Data Report

NBP0008

Jacobs

December 20, 2000 – January 25, 2001

United States Antarctic Program

RVIB Nathaniel B. Palmer

Raytheon Polar Services Company

January 25, 2001

Data Report Prepared by, Aaron Hunt, Robbie Liben, Kathleen Gavahan & Andy Archer

Introduction

The NBP data acquisition systems continuously log data from several instruments throughout the cruise. This document describes the format of that data and its location on the distribution DAT tapes. It also contains important information which may affect how this data is processed such as instrument failures or other known problems with acquisition.

The data collected during this cruise is distributed on a CD-ROM written in ISO9660 level-1 format. This data format has very strict requirements on filenames and organization. However, it is readable by virtually every computing platform.

The data is contained in a Unix tar archive called NBP0008.tar. All of the data has been compressed using Unix "gzip" compression. Gzipped files have a ".gz" extension. Tools are available on all platforms for uncompressing and de-archiving these formats. On Macintosh, Stuffit Expander with DropStuff will open a tar archive and uncompress gzipped and Unix compressed files. For Windows9X, WinZip, a shareware utility included on this CD (remember, it is shareware) will open these files.

IMPORTANT: Read the last section in this document, Acquisition Problems and Events, for important information that may affect the processing of this data.

Distribution Contents

ADCP

The ADCP data set is broken up into files representing 24 hours of data collection. The files are named pingdata.xxx (xxx representing a day number). Note that these extensions do NOT represent Julian day numbers. Please refer to the file's creation date.

Some ADCP data is also transmitted to RVDAS. East and North vectors for ship's speed relative to the reference layer and ship's heading are archived in the navigational data section of RVDAS.

CTD

The ctd data and report have been placed in the tar file 0008ctd.tar, which contains the following structure:

ctdlist.txt (list of all ctd stations)
ctdsetup (batch files, cfg & con files)
0008Raw (raw datafiles)
0008Proc (processed data files)
seasoft (application for processing CTD data

Individual CTD casts are represented by a set of four files containing a bottle-firing file (.bl), a configuration file (.con), a data file (.dat) and a header file (.hdr). Casts are numbered according to the cruise id number (0008) followed by the number of the cast. For example; the raw files associated with the third cast on this cruise are: 0008003.bl, 0008003.con, 0008003.dat, 0008003.hdr. The raw and processed data files are in binary format. The 1 db bin averaged up and down traces have been converted to ASCII (.asc files).

SeaBird's SeaSoft software used to acquire the data is included in the CTD data distribution in the "Seasoft" directory. SeaSoft is a DOS-based software package, but can be run in a DOS window under the Windows9X operating systems for cast playback and data analysis. The software package used to process this data (version 4.234) is included on this CD in the directory **Seasoft**. The configuration files and processing scripts (written by Suzanne O'Hara for the standard processing of the SBE 9/11*plus*) are also included in the **Seasoft** directory under in the **ctdsetup** directory. The directory **report** contains the CTD data report with folder for all plots produced during the cruise. The directory **seacat** has a structure similar to the ctd directory and contains the data from the SeaCat CTD unit.

File extension definitions:

EXT	Description
ASC	The data portion of a .CNV converted data file written in ASCII by ASCIIOUT, or files written by TERM37.
BL	Created by SEASAVE when a bottle fire confirmation is received. Contains bottle sequence number, position, date, time, beginning and ending scan numbers.
BTL	Created by ROSSUM. This is a summary of the data in a .ROS file.
BSR	Bottle scan range file, used by DATCNV to create a .ROS file.
CFG	Used by SEASOFT modules to store the input filename, input data path, output data path, and other miscellaneous module specific parameters.
CTR	Density contour file generated by CONTOUR.
CNV	'Converted' engineering unit data file. An ASCII header precedes the data.
CON	Contains instrument configuration and calibration coefficients, used by SEACON, SEASAVE, and DATCNV
DAT	Raw binary data, optionally with header information (SBE 9/11, 11X, 9/11*plus*, and data files created with previous versions of SEASOFT).
DSP	Used by SEASAVE to store data acquisition and display parameters.
HDR	R. Header portion of a .CNV converted data file written by ASCIIOUT. 2) Header recorded when acquiring real time data or uploading archived data.
HEX	Raw HEX data with header information (SBE 16, 17, 19, 21, and 25)
MRK	Marker file created by SEASAVE during real time data acquisition.
PLT	Used by SEAPLOT to store display parameters
ROS	Scans marked with the bottle fire confirmation bit, or defined by a .BSR file, written by DATCNV.

GUV 510 Data Output

field	description	units
Record Number	record no.	none
Time	recorded time	hour:min:s
Depth	Depth of PUV500 profiler	meters
308 U	underwater radiant flux centered at 308 nm	uW/cm^2 nm
320 U	underwater radiant flux centered at 320 nm	uW/cm^2 nm
TempU	Water temperature at profiler depth	deg C
NatFL	underwater solar-stimulated fluorescence at 680 nm	nEin/m^2/str/sec
340 U	underwater radiant flux centered at 340 nm	uW/cm^2 nm
380 U	underwater radiant flux centered at 380 nm	uW/cm^2 nm
PAR U	Underwater photosynthetically active radiation, 400 to 700 nm	uEin/cm^2/s
TempS	Temperature in air at GUV510	deg C
308 S	Above-water radiant flux centered at 380 nm	uW/cm^2 nm
Electronics Temp	Internal meter temperature of GUV510	deg C
320 S	Above-water radiant flux centered at 320 nm	uW/cm^2 nm
340 S	Above-water radiant flux centered at 340 nm	uW/cm^2 nm
380 S	Above-water radiant flux centered at 380 nm	uW/cm^2 nm
Gnd S	Grounded channel in the surface unit	
PAR S	Above-water photosynthetically active radiation, 400 to 700 nm	uEin/cm^2/s

NBP Data Products: MGD77 & JGOFS

NBP0008.mgd
NBP0008.gmt
/geopdata/JGOF
/geopdata/PROC

Two data products are created on each cruise of the NBP: JGOFS and MGD77.

JGOFS

The JGOFS data set consists of a single file produced each day named jgDDD.dat.gz where DDD is the Julian day the data was acquired. The ".gz" extension indicates that the individual files are compressed before archiving. The daily file consists of 20 separate columnar fields in text format, which are described below. The JGOFS data set is obtained primarily by applying calibrations to raw data and decimating to whole minute intervals. However, several fields are derived measurements from more than a single raw input. For example, Course Made Good (CMG) and Speed Over Ground (SOG) are calculated from gyro and GPS inputs by the NGL software package. Similarly, the wind direction field is the vector sum of the separate X and Y inputs received from the wind instruments. The JGOFS data set was used to produce the daily data plots during the cruise. *Note: Null, unused, or unknown fields are filled with 9's in the JGOFS data. TSG data is processed by RVDAS.*

Field	Data	Units
01	GMT date	dd/mm/yy
02	GMT time	hh:mm:ss
03	NGL latitude (negative is South)	dd.dddd
04	NGL longitude (negative is West)	ddd.dddd
05	speed over ground	Knots
06	GPS HDOP	-
07	Gyro Heading	Degrees (azimuth)
08	course made good	Degrees (azimuth)
09	mast PAR	μEinsteins/meters^2 sec

Col	Len	Type	Description
			(gammas).
67-72	6	real	MAGNETICS TOTAL FIELD, 2ND SENSOR: In tenths of nanoteslas (gammas). For trailing sensor.
73-78	6	real	MAGNETICS RESIDUAL FIELD: In tenths of nanoteslas (gammas). The reference field used is in Header Seq. 13.
79	1	int	SENSOR FOR RESIDUAL FIELD 1 = 1st or leading sensor; 2 = 2nd or trailing sensor; 9 = Unspecified
80-84	5	real	MAGNETICS DIURNAL CORRECTION: In tenths of nanoteslas (gammas). (In nanoteslas) if 9-filled (i.e., set to "+9999"), total and residual fields are assumed to be uncorrected; if used, total and residuals are assumed to have been already corrected.
85-90	6	F6.0	DEPTH OR ALTITUDE OF MAGNETICS SENSOR: In meters. + = Below sea level 3 = Above sea level
91-9	7	real	OBSERVED GRAVITY: In 10th of mgals. Corrected for Eotvos, drift, tares.
98-10	6	real	EOTVOS CORRECTION: In tenths of mgals. E = 7.5 V cos phi sin alpha + 0.0042 V*V
104-108	5	real	FREE-AIR ANOMALY In tenths of milligals Free-air Anomaly = G(observed) – G(theoretical)
109-113	5	char	SEISMIC LINE NUMBER: Used for cross-referencing with seismic data.
114-119	6	char	SEISMIC SHOT-POINT NUMBER
120	1	int	QUALITY CODE FOR NAVIGATION: 5=Suspected, by the originating institution;6=Suspected, by the data center, 9=No identifiable problem found

RVDAS

rvdas/uw
rvdas/nav

Daily data processing of the RVDAS data is performed to convert values into usable units and as a check of the proper operation of the DAS. Both the raw and processed data sets from RVDAS are included in the data distribution. Below you will find detailed information on the data included. Be sure to read the "Significant Acquisition Events" section below for important information about data acquisition during this cruise.

Meteorological and Light Data

Measurement	File ID	Collect. Status	Rate	Instrument
Air Temperature	met1	continuous	0.5 sec	R. M. young 41342C
Relative Humidity	met1	continuous	0.5 sec	Rotonics MP-101A-C4
Wind Speed/Direction	met1	continuous	0.5 sec	Belfort Model 5-122AHD
PIR (LW radiation)	met1	continuous	0.5 sec	Eppley PIR
PSP (SW radiation)	met1	continuous	0.5 sec	Eppley PSP
PhotoActive Radiation	met1	continuous	0.5 sec	BSI QSR-240
Barometer	bar1	continuous	9 sec	AIR-DB-3A

Navigational Data

Measurement	File ID	Collect. Status	Rate	Instrument
Attitude GPS	3df1	continuous	1 sec	Ashtec 12
P-Code GPS	PCOD	continuous	1 sec	Trimble 20636-00SM
Gyro	gyr1	continuous	0.2 sec	Yokogawa Gyro
NGL	ngl1	continuous	1 sec	NGL Processed Nav Data

Geophysical Data

Measurement	File ID	Collect. Status	Rate	Instrument
Gravimeter	grv1	not collected		Lacoste & Romberg Gravity
Magnetometer	mag1	not collected		EG&G G-866
Bathymetry	bat1	continuous	varies	ODEC Bathy 2000
Bathymetry	sim1	depth < 2500 m	varies	Simrad EK200 Sonar

bat1

```
00+019:23:59:53.901 ;I04485.3ME-23.0,I00000.0,-99.9, 0000@01/11/00,23:59:52.08 PW2 PF1 SF1 PL3
MO4 SB3 PO0 TX1 TR: GM5 1500 06.7 -72.1
```

Field	Data	Units
1	RVDAS Time Tag	
2	Flagged Low Freq. Chn. Depth w/ units ;FDDDDD.DUN F= V valid, I invalid	meters
3	Low Freq. Echo Strength EEE.EE	dB
4	Flagged High Freq. Chn. Depth – unused	
5	High Freq. Echo Strength – unused	
6	Signed Heave Data SHHHH	cm
7	Date	mm/dd/yy
8	Time	hh:mm:ss
9	transmit pulse window type: PW1 Rectangular, PW2 Hamming, PW3 Cosine, PW4 Blackman	
10	Primary transmit frequency PF1 3.5 kHz, PF2 12.0 kHz	
11	Parametric mode secondary freq. SF1 3.5 kHz, SF2 12.0 kHz	
12	pulse length: PL1 200usec, PL2 500usec, PL3 1msec, PL4 2msec, PL5 5msec, PL6 10msec, PL7 25msec. If transmit mode is FM: PL1 25msec, PL2 50msec, PL3 100msec.	
13	Operating Mode: MO1 CW parametric, MO2 CW, MO3 FM parametric, MO4 FM	
14	Frequency sweep bandwidth: SB1 1 kHz, SB2 2 kHz, SB3 5 kHz	
15	power level: PO1 0dB, PO2 -6dB, PO3 -12dB, PO4 -18dB, PO5 -24dB, PO6 -30dB, PO6 -30 dB, PO7 -36dB, PO8 -42dB	
16	Transmit Mode: TX1 single ping active, TX2 pinger listen, TX3 multipinging TR, TX4 multipinging TR, TX5 multipinging TTRR, TX6 multipinging TTTTRRRR, TX7 multipinging TTTTTRRRRR	
17	Transmit Rate: TR3 4Hz, TR4 2Hz, TR5 1Hz, TR6 .5Hz, TR7 .33Hz, TR8 .25Hz, TR9 .20Hz, TR: = .10Hz, TR; = .05Hz	
18	System Gain Mode: GM0 hydrographic AGC, GM1 to GM9 hydrographic +3db to + 27db manual. GMA to GMD hydrographic + 30db through + 60db manual, GME to GMK sub-bottom 1 through sub-bottom 7	
19	speed of sound	m/sec
20	depth of sonar window below sea-level	meters
21	background noise level in fixed point reference	dB/V

flr1

```
00+019:23:59:58.061 0  0818 ::  1/19/00 17:23:17 = 0.983  (RAW)   1.2 (C)
```

Field	Data	Units
1	RVDAS Time Tag	
2	marker 0 to 8	
3	4-digit index	
4	date	mm/dd/yy
5	time	hh:mm:ss
6	signal	
7	signal units of measurement	
8	cell temperature	
9	temperature units	

grv1

```
99+099:00:18:19.775 your_line#1999 99 01818 9735.4
```

Field	Data	Units	Conversion
1	RVDAS Time Tag		
2	text string		
3	gravity device date	yyyyjjjhhmmss	
3	gravity count	count	mgal = count x 1.0047 + offset

mag1

```
99+099:00:00:23.203 %  0  98 235928    0?372453
```

tsg1

```
00+019:23:59:46.976 15A16CFC163F8C2C100
```

Field	Data	Units
1	RVDAS Time Tag	
2	Seabird Hex string (see notes on converting to real units)	

3df1

PBEN: Measurement Data

```
00+019:23:59:57.054 $PASHR,PBN,345609.00,-1695527.0,-1569301.4,-5925126.0,-068:49.6968,-
137:12.8448,00047.7,-000.69,000.67,-000.51,08,????,02,01,02,01*32
```

Field	Data	Units
1	RVDAS Time Tag $PASHR	
2	PBN	
3	GPS Time sec. of the week	seconds
4	Station Position: ECEF X	meters
5	Station Position: ECEF Y	meters
6	Station Position: ECEF Z	meters
7	Latitude (- = South)	deg:min
8	Longitude (- = West)	deg:min
9	altitude	meters
10	velocity in ECEF X	m/sec
11	velocity in ECEF Y	m/sec
12	velocity in ECEF Z	m/sec
13	number of satellites used	
14	site name	
15	PDOP	
16	HDOP	
17	VDOP	
18	TDOP	

ATTD: Attitude Data

```
00+019:23:59:57.854 $PASHR,ATT,345610.0,252.82,+000.52,+001.95,0.0011,0.0068,0
```

Field	Data	Units
1	RVDAS Time Tag $PASHR	
2	ATT	
3	GPS Time sec. of the week	seconds
4	heading (rel. to true North)	degrees
5	pitch	degrees
6	roll	degrees
7	Measurement RMS error	meters
8	Baseline RMS error	meters
9	attitude reset flag	

GGA: GPS Position Fix – Geoid/Ellipsoid

```
00+019:23:59:57.134 $GPGGA,235956.00,6849.6968,S,13712.8448,W,1,08,01.0,+00048,M,,M,,
```

Field	Data	Units
1	RVDAS Time Tag $GPGGA	
2	UTC time at position	hhmmss.ss
3	Latitude	ddmm.mmm
4	North (N) or South (S)	
5	Longitude	ddmm.mmm
6	East (E) or West (W)	
7	GPS quality (1=GPS 2=DGPS)	
8	Number of GPS satellites used	
9	HDOP	

GLL: GPS Latitude/Longitude

```
00+019:23:59:59.381 $GPGLL,6849.6944,S,13712.8472,W,235958.409,A*35
```

Field	Data	Units
1	RVDAS Time Tag	
2	$GPGLL	
3	Latitude	degrees
4	North or South	
5	Longitude	degrees
6	East or West	
7	UTC of position	hhmmss.sss
8	status of data (A = valid)	
9	checksum	

VTG: GPS Track and Ground Speed

```
00+019:23:59:59.382 $GPVTG,238.7,T,182.3,M,001.8,N,003.3,K*41
```

Field	Data	Units
1	RVDAS Time Tag	
2	$GPVTG	
3	heading	degrees
4	degrees True (T)	
5	heading	degrees
6	degrees magnetic (M)	
7	Ship speed	knots
8	N = knots	
9	speed	km/hr
10	K = km per hour	
11	checksum	

adcp

```
00+019:23:59:59.099 $PUHAW,UVH,-1.48,-0.51,250.6
```

Field	Data	Units
1	RVDAS Time Tag	
2	$PUHAW	
3	UVH (E-W, N-S, Heading)	
4	Ship Speed relative to reference layer, East vector	kn.
5	Ship Speed relative to reference layer, North vector	kn.
6	Ship heading	degrees

Ocean Data Files

ocean/

Some data files are "processed" into a slightly different form. The pCO_2 data is merged with data from other sources for ease of data analysis.

pCO2-merged

```
00+019:23:58:15.502 2000019.9983 2445.2 965.0 32.90 52.8 372.3 352.5 -1.27 -68.8285 -137.2080
Equil -68.8280 -137.2079 -1.58 33.60 0.97 9.06 307.23 50.0
```

Field	Data	Units
1	RVDAS Time Tag	
2	pCO_2 Time Tag (decimal is time of day)	yyyjdd.fod
3	raw voltage	mV
4	barometer	mBar
5	cell temperature	°C
6	flow rate	cm^3/min
7	concentration	ppm
8	pCO_2 pressure	microAtm

NBP0008 Sensors

Shipboard Sensors

Sensor	Description	Serial #	Cal. Date	Status
Port Anemometer	Belfort 5-122AHD	7957	4/1/99	collect
Stbd Anemometer	Belfort 5-122AHD	92-2133	6/23/98	collect
Barometer	Atmospheric Instr. AIR-DB-3A	7G3095	5/17/99	collect
Mast PRR	BSI PRR-610	9696	3/18/99	not collect
UW PRR	BSI PRR-600	9695	3/18/99	not collect
Rel. Hum./Air Temp	Rotronics MP-101A-C4	R45618	5/12/99	collect.
Mast PAR	BSI QSR-240	6357	7/29/99	collect
P-Code GPS	Trimble 20636-00 (SM)			PCD/CIV
Attitude GPS	Ashtech 12	700273F2114 FW 7B13-D1-C21		collect
Pyranometer	Eppley PSP	28933F3	7/23/98	collect
Pyrgeometer	Eppley PIR	28903F3	7/23/98	collect
Dry Air Temp	R. M. Young 41342C	2267	10/1/99	collect
TSG	SeaBird SBE21	218091-1390	11/20/99	collect
TSG Remote Temp	SeaBird 3-01/S	031267	8/24/99	collect
Fluorometer	Turner 10-AU-005 Lamp: daylight 10-045, reference filter: 10-052, emission filter: 10-051, excitation filter: 10-050.	5651 FRTD		collect
Magnetometer	EG&G G-866			off ship
Gravimeter	Lacoste & Romberg Gravity Meter			not collect
Bathymetry	Simrad EK200	3001	11/1/95	collect
Bathymetry	Bathy 2000			collect

0008 CTD Sensors:

Sensor	Description
CTD Fish	SeaBird model SBE 9+ SN 09510716-0377, w/Paroscientific model 410K-105 pressure sensor SN 58949
CTD Deck Unit	SeaBird model SBE 11+ SN 11P7536-0317
Primary Temperature Sensor	SeaBird model 3-02/F SN 031237. Last cal 8/98.
Secondary Temperature Sensor	SeaBird model 3-02/F SN 031541. Last cal 3/97.
Primary Conductivity Sensor	SeaBird model 4-02/0 SN 041314. Last cal 5/98.
Secondary Conductivity Sensor	SeaBird model 4C SN041798. Last cal 1/98.
Dissolved Oxygen Sensor	SeaBird model 13-02-B SN 130491. Last cal 6/98.
Fluorometer	Chelsea model Mk III Aquatracka SN 088080. Last cal 7/98.

Acquisition Problems and Events

This section lists all known problems with acquisition during this cruise including instrument failures, data acquisition system failures and any other factor affecting this data set. The format is jjj:hh:mm (jjj is Julian day, hh is hour, and mm is minute). All times are in GMT.

Start Time	End Time	Event
356		New Cruise NBP0008 – Australia 200 Mile Limit: Turn on all logging.
020:23:53	021:01:40	P-Code GPS stopped transmitting military grade GPS data. Temporarily stopped P-Code logging so that instruments would use Furuno GPS. Reset P-Code to transmit civilian mode GPS and started it logging again.
025:04:00		Data logging ceases at Australia 200 Mile Limit.

SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington 98005 USA
Phone: (425) 643 - 9866 Fax: (425) 643 - 9954 Internet: seabird@seabird.com

SENSOR SERIAL NUMBER = 1390
CALIBRATION DATE: 20-Nov-99

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

GHIJ COEFFICIENTS

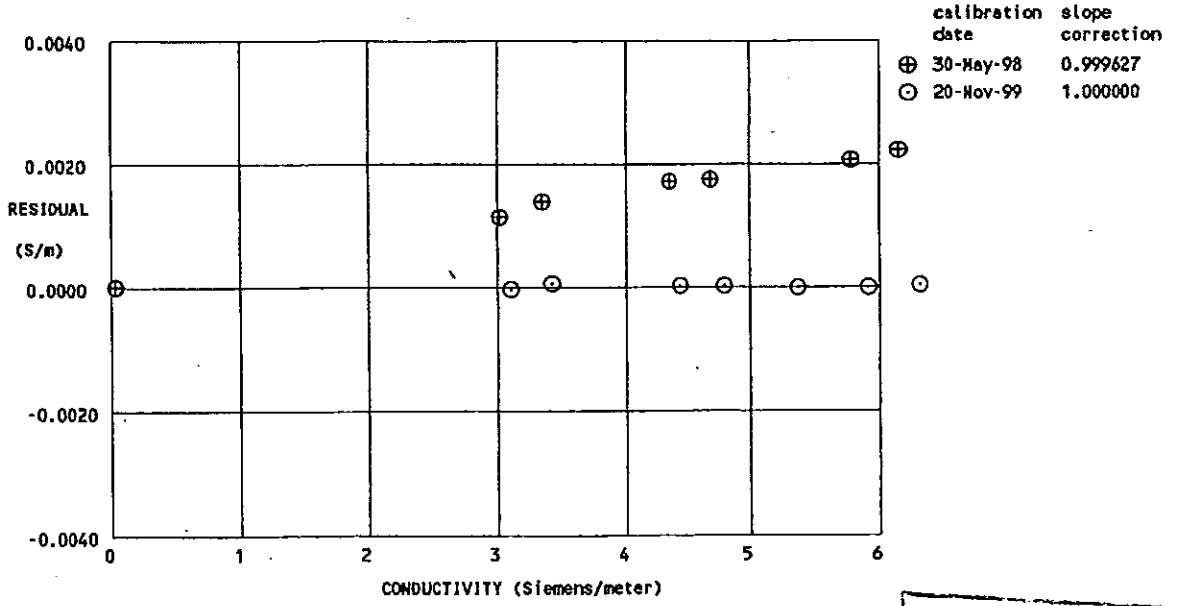
g = -3.93202500e+00
h = 4.70256307e-01
i = 7.32400918e-04
j = -1.40591115e-05
CPcor = -9.57e-08 (nominal)
CTcor = 3.25e-06 (nominal)

ABCDM COEFFICIENTS

a = 1.47556503e-02
b = 4.52645265e-01
c = -3.91849365e+00
d = -9.05554567e-05
m = 2.2
CPcor = -9.57e-08 (nominal)

BATH TEMP (ITS-90 °C)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (kHz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2.88550	0.00000	0.00000
1.0000	36.0948	3.07458	8.53995	3.07454	-0.00004
4.5000	36.0923	3.39296	8.92178	3.39301	0.00005
15.0000	36.0872	4.41063	10.04412	4.41064	0.00001
18.4999	36.0860	4.76818	10.40948	4.76819	0.00001
23.9999	36.0835	5.34578	10.97375	5.34576	-0.00002
29.0000	36.0788	5.88528	11.47555	5.88526	-0.00002
32.5000	36.0722	6.26964	11.81996	6.26966	0.00002

Conductivity = $(g + hf^2 + if^3 + jf^4) / [10(1 + \delta t + \epsilon p)]$ Siemens/meter
Conductivity = $(af^m + bf^2 + c + dt) / [10(1 + \epsilon p)]$ Siemens/meter
t = temperaure [deg C]; p = pressure [decibars]; δ = CTcor; ϵ = CPcor;
Residual = (instrument conductivity - bath conductivity) using g, h, i, j coefficients



POST CRUISE CALIBRATION

Mast PAR Sensor

DO NOT DESTROY
Biospherical Instruments Inc.
CALIBRATION DATA

Biospherical Instruments Inc.

CALIBRATION CERTIFICATE

Calibration Date	2/3/00
Model Number	QSR-240
Serial Number	6388
Operator	TPC
Standard Lamp	94532(03/13/98)
Probe Excitation Voltage Range:	5 to 18 VDC(+)
Output Polarity:	POSITIVE

Probe Conditions at Calibration(in air):

Calibration Voltage:	8	VDC(+)
Probe Current:	1.1	mA

Probe Output Voltage:

Probe Illuminated	88.7	mV
Probe Dark	0.2	mV
Probe Net Response	88.5	mV

Corrected Lamp Output:

Output in Air (same condition as calibration):

8.58E+15	quanta/cm²sec
0.014	uE/cm²sec

Calibration Factor:
(To calculate irradiance, divide the net voltage reading in Volts by this value.)

Dry:	1.03E-17	V/(quanta/cm²sec)
	6.23E+00	V/(uE/cm²sec)

Notes:
1. Annual calibration is recommended.
2. Calibration is performed using a Standard of Spectral Irradiance traceable to the National Institute of Standards and Technology (NIST).
3. The collector should be cleaned frequently with alcohol.
4. Calibration was performed with customer cable, when available.

QSR240R 05/24/95

Precision Spectral Pyranometer

THE EPPLEY LABORATORY, INC.
12 Sheffield Ave., P.O. Box 419, Newport, RI 02840 USA
Telephone: 401-847-1020 Fax: 401-847-1031

EPLAB
Scientific Instruments for Precision Measurements Since 1917

STANDARDIZATION OF EPPLEY PRECISION SPECTRAL PYRANOMETER Model PSP

Serial Number: 32850F3

Resistance: 707 Ω at 23 °C
Temperature Compensation Range: -20 to 40 °C

This radiometer has been compared with Standard Precision Spectral Pyranometer, Serial Number 21231F3 in Eppley's Integrating Hemisphere under radiation intensities of approximately 700 watts meter^{-2} (roughly one-half a solar constant). The adopted calibration temperature is 25 °C.

As a result of a series of comparisons, it has been found to have a sensitivity of:

8.25 x 10^{-6} volts/watts meter^{-2}

5.75 millivolts/cal cm^{-2} min^{-1}

The calculation of this constant is based on the fact that the relationship between radiation intensity and emf is rectilinear to intensities of 1400 watts meter^{-2}. This radiometer is linear to within ± 0.5% up to this intensity.

The calibration of this instrument is traceable to standard self-calibrating cavity pyrheliometers in terms of the Systems Internationale des Unites (SI units), which participated in the Eighth International Pyrheliometric Comparisons (IPC VIII) at Davos, Switzerland in October 1995.

Useful conversion facts: 1 cal cm^{-2} min^{-1} = 697.3 watts meter^{-2}
1 BTU/ft^2-hr^{-1} = 3.153 watts meter^{-2}

Shipped to:
Antarctic Support Associates
Port Hueneme, CA

Date of Test: January 25, 2000

In Charge of Test: R.T. Eppman

S.O. Number: 57886
Date: February 29, 2000

Reviewed by: Thomas J. Kirk

Remarks:

rotronic
instrument corp

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CERTIFICATE OF HUMIDITY CALIBRATION

Model : MP101A
Serial # : 45618

This instrument was placed in a ventilated tunnel having a minimum air velocity of 180 Ft/min. and calibrated against two reference instruments.

Calibration of the reference instruments was both with saturated salt solutions and with a certified chilled mirror instrument, traceable to the National Institute of Standards and Technology (NIST). A certified, traceable thermometer was used to monitor temperature. The %RH values of the saturated salt solutions were taken from the tables published by the National Bureau of Standards (now NIST), L. Greenspan, Journal of Research, Vol. 81A, January - February 1977. Details regarding calibration with saturated salt solutions may be found in ASTM standard E104-85.

Based on the above procedures, the accuracy of this instrument has been found to be as follows:

Reference	Reading	Correction
35.0	35.0	0.0
80.0	80.0	0.0
0.3	0.3	0.0

Note: Humidity Values in %RH.

By: _____ Date:6/20/2000

ROTRONIC Instrument Corp.