AZFP Certificate of Calibration Version : 12.0

12/5/2019	Operator:	Jay Milligan	Unit Serial Number:	59019

Sonar Channel #1:

Frequency:	38.0 KHz	Transducer Part#:	92A01N40	Transducer Serial#:	106
OCV: Voltage on reference:	8.8V	Reference TVR:	145.9dB	Transducer Voltage:	0.17V
TVR: Voltage on transducer:	561V	Reference OCV:	-213.2dB	Reference Voltage:	0.7V

System Gain and Linearity:

Voltage on Reference	A/D Counts (N)
*	65000
-10dB	58900
-20dB	53100
-30dB	47200
-40dB	41000
-50dB	35000

Calibration Values		Units
TVR	155.1	dB
VTX	198.3	V_{RMS}
BP	0.15996	Sr
Echo Level	152.4	dB
Slope	0.0228	V/dB

Sphere Check		Units
Water Temp	5.0	°C
Range	340	cm
Measured	-50.8	dB
Expected	-51.0	dB
Error	0.2	dB

*This voltage is adjusted to bring N between 64950 and 65050 counts
All measurements with 1.0 meter separation in 20°C fresh water unless otherwise noted.

Sonar Channel #2:

Frequency:	67.5KHz	Transducer Part#:	92A01N21	Transducer Serial#:	106
OCV: Voltage on reference:	9.8V	Reference TVR:	143.2dB	Transducer Voltage:	0.13V
TVR: Voltage on transducer:	610V	Reference OCV:	-213.1dB	Reference Voltage:	1.25V

System Gain and Linearity:

Voltage on Reference	A/D Counts (N)
*	65000
-10dB	58700
-20dB	52600
-30dB	46800
-40dB	40500

Calibration Values		Units
TVR	159.7	dB
VTX	215.7	V_{RMS}
BP	0.04831	Sr
Echo Level	147.7	dB
Slope	0.0232	V/dB

Sphere Check		Units
Water Temp	5.0	°C
Range	330	cm
Measured	-52.8	dB
Expected	-53.5	dB
Error	0.7	dB

*This voltage is adjusted to bring N between 64950 and 65050 counts
All measurements with 1.0 meter separation in 20°C fresh water unless otherwise noted.

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ASL Environmental Sciences

Sonar Channel #3:

Frequency:	125KHz	Transducer Part#:	92A01N21	Transducer Serial#:	106
OCV: Voltage on reference:	9.4V	Reference TVR:	139.7dB	Transducer Voltage:	0.09
TVR: Voltage on transducer:	345V	Reference OCV:	-214	Reference Voltage:	2.5V

System Gain and Linearity:

Voltage on Reference	A/D Counts (N)
*	65000
-10dB	58500
-20dB	52500
-30dB	46500
-40dB	41500

Calibration Values		Units
TVR	171.2	dB
VTX	122.0	V_{RMS}
BP	0.01071	Sr
Echo Level	140.5	dB
Slope	0.0225	V/dB

Sphere Check		Units
Water Temp	5.0	°C
Range	420	cm
Measured	-48.6	dB
Expected	-49.4	dB
Error	0.8	dB

*This voltage is adjusted to bring N between 64950 and 65050 counts
All measurements with 1.0 meter separation in 20°C fresh water unless otherwise noted.

Calibration Details

Sonar Calibration:
The sonar system is calibrated using a reference hydrophone and a reference source transducer in our fresh-water laboratory test tank. All measurements are at 20°C and 1.0 meters distance. The AZFP does not use a TVG system, so all system gain measurements are valid from 0 meters to full range.

Sonar Sphere Check:
The sonar sphere check is done in ASL's outdoor fresh water calibration tank. A precision tungsten-carbide sphere with known target strengths (at each frequency) is placed at 3.8m from the transducer. The values measured by the unit under test are compared to the known values of the sphere.

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