Data Formats for Healy Under way Instruments

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Data

Data are received via RS-232 serial connections. In SCS a time tag is added at the beginning of each line of data in the form, mm/dd/yyyy,hh:mm:ss.sss,[data stream from instrument] where:

Format	Value used
mm	2 digit month of the year
dd	2 digit day of the month
yyyy	4 digit year
hh	2 digit hour of the day
mm	2 digit minute
ss.sss	seconds

An example string from the Seabeam Centerbeam file is:
04/13/2007,06:49:20.920,$SBCTR,2007,4,13,06:49:09.437,57.158792,-165.664322 ,69.15,60*00
All times are reported in UTC. Each file type has it's own NMEA string name ($SBCTR as an example).
The delimiters that separate fields in the raw data files are commas. Care should be taken when reprocessing the data that the field's separations are clearly understood.

Directories and Contents:

1_Minute_Averaged_Data:	This directory contains all of the under way data averaged over a 1 minute window in time.
SCS_Data*:*	This directory contains serial data collected by the SCS version 3.3b data collection system in different directories. Directory names are labeled by the instrument name and string type of the data collected. A description of the data contained in this directory is below.
LDS_Data*:*	This directory contains serial data collected by the Lamont LDS data collection system in different directories. Directory names are labeled by the instrument name and string type of the data collected. A description of the data contained in this directory is below.
Raw:	This directory contains raw data as recorded by individual instruments and put into different directories. Directory names are labeled by the instrument name and string type of the data

	collected. A description of the data contained in this directory is below.
Meta_data:	This directory contains documents useful in the post analysis of the data on this DVD media set. The data type are separated into different directories by type. A description of these directories is below.

1_Minute_Averaged_Data:

HLY0902_distance.csv.gz	Distance along track from port.
HLY0902_Averaged.csv.gz	All the Under way data averaged for 1 minute.
Shapefile	All of the 1 minute under way data averaged at 1 minute spacing in shp, shx and dbf GIS files.

SCS_Data:

/aft_a_frame	Wire tension, wire out, and wire speed for the Aft A frame sheaves.
/air_temp_f	Temperature data from the ship temperature snsor on the bridge in Fahrenheit. Data is derived from data from files in the rmyoung_air directory.
/air_temp3a_f	Temperature data from the MET3A sensor on top of the HCO shack in Fahrenheit. Data is derived from data from files in the met3a_sen directory.
/air_temp_bow	Temperature data from the temperature sensor on the Jackstaff in Fahrenheit.
/ashtech_attitude	Attitude in NMEA format from the Ashtech ADU5 GPS receiver.
/ashtech_gga	Position data in NMEA GGA format from the Ashtech ADU5 GPS receiver.
/ashtech_gll	Position data in NMEA GLL format from the Ashtech ADU5 GPS receiver.
/ashtech_hdt	Heading data in NMEA HDT format from the Ashtech ADU5 GPS receiver.
/flomet	Flow meter data just upstream of the TSG and Fluorometer.
/flomet_b	Flow meter data just upstream of the B TSG and Fluorometer. (if this second sensor is installed)
/fluro	Flurometer for the TSG sensor.
/fluro_b	Flurometer for B TSG sensor. (if this second sensor is installed)

/glonass_gga	Position data in NMEA GGA format from the GLONASS GPS receiver.
/glonass_gll	Position data in NMEA GLL format from the GLONASS GPS receiver.
/gyro_mk27	Heading data in NMEA HDT format from the Sperry MK27 gyro compass.
/gyro_mk39	Heading data in NMEA HDT format from the Sperry MK39 gyro compass.
/ibs_waypoints	Waypoints from the Healy's Integrated Bridge Syste.m
/isus	ISUS Nitrate Sensor small file.
/isus3v	ISUS Nitrate Sensor 3V full file.
/knudsen	Depth data in a proprietary PKEL format received from Knudsen 320 B/R serial output.
/met3a_sen	Meterology data from the top of the Jackstaff.
/oxygen	Oxygen values from the TSG.
/oxygen_b	Oxygen values from B TSG. (if this second sensor is installed)
/pcode_aft_gga	Position data in NMEA GGA format from the Trimble Centurion receiver located in the Computer lab.<
/pcode_aft_gll	Position data in NMEA GLL format from the Trimble Centurion receiver located in the Computer lab.
/pcode_aft_vtg	Course and speed over ground in NMEA VTG format from the Trimble Centurion receiver located in the Computer lab.
/pcode_aft_zda	Time and date data in the NMEA ZDA format. Data retrieved from the Trimble Centurion receiver located in the Computer lab.
/pcode_bridge_gga	Position data in NMEA GGA format from the Trimble GPS receiver located on the bridge.
/pcode_bridge_gll	Position data in NMEA GLL format from the Trimble GPS receiver located on the bridge.
/pcode_bridge_vtg	Course and speed over ground data in NMEA VTG format from the Trimble GPS receiver located on the bridge.
/posmv_gga	Position data in NMEA GGA format from the POS/MV
/posmv_gst	Pseudorange error statistics in NMEA GST format from the POS/MV
/posmv_hdt	Heading data in NMEA HDT format from the POS/MV
/posmv_pashr	Roll, pitch and heave from POS MV inertial navigation system.
/posmv_vtg	Course and speed over ground in NMEA VTG format from the POS/MV
/posmv_zda	Time and date data in NMEA ZDA format from the POS/MV

/pressure_sen	Pressure sensor in the Uncontaminated Seawater System before the Bio Chem Lab which measures header pressure in PSI.
/rmyoung_air	Temperature, humidity, air pressure data in NMEA XDR format from the ship RM Young meteorological system near the bridge.
/rmyportwind	Wind speed and direction data in NMEA WMV format from the ship RM Young weather vane on the port side of the Healy Mast Yard.<
/rmystbdwind	Wind speed and direction data in NMEA WMV format from the ship RM Young weather vane on the starboard side of the Healy Mast Yard.
/samos_data	Meterology data for SAMOS.
/seabeam_center	Center depth data from the Seabeam 2112
/solar_radiometers	Solar Radiometer data for SW and IW.
/sperry_speedlog	Ground/water speed data from the Sperry Speed Log.
/stbd_a_frame	Wire tension, wire out, and wire speed for the starboard A frame sheaves.
/surface_par	Photosynthetic Active Radiation volts and Microeinstens/m2 se from the surface par sensor.
/sv2000	Sound Velocity data from the SV2000 sound velocimeter located in the ADCP BB150 sonar well.
/temp_incubat	Temperatures from the Bow Incubators.
/true_wind_port	True wind speed data derived from gyro data and rmyportwind.
/true_wind_stbd	True wind speed data derived from gyro data and rmystbdwind.
/tsg	Thermosalinograph and fluorometer data from the TSG instruments in the Bio/Chem Lab.
/tsg_b	Thermosalinograph and fluorometer data from the B TSG instruments in the Bio/Chem Lab. (if this second sensor is installed)
/wind_aft	Wind data from the UltraSonic wind sensor on top of the HCO Shack.
/wind_bow	Wind data from the UltraSonic wind sensor on top of the Jack Staff.
/wind_mid	Wind data from the UltraSonic wind sensor on the Yard.

***Extra files in the directory SCS_Data*:**

Acq.LOG	Contains the data as to what occurred with SCS data. It shows when data collection was started and stopped.
CallSign	
EventData	Contains logs of Events in changing SAMOS setings.
Incidents_YYYYMMDD-TTTTTT.DTM	Contains any incident data which were triggered in SCS 3.3b.
NOAA_Data	Files of data sent to NOAA of BarometricPressure and SeaSurface Temperature.
sensor_YYYYMMDD-TTTTTT.scf	Contains the configuration file for data collection as configured by SCS 3.3b.

LDS_Data:

/AloftConCam	Contains picture files separated by folders named by Year and Day of the Year (YYYYJJJ). The picture files are in 5 minute JPEG format.
/FantailCam	Contains picture files separated by folders named by Year andDay of the Year (YYYYJJJ). The picture files are in 5 minute JPEG format.
/adcp_nav	Contains the navigation data sent to the ADCPs.
/adu5	Contains the data from the ADU5 GPS.
/aggps	Contains the data from the AG GPS.
/ais	Contains Automatic Identification System (AIS) messages as encapsulated VDM sentences.
/bgm221	Contains the data from the BGM221 Gravimeter.
/bgm222	Contains the data from the BGM222 Gravimeter.
/events	Contains the logs of event for different systems.
/hdgextract	Contains the extracted Heading dagta from the POSMV.
/ibs_waypoints	Contains the way points from the ship's IBS navigation system on the Bridge.
/mk27	Contains the data from the MK27 Gyro.
/mk30	Contains the data from the MK30 Gyro.
/posatt	Contains the attitude data from the POSMV GPS.
/posnav	Contains the navigation data from the POSMV GPS.

/posreform2sb	Contains the navigation data from the POSMV GPS reformatted for the SeaBeam.
/sbctr	Contains the center beam data from the SeaBeam.
/sbsv	Contains the surface sound velocity data for the SeaBeam.
/seabeam	Contains the data from the SeaBeam.
/tsg_met	Contains all the data from SIO TSG and Met sensors.
/winch_aft	Contains all the data from the winches going over the stern of the ship.
/winch_stbd	Contains all the data from the winch on the Starboard A-Frame.

Meta_Data:

/elog	Contains the technician's narrative of important events, which occurred both to the network and to individual sensors.
/Systems_Calibrations	Contains directories of the Calibratin sheets for the shipboard instruments.
/Bridge_Logs	
DDMMMYY.doc	The "smooth log" containing events recorded by the bridge watch.
DDMMMYYWX.xls	Weather log recorded by the watch.
DDMMMYYNAV.xls	Navigation logs recorded by the watch.

Raw:

/adcp150	150 Khz ADCP data.
/adcp75	75 KHz ADCP data.
/ctd	CTD data in directories by Cast number.
/ctd/TSG Data	AUTOSAL Salinometer TSG comparison data.
/environmental_sensors	Temperature logs from the Freezers and Coolers.
/knudsenraw	Knudsen 320B/R data.

/tsg_met	All the TSG and MET data.
/xbt	Expendable Bathythermograph data.

Images:

/Satellite_Image	Contains satellite imagery in jpeg format
/dmsp	dmsp folders labeled by Year, Month, Day
/hrpt	hrpt folders labeled by Year, Month, Day

Ice_observations:

Directories of the Ice Observations taken for the cruise.

knudsen_hourly_plots:

Directories of the SIOSEIS plots of the Knudsen 3.5 kHz data are in directories named by year, month, and day. These images are in the png format. There are two plots for each window in time. The files start 10 minutes before the file name and 10 minutes after the hour the file is named for.

SVP:

Sound velocity profiles used for the Seabeam.(Not provided for HLY0902)

Merged Data

LDEO Averaged One Minute Data File

The data are summarized into an averaged one (1) minute data file by the LDEO technician. This file takes the average value centered around the minute, (30 seconds either side of the whole minute). The data are the raw values as they are logged. There has been no quality control done on these files. Those wishing more accurate and quality controlled values should process the data in the directories described below in the document.

HLY0902_track.csv or *HLY0902_averaged.csv*

10950,2009/03/18 02:28,63.2094507,-172.5289363,227.2,6.7,234.6,,-1.759,-1.279,26.1927,32.594,
0.324,0.032,1.91,288.98,360.48,260.47,260.81,1421.95,-14 .74,70.68,1035.20,104.69,7.43,0.35,9.29,101.71,6.28,1.04,8.09,7.519,-1.281,2,
-80,-4,0,2,-80,-4,0,16.88,2.2,8.43,0.91

10951,2009/03/18 02:29,63.2081712,-172.5319592,227.1,6.7,234.2,,-1.758,-1.284,26.2043,32.615,
0.352,0.035,1.91,286.02,361.14,260.52,260.80,1413.57,-14 .80,70.25,1035.20,105.68,7.20,0.47,9.12,107.06,6.54,3.03,8.56,7.656,-1.286,2,
-80,-4,0,2,-80,-4,0,17.28,3.2,8.43,0.77

10952,2009/03/18 02:30,63.2070295,-172.5346542,225.9,5.2,235.4,,-1.758,-1.287,26.2101,32.626,
0.415,0.042,1.91,265.21,361.58,260.52,260.70,1391.30,-14 .84,70.25,1035.23,107.69,7.36,0.30,9.13,107.76,6.24,2.74,8.08,7.661,-1.288,2,
-80,-4,0,2,-80,-4,0,15.40,1.6,8.43,0.77

Field	Data	Example	Units
01	ID	10950	sample count
02	date	2009/03/18 02:28	date & time UTC (year/month/day hour:minute)
03	lat	63.2094507	$INGGA, POSMV Latitude (decimal degrees)
04	lon	-172.5289363	$INGGA, POSMV Longitude (decimal degrees)
05	cog	227.2	$INVTG, POSMV Course Over Ground (angular distance from 0 (North) clockwise through 360, 1 minute average)
06	sog	6.7	$INVTG, POSMV Speed Over Ground (Knots, 1 minute average
07	heading	234.6	$PASHR, POSMV ship heading(angular distance from 0 (North) clockwise through 360, 1 minute average)

08	depth		$SBCTR, Seabeam centerbeam depth(meters, 1 minute average)
09	SST	-1.759	$PSSTA, SBE3s RemoteTemperature, Sea Chest intake (Celsius, 1 minute average)
10	TSG_InTemp	-1.279	$PSTSA, SBE45 Water Temperature (Celsius, 1 minute average)
11	TSG_Cond	26.1927	$PSTSA, SBE45 Water Conductivity (millisiemens/centimeter, 1 minute average)
12	TSG_Sal	32.594	$PSTSA, SBE45 Water Salinity (PSU, 1 minute average)
13	SCF-FL	0.324	$PSFLA, Seapoint Fluorometer (Ug/l, 1 minute average)
14	SCF-FL-V	0.032	$PSFLA, Seapoint Fluorometer (Volts, 1 minute average)
15	tsg_flow_A	1.91	$PSFMA, Flowmeter in-line with PSTSGA, PSOXA, PSFLA (LitersPerMinute, minimum value in 1 minute interval)
16	SWR	288.98	$PSSRA, Short Wave Radiation (W/M^2, 1 minute average)
17	LWR	360.48	$PSSRA, Long Wave Radiation (W/M^2, 1 minute average)
18	LWR_Dome_T	260.47	$PSSRA, LWD Dome Temperature (Deg K, 1 minute average)
19	LWR_Body_T	260.81	$PSSRA, LWD Body Temperature (Deg K, 1 minute average)
20	PAR	1421.95	$PSSPA, Surface PAR (uE/Sec/M^2, 1 minute average)
21	JS_Air_Temp	-14.74	$PSATC, Bow Jackstaff Air Temperature (Deg C, 1 minute average)
22	Bridge_RH	70.68	$PSMEB, Bridge RM Young Relative Humidity (%, 1 minute average)
23	Bridge_Baro	1035.20	$PSMEB, Bridge RM Young Barometric Pressure (millibars, 1 minute average)
24	JS_WndDirR	104.69	$PSWDC, Jackstaff Relative wind direction (deg, 1 minute average)
25	JS_WndSpdR	7.43	$PSWDC, Jackstaff Relative wind speed (m/s, 1 minute average)
26	JS_WndDirT	0.35	$PSWDC, Jackstaff True wind direction (deg, 1 minute average)
27	JS_WndSpdT	9.29	$PSWDC, Jackstaff True wind speed (m/s, 1 minute average)
28	MM_WndDirR	101.71	$PSWDB, Main Mast Relative wind direction (deg, 1 minute average)
29	MM_WndSpdR	6.28	$PSWDB, Main Mast Relative wind speed (m/s, 1 minute average)
30	MM_WndDirT	1.04	$PSWDB, Main Mast True wind direction (deg, 1 minute average)
31	MM_WndSpdT	8.09	$PSWDB, Main Mast True wind speed (m/s, 1 minute average)
32	SBE_Oxy	7.519	$PSOXA, SBE-43 Oxygen(ml/l, 1 minute average)

33	SBE_Oxy_T	-1.281	$PSOXA, SBE-43 Oxygen Temperature(Deg C, 1 minute average)
34	WinchAft	2	Aft A-Frame Winch number
35	TensionAft	-80	Aft A-Frame Winch Wire tension(Pounds, 1 minute average)
36	WireOutAft	-4	Aft A-Frame Winch Wire out (Meters, 1 minute average)
37	SpeedAft	0	Aft A-Frame Winch Wire speed(Meters/minute, 1 minute average)
38	WinchSbd	2	Starboard A-Frame Winch number
39	TensionSbd	-80	Starboard A-Frame Winch Wire tension(Pounds, 1 minute average)
40	WireOutSbd	-4	Starboard A-Frame Winch Wire out (Meters, 1 minute average)
41	SpeedSbd	0	Starboard A-Frame Winch Wire speed(Meters/minute, 1 minute average)
42	StbdWndSpdT	16.88	RMYoung True Wind Speed, starboard(Knots, 1 minute average)
43	StbdWndDirT	2.2	RMYoung True Wind Direction, starboard(angular distance from 0 (North) clockwise through 360, 1 minute average)
44	OxySat	8.43	Dissolved oxygen (DO) saturation as a funciton of T and S (Weiss)(ml/L, 1 minute average)
45	AOU	0.91	Apparent Oxygen Utilization (AOU)(ml/L,1 minute average)

File Formats of Data Collected Underway

In the sections below for each data type the directory name is listed, then an example file name, and then 3 lines from that file. This part is followed by a table that lists the data contained in the string.

./SCS_Data

The following data types are to be found in the SCS_Data directory.

Underway Data

Meteorology Data

Temperature Sensors

Ship Air Temperatures on the Bridge Deck

Temperature, humidity, air pressure data from the ship RM Young meteorological system on the bridge deck.
./rmyoung_air
RMYoung-Air_20090314-165026.Raw
03/14/2009,16:50:31.332,$PSMEB,-15.51,80.41,1030.34,*42
03/14/2009,16:50:35.317,$PSMEB,-15.51,80.41,1030.34,*42
03/14/2009,16:50:39.334,$PSMEB,-15.51,80.41,1030.33,*45

FIELD	DATA	Example	UNITS
1	SCS logged Date	03/14/2009	mm/dd/year
2	SCS logged Time GMT	16:50:31.332	hh:mm:ss.sss
3	NMEA header	$PSMEB	ASCII text
4	Air Temperature	-15.51	Degrees C

5	Relative Humidity	80.41	Percent
6	Barometer	1030.34	Millibars
7	Check sum	*42	ASCII text

Ship Air Temperatures on the Bridge Deck, (Derived)

Temperature data from the ship RM Young temperature sensor on the bridge deck in Fahrenheit. Data is derived from data from files in the rmyoung_air directory.

./air_temp_f

AirTemp-F_20070413-000000.Raw

04/13/2007,00:00:02.074,$DERIV,28.83,-1.76,
04/13/2007,00:00:05.074,$DERIV,28.62,-1.88,
04/13/2007,00:00:08.074,$DERIV,28.62,-1.88,

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/13/2007	mm/dd/year
2	SCS logged Time GMT	00:00:02.074	hh:mm:ss.sss
3	NMEA header	$DERIV	ASCI text
4	Air Temperature	28.83	Fahrenheit
5	Air Temperature	-1.76	Celsius

Jack Staff Air Temperature, Celsius

Temperature data from the Jack Staff temperature sensor.
./airtemp_bow
Air-temp-Bow-Jackstaff_20090314-000000.Raw
03/14/2009,00:00:27.602,$PSATC,-9.53,40.703*77
03/14/2009,00:00:29.587,$PSATC,-9.53,40.702*76
03/14/2009,00:00:31.602,$PSATC,-9.53,40.701*75

FIELD	DATA	Example	UNITS
1	SCS logged Date	03/14/2009	mm/dd/year
2	SCS logged Time GMT	00:00:27.602	hh:mm:ss.sss
3	NMEA header	$PSATB	ASCI text
4	Air Temperature	-9.53	Celsius
5	Air Temperature	40.703	Raw
6	Check sum	*77	ASCII text

HCO Met3A Air Temperature, Fahrenheit

From the HCO Met3A weather station temperature sensor. Temperature is converted to Fahrenheit.
./air_temp3a_f
Met3a-Air-Temp-F_20090129-173743.Raw
01/29/2009,17:37:47.068,$DERIV,41.41,5.23,
01/29/2009,17:37:50.683,$DERIV,41.41,5.23,
01/29/2009,17:37:54.297,$DERIV,41.41,5.23,

FIELD	DATA	Example	UNITS
1	SCS logged Date	01/29/2009	mm/dd/year
2	SCS logged Time GMT	17:37:47.068	hh:mm:ss.sss
3	NMEA header	$DERIV	ASCI text
4	Air Temperature	41.41	Fahrenheit
5	Air Temperature	5.23	Celsius
6	Check sum		ASCII text

HCO Met3A Air Temperature, Relative Humidity, Barometric Pressure, and Precipitation

From the HCO Met3A weather station sensors.
./met3a_sen
MET3A-Sen_20090129-173743.Raw
01/29/2009,17:37:46.997,$PSMEA,5.23,89.90,1035.61,0.16*41
01/29/2009,17:37:48.805,$PSMEA,5.23,89.90,1035.61,0.16*41
01/29/2009,17:37:50.612,$PSMEA,5.23,89.90,1035.61,0.16*41

FIELD	DATA	Example	UNITS
1	SCS logged Date	01/29/2009	mm/dd/year
2	SCS logged Time GMT	17:37:46.997	hh:mm:ss.sss
3	NMEA header	$PSMEA	ASCI text
4	Air Temperature	5.23	Celsius
5	Relative Humidity	89.90	Percentage
6	Barometric Pressure	1035.61	millibars
7	Precipitation	0.16	millimeters total precipitation
8	Check sum	*41	ASCII text

Winds
Ship Wind Sensor, Port Yardarm

Relative wind speed and direction data
./rmyportwind
RMYPortWind_20070414-182437.Raw
04/14/2007,18:24:38.490,$WIMWV,033,R,028.1,N,A*36

04/14/2007,18:24:39.505,$WIMWV,041,R,028.7,N,A*35
04/14/2007,18:24:40.521,$WIMWV,034,R,029.4,N,A*35

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/14/2007	mm/dd/year
2	SCS logged Time GMT	18:24:38.490	hh:mm:ss.sss
3	NMEA header	$WIMWV	ASCII text
4	Wind Direction	033	Degrees
5	R= Relative	R	ASCII character
6	Wind Speed	028.1	Knots
7	N= Knots	N	ASCII character
8	A= Valid Data	A	ASCII character
9	Check sum	*36	ASCII text

Ship Wind Sensor, Starboard Yardarm

Relative wind speed and direction data in NMEA MWV format from the ship RM Young weather vane on the starboard side of the mast yardarm.

./rmstbwind

RMYStbdWind_20070414-182437.Raw

04/14/2007,18:24:38.677,$WIMWV,044,R,025.4,N,A*3E
04/14/2007,18:24:39.693,$WIMWV,045,R,025.6,N,A*3D
04/14/2007,18:24:40.724,$WIMWV,042,R,025.2,N,A*3E

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/14/2007	mm/dd/year
2	SCS logged Time GMT	18:24:38.677	hh:mm:ss.sss
3	NMEA header	$WIMWV	ASCII text
4	Wind Direction	044	Degrees
5	R= Relative	R	ASCII character
6	Wind Speed	025.4	Knots
7	N= Knots	N	ASCII character
8	A= Valid Data	A	ASCII character
9	Check sum	*3E	ASCII text

True Wind, Ship Port Yardarm (Derived)

True wind speed data derived from the POSMV HDT, SOG and COG data and the rmyportwind data from the ship weather vane on the port side of Mast yardarm.

./true_wind_port

PortWnd-T_20070415-000000.Raw

04/15/2007,00:00:03.927,$DERIV,18.59,4.57,30.6,12,12.5,343.7,344.2,
04/15/2007,00:00:05.927,$DERIV,19.69,10.28,31.4,16,12.5,344.2,344.2,
04/15/2007,00:00:07.927,$DERIV,19.85,3.73,31.8,12,12.4,344.1,344.2,

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	,00:00:03.927	hh:mm:ss.sss
3	NMEA header	$DERIV	ASCII text
4	Wind Speed derived	18.59	knots
5	Wind Directions derived	4.57	degrees
6	Wind Speed relative	30.6	knots
7	Wind Direction relative	12	direction
8	Speed over ground (POSMV)	12.5	knots
9	Course over ground (POSMV)	343.7	Degrees
10	Heading (POSMV)	344.2	Degrees
11	Check sum		ASCII text

True Wind, Ship Starboard Yardarm (Derived)

True wind speed data derived from the POSMV HDT, SOG and COG data and rmystbdwind from the weather vane on the Starboard side of Mast yardarm.
./true_wind_stbd
StbdWnd-T_20070415-000000.Raw
04/15/2007,00:00:03.396,$DERIV,17.33,3.47,29.4,11,12.5,343.7,344.2,
04/15/2007,00:00:05.396,$DERIV,17.05,15.29,28.5,18,12.5,344.2,344.2,
04/15/2007,00:00:07.396,$DERIV,19.99,13.31,31.4,18,12.4,344.1,344.2,

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:07.396	hh:mm:ss.sss
3	NMEA header	$DERIV	ASCII text
4	Wind Speed derived	19.99	knots
5	Wind Directions derived	13.31	degrees
6	Wind Speed relative	31.4	knots
7	Wind Direction relative	18	direction
8	Speed over ground (POSMV)	12.4	knots
9	Course over ground (POSMV)	344.1	Degrees
10	Heading (POSMV)	344.2	degrees
11	Check sum		ASCII text

Ultrasonic Wind Sensor, Starboard Yardarm

Wind speed data from the Ultrasonic sensor on the Starboard Mast Yardarm. The true data are derived from the POSMV HDT, SOG and

COG data and the Relative wind data for this sensor.
./wind_mid
WIND-MID_20090129-173743.Raw
01/29/2009,17:37:47.026,$PSWDB,18.00,13.18,124.12,7.87*5C
01/29/2009,17:37:48.833,$PSWDB,18.00,13.18,121.95,7.98*58
01/29/2009,17:37:50.640,$PSWDB,18.08,13.23,125.38,8.01*54

FIELD	DATA	Example	UNITS
1	SCS logged Date	01/29/2009	mm/dd/year
2	SCS logged Time GMT	17:37:47.026	hh:mm:ss.sss
3	NMEA header	$PSWDB	ASCII text
4	Relative Wind Direction	18.00	Degrees
5	Relative Wind Speed	13.18	meters/sec
6	True Wind Direction	124.12	Degrees
7	True Wind Speed	7.87	meters/sec
8	Check sum	*5C	ASCII text

Ultrasonic Wind Sensor, HCO Shack

Wind speed data from the Ultrasonic sensor atop the HCO Shack. The true data are derived from the POSMV HDT, SOG and COG data and the Relative wind data for this sensor.
./wind_aft
WIND-AFT_20090129-173743.Raw
01/29/2009,17:37:47.012,$PSWDA,30.59,7.45,184.68,5.36*6B
01/29/2009,17:37:48.819,$PSWDA,28.34,7.45,177.51,4.96*64
01/29/2009,17:37:50.626,$PSWDA,30.25,7.49,216.38,3.37*66

FIELD	DATA	Example	UNITS
1	SCS logged Date	01/29/2009	mm/dd/year
2	SCS logged Time GMT	17:37:47	hh:mm:ss.sss

3	NMEA header	$PSWDA	ASCII text
4	Relative Wind Direction	30.59	Degrees
5	Relative Wind Speed	7.45	meters/sec
6	True Wind Direction	184.68	Degrees
7	True Wind Speed	5.36	meters/sec
8	Check sum	*6B	ASCII text

Ultrasonic Wind Sensor, Jackstack

Wind speed data from the Ultrasonic sensor atop the Jack Staff. The true data are derived from the POSMV HDT, SOG and COG data and the Relative wind data for this sensor.

./wind_bow

WIND-BOW_20090129-173743.Raw

01/29/2009,17:37:47.040,$PSWDC,26.58,10.68,145.76,6.14*57
01/29/2009,17:37:48.847,$PSWDC,26.42,10.71,147.73,6.14*53
01/29/2009,17:37:50.654,$PSWDC,26.00,10.78,144.86,5.88*53

FIELD	DATA	Example	UNITS
1	SCS logged Date	01/29/2009	mm/dd/year
2	SCS logged Time GMT	17:37:040	hh:mm:ss.sss
3	NMEA header	$PSWDC	ASCII text
4	Relative Wind Direction	26.58	Degrees
5	Relative Wind Speed	10.68	meters/sec
6	True Wind Direction	145.76	Degrees
7	True Wind Speed	6.14	meters/sec
8	Check sum	*57	ASCII text

Solar Radiometers

Photosynthetic Active Radiation (PAR) Sensor

Photosynthetic Active Radiation Microeinstens/m2 sec and volts from the surface PAR sensor on top of HCO.
./suface_par
Surface-PAR_20080312-000000.Raw
03/12/2008,22:02:46.872,$PSSPA,1749.51,1.056*4C
03/12/2008,22:02:48.872,$PSSPA,1755.43,1.060*47
03/12/2008,22:02:50.888,$PSSPA,1755.43,1.060*47

FIELD	DATA	Example	UNITS
1	SCS logged Date	03/12/2008	mm/dd/year
2	SCS logged Time GMT	22:02:46.872	hh:mm:ss.sss
3	NMEA header	$PSSPA	ASCII text
4	Surface PAR	1749.51	MicroEinstiens/sec/m^2
5	Surface PAR	1.056	Raw Volts
6	Check sum	*4C	ASCII text

Solar Radiometers (Short and Long Wave), Pyranometer and Pyrgeometer

Solar Radiometers data from the sensors on top of HCO. The short wave radiometer is the Pyranometer and the Long wave radiometer is the Pyrgeometer.

/solar_radiometers

SRM_20080314-000000.Raw

03/14/2008,12:31:43.329,$PSSRA,1.20,0.010,338.30,0.034,276.02,1.192,275.97,1.194*44
03/14/2008,12:31:45.329,$PSSRA,1.20,0.010,338.30,0.034,276.02,1.192,275.97,1.194*44
03/14/2008,12:31:47.328,$PSSRA,1.20,0.010,339.20,0.037,276.02,1.192,275.97,1.194*47

FIELD	DATA	Example	UNITS
1	SCS logged Date	03/14/2008	mm/dd/year
2	SCS logged Time GMT	12:31:43.329	hh:mm:ss.sss
3	NMEA header	$PSSRA	ASCII text
4	Short Wave Radiation (SWR)	1.20	W/m^2
5	Short Wave Radiation	0.010	Raw millivolts
6	Long Wave Radiation (LWR)	338.30	W/m^2
7	Long Wave Radiation	0.034	Raw millivolts
8	LWR, Dome temperature	276.02	Degrees Kelvin
9	LWR, Some temp, RAW	1.192	Raw volts
10	LWR, Body temperature	275.97	Degrees Kelvin
11	LWR, Body temp, RAW	1.194	Raw volts
12	Check sum	*44	ASCII text

SAMOS (Shipboard Automated Meteorological and Oceanographic Systems)

Data formatted to be sent to the U.S. Research Vessel Surface Meteorology Data Assembly Center (DAC).
These data are in files that have only a single value. Every variable sent into SAMOS is in a separate file. The name of the file should tell the user what the variable is.
There are two types of formats used. The bulk of the data has the date, time, a NMEA header for derived data, the mean data for the minute, the last value used in the minute, the total of all the values for the minute and the number of values used to get the mean. The other is for data that is in degrees. The data for degrees has the date, time, a NMEA header for derived data, the mean data for the minute found using the arc tangent of the sine and cosine of the data, the last data value for the minute, the mean of the sums of the sin of the data, the mean of the sum of the cosines of the data and the number of values used to get the mean.

For caluculation of the True wind direction and speed value for SAMOS the method is a less accurate one. The directions are caluculated as desribed above with the means of the sine and cosine of the angles applied to the arctangent for an average heading. The True winds are only a mean of the values entered. In the future (2009???) the direction and speed averages will be calulated using the vectors these data represent.

Example Format for most variables

FIELD	DATA	Example	UNITS
1	SCS logged Date	03/25/2008	mm/dd/year
2	SCS logged Time GMT	00:00:04.710	hh:mm:ss.sss
3	NMEA header	$DERIV	
4	mean value	7.71	
5	Last value used	7.712	
6	Sum of values	215.893	
7	number of values	28	

Example file using the Oxygen data:
SAMOS-OX_20080325-000000.Raw
03/25/2008,00:00:04.710,$DERIV,7.71,7.712,215.893,28,

03/25/2008,00:00:06.132,$DERIV,7.71,7.712,223.605,29,
03/25/2008,00:00:07.475,$DERIV,7.71,7.709,223.605,29,

Example Format for data in Degrees

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:05.505	hh:mm:ss.sss
3	NMEA header	$DERIV	ASCII text
4	Arctangent of the Sums	79.39	
5	Last value used	93.174	
6	Mean of the Sines	57.4453621646971	
7	Mean of the Cosines	10.7645427712987	
8	number of values	59	

Example file using the Jack Staff True Wind data:
SAMOS-TIB_20080326-000000.Raw
03/26/2008,00:00:04.561,$DERIV,321.84,319.15,36.9644472519094,47.0329478291115,60,
03/26/2008,00:00:06.045,$DERIV,321.72,317.79,36.436429442339,46.173817552869,59,
03/26/2008,00:00:07.092,$DERIV,321.66,317.79,37.1082793162236,46.9145049005139,60,
The data filenames each have a 2 letter data type designator to tell what kind of data is in the file. The files are named:

SAMOS	The start of the filename for SAMOS data
OX	Data type, here for Oxygen
20080325	Date, year, month and day of the month
000000	Time in hour, minute and seconds in UTC

The above file name would be*:* *SAMOS-OX_20080325-000000.Raw*

SAMOS Data Designator Keys

Parameter	Designator Key
Air temperature	AT
Air temperature $PSMEA(2)	AT1
Atm. pressure	BP
Atm. Pressure $PSMEA(4)	BP1
Conductivity $PSTSA(3)	TC
Course over ground	CR
Depth to Surface	BT
Dewpoint temperature	DP
Earth relative wind direction	TIP
Earth relative wind direction $PSWDA(4)	TIB
Earth relative wind direction $PSWDB(4)	TIS1
Earth Relative Wind Direction Stbd	TIS
Earth relative wind speed	TKP
Earth relative wind Speed $PSWDA(5)	TWB
Earth relative wind speed $PSWDB(5)	TWS
Earth Relative Wind Speed Stbd	TKS
Flow through TSG $PSFMA(2)	FI
Heading	GY
Heave	VH
Latitude	LA
Longitude	LO

Parameter	Designator Key
Longitudinal Water Speed Fore - Aft	SL
Longwave radiation $PSSRA(4)	LW
Longwave radiation $PSSRA(6)	LD
Longwave radiation $PSSRA(8)	LB
Oxygen $PSOXA(2)	OX
Oxygen $PSOXA(4)	OT
Photosynthetically Active Radiation $PSSPA(2)	PA
Pitch	VP
POS-MV Heading	SH
Precipitation $PSMEA(5)	PR
Relative humidity	RH
Relative humidity $PSMEA(3)	RH1
Roll	VR
Salinity $PSTSA(4)	SA
Sea Surface Temp $PSSTA(2)	ST
Ship relative wind direction	WDP
Ship relative wind direction $PSWDA(2)	WDB
Ship relative wind direction $PSWDB(2)	WDS1
Ship Relative Wind Direction Stbd	WDS
Ship relative wind speed	WKP
Ship relative wind speed $PSWDA(3)	WSB
Ship relative wind speed $PSWDB(3)	WSS
Ship Relative Wind Speed Stbd	WKS
Shortwave radiation $PSSRA(2)	SW
Speed over ground	SP

Parameter	Designator Key
Transverse Water Speed Port to Stbd	SX
TSG Fluorometry $PSFLA(2)	FL1
TSG Fluorometry $PSFLB(2)	FL
TSG internal water temp. $PSTSA(2)	TT
Turbidity $PSFLB(4)	TB

Oceanographic Data

Thermosalinograph / Fluorometer

TSG

Thermosalinograph data from the TSG, Seabird SBE45, instruments in the Bio Chem Lab.
The TSG Salinometer was replaced early in the cruise. It was determined that it was malfunctioning and outputting incorrect values from the beginning of the cruise until it was replaced with a new unit on 04/12/2009 05:15 UTC. This data should not be used prior to this replacement.
./tsg
TSG-A_20080313-000000.Raw
03/13/2008,04:46:03.355,$PSTSA,2.565,28.4522,31.526,1456.01*7E
03/13/2008,04:46:05.340,$PSTSA,2.566,28.4529,31.526,1456.02*75
03/13/2008,04:46:07.355,$PSTSA,2.565,28.4519,31.525,1456.01*75

FIELD	DATA	Example	UNITS
1	SCS logged Date	03/13/2008	mm/dd/year
2	SCS logged Time GMT	04:46:03.355	hh:mm:ss.sss
3	NMEA header	$PSTSA	ASCII text
4	Temperature	2.565	Celsius
5	Conductivity	28.4522	millisiemens/centimeter
6	Salinity	31.526	PSU
7	Sound Velocity	1456.01	Meters per Second (m/s)
8	Check sum	*7E	ASCII text

TSG B

Thermosalinograph data from the B TSG instruments in the Bio Chem Lab.
These data are collected on cruises when extra TSG sensors are installed. This may not happen on most cruises.

./tsg_b

TSG-B_20080313-000000.Raw

03/13/2008,04:46:03.355,$PSTSB,2.565,28.4522,31.526,1456.01*7E
03/13/2008,04:46:05.340,$PSTSB,2.566,28.4529,31.526,1456.02*75
03/13/2008,04:46:07.355,$PSTSB,2.565,28.4519,31.525,1456.01*75

FIELD	DATA	Example	UNITS
1	SCS logged Date	03/13/2008	mm/dd/year
2	SCS logged Time GMT	04:46:03.355	hh:mm:ss.sss
3	NMEA header	,$PSTSB	ASCII text
4	Temperature	2.565	Celsius
5	Conductivity	28.4522	millisiemens/centimeter
6	Salinity	31.526	PSU
7	Sound Velocity	1456.01	Meters per Second (m/s)
8	Check sum	*7E	ASCII text

Sea Surface Temperature

Sea surface temperature from the Science sea water intake. This uses a Seabird SBE-3S Sensor.
/surface_temp
Sea-Surface_20080313-000000.Raw
03/13/2008,05:46:40.402,$PSSTA,2.039,2945.900*7E
03/13/2008,05:46:42.402,$PSSTA,2.039,2945.900*7E
03/13/2008,05:46:44.402,$PSSTA,2.039,2945.900*7E

FIELD	DATA	Example	UNITS
1	SCS logged Date	03/13/2008	mm/dd/year
2	SCS logged Time GMT	05:46:40.402	hh:mm:ss.sss
3	NMEA header	$PSSTA	ASCII text
4	Surface temperature (Sea Chest)	2.039	Celsius
5	Temperature, RAW	2945.900	Raw volts
6	Check sum	*7E	ASCII text

Theromsalinograph Flowmeter

Flow meter, Flocat C-ES45-B003, data from the TSG in the Bio/Chem Lab.
/flomet
FlowMeter_20080314-000000.Raw
03/14/2008,13:44:44.640,$PSFMA,2.51,38.000*44
03/14/2008,13:44:46.624,$PSFMA,2.64,40.000*4D
03/14/2008,13:44:48.624,$PSFMA,2.64,40.000*4D

FIELD	DATA	Example	UNITS
1	SCS logged Date	03/14/2008	mm/dd/year
2	SCS logged Time GMT	13:44:44.640	hh:mm:ss.sss
3	NMEA header	$PSFMA	ASCII text
4	Flow meter	2.51	Liters/minute
5	Flow meter Raw	38.000	frequency
6	Check sum	*44	ASCII text

Flowmeter, Bow Incubators

Flowmeter for the Bow Incubators.
/flomet_b
FlowMeter-BOW_20080313-000000.Raw
03/13/2008,02:51:49.277,$PSFMB,2.91,15.000*44
03/13/2008,02:51:51.277,$PSFMB,2.91,15.000*44
03/13/2008,02:51:53.261,$PSFMB,2.91,15.000*44

FIELD	DATA	Example	UNITS
1	SCS logged Date	03/13/2008	mm/dd/year
2	SCS logged Time GMT	02:51:49	hh:mm:ss.sss
3	NMEA header	$PSFMB	ASCII text
4	Flowmeter	2.91	Liters/minute
5	Flowmeter, RAW	15.000	frequency
6	Check sum	*44	ASCII text

Water Temperature, Bow Incubators

Seawater Temperature for the Bow Incubators. Uese SBE-3S sensor.
/temp_incubat
Temp-Bow-Incubator_20080313-000000.Raw
03/13/2008,02:51:49.277,$PSXTA,2.91,15.000*44
03/13/2008,02:51:51.277,$PSXTA,2.91,15.000*44
03/13/2008,02:51:53.261,$PSXTA,2.91,15.000*44

FIELD	DATA	Example	UNITS

1	SCS logged Date	03/13/2008	mm/dd/year
2	SCS logged Time GMT	02:51:49	hh:mm:ss.sss
3	NMEA header	$PSXTA	ASCII text
4	Flowmeter	2.91	Liters/minute
5	Flowmeter, RAW	15.000	frequency
6	Check sum	*44	ASCII text

Oxygen Sensor

Oxygen, SEABIRD SBE-43, data from the TSG instruments in the Bio/Chem Lab. This is computed with the Salinity value from the theromsalinograph.

./oxygen

OXYGEN_20080313-000000.Raw

03/13/2008,05:25:28.371,$PSOXA,7.265,2.922,2.576,2.576*58
03/13/2008,05:25:30.386,$PSOXA,7.265,2.922,2.577,2.577*58
03/13/2008,05:25:32.371,$PSOXA,7.268,2.923,2.576,2.576*54

FIELD	DATA	Example	UNITS
1	SCS logged Date	03/13/2008	mm/dd/year
2	SCS logged Time GMT	05:25:28.371	hh:mm:ss.sss
3	NMEA header	$PSOXA	ASCII text
4	Oxygen	7.265	ml/l
5	Oxygen, RAW	2.922	Raw value
6	Oxygen Temperature	2.576	Celsius
7	Oxygen Temperature	2.576	Raw value
8	Check sum	*58	ASCII text

Oxygen Sensor B

Oxygen B data from the B TSG instruments in the Bio/Chem Lab.
These data are collected on cruises when extra TSG sensors are installed. This may not happen on most cruises.
./oxygen_b
OXYGEN-B_20080313-000000.Raw
03/13/2008,05:25:28.371,$PSOXB,7.265,2.922,2.576,2.576*58
03/13/2008,05:25:30.386,$PSOXB,7.265,2.922,2.577,2.577*58
03/13/2008,05:25:32.371,$PSOXB,7.268,2.923,2.576,2.576*54

FIELD	DATA	Example	UNITS
1	SCS logged Date	03/13/2008	mm/dd/year
2	SCS logged Time GMT	05:25:28.371	hh:mm:ss.sss
3	NMEA header	$PSOXB	ASCII text
4	Oxygen	7.265	ml/l
5	Oxygen, RAW	2.922	Raw value
6	Oxygen Temperature	2.576	Celsius
7	Oxygen Temperature, Raw	2.576	Raw value
8	Check sum	*58	ASCII text

Fluorometer

Flurometer data from the, Seapoint SCF, TSG instruments in the Bio/Chem Lab.
/fluro
Fluro_20080313-000000.Raw
03/13/2008,03:19:57.277,$PSFLA,0.330,0.033,0.000,0.010*49
03/13/2008,03:19:59.277,$PSFLA,0.330,0.033,0.000,0.010*49
03/13/2008,03:20:01.277,$PSFLA,0.360,0.036,0.000,0.010*49

FIELD	DATA	Example	UNITS
1	SCS logged Date	03/13/2008	mm/dd/year
2	SCS logged Time GMT	03:19:57.277	hh:mm:ss.sss
3	NMEA header	$PSFLA	ASCII text
4	Flurometer	0.330	Ug/l
5	Flrometer, RAW	0.033	volts
6	Turbidity	0.000	NTU (Not used)
7	Turbidity, RAW	0.010	volts (Not used)
8	Check sum	*49	ASCII text

Fluorometer B

Flurometer B, Turner SCUFA, data from the B TSG instruments in the Bio/Chem Lab. These data are collected on cruises when extra TSG sensors are installed. This may not happen on most cruises.

/fluro_b
Fluro-B_20080313-000000.Raw
3/13/2008,03:24:49.293,$PSFLB,0.910,0.091,0.200,0.020*4B
03/13/2008,03:24:51.293,$PSFLB,0.910,0.091,0.200,0.020*4B
03/13/2008,03:24:53.308,$PSFLB,0.910,0.091,0.200,0.020*4B

FIELD	DATA	Example	UNITS
1	SCS logged Date	03/13/2008	mm/dd/year
2	SCS logged Time GMT	03:24:49.293	hh:mm:ss.sss
3	NMEA header	$PSFLB	ASCII text
4	Flurometer	0.910	Ug/l
5	Flrometer, RAW	0.091	volts
6	Turbidity	0.200	NTU (not used)
7	Turbidity, RAW	0.020	volts (not used)
8	Check sum	*4B	ASCII text

ISUS Nitrate Sensor

ISUS Nitrate Sensor, MBARI/Satlatic ISIS V3, TSG instruments in the Bio/Chem Lab. Data is logged every 5 minutes for about 30 seconds. For the times in between this the values in the volts columns are 0.0
NOT currently collected.
./isus
Isus_20080422-000000.Raw
04/22/2008,00:04:31.275,$PSNTA,-0.308,0.478*75
04/22/2008,00:04:33.275,$PSNTA,-0.308,0.478*75
04/22/2008,00:04:35.275,$PSNTA,-0.308,0.478*75

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/22/2008	mm/dd/year
2	SCS logged Time GMT	00:04:31.275	hh:mm:ss.sss
3	NMEA header	$PSNTA	ASCII text
4	ISUS Aux 1	-0.308	volts
5	ISUS Aux 2	0.478	volts
6	Check sum	*75	ASCII text

ISUS Nitrate Sensor 3V

ISUS Nitrate Sensor 3V, MBARI/Satlatic ISIS V3, instrument in the Bio/Chem Lab. Data is logged every 5 minutes for a few seconds. Each data line is very long and logging via SCS is not perfect. Each data message is preceded with an SCS time stamp. However, where the data message is split appears to be sometimes arbitrary. A more complete description of this format is below in a section from the Satlantic Operation Manual's format secton. The example of the data below only shows the first 6 columns of data.

./isusv3

ISUSV3-SERIAL_20090507-000000.Raw

05/07/2009,00:15:04.965,SATNDF0141,2009127,0.261589,0.00,0.00,0.00,0.00,0.000000,...
05/07/2009,00:15:05.746,25143,25692,26277,26920,27603,28295,29009,29752,30455,31169,...
05/07/2009,00:15:08.184,SATNLF0141,2009127,0.262853,4.96,32.18,210.36,0.08,0.000001,..
05/07/2009,00:15:10.621,SATNLF0141,2009127,0.263531,4.83,32.98,202.71,0.08,0.000001,...
05/07/2009,00:20:04.793,SATNDF0141,2009127,0.344886,0.00,0.00,0.00,0.00,0.000000,...
05/07/2009,00:20:05.621,6,23407,23274,23189,23223,23360,23533,23824,24195,24658,25147,...
05/07/2009,00:20:08.074,SATNLF0141,2009127,0.346151,5.31,34.53,176.34,0.07,0.000001,...

FIELD	DATA	Example	UNITS
1	Instrument	SATNLF0141	ASCII text
2	Date (year, day of year)	2008112	yyyyjjj
3	decimal hours, GMT	23.928082	number
4	Nitrate Concentration	-4.82	uMol/L
5	Aux 1	19.99	volts
6	Aux 2	407.63	ASCII text
7 - n	See Appendix	...	...

Pressure Sensor

This pressure sensor is located in the Bio_Chem lab approx. 30' upstream of the TSG.
./pressure_sen
Seawater-Pressure-Sensor_20080428-000000.Raw
04/28/2008,00:00:03.401,$PSPSA,25.88,2.588*41
04/28/2008,00:00:05.401,$PSPSA,25.86,2.586*41
04/28/2008,00:00:07.401,$PSPSA,25.92,2.592*41

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/28/2008	mm/dd/year
2	SCS logged Time GMT	00:00:03.401	hh:mm:ss.sss
3	NMEA header	$PSPSA	ASCII text
4	Pressure	25.88	PSI
5	Pressure, Raw	2.588	Volts
6	Check sum	*41	ASCII text

Sonar Data

Seabeam 2112 Center Beam

Center depth data derived from the Seabeam 2112 data on the POSMVNAV computer.
./seabeam_center
Seabeam-Centerbeam_20070414-182437.Raw
04/14/2007,18:24:38.427,$SBCTR,2007,4,14,18:24:35.713,58.119110,-169.839278,70.70,60*00
04/14/2007,18:24:40.177,$SBCTR,2007,4,14,18:24:37.213,58.119152,-169.839367,70.49,61*00
04/14/2007,18:24:40.615,$SBCTR,2007,4,14,18:24:38.734,58.119193,-169.839452,70.92,60*00

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/14/2007	mm/dd/year
2	SCS logged Time GMT	18:24:40.615	hh:mm:ss.sss
3	NMEA header	$SBCTR	ASCII text
4	Seabeam Date	2007,	Year
5	Seabeam Date	4	Month
6	Seabeam Date	14	Day
7	Seabeam Time	18:24:38.734	hh:mm:ss.sss
8	Latitude	58.119193	Degrees
9	Longitude	-169.839452	Degrees
10	Depth	70.92	meters
11	Number of Beams	60	ASCII text
12	Check sum	*00	ASCII text

Knudsen

Sub Bottom

Depth data in a proprietary PKEL format received from Knudsen 320 B/R serial output. This can be reset on the Knudsen computer very easily. As a result users should be careful using this format page without verifying that the coulums desired are the right ones.
./knudsen
Knudsen_20070414-182437.Raw
04/14/2007,18:24:38.099,$PKEL99, ,14042007,182524.248,00192,HF,00.00,0,+008.50, LF,73.24,1,+008.50,1500, , ,58
07.123897N,169 50.315830W,1060*12
04/14/2007,18:24:38.349,$PKEL99, ,14042007,182525.759,00191,HF,00.00,0,+008.50,LF,73.22,1,+008.50,1500,------, ,58
07.127267N,169 50.322883W,0565*1F
04/14/2007,18:24:39.865,$PKEL99, ,14042007,182527.269,00191,HF,00.00,0,+008.50,LF,73.22,1,+008.50,1500, , ,58
07.128948N,169 50.326409W,1078*10

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/14/2007	mm/dd/year
2	SCS logged Time GMT	18:24:39.865	hh:mm:ss.sss
3	NMEA header	$PKEL99	ASCII text
4	Record Number???	------	
5	Knudsen Date	14042007	DDMMYYYY
6	Knudsen Time	182527.269	HHMMSS.sss
7		00191	
8	HF Header (12 kHz)	HF	ASCII text
9	HF Depth to Surface	00.00	Meters *
10	HF Draft	+008.50	Meters
11	LF Header	LF	ASCII text

12	LF Depth to Surface	73.22	Meters *
13	LF Depth Valid Flag	1	ASCII integer
14	LF Draft	+008.50	Meters
15	Sound Speed	1500	Meters Per Second**
18	Latitude	58 07.128948N	DD MM.MMMMMM***
19	Longitude	169 50.326409W	DDD MM.MMMMMM***
20	Position Latency	1078	
21	Checksum	*10	

* Knudsen depth is currently set for XXXXXXX Meters
** Knudsen default sound speed 1500 meters/sec.
*** Current GPS source is the POSMV

Winch data

Starboard A-Frame Winch Data

1 second data from the Starboard A Frame winch data output.
./stbd_a_frame
Winch-Control-Stbd_20070418-000000.Raw
04/18/2007,06:13:18.281,01, 36, , -27, ,0000
04/18/2007,06:13:19.250,01, 890, , 35, , -28, ,0000
04/18/2007,06:13:20.235,01, 900, , 35, , -28, ,0000

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/18/2007	mm/dd/year
2	SCS logged Time GMT	06:13:20.235	hh:mm:ss.sss

3	Winch number	01	
4	Wire tension	900	Pounds
5	Wire out	35	Meters
7	Wire speed	-28	Meters/minute

Aft A-Frame Winch Data

1 second data from the Aft A Frame winches data output. This is from al the winches that use the aft A-frame.
./aft_a_frame
Winch-Control-Aft_20070418-000000.Raw
04/18/2007,08:46:45.844,02, 31, , 58, ,0000
04/18/2007,08:46:46.844,02, -160, , 32, , 60, ,0000
04/18/2007,08:46:47.812,02, -160, , 33, , 60, ,0000

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/18/2007	mm/dd/year
2	SCS logged Time GMT	08:46:47.812	hh:mm:ss.sss
3	Winch number	02	
4	Wire tension	-160	Pounds
5	Wire out	33	Meters
7	Wire speed	60	Meters/minute

Navigational Data

POSMV GPS

POSMV Global Positoning System Fix Data (GGA)

Position data in NMEA GGA format from the POSMV.
./posmv_gga
POSMV-GGA_20070415-000000.Raw
04/15/2007,00:00:03.052,$INGGA,000002.737,5830.47054,N,17012.64182,W,2,08,1.0,1.80,M,,,4,0297*07
04/15/2007,00:00:04.052,$INGGA,000003.737,5830.47385,N,17012.64365,W,2,08,1.0,1.76,M,,,5,0297*0A
04/15/2007,00:00:05.052,$INGGA,000004.737,5830.47716,N,17012.64550,W,2,08,1.0,1.71,M,,,6,0297*07

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:05.052	hh:mm:ss.sss
3	NMEA header	$INGGA	ASCII text
4	GPS time at position GMT	000004.737	hhmmss.sss
5	Latitude	5830.47716	ddmm.mmmmm
6	North (N) or South(S)	N	ASCII character
7	Longitude	17012.64550	dddmm.mmmmm
8	East (E) or West (W)	W	ASCII character
9	GPS Quality: 1 = GPS 2 = DGPS	2	
10	Number of GPS Satellites Used	08	
11	HDOP (horizontal dilution of precision)	1.0	
12	Antenna height	1.71	meters

13	M for Meters	M	
14	Geoidal Height		meters
15	M for Meters		
16	Differential reference station ID	0297	
17	Checksum	*07	ASCII text

POSMV Psuedorange Error Statistics (GST)

Psuedorange error statistics in NMEA GST format from the POSMV.
./posmv_gst
POSMV-Pseudo-Noise_20070415-000000.Raw
04/15/2007,00:00:02.990,$INGST,000002.737,,0.6,0.4,22.3,0.4,0.6,0.8*63
04/15/2007,00:00:03.990,$INGST,000003.737,,0.6,0.4,22.3,0.4,0.6,0.8*62
04/15/2007,00:00:04.990,$INGST,000004.737,,0.6,0.4,22.3,0.4,0.6,0.8*65

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:05.052	hh:mm:ss.sss
3	NMEA header	$INGST	ASCII text
4	GPS time at position GMT	000004.737	hhmmss.sss
5			
6	Smjr.smjr	0.6	meters
7	Smnr.smnr	0.4	meters
8	000.0	22.3	
9	l.l	0.4	meters
10	y.y	0.6	meters
11	Standard deviation of altitude (a.a)	0.8	meters
12	Checksum	*65	ACII text

POSMV Heading True (HDT)

Heading data in NMEA HDT format from the POSMV.
./posmv_hdt
POSMV-HDT_20070415-000000.Raw
04/15/2007,00:00:03.083,$INHDT,344.2,T*24
04/15/2007,00:00:04.083,$INHDT,344.2,T*24
04/15/2007,00:00:05.083,$INHDT,344.2,T*24

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:05.083	hh:mm:ss.sss
3	NMEA header	$INHDT	ASCII text
4	Heading	344.2	Degrees
5	True(T) or Magnetic(M)	T	ASCII character
6	Checksum	*24	ASCII text

POSMV PASHR

Pitch and Roll data in NMEA PASHR format from the POSMV.
./posmv_pashr
POSMV-PASHR_20070415-000000.Raw
04/15/2007,00:00:02.912,$PASHR,000002.737,344.17,T,-0.21,0.10,-0.02,0.017,0.017,0.011,2,1*17
04/15/2007,00:00:03.912,$PASHR,000003.737,344.19,T,-0.22,0.10,-0.02,0.017,0.017,0.011,2,1*1B
04/15/2007,00:00:04.912,$PASHR,000004.737,344.20,T,-0.24,0.10,-0.02,0.017,0.017,0.011,2,1*10

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:05.052	hh:mm:ss.sss
3	NMEA header	$PASHR	ASCII text
4	Time GMT	000004.737	hhmmss.sss
5	Heading	344.20	heading
6	True	T	ASCII character
7	Roll	-0.24	Degrees
8	Pitch	0.10	Degrees
9	Heave	-0.02	Degrees
10	Accuracy roll	0.017	Degrees
11	Accuracy pitch	0.017	Degrees
12	Accuracy heading	0.011	Degrees
13	Accuracy of heading 0 = no aiding, 1= GPS 2 = GPS & GAMS	2	ASCII integer
14	IMU 0= out 1= satisfactory	1	ASCII character
15	Check Sum	*10	ASCI text

POSMV Course over the GroundandGrond SPeed (VTG)

Course and speed over ground in NMEA VTG format from the POSMV.
./posmv_vtg
POSMV-VTG_20070415-000000.Raw
04/15/2007,00:00:03.130,$INVTG,343.7,T,,M,12.5,N,23.1,K*75
04/15/2007,00:00:04.130,$INVTG,344.0,T,,M,12.5,N,23.1,K*75
04/15/2007,00:00:05.115,$INVTG,344.2,T,,M,12.5,N,23.1,K*77

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:05.115	hh:mm:ss.sss
2	NMEA header	$INVTG	ASCII text
3	Heading	344.2	Degrees
4	Degrees true (T)	T	ASCII character
5	Heading		Degrees
6	Degrees magnetic	M	ASCII character
7	Ship Speed	12.5	knots
8	N=Knots	N	ASCII character
9	Ship Speed	23.1	km/hr
10	K=KM per hour	K	ASCII character
11	Check sum	*77	ASCII text

POSMV Time and Day (ZDA)

Time and date data in NMEA ZDA format from the POS/MV.
./posm_zda
POSMV-ZDA_20070415-000000.Raw
04/15/2007,00:00:03.162,$INZDA,000003.0016,15,04,2007,,*77
04/15/2007,00:00:04.162,$INZDA,000004.0016,15,04,2007,,*70
04/15/2007,00:00:05.162,$INZDA,000005.0016,15,04,2007,,*71

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:05.162	hh:mm:ss.sss
2	NMEA header	$INZDA	ASCII text
3	Time UTC	000005.0016	HHMMSS.ssss
4	Day	15	DD
5	Month	04	MM
6	Year	2007	YYYY
7	Local zone hours		HH
8	Local zone minutess		MM
9	Checksum	*71	ASCII text

Ashtech GPS

Ashtech Attitude

Attitude in NMEA format from the Ashtech ADU5 GPS receiver.
./ashtech_attiude
Ashtech-Attitude_20070415-000000.Raw
04/15/2007,00:00:03.490,$GPPAT,000003.00,5830.44196,N,17012.62728,W,00030.21,344.3730,000.25,-000.01,0.0015,0.0074,0*42
04/15/2007,00:00:04.490,$GPPAT,000004.00,5830.44527,N,17012.62914,W,00030.23,344.3537,000.20,-000.06,0.0015,0.0071,0*4A
04/15/2007,00:00:05.490,$GPPAT,000005.00,5830.44859,N,17012.63099,W,00030.23,344.3431,000.22,-000.07,0.0014,0.0077,0*41

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:05.490	hh:mm:ss.sss
3	NMEA header	$GPPAT	ASCII text
4	GPS time at position GMT	000005.00	hhmmss.ss
5	Latitude	5830.44859	ddmm.mmmmm
6	North (N) or South(S)	N	ASCII character
7	Longitude	17012.63099	dddmm.mmmmm
8	East (E) or West (W)	W	ASCII character
9	Altitude	00030.23	Meters
10	Heading	344.3431	Degrees
11	Pitch	000.22	Degrees
12	Roll	-000.07	degrees
13	Attitude phase measurement rms error, MRMS	0.0014	meters
14	Attitude baseline length rms error, BRMS	0.0077	meters

15	Attitude reset flag (0=good attitude, 1=rough estimate or bad attitude)	0	ASCII integer
16	Check sum	*41	ASCII text

Ashtech Global Positoning System Fix Data (GGA)

Position data in NMEA GGA format from the Ashtech ADU5 GPS receiver.
./ashtech_gga
Ashtech-GGA_20070415-000000.Raw
04/15/2007,00:00:02.333,$GPGGA,000002.00,5830.43864,N,17012.62542,W,1,13,0.7,20.74,M,9.47,M,,*73
04/15/2007,00:00:03.333,$GPGGA,000003.00,5830.44196,N,17012.62728,W,1,13,0.7,20.75,M,9.47,M,,*7E
04/15/2007,00:00:04.333,$GPGGA,000004.00,5830.44527,N,17012.62914,W,1,13,0.7,20.76,M,9.47,M,,*75

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:04.333	hh:mm:ss.sss
3	NMEA header	$GPGGA	ASCII text
4	GPS time at position GMT	000004.00	hhmmss.ss
5	Latitude	5830.44527	ddmm.mmmmm
6	North (N) or South(S)	N	ASCII character
7	Longitude	17012.62914	dddmm.mmmmm
8	East (E) or West (W)	W	ASCII character
9	GPS Quality: 1 = GPS 2=DGPS	1	ASCII integer
10	Number of GPS Satellites Used	13	ASCII integer
11	HDOP (horizontal dilution of precision)	0.7	
12	Antenna height	20.76	meters
13	M for Meters	M	ASCII character
14	Geoidal Height	9.47	meters
15	M for Meters	M	ASCII character
16	Differential reference station ID (no data in sample string)		

17	Checksum	*75	ASCCII text

Ashtech Geographic Position - Latitude/Longitude (GLL)

Position data in NMEA GLL format from the Ashtech ADU5 GPS receiver.
./ashtech_ggl
Ashtech-GLL_20070415-000000.Raw
04/15/2007,00:00:03.271,$GPGLL,5830.44196,N,17012.62728,W,000003.00,A,A*74
04/15/2007,00:00:04.255,$GPGLL,5830.44527,N,17012.62914,W,000004.00,A,A*7C
04/15/2007,00:00:05.255,$GPGLL,5830.44859,N,17012.63099,W,000005.00,A,A*74

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:05.255	hh:mm:ss.sss
3	NMEA header	$GPGLL	ASCI text
4	Latitude	5830.44859	ddmm.mmmmm
5	North or South	N	ASCII character
6	Longitude	17012.63099	dddmm.mmmmm
7	East or West	W	ASCII character
8	GMT of Position	000005.00	hhmmss.ss
9	Status of data (A=valid)	A	ASCII character
10	Mode Indicator (A=autonomous)	A	ASCII character
11	Checksum	*74	ASCII text

Ashtech Heading True (HDT)

Heading data in NMEA HDT format from the Ashtech ADU5 GPS receiver.
./ashtech_hdt
Ashtech-HDT_20070415-000000.Raw
04/15/2007,00:00:03.505,$GPHDT,344.373,T*31
04/15/2007,00:00:04.505,$GPHDT,344.354,T*34
04/15/2007,00:00:05.505,$GPHDT,344.343,T*32

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:05.505	hh:mm:ss.sss
3	NMEA header	$GPHDT	ASCII text
4	Heading	344.343	Degrees
5	True(T) or Magnetic(M)	T	ASCII character
6	Checksum	*32	ASCII text

PCode

PCode AFT

PCode Aft Global Positoning System Fix Data (GGA)

Position data in NMEA GGA format from the Trimble Centurion receiver located in the Computer lab.
./pcode_aft_gga
PCode-AFT-GGA_20070415-000000.Raw
04/15/2007,00:00:03.443,$GPGGA,000002.522,5830.4417,N,17012.6249,W,1,04,1.5,019.8,M,-008.9,M,,*51
04/15/2007,00:00:04.427,$GPGGA,000003.522,5830.4450,N,17012.6267,W,1,04,1.5,019.8,M,-008.9,M,,*5F
04/15/2007,00:00:05.427,$GPGGA,000004.522,5830.4483,N,17012.6286,W,1,04,1.5,019.8,M,-008.9,M,,*59

FIELD	DATA	Examples	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:05.427	hh:mm:ss.sss
3	NMEA header	$GPGGA	ASCII text
4	GPS time at position GMT	000004.522	hhmmss.ss
5	Latitude	5830.4483	ddmm.mmmm
6	North (N) or South(S)	N	ASCII character
7	Longitude	17012.6286	dddmm.mmmm
8	East (E) or West (W)	W	ASCII character
9	GPS Quality: 1 = GPS 2=DGPS	1	ASCII integer
10	Number of GPS Satellites Used	04	
11	HDOP (horizontal dilution of precision)	1.5	
12	Antenna height	019.8	meters

13	M for Meters	M	ASCII character
14	Geoidal Height	-008.9	meters
15	M for Meters	M	ASCII character
16	Differential reference station ID (no data in sample string)		
17	Checksum	*59	ASCII text

PCode Aft Geographic Position - Latitude/Longitude (GLL)

Position data in NMEA GLL format from the Trimble Centurion receiver located in the Computer lab.
./pcode_aft_gll
Pcode-AFT-GLL_20070415-000000.Raw
04/15/2007,00:00:03.474,$GPGLL,5830.4417,N,17012.6249,W,000002.522,A*25
04/15/2007,00:00:04.474,$GPGLL,5830.4450,N,17012.6267,W,000003.522,A*2
04/15/2007,00:00:05.490,$GPGLL,5830.4483,N,17012.6286,W,000004.522,A*2D

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:05.490	hh:mm:ss.sss
3	NMEA header	$GPGLL	ASCI text
4	Latitude	5830.4483	ddmm.mmmm
5	North or South	N	ASCII character
6	Longitude	17012.6286	dddmm.mmmm
7	East or West	W	ASCII character
8	GMT of Position	000004.522	hhmmss.sss
9	Status of data (A=valid)	A	ASCII character
10	Checksum	*2D	ASCVII text

PCode AFT Course over the GroundandGrond SPeed (VTG)

Course and speed over ground in NMEA VTG format from the Trimble Centurion receiver located in the Computer lab.
./pcode_aft_vtg
Pcode-AFT-VTG_20070415-000000.Raw

04/15/2007,00:00:04.537,$GPVTG,343.6,T,331.3,M,012.5,N,023.1,K*48
04/15/2007,00:00:05.537,$GPVTG,343.6,T,331.3,M,012.4,N,023.0,K*48

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:05.537	hh:mm:ss.sss
2	NMEA header	$GPVTG	ASCI text
3	Heading	343.6	Degrees
4	Degrees true (T)	T	ASCII character
5	Heading	331.3	Degrees
6	Degrees magnetic	M	ASCII character
7	Ship Speed	012.4	knots
8	N=Knots	N	ASCII character
9	Ship Speed	023.0	km/hr
10	K=KM per hour	K	ASCII character
11	Check sum	*48	ASCII text

PCode AFT Time and Day (ZDA)

Time and date data in the NMEA ZDA format. Data retrieved from the Trimble Centurion receiver located in the Computer lab.
./pcode_aft_zda
Pcode-AFT-ZDA_20070415-000000.Raw
04/15/2007,00:00:03.224,$GPZDA,000003.00,15,04,2007,00,00,*4C
04/15/2007,00:00:04.224,$GPZDA,000004.00,15,04,2007,00,00,*4B
04/15/2007,00:00:05.224,$GPZDA,000005.00,15,04,2007,00,00,*4A

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:05.537	hh:mm:ss.sss
2	NMEA header	$GPZDA	ASCII text
3	Time UTC	000005.00	hhmmss.sss
4	Day	15	DD
5	Month	04	MM
6	Year	2007	YYYY
7	Local zone hour	00	HH
8	Local zone minute	00	MM
9	Checksum	*4A	ASCII text

PCode Bridge

PCode Bridge Global Positoning System Fix Data (GGA)

Position data in NMEA GGA format from the Trimble GPS receiver located on the bridge.
./pcode_bridge_gga
PCode-Bridge-GGA_20070415-000000.Raw
04/15/2007,00:00:03.037,$GPGGA,000002.00,5830.469,N,17012.644,W,1,04,2.666,32.15,M,8.930,M,,*4D
04/15/2007,00:00:05.037,$GPGGA,000004.00,5830.476,N,17012.648,W,1,04,2.667,31.82,M,8.930,M,,*45
04/15/2007,00:00:07.052,$GPGGA,000006.00,5830.482,N,17012.651,W,1,04,2.668,31.55,M,8.930,M,,*41

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:07.052	hh:mm:ss.sss
3	NMEA header	$GPGGA	ASCII text
4	GPS time at position GMT	000006.00	hhmmss.ss
5	Latitude	5830.482	ddmm.mmm
6	North (N) or South(S)	N	ASCII character
7	Longitude	17012.651	dddmm.mmm
8	East (E) or West (W)	W	ASCII character
9	GPS Quality: 1 = GPS 2=DGPS	1	ASCII integer
10	Number of GPS Satellites Used	04	ASCII integer
11	HDOP (horizontal dilution of precision)	2.668	
12	Antenna height	31.55	meters
13	M for Meters	M	ASCII character
14	Geoidal Height	8.930	meters

15	M for Meters	M	ASCII character
16	Differential reference station ID (no data in sample string)		
17	Checksum	*41	ASCII text

PCode Bridge Geographic Position - Latitude/Longitude (GLL)

Position data in NMEA GLL format from the Trimble GPS receiver located on the bridge.
./pcode_bridge_gll
Pcode-Bridge-GLL_20070415-000000.Raw
04/15/2007,00:00:03.099,$GPGLL,5830.469,N,17012.644,W,000002.00,A*12
04/15/2007,00:00:05.099,$GPGLL,5830.476,N,17012.648,W,000004.00,A*16
04/15/2007,00:00:07.099,$GPGLL,5830.482,N,17012.651,W,000006.00,A*17

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:07.099	hh:mm:ss.sss
3	NMEA header	$GPGLL	ASCII text
4	Latitude	5830.482	ddmm.mmm
5	North or South	N	ASCII character
6	Longitude	17012.651	dddmm.mmm
7	East or West	W	ASCII character
8	GMT of Position	000006.00	hhmmss.ss
9	Status of data (A=valid)	A	ASCII character
10	Checksum	*17	ASCII text

PCode Bridge Course over the Ground and Grond Speed (VTG)

Course and speed over ground data in NMEA VTG format from the Trimble GPS receiver located on the bridge.
./pcode_bridge_vtg
Pcode-Bridge-VTG_20070415-000000.Raw
04/15/2007,00:00:03.162,$GPVTG,343.9,T,333.8,M,12.46,N,23.08,K*40
04/15/2007,00:00:05.162,$GPVTG,343.8,T,333.8,M,12.49,N,23.12,K*45
04/15/2007,00:00:07.146,$GPVTG,343.9,T,333.8,M,12.48,N,23.11,K*46

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:07.146	hh:mm:ss.sss
2	NMEA header	$GPVTG	ASCII text
3	Heading	343.9	Degrees
4	Degrees true (T)	T	ASCII character
5	Heading	333.8	Degrees
6	Degrees magnetic	M	ASCII character
7	Ship Speed	12.48	knots
8	N=Knots	N	ASCII character
9	Ship Speed	23.11	km/hr
10	K=KM per hour	K	ASCII character
11	Check sum	*46	ASCII text

Glonass

Glonass Global Positoning System Fix Data (GGA)

Position data in NMEA GGA format from the GLONASS GPS receiver.
./glonass_gga
Glonass-GGA_20070415-000000.Raw
04/15/2007,00:00:02.412,$GPGGA,000002.00,5830.472078,N,17012.636881,W,1,09,0.9,22.999,M,9.46,M,,*49
04/15/2007,00:00:03.396,$GPGGA,000003.00,5830.475412,N,17012.638716,W,1,09,0.9,23.000,M,9.46,M,,*40
04/15/2007,00:00:04.412,$GPGGA,000004.00,5830.478732,N,17012.640527,W,1,09,0.9,22.932,M,9.46,M,,*4D

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:04.412	hh:mm:ss.sss
3	NMEA header	$GPGGA	ASCII text
4	GPS time at position GMT	000004.00	hhmmss.ss
5	Latitude	5830.478732	ddmm.mmmmmm
6	North (N) or South(S)	N	ASCII character
7	Longitude	17012.640527	dddmm.mmmmmm
8	East (E) or West (W)	W	ASCII character
9	GPS Quality: 1 = GPS 2=DGPS	1	ASCII integer
10	Number of GPS Satellites Used	09	ASCII integer
11	HDOP (horizontal dilution of precision)	0.9	
12	Antenna height	22.932	meters
13	M for Meters	M	ASCII character
14	Geoidal Height	9.46	meters

15	M for Meters	M	ASCII character
16	Differential reference station ID (no data in sample string)		
17	Checksum	*4D	ASCII text

Glassnos Geographic Position - Latitude/Longitude (GLL)

Position data in NMEA GLL format from the GLONASS GPS receiver.
./glassnos_gll
Glonass-GLL_20070415-000000.Raw
04/15/2007,00:00:03.240,$GPGLL,5830.475412,N,17012.638716,W,000003.00,A*12
04/15/2007,00:00:04.255,$GPGLL,5830.478732,N,17012.640527,W,000004.00,A*16
04/15/2007,00:00:05.255,$GPGLL,5830.482216,N,17012.642424,W,000005.00,A*11

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:05.255	hh:mm:ss.sss
3	NMEA header	$GPGLL	ASCII text
4	Latitude	5830.482216	ddmm.mmmmmm
5	North or South	N	ASCII character
6	Longitude	17012.642424	dddmm.mmmmmm
7	East or West	W	ASCII character
8	GMT of Position	000005.00	hhmmss.ss
9	Status of data (A=valid)	A	ASCII character
10	Checksum	*74	ASCII text

Gyro

Gyro Heading

Sperry MK27 Gyro

Heading data in NMEA HDT format from the Sperry MK27 gyrocompass.
./gyro_mk27
Gyro-MK27_20080314-000000.Raw
03/14/2008,00:00:01.467,$HEHDT,53.94,T*24
03/14/2008,00:00:01.577,$HEHDT,53.94,T*24
03/14/2008,00:00:01.671,$HEHDT,53.94,T*24

FIELD	DATA	Example	UNITS
1	SCS logged Date	03/14/2008	mm/dd/year
2	SCS logged Time GMT	00:00:01.467	hh:mm:ss.sss
3	NMEA header	$HEHDT	ASCII text
4	Heading	53.94	degrees
5	True (T) or Magnetic (M)	T	ASCII character
6	Check sum	*24	ASCII text

Sperry MK39 Gyro

Heading data in NMEA HDT format from the Sperry MK39 gyrocompass.
./gyro_mk39
Gyro-MK39_20080314-000000.Raw
03/14/2008,00:00:01.327,$INHDT,53.70,T*24
03/14/2008,00:00:01.436,$INHDT,53.70,T*24
03/14/2008,00:00:01.530,$INHDT,53.70,T*24

FIELD	DATA	Example	UNITS
1	SCS logged Date	03/14/2008	mm/dd/year
2	SCS logged Time GMT	00:00:01.327	hh:mm:ss.sss
3	NMEA header	$HEHDT	ASCII text
4	Heading	53.70	degrees
5	True (T) or Magnetic (M)	T	ASCII character
6	Check sum	*24	ASCII text

Waypoints

IBS Waypoints

Waypoints from the Healy's Integrated Bridge System (IBS).
./ibs_waypoints
IBS-WayPoints_20070415-000000.Raw
04/15/2007,00:00:03.193,$NVWPL,6152.68,N,17402.58,W,62*51
04/15/2007,00:00:04.193,$NVWPL,6156.58,N,17422.68,W,63*56
04/15/2007,00:00:05.193,$NVWPL,6202.16,N,17439.96,W,64*52

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:05.193	hh:mm:ss.sss
3	NMEA header	$NVWPL	ASCII text
4	Latitude	6202.16	ddmm.mm
5	North or South	N	ASCII character
6	Longitude	17439.96	dddmm.mm
7	East or West	W	ASCII character
8	Waypoint number	64	ASCII integer
9	Checksum	*52	ASCII text

Speed Log

Sperry Speed Log

Ground/water speed data from the Sperry Speed Log.
./sperry_speedlog
Sperry-Speedlog_20070415-000000.Raw
04/15/2007,00:00:02.755,$VDVBW,12.32,0.85,A,12.43,0.66,A*5A
04/15/2007,00:00:03.271,$VDVBW,12.33,0.80,A,12.44,0.66,A*59
04/15/2007,00:00:03.771,$VDVBW,12.34,0.78,A,12.45,0.68,A*56

FIELD	DATA	Example	UNITS
1	SCS logged Date	04/15/2007	mm/dd/year
2	SCS logged Time GMT	00:00:03.771	hh:mm:ss.sss
2	NMEA header	$VDVBW	ASCII text
3	Fore-aft Water Speed - = astern	12.34	knots
4	Port-Stbd Water Speed - = port	0.78	knots
5	A= Data Valid V=Invalid	A	ASCII character
6	Fore-aft Bottom Speed - = astern	12.45	knots
7	Port-Stbd Bottom Speed - = port	0.68	knots
8	A= Data Valid V=Invalid	A	ASCII character
9	Checksum	*56	ASCII text

Sound Velocimeter

SV2000

Sound Velocity data from the SV2000 sound velocimeter.
./sv2000
Sound-Velocimeter_20080314-000000.Raw
03/14/2008,00:00:24.999, 1470.87
03/14/2008,00:00:55.030, 1470.87
03/14/2008,00:01:25.045, 1470.87

FIELD	DATA	Example	UNITS
1	SCS logged Date	03/14/2008	mm/dd/year
2	SCS logged Time GMT	00:00:24.999	hh:mm:ss.sss
3	Speed of Sound	1470.87	Meters/sceond

./Raw

The following sections are in the Raw data directory.

75 KHz ADCP data

./adcp75
The shipboard ADCP system measures currents in the depth range from about 30 to 300 m -- in good weather. In bad weather or in ice, the range is less, and sometimes no valid measurements are made. ADCP data collection occurs on the Healy for the benefit of the scientists on individual cruises and for the long-term goal of building a climatology of current structure in the Ocean.
The ADCP 75 data set collected during this cruise are placed in the directory ./Raw/adcp75. The files are named by the cruise, HLY0902, a three place number of the sequence in the files, then an extra "_000000", and then an extent for the kind of data in the file. An example of the files for one set is:

FILE NAME	FILE EXTENSION	DEFINITION
HLY0901022_000000		Raw Binary ADCP Data
HLY0901022_000000	*.ENS*	Binary Adcp Data
HLY0901022_000000	*.ENX*	Binary Ensemble Data
HLY0901022_000000	*.STA*	short term average
HLY091022_000000	*.LTA*	long term average
HLY0901022_000000	*.N1R*	Raw NMEA ASCII
HLY0901022_000000	*.N2R*	Raw NMEA ASCII
HLY0901022_000000	*.NMS*	Averaged Nav Data
...		
HLY0901_0000??	.INI	Initialization File

150 Khz ADCP data

./adcp150

The shipboard ADCP system measures currents in the depth range from about 30 to 300 m -- in good weather. In bad weather or in ice, the range is less, and sometimes no valid measurements are made. ADCP data collection occurs on the Healy for the benefit of the scientists on individual cruises and for the long-term goal of building a climatology of current structure in the Ocean.

The ADCP150 data set collected during this cruise are placed in the directory ./Raw/adcp150. The files are named by the cruise, HLY0902, a three place number of the sequence in the files, then an extra "_000000", and then an extent for the kind of data in the file. An example of the files for one set is:

FILE NAME	FILE EXTENSION	DEFINITION
HLY0901022_000000		Raw Binary ADCP Data
HLY0901022_000000	*.ENS*	Binary Adcp Data
HLY0901022_000000	*.ENX*	Binary Ensemble Data
HLY0901022_000000	*.STA*	short term average
HLY0901022_000000	*.LTA*	long term average
HLY0901022_000000	*.N1R*	Raw NMEA ASCII
HLY0901022_000000	*.N2R*	Raw NMEA ASCII
HLY0901022_000000	*.NMS*	Averaged Nav Data
...		
HLY0901_0000??	.INI	Initialization File

KNUDSEN 320B/R

The Knudsen 320B/R depth sounder can record depth in both 3.5 and 12 kHz mode. The Healy records the 3 - 6kHz data (Sub Bottom Profile) underway. This data is saved in all of the formats that the Knudsen can record data in. These files are in both ASCII and BINARY format (see the table below). This data is also saved as depth in SCS_Data/Knudsen.

./knudsenraw

FILENAME	FORMAT	DEFINITION
2007_102_0005_004.keb	Binary	Knudsen Playback File
2007_102_0005_008.kea	Ascii	Log of depth, settings and environmental data
2007_102_0005_HF_001.sgy	Binary	SEG-Y extended Seismic format

Seabeam

The raw Seabeam 2112 files are in this directory. The naming convention uses the year, month, Julian day, and the start hour and minute in it. For year 2007 on day 110 starting at 11:12 the name would be sb20071101112.mb41. mb41 is the MB-System multibeam format number for the Seabeam 2112. These files can best be accessed and used by using the MB-System software.
./Seabeam
sb20071091600.mb41

CTD

Data for the each CTD cast are contained here. These files are in SeaBird software's format. Each cast is in a separately numbered subdirectory. The Names of the files vary by cruise but file extent examples below will be consistent.
./ctd

FILENAME	FORMAT	DEFINITION
021.BL	ASCII	Bottle firing information
021.CON	ASCII	The configuration file for the cast
021.HDR	ASCII	Header information for the cast
021.btl	ASCII	Averaged Bottle firing information
021.cnv	ASCII	The data
021.dat	Binary	The data
021.jpg	Binary	Plotted JPEG image of the cast
021.ros	ASCII	Data from when bottles fire
021avg.cnv	ASCII	Meaned 1 meter down cast of the data

TSG Autosal comparison

./ctd/TSG DATA
This contains the AUTOSAL Salinometer TSG comparison data. There are two files in this directory. A pdf which contains the scanned log sheets of when the samples were taken. And a text file of the AUTOSAL measured values.

Environmental_sensors

This directory contains the log files for the temperature probes recording the cold room and freezer tempeatures. The files are all in ASCII. A list of the current files is below. These can be plotted with any simple plotting program or Spread sheet program. There is a header that tells what the columns are.

Biochem_RH.txt
Biochem_Temp.txt
CC1_temp.txt
CC2_temp.txt
Port_Temp.txt
Previous Data
StbdReefer_temp.txt

Expendable Bathythermograph (XBT)

The file names use the sequence number of the XBT or Expendable Sound Velocimeter (XSV) in the series used for the cruise.

FILENAME	EXTENSION	DEFINITION	PROGRAM REQUIRED to read the file
drop001	asc	ASCII with detailed header	Any text/spreadsheet
drop001	csv	ASCII coma seperated	Any text/spreadsheet
drop001	jjv	parameter file?	Any text reader
drop001	nc	NETCDF Data Format	A NETCDF reader
drop001	xbt	ASCII Header file	Any text/spreadsheet

LDS_Data

The Lamont Data Logging System (LDS) outputs it's file to LDS_Data. Below are directories in which data is written to.

Navigation

Navigation data are logged in the format they come from the device with a data source stamp and a time stamp added to them in several directories in LDS_Data. These data strings are in NMEA (National Marine Electronics Association) format. You will need a copy of NMEA 183, Standard for Interfacing Marine Electronics Devices, Version 2.3, March 1, 1998, to help you understand the data formats used. These data are also in the SCS_Data directories that are described above in formats that are explained. The web-site http:/www.gpsinformation.org/dale/nmea.htm might help you understand these formats. Example files will be shown below but no formats will be given.

ADU5 (Ashtech GPS)

Data from the Ashtech GPS is written here as it is from the GPS receiver.
./adu5
HLY0801-adu5.y2008d082

```
adu5   2008:082:00:00:00.1772  $GPGLL,6222.52645,N,16922.29346,W,000000.00,A,A*7B
adu5   2008:082:00:00:00.2942  $GPGGA,000000.00,6222.52645,N,16922.29346,W,1,11,0.8,18.49,M,7.53,M,,*73
adu5   2008:082:00:00:00.3542  $GPVTG,165.20,T,154.20,M,002.86,N,005.29,K,A*23
adu5   2008:082:00:00:00.4152  $GPPAT,000000.00,6222.52645,N,16922.29346,W,00026.02,150.5834,000.30,001.12,0.0015,0.0093,0*62
adu5   2008:082:00:00:00.4241  $GPHDT,150.583,T*3F
adu5   2008:082:00:00:01.1731  $GPGLL,6222.52568,N,16922.29301,W,000001.00,A,A*75
adu5   2008:082:00:00:01.2901  $GPGGA,000001.00,6222.52568,N,16922.29301,W,1,11,0.8,18.50,M,7.53,M,,*75
adu5   2008:082:00:00:01.2920  $GPVTG,164.37,T,153.37,M,002.96,N,005.47,K,A*2C
adu5   2008:082:00:00:01.4110  $GPPAT,000001.00,6222.52568,N,16922.29301,W,00026.03,150.7601,000.28,001.23,0.0017,0.0118,0*6C
adu5   2008:082:00:00:01.4200  $GPHDT,150.760,T*30
```

Trimble AGGPS

Navigation data from the AGGPS receiver is written here as it is from the GPS receiver.

./aggps

HLY0801-aggps.y2008d082

```
aggps  2008:082:00:00:00.2252  $GPGGA,000000.00,6222.525857,N,16922.290938,W,2,07,1.2,21.02,M,8.08,M,5.0,0297*54
aggps  2008:082:00:00:00.2832  $GPGLL,6222.525857,N,16922.290938,W,000000.00,A,D*75
aggps  2008:082:00:00:00.3412  $GPVTG,165.5,T,,,002.89,N,005.35,K,D*42
aggps  2008:082:00:00:00.3992  $GPGSV,2,1,07,31,23,093,44,32,25,079,45,23,22,190,46,20,66,229,50*78
aggps  2008:082:00:00:00.4572  $GPGSV,2,2,07,11,51,173,50,14,20,043,42,17,41,279,50,,,,*46
aggps  2008:082:00:00:00.5172  $GPGSA,A,3,31,32,23,20,11,14,17,,,,,,2.6,1.2,2.3*37
aggps  2008:082:00:00:00.5752  $GPZDA,000000.10,22,03,2008,00,00*6E
aggps  2008:082:00:00:00.6332  $GPRMC,000000,A,6222.525857,N,16922.290938,W,002.89,165.5,220308,13.9,E,D*03
aggps  2008:082:00:00:00.6631  $GPGST,000000.00,0.4,1.1,0.9,52.2,1.0,1.0,2.7*6A
aggps  2008:082:00:00:01.2320  $GPGGA,000001.00,6222.525073,N,16922.290454,W,2,07,1.2,20.94,M,8.08,M,3.6,0297*52
aggps  2008:082:00:00:01.2902  $GPGLL,6222.525073,N,16922.290454,W,000001.00,A,D*7D
```

POSMV Attitude

The Attitude data from the POSMV is written here.
./posatt
HLY0801-posatt.y2008d082
posatt 2008:082:00:00:00.0082 :06000C -0004F 0105 0013
posatt 2008:082:00:00:00.1082 :010007 -0003F 0105 0013
posatt 2008:082:00:00:00.2082 :0A0007 -0003F 0105 0013
posatt 2008:082:00:00:00.3082 :01000C -0004F 0105 0013
posatt 2008:082:00:00:00.4082 :09011E -0003F 0105 0013
posatt 2008:082:00:00:00.5081 :0A000C -0003F 0105 0013
posatt 2008:082:00:00:00.6081 :04011E -0003F 0105 0013

POSMV GPS

The data from the POSMV GPS is written here.
./posnav
HLY0801-posnav.y2008d082

```
posnav  2008:082:00:00:00.0502  $INZDA,000000.0043,22,03,2008,,*78
posnav  2008:082:00:00:00.1922  $PASHR,000000.069,150.36,T,1.05,0.13,-0.03,0.019,0.019,0.011,2,1*35
posnav  2008:082:00:00:00.1923  $PRDID,0.13,1.05,150.36*7E
posnav  2008:082:00:00:00.2502  $INGST,000000.069,,0.7,0.5,18.0,0.7,0.5,1.1*6F
posnav  2008:082:00:00:00.3112  $INGGA,000000.069,6222.50218,N,16922.26144,W,2,09,0.9,-2.73,M,,,4,0297*23
posnav  2008:082:00:00:00.3642  $INHDT,150.4,T*25
posnav  2008:082:00:00:00.3643  $INVTG,169.7,T,,M,3.0,N,5.5,K*7A
posnav  2008:082:00:00:01.0501  $INZDA,000001.0043,22,03,2008,,*79
posnav  2008:082:00:00:01.1920  $PASHR,000001.069,150.53,T,1.04,0.13,-0.03,0.019,0.019,0.011,2,1*36
```

POSMV Navigation for the SeaBeam

The SeaBeam only needs specific navigation data. So, the POSMV data is reformatted SeaBeam and sent to the SeaBeam for use by it.

./posreform2sb

HLY0801-posreform2sb.y2008d082

posreform2sb 2008:082:00:00:00.366 $NVVBW,3.0,0.1,A,3.0,0.1,A*5B
posreform2sb 2008:082:00:00:00.366 $NVHDT,150.36,T*0B
posreform2sb 2008:082:00:00:00.366 $NVGLL,6222.5022,N,16922.2614,W,000000.07,A*10
posreform2sb 2008:082:00:00:01.366 $NVVBW,3.1,0.1,A,3.1,0.1,A*5B
posreform2sb 2008:082:00:00:01.366 $NVHDT,150.53,T*08
posreform2sb 2008:082:00:00:01.366 $NVGLL,6222.5014,N,16922.2611,W,000001.07,A*11
posreform2sb 2008:082:00:00:02.368 $NVVBW,3.2,0.1,A,3.2,0.1,A*5B

Automatic Identification System (AIS) messages

Automatic Identification System (AIS) messages as encapsulated VDM sentences. The bit-by-bit descriptions of the contents of these messages are documented in tables contained in the ITU-R M.1371 international standard for AIS.

./ais

HLY0805-ais.y2008d247

```
ais  2008:247:23:58:55.5902   !AIVDM,1,1,,B,34eQ;R3Oi3Dk3Q0dpKVSoC3d00u0,0*40
ais  2008:247:23:59:02.0952   !AIVDM,1,1,,B,34eQ;R3Oi6Dk3jPdpKS3k3400000,0*19
ais  2008:247:23:59:02.6691   !AIVDM,1,1,,B,34Qle<001=Dd4WndsdttQ:040000,0*7B
ais  2008:247:23:59:08.3642   !AIVDM,1,1,,B,14eQ;R3019Dk454dpKPCf34<00Sa,0*4F
ais  2008:247:23:59:09.4160   !AIVDM,1,1,,B,34Qle<0Oi=Dd4JndseELPb2@00uA,0*52
```

SeaBeam Data

SeaBeam Center Beam Data

The data from the SeaBeam's center beam is stripped out of the data file and used for displays around the ship. This data is also available as described above.

./sbctr

HLY0801-sbctr.y2008d082

```
sbctr   2008:082:00:00:03.8623  $SBCTR,2008,3,22,00:00:01.222,62.375023,-169.371017,33.82,43*00
sbctr   2008:082:00:00:05.3697  $SBCTR,2008,3,22,00:00:02.742,62.375000,-169.371010,33.92,51*00
sbctr   2008:082:00:00:07.7156  $SBCTR,2008,3,22,00:00:04.252,62.374975,-169.371002,36.19,40*00
sbctr   2008:082:00:00:08.1426  $SBCTR,2008,3,22,00:00:05.762,62.374957,-169.370990,33.32,40*00
sbctr   2008:082:00:00:09.8221  $SBCTR,2008,3,22,00:00:07.272,62.374932,-169.370985,31.89,46*00
sbctr   2008:082:00:00:11.6578  $SBCTR,2008,3,22,00:00:08.992,62.374903,-169.370970,32.48,42*00
sbctr   2008:082:00:00:13.5820  $SBCTR,2008,3,22,00:00:10.502,62.374870,-169.370955,34.15,48*00
sbctr   2008:082:00:00:16.1493  $SBCTR,2008,3,22,00:00:13.522,62.374817,-169.370927,34.30,45*00
sbctr   2008:082:00:00:17.6985  $SBCTR,2008,3,22,00:00:15.032,62.374790,-169.370912,33.82,43*00
sbctr   2008:082:00:00:19.5798  $SBCTR,2008,3,22,00:00:16.552,62.374760,-169.370890,33.47,55*00
```

Speed of Sound in the Surface Water for SeaBeam

The SeaBeam needs the Speed of Sound at the surface. This is calculated from the Sea Chest intake water temperature and the TSG Salinity. The water temperature and Salinity are also in this file.

./sbsv

HLY0801-sbsv.y2008d082

```
sbsv   2008:082:00:00:00.4142  1439.5, -1.72, 0033.7,0
sbsv   2008:082:00:00:02.4138  1439.5, -1.72, 0033.7,0
sbsv   2008:082:00:00:04.4146  1439.5, -1.72, 0033.7,0
sbsv   2008:082:00:00:06.4222  1439.5, -1.73, 0033.7,0
sbsv   2008:082:00:00:08.3860  1439.5, -1.73, 0033.7,0
sbsv   2008:082:00:00:10.4126  1439.5, -1.73, 0033.7,0
sbsv   2008:082:00:00:12.4142  1439.5, -1.73, 0033.7,0
sbsv   2008:082:00:00:14.4140  1439.5, -1.73, 0033.7,0
sbsv   2008:082:00:00:16.3947  1439.5, -1.73, 0033.7,0
sbsv   2008:082:00:00:18.3864  1439.5, -1.73, 0033.7,0
```

Raw SeaBeam Files

The Raw SeaBeam data files are here. These are in the SeaBeam 2112 format. To use these files you will need a tool such as the MB-System Software package that can be found at LDEO. The files are named using the year, day in the year and time. Each of these files also has a file that uses the same name with .inf attached to the end. This is an information file that has a summary of the data in the seabeam file.

./seabeam

sb20080812300.mb41
sb20080820000.mb41
sb20080820100.mb41
sb20080820200.mb41
sb20080820300.mb41
sb20080820400.mb41
sb20080820500.mb41
sb20080820600.mb41
sb20080820700.mb41
sb20080820800.mb41
sb20080820900.mb41

Gyroscope data

There are 2 Sperry Gyroscopes running the MK27 and the MK30 on the ship. These contain heading of the ship.

MK27 Sperry Gyroscope

./mk27
0801-mk27.y2008d082

```
mk27    2008:082:00:00:0.0556   $HEHDT,150.94,T*16
mk27    2008:082:00:00:0.1452   $HEHDT,150.95,T*17
mk27    2008:082:00:00:0.1876   $HEROT,7.07,A*1B
mk27    2008:082:00:00:0.3013   $HEXDR,A,150.95,D,HDG,A,-0.97,D,ROLL,A,-0.24,D,PITCH*48
mk27    2008:082:00:00:0.3432   $HEHDT,150.97,T*15
mk27    2008:082:00:00:0.3855   $HEHDT,150.98,T*1A
mk27    2008:082:00:00:0.4516   $HEHDT,151.00,T*1A
mk27    2008:082:00:00:0.5452   $HEHDT,151.02,T*18
mk27    2008:082:00:00:0.6495   $HEHDT,151.03,T*19
mk27    2008:082:00:00:0.6936   $HEROT,8.06,A*15
mk27    2008:082:00:00:0.7453   $HEHDT,151.05,T*1F
```

MK39 Sperry Gyroscope

./mk39

HLY0801-mk39.y2008d082

```
mk30    2008:082:00:00:00.0159  $INHDT,150.68,T*1F
mk30    2008:082:00:00:00.0666  $INROT,9,A*36
mk30    2008:082:00:00:00.1142  $INHDT,150.69,T*1E
mk30    2008:082:00:00:00.1602  $INROT,9,A*36
mk30    2008:082:00:00:00.2205  $INHDT,150.71,T*17
mk30    2008:082:00:00:00.2646  $INROT,9,A*36
mk30    2008:082:00:00:00.3142  $INHDT,150.72,T*14
mk30    2008:082:00:00:00.3623  $INROT,10,A*0E
mk30    2008:082:00:00:00.4186  $INHDT,150.74,T*12
mk30    2008:082:00:00:00.4633  $INROT,10,A*0E
mk30    2008:082:00:00:00.5142  $INHDT,150.76,T*10
mk30    2008:082:00:00:00.5725  $INROT,10,A*0E
mk30    2008:082:00:00:00.6166  $INHDT,150.77,T*11
```

All SIO TSG and MET Data

All of the data from the SIO TSG and Meteorological Sensors are sent in one serial line. All of these data have different NMEA strings and formats. This is a single file for all these data. This data is also in the SCS data sections above in the Meteorological section. The format for this file can be seen here.

./tsg_met
HLY0801-tsg_met.y2008d082

```
tsg_met 2008:082:00:00:00.3272  $PSSRA,501.80,4.190,349.54,0.257,261.02,1.951,261.51,1.922*4E
tsg_met 2008:082:00:00:00.3275  $PSSPA,1665.98,1.006*43
tsg_met 2008:082:00:00:00.3542  $PSMEA,-11.56,87.90,1022.45,0.03*51
tsg_met 2008:082:00:00:00.3543  $PSWDA,240.50,11.88,243.30,11.08*5C
tsg_met 2008:082:00:00:00.3872  $PSWDB,234.33,10.31,233.57,11.74*57
tsg_met 2008:082:00:00:00.4142  $PSSTA,-1.721,2708.200*52
tsg_met 2008:082:00:00:00.4143  $PSTSA,-1.274,27.0231,33.728,1441.48*5C
tsg_met 2008:082:00:00:00.4432  $PSTSB,,,,*46
tsg_met 2008:082:00:00:00.4432  $PSOXA,7.350,2.768,-1.274,-1.274*5F
tsg_met 2008:082:00:00:00.4433  $PSOXB,,,,*56
tsg_met 2008:082:00:00:00.4732  $PSFLA,0.300,0.030,0.000,0.013*4A
tsg_met 2008:082:00:00:00.5012  $PSFLB,1.150,0.115,0.430,0.043*4B
tsg_met 2008:082:00:00:00.5013  $PSNTA,0.000,0.000*58
tsg_met 2008:082:00:00:00.5311  $PSFMA,3.04,46.000*4C
tsg_met 2008:082:00:00:00.5313  $PSFMB,3.30,17.000*4C
tsg_met 2008:082:00:00:00.5371  $GPZDA,000000.00,22,03,2008,00,00*6F
```

Gravity

Two Gravimeters are being recorded from the IC no-Gyro room.

BGM221

./bgm221
HLY0801-bgm221.y2008d082
bgm221 2008:082:00:00:00.5731 04:025278 00
bgm221 2008:082:00:00:01.5661 04:025279 00
bgm221 2008:082:00:00:02.5661 04:025279 00

FIELD	DATA	Example	UNITS
1	Data Stream Name	bgm221	ASCII text
2	LDS logged Time GMT	2008:082:00:00:00.5731	yyyy:jjj:hh:mm:ss.sss
3	measurement period in quarters of a second	04	quarters of a second
4	"counts" proportional to observed gravity	025278	counts
5	status flags	00	0 = OK

BGM222

./bgm222

HLY0801-bgm222.y2008d082

bgm222 2008:082:00:00:00.4962 04:025332 00
bgm222 2008:082:00:00:01.5071 04:025333 00
bgm222 2008:082:00:00:02.4960 04:025332 00

FIELD	DATA	Example	UNITS
1	Data Stream Name	bgm222	ASCII text
2	LDS logged Time GMT	2008:082:00:00:00.4962	yyyy:jjj:hh:mm:ss.sss
3	measurement period in quarters of a second	04	quarters of a second
4	"counts" proportional to observed gravity	025332	counts
5	status flags	00	0 = OK

Events in Running LDS

The files here are logs of LDS start and stops of different data loggers.
./events
Some examples files here are:
HLY0801-ev-adcp_nav.y2008d073
HLY0801-ev-adcp_nav.y2008d081
HLY0801-ev-adcp_rph.y2008d073
HLY0801-ev-adcp_rph.y2008d081
HLY0801-ev-adu5.y2008d073
HLY0801-ev-aggps.y2008d073
HLY0801-ev-bgm221.y2008d073
HLY0801-ev-bgm222.y2008d073
The file HLY0801-ev-posreform2sb.y2008d073 contains:
posreform2sb 2008:073:20:22:50.0857 LOGGER_STARTUP N/A starting up...
posreform2sb 2008:073:20:22:50.0857 OTHER N/A succeeded in locking in memory

Web camera Images

Web camera image files are created every 5 minutes and saved in a seperate directory for each day.
The images from the web camera in Aloft Con are stored in:
./AloftConnCam
An example of the files from day 31 in 2009 is:
2009031
2009-031-000000.jpg
2009-031-000500.jpg
2009-031-001000.jpg
2009-031-001500.jpg
2009-031-002000.jpg
2009-031-002500.jpg
The images from the web camera in Aft Con are stored in **./FantailCam** in the same style as the AloftConn images are.

Bridge IBS Navigation System Way Points

The ship's IBS Navigation System Way Points are written into files for each day. This is continuously updated. These way points are used to generate the way points shown in Mapserver.

HLY0901-ibs_waypoints.y2009d068
HLY0901-ibs_waypoints.y2009d069
HLY0901-ibs_waypoints.y2009d070
HLY0901-ibs_waypoints.y2009d071

Winches

Aft Winch

Data from the Aft A Frame winches data output. This is from all of the winches that use the aft A-frame.
./winch_aft
HLY0901-winch_aft.y2009d075
winch_aft 2009:075:00:00:00.1068 01, 40, , 6, , 0.0, ,0000
winch_aft 2009:075:00:00:00.3548 01, 40, , 6, , 0.0, ,0000
winch_aft 2009:075:00:00:00.5978 01, 40, , 6, , 0.0, ,0000

FIELD	DATA	Example	UNITS
1	Data Stream Name	winch_aft	mm/dd/year
2	LDS logged Time GMT	2009:075:00:00:00.1068	yyyy:jjj:hh:mm:ss.sss
3	Winch number	01	ASCII text
4	Wire tension	40	Pounds
5			
6	Wire out	6	Meters
7			
8	Wire speed	0.0	Meters/minute

9			
10		0000	

Starboard Winch

Data from the Staboard A Frame winches data output. This is from all of the winches that use the Starboard A-frame.
./winch_stbd
HLY0901-winch_stbd.y2009d075
winch_stbd 2009:075:00:00:00.1328 02, -65, , -3, , 0.0, ,0000
winch_stbd 2009:075:00:00:00.3788 02, -63, , -3, , 0.0, ,0000
winch_stbd 2009:075:00:00:00.6247 02, -65, , -3, , 0.0, ,0000

FIELD	DATA	Example	UNITS
1	Data Stream Name	winch_stbd	mm/dd/year
2	LDS logged Time GMT	2009:075:00:00:00.1328	yyyy:jjj:hh:mm:ss.sss
3	Winch number	02	ASCII text
4	Wire tension	-65	Pounds
5			
6	Wire out	-3	Meters
7			
8	Wire speed	0.0	Meters/minute
9			
10		0000	

Underway Sensorsand Calculations

Sensors and Calculations

HLY0902 - Shipboard Sensors

Sensor	Description	Serial #	Last Calibration Date	Status

Sensor	Description	Serial #	Last Calibration Date	Status
Meteorology & Radiometers				
Port Yard Arm Anemometer	RM Young 09101	L001	12/01/08	Collected
Stbd Yard Arm Anemometer	RM Young 09101	L003	03/07/07	Collected
Barometer	RM Young 612011	BP01643	02/22/08	Collected
Air Temp/Rel. Hum.	RM Young 41382V	13352	02/22/08	Collected
Helo shack PAR	BSI QSR-2200	20270	01/09/07	Collected
Shortwave Radiation	Eppley labs - PSP	35032F3	11/11/08	Collected
Longwave Radiation	Eppley labs - PIR	34955F3	11/13/08	Collected
Helo shack MET3A Barometer, Relative Humidity, Temperature	Paroscientific MET3A	101757	06/27/07	Collected
HCO Precipitation	RM Young 50202	1567	1/19/09	Collected
Jack Staff Temperature	41342LC	15166	12/17/08	Collected
Jack Staff Ultrasonic Anemometer	RM Young 85004	00894	09/20/07	Collected
Yard Arm Stbd Ultrasonic Anemometer	RM Young 85004	00704	09/20/07	Collected
Helo shack Ultrasonic Anemometer	RM Young 85004	00703	09/20/07	Collected
Underway Ocean				
TSG	SeaBird SBE45	0215	01/09/09	Collected to 04/12/9
TSG	SeaBird SBE45	0228	01/09/09	Collected starting 04/12/09
Remote Sea Temp	SeaBird SBE3S	4063	12/13/08	Collected
Fluorometer	Seapoint SCF	SCF2957	12/15/07	Collected
Oxygen Sensor	SeaBird SBE-43	1333	01/20/09	Collected
Wet lab Flowmeter	Flocat C-ES45-B003	09061005	01/07/08	Collected
Wet lab Pressure	Hiller1	001P	12/15/07	Collected

Sensor	Description	Serial #	Last Calibration Date	Status
Bow Flowmeter	Signet P51530-PO	60012089621	01/07/08	NOT Collected
Ultraviolet Spectrophotometer	Satlantic MBARI-ISUS V3	0141	01/15/09	Collected
Sonars				
Knudsen- subbottom	320 B/R	K2K-00-0013	N/A	Collected
ADCP 150 kHz	RDI Broad Band (BB150)	80	N/A	Collected
ADCP 75 kHz	RDI Ocean Surveyor	172	N/A	Collected
Multibeam	Seabeam 2112	?	N/A	Collected
Speed log	Sperry SRD500	?	N/A	Collected
Navigation				
P-Code GPS (aft)	Trimble Centurion	0220035469	N/A	Collected
Attitude GPS	Ashtech ADU5	AD520033513	N/A	Collected
DGPS	Trimble AGGPS- AG132	0224016199	N/A	Collected
POSMV	Model- MV V4	2306	N/A	Collected
P-Code GPS (fwd)	Rockwell Collins	?	N/A	Collected
Glonass GPS	?	?	N/A	Collected
GYRO 1	Sperry MK39 Mod 3A PN 03956-1982416-2	340	?	Collected
GYRO 2	Sperry MK27A 4800880-1	025	N/A	Collected

HLY0902 - CTD Sensors

Sensor	Comments	Serial #	Last service/ Calibration Date	Status
CTD sensor	SBE 911plus	639	01/14/09	
Pressure Sensor #1	Digiquartz with TC	83012	01/14/09	Collected
Temperature #1	SBE3- Primary	2841	12/18/08	Collected
Temperature #2	SBE3- Secondary	2824	12/18/08	Collected
Conductivity #1	SBE4C- Primary	2575	01/08/09	Collected
Conductivity #2	SBE4C- Secondary	2619	12/18/08	Collected
Pump	SBE5 Primary	3115	01/08	NA
Pump	SBE5 Secondary	3112	01/08	NA
Deck Unit	SBE 11-Plus V2	0417	12/07	NA
Altimeter	PSA916	843	01/08	Collected
Oxygen	SBE43	458	12/17/08	Collected
Fluorometer	Chelsea-Aquatrack3	088234	03/06/07	Collected
Transmisometer	Wetlabs	CST-390DR	02/27/07	Collected
PAR	Bioshperical QSP2300	70115	12/01/08	Collected
Carousel	SBE32- 12 place	347	01/08	NA

Software Versions of some Recording programs

System	Program	Version number
CTD	Seabird SeaSave	7.18c
XBT	Turo XBT software	3.03.01
XBT	Sippican (Old system)	2.1.2
ADCP 75	VMDAS	1.45 operated until 04/29/09
ADCP 75	VMDAS	1.46 installed 04/29/09
ADCP 150	VMDAS	1.45 operated until 04/29/09
ADCP 150	VMDAS	1.45 installed 04/29/09

HLY0902 - Sensor Calculations

The coefficients for temperature, conductivity, fluorometer and turbidity sensors can be found in the calibrations sheets below in the Appendix.

Calculating Temperature – ITS-90

T = decimal equivalent of bytes 1-4

Temperature Frequency: f = T/19 +2100

$$\text{Temperature} = 1/\{g + h[ln(f_0/f)] + i[ln^2(f_0/f)] + j[ln^3(f_0/f)]\} - 273.15\ (°C)$$

Calculating Conductivity – ITS-90

C = decimal equivalent of bytes 5-8

Conductivity Frequency f = sqrt(C*2100+6250000)

$$\text{Conductivity} = (g + hf^2 + if^3 + jf^4)/[10(1 + dt + ep)]\ \text{(siemens/meter)}$$

t = temperature (°C); p = pressure (decibars); d = Ctcor; e = CPcor

Calculating Fluorometry Voltage

f = decimal equivalent of bytes 15-17

Fluorometry Voltage = f/819

Calculating Transmittance

V_{dark} = 0.058 V

V_{ref} = 4.765 V

t = decimal equivalent of bytes 18 - 20

Transmissometer Voltage (V_{signal}) = t/819

% Transmittance = (V_{signal} - V_{dark}) / (V_{ref} - V_{dark})

Calculating PAR for surface PAR

raw data = mV

calibration scale = 6.08 V/(mEinstiens/cm ^{2}sec)

offset (V_{dark}) = 0.3 mV

(*raw* mV - V_{dark})/scale x 10^4 cm^2/m^2 x 10^{-3} V/mV= mEinstiens/m^2sec

or

(*data* mV - 0.3 mV) x 1.65 (mEinstiens/m^2sec)/mV = mEinstiens/m^2sec

Calculating Pyrgeometer Values

V = Eppley PIR Thermopile voltage

S = Sensitivity (Calibration factor from Eppley Cal sheet)

S = 3.32

J = Stefan-Boltzmann Constant

J = 5.6697e-8

B = [absorption constant (for Eppley Black paint formula) 0.985 / dome glass IR transmission 0.5]

B= 3.5 for Stock Eppley PIR

Tb = Eppley Body Temperature in degrees Kelvin

Td = Eppley Dome Temperature in degrees Kelvin

Tb and Td calculated as follows:

T = 1/ (a + ln(Vo/Irt)*(b + c*(ln(Vo/Irt)**2)));

>Irt = (Vref-Vin)/R1

On Healy R1 = 82500 Vref = 5.0>

a= 0.0010295 b= 0.000239 c = 1.568e-7

$W/M2 = V/S + (J * Tb^4) + (B*J*(Tb^4 - Td^4))$

MBARI-ISUS V3 Data File FORMAT
From Satlantic Document SAT-DN-425 pages D-5 and D-6

Field Name	Format	Description
INSTRUMENT	AS 10	The frame header or synchronization string starts with "SAT" for a Satlantic instrument, followed by three characters identifying the frame type. The last four characters are the instrument serial number.
DATE	AS 7 BS 4	The date field denotes the date at the time of the sample, using the year and Julian day. The format is YYYYDDD.
TIME	AF 9 BD 8	The time field gives the GMT/UTC time of the sample in decimal hours of the day.

NTR_CONC	AF 4..7 BF 4	The Nitrate concentration as calculated by the ISUS is reported in ?Mol/L; in ASCII frames to 2 decimal places.
AUX1	AF 4..7 BF 4	First auxiliary fitting result of the ISUS is reported.
AUX2	AF 4..7 BF 4	Second auxiliary fitting result of the ISUS is reported.
AUX3	AF 4..7 BF 4	Third auxiliary fitting result of the ISUS is reported.
RMS ERROR	AF 8..10 BF 4	The Root Mean Square Error of the ISUS' concentration calculation is given, in ASCII frames to 6 decimal places.
The above fields are present in all frames, the following fields only in full frames.		
T_INT	AF 5 BF 4	The temperature inside the ISUS housing is given in degrees Celsius; in ASCII frames to 2 decimal places.
T_SPEC	AF 5 BF 4	The temperature of the spectrometer is given in degrees Celsius; in ASCII frames to 2 decimal places.
T_LAMP	AF 5 BF 4	The temperature of the lamp is given in degrees Celsius; in ASCII frames to 2 decimal places.
LAMP_TIME	AI 1..6 BU 4	The lamp on-time of the current data acquisition in seconds.
HUMIDITY	AF 4..5 BF 4	The humidity inside the instrument, given in percent. Increasing values of humidity indicate a slow leak.
VOLT_12	AF 5 BF 4	The voltage of the lamp power supply.
VOLT_5	AF 5 BF 4	The voltage of the internal analog power supply.
VOLT_MAIN	AF 5 BF 4	The voltage of the main internal supply.
REF AVG	AF 7 BF 4	The average Reference Channel measurement during the sample time, in ASCII mode to 2 decimal places.

REF STD	AF 6 BF 4	The variance of the Reference Channel measurements, in ASCII mode to 2 decimal places.
SW DARK	AF 8 BF 4	An AF formatted field representing the Sea-Water Dark calculation (to 2 decimal places), in spectrometer counts.
SPEC AVG	AF 8 BF 4	An AF formatted field representing the average value of all spectrometer channels, to 2 decimal places.
CHANNEL(?1)	AI 3..5 BU 2	The counts of the first channel (wavelength ?1) of the spectrometer.
…	…	…
CHANNEL(?n)	AI 3..5 BU 2	The counts of the n-th channel (wavelength ?n) of the spectrometer.
…	…	…
CHANNEL(?256)	AI 3..5 BU 2	The counts of the last (256-th) channel (wavelength ?256) of the spectrometer.
CHECK SUM	AI 1..3 BU 1	A check sum validates frames. Satlantic's software rejects invalid frames.
TERMINATOR	AS 2 AS 2	This field marks the end of the frame by a carriage return/line feed pair (0Dhex and 0Ahex).

Depending on the frame type, the sizes of the frames (for ASCII frames including the delimiters) are:

ASCII Concentration Frame 73 bytes (maximum)
ASCII Full Frame 1694 bytes (maximum)
Binary Full Frame 605 bytes (fixed)

For a flash disk size of 256 MB, this translates to approximately 4,500,000 ASCII Concentration frames, 155,000 ASCII Full frames, or 440,000 Binary Full frames. With an acquisition rate of one frame per second, an acquisition period of 52 days (ASCII Concentration frame), 43.5 hours (ASCII Full frame) or 122 hours (Binary Full frame) can be stored on the flash disk. Larger disk sizes are available upon request.

The instrument is normally configured to periodically generate dark spectra to correct for thermal noise. This is achieved by closing an on-board shutter over the UV light source before sampling. To distinguish between *Light* and *Dark* frames, the instrument uses different frame headers. This allows any telemetry acquisition system to distinguish between sensor readings taken with the shutter opened and

closed.

The different frames are distinguished by their header string: following the three letter 'SAT' identifier is a three letter frame identifier: The first letter is for ISUS frames always a 'N', indicating that the ISUS is an **N**itrate measuring instrument. The second letter indicates the shutter state of that frame ('L' for **L**ight frame, 'D' for **D**ark frame) and the third letter indicates the frame type ('C' for ASCII **C**oncentration Frame, 'F' for ASCII **F**ull Frame, and 'B' for **B**inary Full Frame).

Frame Header	**Explanation of frame header**
SATNLC	SATlantic Nitrate Light Concentration frame
SATNDC	SATlantic Nitrate Dark Concentration frame
SATNLF	SATlantic Nitrate Light Full ASCII frame
SATNDF	SATlantic Nitrate Dark Full ASCII frame
SATNLB	SATlantic Nitrate Light full Binary frame
SATNDB	SATlantic Nitrate Dark full Binary frame

Instrument Locations on the Healy

Layout plot of instrument locations

The locations of Instruments on this diagram are approximate only. Do NOT use this for measurements but only for relative locations.

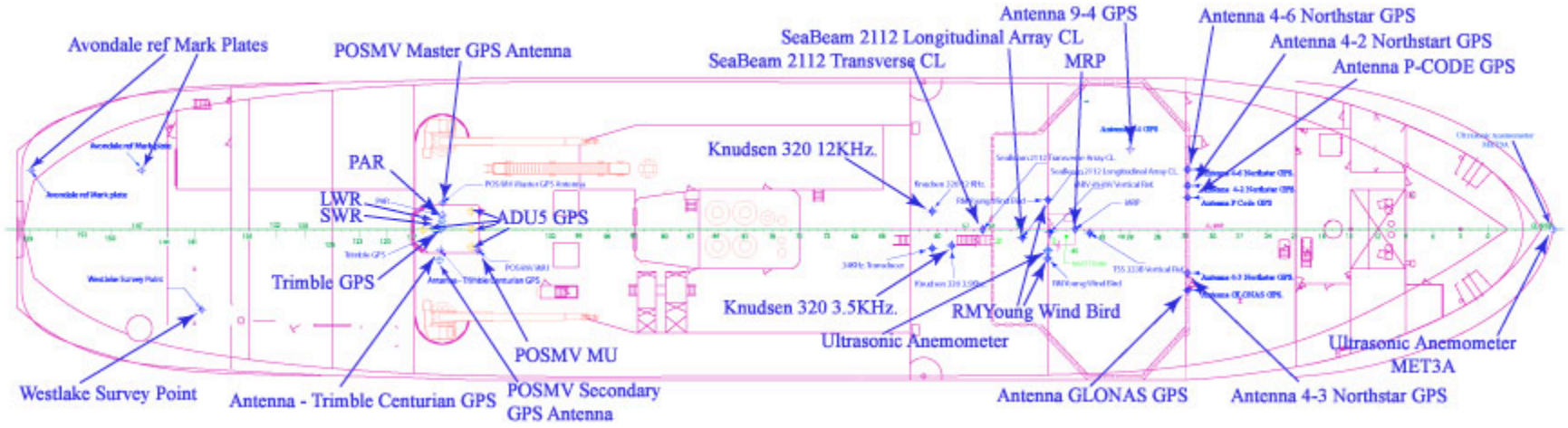

Table of Survey measurements

All Measurements in *Meters* relative to MRP unless otherwise stated

Consolidated Survey Data						
	Elements of:					
		Avondale Survey				
		Westlake Survey				
		Lamont Survey				
	X = fore & aft with + foreward					
	Y = port & starboard with + to starboard					
	Z= vertical with + upwards					
				X	Y	Z
Item	***Survey***	***Description***		***North***	***East***	***Elevation***
1	Avondale	**MRP**	See discussion Westlake Final Report	34.30	0.00	9.15
2	Westlake	**MRP**	by Definition	0.00	0.00	0.00
3	Westlake	**Seabeam 2112**				
		Transverse Array	Centerline	-7.679	0.030	9.242
		Longitudinal Array	Centerline	-4.386	0.711	9.238
4	Westlake	**Transducers**				
		Starboard - Forward to Aft				
		Transducer -	Bathy 2000 3.5 kHz	-10.252	1.362	9.243
		Transducer -	Bathy 1500 34 kHz *	-11.866	1.559	9.245
		Transducer -	Doppler Speed Log	-12.168	0.414	9.245
		Transducer -	Spare Transducer Well	-13.081	1.449	9.237
5	Westlake	**Port - Forward to Aft**				

		Transducer -	VM 150	-9.726	-1.395	9.230
		Transducer -	Ocean Surveyor 75 kHz	-10.819	-1.290	9.230
		Transducer -	Bathy 2000 12 kHz	-11.859	-1.492	9.234
		Transducer -	Spare Transducer Well	-13.078	-1.394	9.235
6	Westlake	**Gyros**				
		Starboard Gyro	Centerline	4.741	0.207	-19.604
		Port Gyro	Centerline	4.746	-0.207	-19.609
7	Westlake	**Antennas**				
		REF DWG TBD	Antenna 9-4 * - GPS Antenna (4.1.5)	4.587	-6.622	-24.000
			Antenna 4-6 * - Northstar GPS (4.1.1)	9.374	-4.970	-23.406
			Antenna 4-2 * - Northstar (4.1.2)	9.362	-3.617	-23.451
			P CODE GPS Antenna *	9.368	-2.645	-23.609
			Antenna 4-3 * - Northstar (4.1.4)	9.355	3.638	-23.363
			GLONAS GPS Antenna *	9.379	5.066	-23.515
			Antenna base (4A)	-53.872	-0.011	-22.025
			Antenna base (4B)	-49.758	0.038	-22.010
			Antenna base (4C)	-49.785	1.629	-22.020
			Antenna base (4D)	-49.771	-1.546	-22.008
			Trimble Centurion**	-52.726	-1.717	-21.113
			Time Server **	-52.671	1.838	-21.115
8	Westlake	**Vertical Ref**				
			MRV-M-MV -			
			Measured at Top of mounting bracket			
			Center (mid-point) - calculated	-2.100	0.291	-0.775

			TSS 333B - Marine Motion Sensor -			
			scribe atop mounting plate			
			Center of TSS 333B	1.210	0.329	-0.013
9	LDEO	**POS/MV**				
		From	**TO**	**X**	**Y**	**Z**
		IMU	Port Antenna (Master)	-2.9719	-3.9140	-5.5310
		MRP	IMU	-49.5710	1.7110	-16.7990
		MRP	Transmit array	-4.3860	0.7110	9.2380
		MRP	Port Antenna (Master)	-52.5429	-2.2030	-22.3300
10	Westlake Raw	**Fan Tail**				
			Aft/Port	-86.737	-4.906	-3.617
			Forward/Port	-77.600	-4.881	-3.589
			Forward/Starboard	-72.590	6.676	-3.653