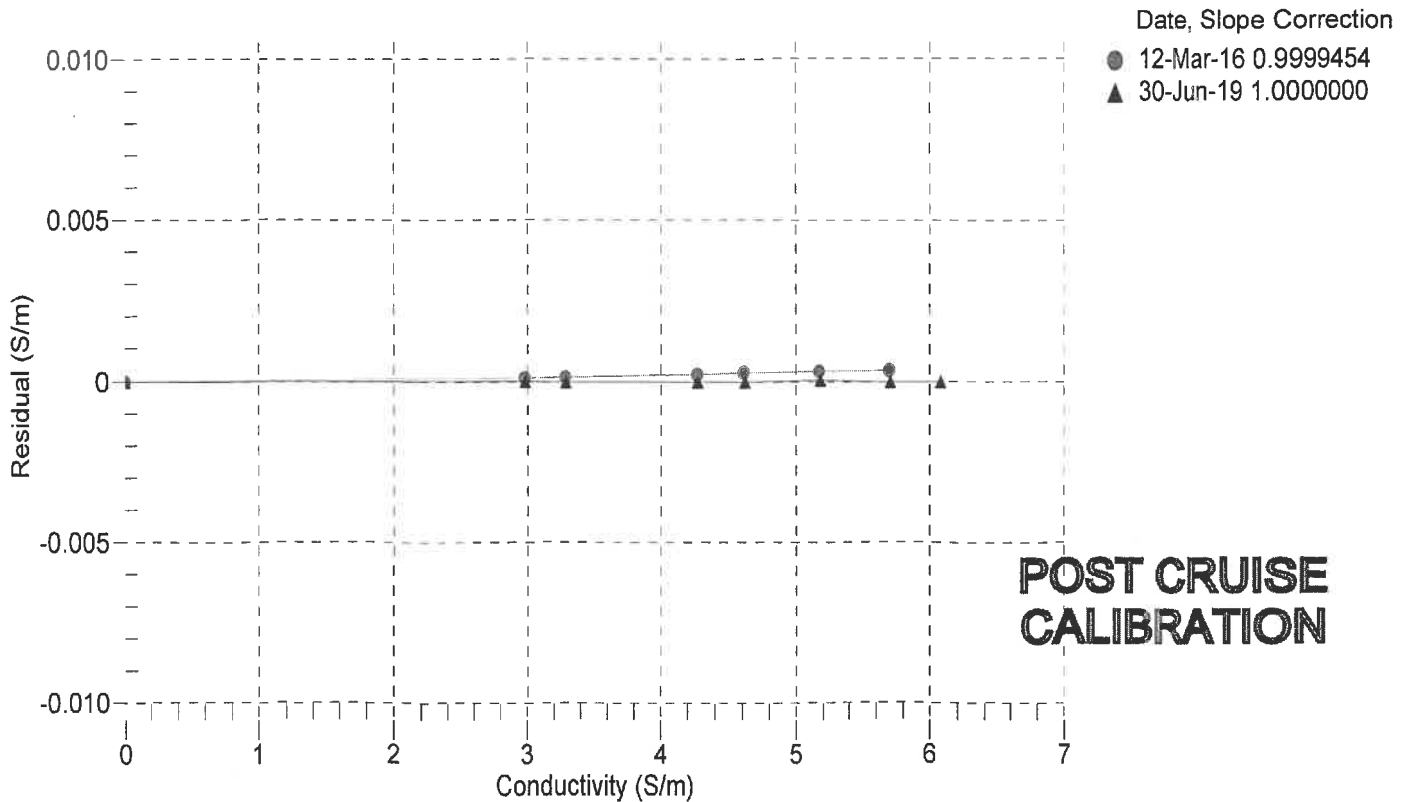
BATH TEMP (° C)	BATH SAL (PSU)	BATH COND (S/m)	INSTRUMENT OUTPUT (Hz)	INSTRUMENT COND (S/m)	RESIDUAL (S/m)
22.0000	0.0000	0.00000	2756.65	0.00000	0.00000
1.0000	34.9137	2.98350	5514.92	2.98350	0.00001
4.5000	34.8940	3.29133	5723.74	3.29133	-0.00001
15.0000	34.8522	4.27555	6344.67	4.27554	-0.00001
18.5000	34.8436	4.62160	6548.73	4.62159	-0.00001
24.0000	34.8342	5.18099	6865.50	5.18102	0.00003
29.0000	34.8291	5.70418	7148.70	5.70417	-0.00001
32.5001	34.8259	6.07748	7343.93	6.07748	-0.00000

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

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

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

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





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SENSOR SERIAL NUMBER: 9354
 CALIBRATION DATE: 28-Jun-19

Slocum Payload CTD PRESSURE CALIBRATION DATA
 1450 psia S/N 4451230

COEFFICIENTS:

PA0 =	2.704433e-001	PTCA0 =	5.242967e+005
PA1 =	4.411015e-003	PTCA1 =	6.303809e+000
PA2 =	-1.996245e-011	PTCA2 =	-1.613113e-001
PTEMPA0 =	1.500515e+002	PTCB0 =	2.509137e+001
PTEMPA1 =	-6.205956e-002	PTCB1 =	-1.250000e-004
PTEMPA2 =	-5.818418e-008	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)
14.67	527624.2	2054.5	14.68	0.00	32.50	1891	527588.80
301.29	592626.5	2051.7	301.35	0.00	29.00	1947	527600.30
588.52	657781.2	2050.5	588.52	0.00	24.00	2027	527614.50
875.72	722980.7	2047.4	875.72	-0.00	18.50	2116	527617.00
1163.02	788235.8	2046.9	1162.99	-0.00	15.00	2172	527609.60
1450.15	853512.0	2044.7	1450.18	0.00	4.50	2340	527580.80
1163.01	788238.3	2046.5	1163.00	-0.00	1.00	2396	527559.80
875.80	722958.3	2047.3	875.62	-0.01			
588.59	657785.1	2047.5	588.54	-0.00	TEMPERATURE (°C)	SPAN	
301.27	592625.1	2043.9	301.35	0.00	-5.00	25.09	
14.67	527601.1	2043.6	14.58	-0.01	35.00	25.09	

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)

● 28-Jun-19 0.00

