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# MBARI BOS Record Formats  
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Description of logged record formats for MBARI Benthic Observing System (BOS)
contextual sensors.

See also: dbheader-<instrument>.csv

Contents:

- Valeport VA500 altitude/pressure
- Honeywell HMR3300 Heading
- Annotation
- PLC
- Garmin 19xHVS GPS
- RBR Duet TP
- References

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# Valeport VA500  
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# Record Format  
epoch-timestamp, timestamp-iso1806, $PRVAT, altitude, altitude-units,  
pressure, pressure-units*checksum<CR><LF>
```

Where:

epoch-timestamp : seconds since Jan 1, 1970
timestamp-iso1806 : date and time in ISO1806 format (yyyy-mm-ddThh:mm:ss.sssZ)
\$PRVAT : output message type
altitude : range from transducer (xx.xxx)
alt-units : range units (e.g. M)
Pressure : pressure (xxxx.xxx)
pre-units : pressure units (e.g dBar)
Checksum : checksum (hex)

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#####  
# Honeywell HMR3300 Heading  
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# Record Format  
epoch-timestamp, timestamp-iso1806, HX-heading-deg, HY-pitch-deg, HZ-  
roll-deg
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Where:

epoch-timestamp : seconds since Jan 1, 1970
timestamp-iso1806 : date and time in ISO1806 format (yyyy-mm-ddThh:mm:ss.sssZ)
HX-heading-deg : heading degrees (range 0:360)
HY-pitch-deg : pitch degrees (range -60:+60)
HZ-roll-deg : roll degrees (range -60:+60)

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Annotation

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epoch-timestamp, timestamp-iso1806, message-txt

Where:

epoch-timestamp : seconds since Jan 1, 1970
timestamp-iso1806 : date and time in ISO1806 format (yyyy-mm-ddThh:mm:ss.sssZ)
message-txt : annotation string

A new record is written each time a newline is sent from the annotation terminal session.

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PLC

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Record Format

epoch-timestamp, timestamp-iso1806, event-text

Where:

epoch-timestamp : seconds since Jan 1, 1970
timestamp-iso1806 : date and time in ISO1806 format (yyyy-mm-ddThh:mm:ss.sssZ)
event-txt : text message describing PLC events, e.g. button presses.

PLC events include :

LANDER_POWER_ON, LANDER_POWER_OFF : platform power on/off

COMMS_FAIL : communications error

INST_PORT_1_ON, INST_PORT_1_OFF
INST_PORT_2_ON, INST_PORT_2_OFF

Instrument port power switched

ENCODERS_ON, ENCODERS_OFF

Video encoder power switched

DOWN_CAMERA_ON, DOWN_CAMERA_OFF

Down-looking camera power switched

SONY_POWER_ON, SONY_POWER_OFF

Stereo camera power switched

SONY_REC_START, SONY_REC_STOP

Stereo camera recording started/stoped

NORTH_LIGHT_ON, NORTH_LIGHT_OFF

SHOUTH_LIGHT_ON, SHOUTH_LIGHT_OFF [sic]

EAST_LIGHT_ON, EAST_LIGHT_OFF

WEST_LIGHT_ON, WEST_LIGHT_OFF

DOWN_LIGHT_ON, DOWN_LIGHT_OFF

Light power switched

FLASH_LIGHTS

Lights flashed (for video synchronization)

DIM_UP, DIM_DOWN

Light brightness level changed

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Garmin 19xHVS GPS

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Record Format

epoch-timestamp, timestamp-iso1806, message-GPGGA

epoch-timestamp, timestamp-iso1806, message-GPRMC

epoch-timestamp, timestamp-iso1806, message-GPGSV

Where:

epoch-timestamp : seconds since Jan 1, 1970

timestamp-iso1806 : date and time in ISO1806 format (yyyy-mm-ddThh:mm:ss.sssZ)

message-GPxxx are NMEA0183 sentences, described below

[From <http://www.gpsinformation.org/dale/nmea.htm>]

GGA - essential fix data which provide 3D location and accuracy data.

\$GPGGA,123519,4807.038,N,01131.000,E,1,08,0.9,545.4,M,46.9,M,,*47

Where:

GGA	Global Positioning System Fix Data
123519	Fix taken at 12:35:19 UTC
4807.038,N	Latitude 48 deg 07.038' N
01131.000,E	Longitude 11 deg 31.000' E
1	Fix quality: 0 = invalid
	1 = GPS fix (SPS)
	2 = DGPS fix
	3 = PPS fix
	4 = Real Time Kinematic
	5 = Float RTK
	6 = estimated (dead reckoning) (2.3

feature)

	7 = Manual input mode
	8 = Simulation mode
08	Number of satellites being tracked
0.9	Horizontal dilution of position
545.4,M	Altitude, Meters, above mean sea level
46.9,M	Height of geoid (mean sea level) above WGS84 ellipsoid
(empty field)	time in seconds since last DGPS update
(empty field)	DGPS station ID number
*47	the checksum data, always begins with *

If the height of geoid is missing then the altitude should be suspect. Some non-standard implementations report altitude with respect to the ellipsoid rather than geoid altitude. Some units do not report negative altitudes at all. This is the only sentence that reports altitude.

RMC – NMEA has its own version of essential gps pvt (position, velocity, time) data. It is called RMC, The Recommended Minimum, which will look similar to:

\$GPRMC,123519,A,4807.038,N,01131.000,E,022.4,084.4,230394,003.1,W*6A

Where:

RMC	Recommended Minimum sentence C
123519	Fix taken at 12:35:19 UTC
A	Status A=active or V=Void.
4807.038,N	Latitude 48 deg 07.038' N
01131.000,E	Longitude 11 deg 31.000' E
022.4	Speed over the ground in knots
084.4	Track angle in degrees True
230394	Date – 23rd of March 1994
003.1,W	Magnetic Variation
*6A	The checksum data, always begins with *

Note that, as of the 2.3 release of NMEA, there is a new field in the

RMC sentence at the end just prior to the checksum. For more information on this field see [here](#).

GSV – Satellites in View shows data about the satellites that the unit might be able to find based on its viewing mask and almanac data. It also shows current ability to track this data. Note that one GSV sentence only can provide data for up to 4 satellites and thus there may need to be 3 sentences for the full information. It is reasonable for the GSV sentence to contain more satellites than GGA might indicate since GSV may include satellites that are not used as part of the solution. It is not a requirement that the GSV sentences all appear in sequence. To avoid overloading the data bandwidth some receivers may place the various sentences in totally different samples since each sentence identifies which one it is.

The field called SNR (Signal to Noise Ratio) in the NMEA standard is often referred to as signal strength. SNR is an indirect but more useful value than raw signal strength. It can range from 0 to 99 and has units of dB according to the NMEA standard, but the various manufacturers send different ranges of numbers with different starting numbers so the values themselves cannot necessarily be used to evaluate different units. The range of working values in a given gps will usually show a difference of about 25 to 35 between the lowest and highest values, however 0 is a special case and may be shown on satellites that are in view but not being tracked.

```
$GPGSV,2,1,08,01,40,083,46,02,17,308,41,12,07,344,39,14,22,228,45*75
```

Where:

GSV	Satellites in view
2	Number of sentences for full data
1	sentence 1 of 2
08	Number of satellites in view
01	Satellite PRN number
40	Elevation, degrees
083	Azimuth, degrees
46	SNR – higher is better
	for up to 4 satellites per sentence
*75	the checksum data, always begins with *

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#####  
# RBR Duet TP  
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```
# Record Format  
epoch-timestamp, timestamp-iso1806, uptime-msec, temperature-degC,  
pressure-dbar
```

Where:

epoch-timestamp : seconds since Jan 1, 1970
timestamp-iso1806 : date and time in ISO1806 format (yyyy-mm-ddThh:mm:ss.sssZ)
uptime-msec : elapsed time since last start or sample rate change (milliseconds)
temperature-degC : temperature (degrees C)
pressure-dbar : pressure (decibar)

References
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NMEA 0183
<http://www.gpsinformation.org/dale/nmea.htm>

Honeywell HMR3300
<https://www.eol.ucar.edu/system/files/hmr3300.pdf>

Valeport VA500
https://www.valeport.co.uk/Portals/0/Docs/Manuals/Echosounders%20&%20Bathymetry/VA500%20Altimeter/0430831e_VA500_Altimeter_Manual.pdf

RBR Duet
<http://rbr-global.com/wp-content/uploads/2017/02/RUG-SL-0000215rev2.pdf>
http://rbr-global.com/wp-content/uploads/dlm_uploads/2015/10/RBRsolo-and-RBRduet-operation-and-maintenance-RBR0001896-Rev-A.pdf