APPENDIX B: WINFROG FILE FORMATS

WINFROG WORKING FILE FORMATS

All WinFrog data are stored in ASCII format for ease of reading with a text editor, such as Windows Notepad™, or printed as an ASCII text file. Each field is comma delimited with no fixed length. Since data storage costs are greatly reduced, compressing data into binary format is not necessary and would be time consuming for the system. Data recovery is much easier from a user-readable file in ASCII rather than an attempt to recover data from a binary file.

File format is subject to change without notice.

In the following format descriptions, the following format terms are used:

d or Integer	integer value
f.ff or Floating point number	double value, the number of decimal places is indicated by the number of *f* characters following the decimal point
[-]	if a negative value, the term is preceded by a negative sign. Note that this is not shown in all cases a negative may be present.
[N/S]dd mm.mmmm	a latitude or longitude in degress, minutes, decimal of minutes format, preceded by the hemisphere character designation
mm-dd-yy	date in month-day-year format, note that the order of the *m*, *d* and *y* characters indicate the actual order
hh:mm:ss.s	time in hour:minute:seconds format, note that the number of decimal places of seconds are indictaed byb the number of *s* characters following the decimal point
s or text	character string of no fixed length

SURVEY LINE FILE (*.PTS)

Survey line file data records are stored as ASCII, free formatted, comma-delimited fields as follows.

SURVEY LINE CONTROL RECORDS

Field	Data	Format	Comment
1	Type	0	Survey Line control record
2	Name	s	Name of survey line
3	Fix#	[-]d	Starting fix number
4	Dist Down Ln	[-]f.fff	Distance down line of first fix/shotpoint (m)
5	Starting KP (m)	[-]f.fff	Starting KP (m)
6	Kp Direction	[-]d	1 = Increasing -1 = Decreasing
7	# of Nodes	d	Number of nodes[1]
8	# of Color	d	Line Color
9	Scalable Line flag	d	Scalable KP Line flag, 0 = Off, 1=On
10	KP ScaleLimits	f.fff	Line Scale Limits
11	KP/FP	d	Line KP/FP Mode (0 =KP, 1= FP)
12	Line approach alarm	d	1 = true, on 0 = false, off
13	Alarm Tolerance	f.fff	Approach distance to trigger the line alarm

[1] The number of line segments is equal to the number of nodes - 1

SURVEY LINE POINT RECORDS

Field	Data	Format	Comment
1	Type	1	Survey Line point record
2	SOL Lat	[-]f.fffffffff	Latitude of point, decimal of degrees
3	SOL Lon	[-]f.fffffffff	Longitude of point, decimal of degrees
4	Depth	[-]f.fff	Depth of point[2]
5	Radius	[-]f.fff	Radius of curvature[2]
6	Northing	[-]f.ff	Grid Northing of point[3]
7	Easting	[-]f.ff	Grid Easting of point[3]
8	KP	f.fff	KP[4] (m)

[1] The coordinates for a given node define the end of a given segment. Whether it is the starting or ending node depends upon the current segment.

[2] Units are included in field and are based upon selected distance units and the number of decimal places specified for the same, default is metres.

[3] Units are not included in the field and are based upon Map Projection units, default is metres.

[4] If the line is set to Scalable KP, the KP values are those specified for the given node. If the line is not set to scalable, the KP values are calculated based on the starting KP value and KP direction.

OVERAGE LOOP POINT RECORDS

Field	Data	Format	Comment
1	Type	2	Overage Loop point record
2	Start Lat	[-]f.fffffffff	Latitude of point that the overage loop starts, decimal of degrees
3	Start Lon	[-]f.fffffffff	Longitude of point that the overage loop starts, decimal of degrees
4	Start Northing	[-]f.ffff	Northing of point that the overage loop starts, metres
5	Start Easting	[-]f.ffff	Easting of point that the overage loop starts, metres
6	Range	f.ffff	Range from previous node to start of overage loop
7	Excess	f.ffff	Amount of excess pipe to be laid, metres
8	Max Deviation	f.fffffffff	Maximum deflection at any node in the overage loop, decimal of degrees
9	Mode	d	0=Off; 1=1/2 loop to the right; 2=1/2 loop to the left; 3=full loop to the right; 4=full loop to the left
10	Node0	d	Number of first node added[1]
11	Node1	d	Number of second node added[1]
12	Node2	d	Number of third node added[1]
13	Node3	d	Number of fourth node added[1]
14	PrevNode	d	Number of node preceding the first node

[1] If a node has not been added, this value is –1.

WAYPOINT (*.WPT)

Waypoint file data records are stored as ASCII, free formatted, comma-delimited fields as follows:

WAYPOINT RECORDS

Field	Data	Format	Comment
1	Name	s	Name of waypoint
2	Lat	[N/S]dd mm.mmmm	Latitude of point
3	Lon	[W/E]ddd mm.mmmm	Longitude of point
4	Icon	d	See Icon List Below
5	Radius	f.fff	Radius of watch circle (m)
6	Northing	[-]f.ff	Grid Northing of point[1]
7	Easting	[-]f.ff	Grid Easting of point[1]
8	Color	d	Color
9	Elevation	f.fff	Elevation of point (m)
10	Vehicle name	s	Name of the vehicle selected for waypoint icon[2]
11	Dashed line	d	Line type: 1 dashed, 0 solid
12	Offset – FA	f.fff	FA offset from vehicle's CRP to point on vehicle that is to be located on waypoint (m)
13	Offset – PS	f.fff	PS offset from vehicle's CRP to point on vehicle that is to be located on waypoint (m)
14	Orientation	f.ffffff	Orientation of vehicle shape (degrees)
15	Orientation type	d	Orientation type: 1 True, 0 Grid

[1] Units are not included in the field and are based upon Map Projection units, default is metres.
[2] Fields 10 to 15 are only included if the icon selected for the waypoint is a vehicle shape.

ICON LIST

Value	Description
0	Anchor
1	Beacon-Radio/Radar
2	Beacon-Square
3	Beacon-Triangular
4	Bullseye
5	Circle
6	Light Directional
7	Light-General
8	Marker-Barrel Buoy
9	Marker-BiColor
10	Marker-General Buoy
11	Marker-Special Buoy
12	Mine
13	Point
14	Post/Pile
15	Rock
16	Sewer Pipeline
17	Square
18	Triangle
19	Wreck

PICTURE FILES

Picture file data records are stored as ASCII, free formatted, comma-delimited fields as follows:

PICTURE POINT RECORDS

Field	Data	Format	Comment
1	Type	d	1 = Pen Up 0 = Pen Down
2	Lat	[-]f.ffffffff	Latitude of point (degrees)
3	Lon	[-]f.ffffffff	Longitude of point (degrees)

PICTURE CONTROL RECORDS

Field	Data	Format	Comment
1	Type	d	2 = Picture Control Record
2	Name	s	Name of picture segment
3	Color	d	
4	Green	d	
5	Blue	d	
6	Line Style	d	0 = Solid 1 = Dashed

PICTURE TEXT RECORDS

Field	Data	Format	Comment
1	Type	d	3 = Picture Text Record
2	Text	s	Text string (80 characters or less)
3	Color	d	
4	Lat	[-]f.fffffffff	Latitude of text
5	Lon	[-]f.fffffffff	Longitude of text
6	Size	f.fffffffff	Size of text
7	Rotation	f.fffffffff	Rotation of text
8	Justification	d	0 = Center 1 = Left 2 = Right

This format utilizes the Pen Up/Pen Down method to enable picture data (e.g. coastline) to be drawn. It allows free-format of data entry. On encountering the first picture file record, WinFrog moves the pen to that location. All following ‘1’ records are then plotted in yellow with the pen down. On encountering a ‘2’ record, the pen is raised and set down again at the next ‘1’ record, allowing gaps to be introduced in picture data. Multiple control point record sequences can also be stored in a picture file.

SEISMIC SOURCE FILES

Seismic Source file data and Source data records are stored as ASCII, free formatted, comma-delimited fields as follows:

SEISMIC SOURCE FILE LIST (*.ASC) RECORDS

The Seismic Source data file list contains the directory and file name of all current Source (.SRC) files, in the following format: drive:\path\filename.SRC.

For example: C:\NEWPROJ\TEST1.SRC

SOURCE (*.SRC) RECORDS

The Source (.SRC) data file contains the actual event data, as follows. Note that the data logged is that for the time of the shotpoint (SP) and that positional and tracking information is for the vehicle's tracking (offset) point.

Version 1 (pre WinFrog v3.5.7)

Field	Data	Format	Comment
1	Fix#	dd	Event number
2	Date/Time	mm-dd-yy hh:mm:ss.s	Date and time of SP
Fields 3 to 22 are repeated for all vehicles configured as either Primary or Secondary Event vehicles.			
3	Lat	[N/S]dd mm.mmmm	Latitude[1]
4	Lon	[W/E]ddd mm.mmmm	Longitude[1]
5	Height	f.ff	Height relative to sea level. In case of sub-surface vehicle, depth is given as a negative.
6	Northing	[-]f.ff	Northing[2]
7	Easting	[-]f.ff	Easting[2]
8	Depth	f.ff	Water depth (m)
9	Off-line	[-]f.ff	Distance offline (m)
10	Alongline	[-]f.ff	Distance alongline (m)
11	Heading	f.ff	Vessel's heading (T)
12	CMG	f.ff	Vessel's course made good (Grid)
13	Speed	f.ff	Vessel's speed (knots)
14	QC	f.ff	Not used
15	Offset	s	Name of the vehicle offset being tracked
16	KiloPost	f.fff	Kilometer post
17	Layback	f.ff	The layback of the vehicle in cases of vehicle referenced to another as a Pipe track vehicle
18	HDOP	f.ff	GPS Horizontal Dilution of Precision (if available)
19	DGPS Age	f.ff	Age of DGPS correction (if available)
20	Lat Std Dev	f.ff	Latitude Standard Deviation
21	Lon Std Dev	f.ff	Longitude Standard Deviation
22	Vessel	text	Name of the vessel that preceding data applies to

[1] Working Ellispoid position

[2] Working Map Projection position, units are as configured for the Map Projection

Version 2 (WinFrog v3.5.7 and later)

Field	Data	Format	Comment
1	Fix#	dd	Event number
2	Version number	**Version=**integer	Version number of this record (2)
3	Date/Time	mm-dd-yy hh:mm:ss.s	Date and time of SP
Fields 4 to 34 are repeated for all vehicles configured as either Primary or Secondary Event vehicles.			
4	Lat	[N/S]dd mm.mmmm	Latitude[1]
5	Lon	[W/E]ddd mm.mmmm	Longitude[1]
6	Height	f.ff	Height relative to sea level. In case of sub-surface vehicle, depth is given as a negative.
7	Northing	[-]f.ff	Northing[2]
8	Easting	[-]f.ff	Easting[2]
9	Depth	f.ff	Water depth (m)
10	Off-line	[-]f.ff	Distance offline (m)
11	Alongline	[-]f.ff	Distance alongline (m)
12	Heading	f.ff	Vessel's heading (T)
13	CMG	f.ff	Vessel's course made good (Grid)
14	Speed	f.ff	Vessel's speed (knots)
15	QC	f.ff	Not used
16	Offset	s	Name of the vehicle offset being tracked
17	KiloPost	f.fff	Kilometer post
18	Layback	f.ff	The layback of the vehicle in cases of vehicle referenced to another as a Pipe track vehicle
19	HDOP	f.ff	GPS Horizontal Dilution of Precision (if available)
20	DGPS Age	f.ff	Age of DGPS correction (if available)
21	Lat Std Dev	f.ff	Latitude Standard Deviation
22	Lon Std Dev	f.ff	Longitude Standard Deviation
23	Pitch	floating point number	Degrees
24	Roll	floating point number	Degrees
25	Temperature	floating point number	Degrees Celcius
26	Conductivity	floating point number	Millimho/cm
27	Pressure	floating point number	millibars
28	Salinity	floating point number	PSU (practical salinity units
29	Sound Velocity	floating point number	Metres/sec
30	Oxygen Concentration	floating point number	µ Moles
31	Oxygen Saturation	floating point number	%
32	Altitude	floating point number	m
33	User Selected value	Number and units	A value the operator selected along with its units. This is only available from some devices and is likely from an analogue source where a voltage was digitized then scaled.
34	Vessel	text	Name of the vessel that preceding data applies to

[1] Working Ellispoid position

[2] Working Map Projection position, units are as configured for the Map Projection

SEISMIC RECEIVER FILES

Seismic Receiver file data and Receiver data records are stored as ASCII, free formatted, comma-delimited fields as follows:

SEISMIC RECEIVER LIST (*.ALL) RECORDS

The Seismic Receiver data file list contains the directory and filename of all current Receiver (.RCV) files, as in the following format: drive:\path\filename.RCV.

For Example: C:\NEWPROJ\FILE1.RCV

RECEIVER (*.RCV) RECORDS

The Receiver (.RCV) data file contains the actual event data, as follows. Note that the data logged is that for the time of the shotpoint (SP) and that positional and tracking information is for the vehicle's tracking (offset) point.

Version 1 (pre WinFrog v3.5.7)

Field	Data	Format	Comment
1	Fix#	Dd	Event number
2	Date/Time	mm-dd-yy hh:mm:ss.s	Date and time of SP
Fields 3 to 22 are repeated for all vehicles configured as either Primary or Secondary Event vehicles.			
3	Lat	[N/S]dd mm.mmmm	Latitude[1]
4	Lon	[W/E]ddd mm.mmmm	Longitude[1]
5	Height	f.ff	Height relative to sea level. In case of sub-surface vehicle, depth is given as a negative.
6	Northing	[-]f.ff	Northing[2]
7	Easting	[-]f.ff	Easting[2]
8	Depth	f.ff	Water depth (m)
9	Off-line	[-]f.ff	Distance offline (m)
10	Alongline	[-]f.ff	Distance alongline (m)
11	Heading	f.ff	Vessel's heading (T)
12	CMG	f.ff	Vessel's course made good (Grid)
13	Speed	f.ff	Vessel's speed (knots)
14	QC	f.ff	Not used
15	Offset	S	Name of the vehicle offset being tracked
16	KiloPost	f.fff	Kilometer post
17	Layback	f.ff	The layback of the vehicle in cases of vehicle referenced to another as a Pipe track vehicle
18	HDOP	f.ff	GPS Horizontal Dilution of Precision (if available)
19	DGPS Age	f.ff	Age of DGPS correction (if available)
20	Lat Std Dev	f.ff	Latitude Standard Deviation
21	Lon Std Dev	f.ff	Longitude Standard Deviation
22	Vessel	text	Name of the vessel that preceding data applies to

[1] Working Ellispoid position

[2] Working Map Projection position, units are as configured for the Map Projection

Version 2 (WinFrog v3.5.7 and later)

Field	Data	Format	Comment
1	Fix#	dd	Event number
2	Version number	**Version=**integer	Version number of this record (2)
3	Date/Time	mm-dd-yy hh:mm:ss.s	Date and time of SP
Fields 4 to 34 are repeated for all vehicles configured as either Primary or Secondary Event vehicles.			
4	Lat	[N/S]dd mm.mmmm	Latitude[1]
5	Lon	[W/E]ddd mm.mmmm	Longitude[1]
6	Height	f.ff	Height relative to sea level. In case of sub-surface vehicle, depth is given as a negative.
7	Northing	[-]f.ff	Northing[2]
8	Easting	[-]f.ff	Easting[2]
9	Depth	f.ff	Water depth (m)
10	Off-line	[-]f.ff	Distance offline (m)
11	Alongline	[-]f.ff	Distance alongline (m)
12	Heading	f.ff	Vessel's heading (T)
13	CMG	f.ff	Vessel's course made good (Grid)
14	Speed	f.ff	Vessel's speed (knots)
15	QC	f.ff	Not used
16	Offset	s	Name of the vehicle offset being tracked
17	KiloPost	f.fff	Kilometer post
18	Layback	f.ff	The layback of the vehicle in cases of vehicle referenced to another as a Pipe track vehicle
19	HDOP	f.ff	GPS Horizontal Dilution of Precision (if available)
20	DGPS Age	f.ff	Age of DGPS correction (if available)
21	Lat Std Dev	f.ff	Latitude Standard Deviation
22	Lon Std Dev	f.ff	Longitude Standard Deviation
23	Pitch	floating point number	Degrees
24	Roll	floating point number	Degrees
25	Temperature	floating point number	Degrees Celcius
26	Conductivity	floating point number	Millimho/cm
27	Pressure	floating point number	millibars
28	Salinity	floating point number	PSU (practical salinity units
29	Sound Velocity	floating point number	Metres/sec
30	Oxygen Concentration	floating point number	µ Moles
31	Oxygen Saturation	floating point number	%
32	Altitude	floating point number	m
33	User Selected value	Number and units	A value the operator selected along with its units. This is only available from some devices and is likely from an analogue source where a voltage was digitized then scaled.
34	Vessel	text	Name of the vessel that preceding data applies to

[1] Working Ellispoid position

[2] Working Map Projection position, units are as configured for the Map Projection

DATA FILES

Data file data and Data point records are stored as ASCII, free formatted, comma-delimited fields as follows:

DATA FILE LIST (*.ALG) RECORDS

The Data file list contains the directory and filename of all Data files, as in the following example: drive:\path\filename.DAT

For Example: C:\NEWPROJ\FILE1.DAT

DATA (.DAT) RECORDS

The Data (.DAT) data file contains the actual event data, as follows. Note that the data logged is that for the time of the event and that positional and tracking information is for the vehicle's tracking (offset) point.

DATA POINT (*.DAT) RECORDS

Version 1 (pre WinFrog v3.5.7)

Field	Data	Format	Comment
1	Fix#	dd	Event number
2	Date/Time	mm-dd-yy hh:mm:ss.s	Date and time of SP
Fields 3 to 22 are repeated for all vehicles configured as either Primary or Secondary Event vehicles.			
3	Lat	[N/S]dd mm.mmmm	Latitude[1]
4	Lon	[W/E]ddd mm.mmmm	Longitude[1]
5	Height	f.ff	Height relative to sea level. In case of sub-surface vehicle, depth is given as a negative.
6	Northing	[-]f.ff	Northing[2]
7	Easting	[-]f.ff	Easting[2]
8	Depth	f.ff	Water depth (m)
9	Off-line	[-]f.ff	Distance offline (m)
10	Alongline	[-]f.ff	Distance alongline (m)
11	Heading	f.ff	Vessel's heading (T)
12	CMG	f.ff	Vessel's course made good (Grid)
13	Speed	f.ff	Vessel's speed (knots)
14	QC	f.ff	Not used
15	Offset	s	Name of the vehicle offset being tracked
16	KiloPost	f.fff	Kilometer post
17	Layback	f.ff	The layback of the vehicle in cases of vehicle referenced to another as a Pipe track vehicle
18	HDOP	f.ff	GPS Horizontal Dilution of Precision (if available)
19	DGPS Age	f.ff	Age of DGPS correction (if available)
20	Lat Std Dev	f.ff	Latitude Standard Deviation
21	Lon Std Dev	f.ff	Longitude Standard Deviation
22	Vessel	text	Name of the vessel that preceding data applies to

[1] Working Ellispoid position

[2] Working Map Projection position, units are as configured for the Map Projection

Version 2 (WinFrog v3.5.7 and later)

Field	Data	Format	Comment
1	Fix#	Dd	Event number
2	Version number	**Version=**integer	Version number of this record (2)
3	Date/Time	mm-dd-yy hh:mm:ss.s	Date and time of SP
Fields 4 to 34 are repeated for all vehicles configured as either Primary or Secondary Event vehicles.			
4	Lat	[N/S]dd mm.mmmm	Latitude[1]
5	Lon	[W/E]ddd mm.mmmm	Longitude[1]
6	Height	f.ff	Height relative to sea level. In case of sub-surface vehicle, depth is given as a negative.
7	Northing	[-]f.ff	Northing[2]
8	Easting	[-]f.ff	Easting[2]
9	Depth	f.ff	Water depth (m)
10	Off-line	[-]f.ff	Distance offline (m)
11	Alongline	[-]f.ff	Distance alongline (m)
12	Heading	f.ff	Vessel's heading (T)
13	CMG	f.ff	Vessel's course made good (Grid)
14	Speed	f.ff	Vessel's speed (knots)
15	QC	f.ff	Not used
16	Offset	s	Name of the vehicle offset being tracked
17	KiloPost	f.fff	Kilometer post
18	Layback	f.ff	The layback of the vehicle in cases of vehicle referenced to another as a Pipe track vehicle
19	HDOP	f.ff	GPS Horizontal Dilution of Precision (if available)
20	DGPS Age	f.ff	Age of DGPS correction (if available)
21	Lat Std Dev	f.ff	Latitude Standard Deviation
22	Lon Std Dev	f.ff	Longitude Standard Deviation
23	Pitch	floating point number	Degrees
24	Roll	floating point number	Degrees
25	Temperature	floating point number	Degrees Celcius
26	Conductivity	floating point number	Millimho/cm
27	Pressure	floating point number	millibars
28	Salinity	floating point number	PSU (practical salinity units
29	Sound Velocity	floating point number	Metres/sec
30	Oxygen Concentration	floating point number	µ Moles
31	Oxygen Saturation	floating point number	%
32	Altitude	floating point number	m
33	User Selected value	Number and units	A value the operator selected along with its units. This is only available from some devices and is likely from an analogue source where a voltage was digitized then scaled.
34	Vessel	text	Name of the vessel that preceding data applies to

[1] Working Ellispoid position

[2] Working Map Projection position, units are as configured for the Map Projection

LOG FILES

Log data records are stored as ASCII, free formatted, comma-delimited fields as follows. Note that the data logged is that for the time of the fix and that positional and tracking information is for the vehicle's tracking (offset) point.

LOG (*LOG) RECORDS

Field	Data	Format	Comment
1	Comment	Text	Brief description of log entry
2	Version number	**Version=**Integer	Record version number (3)
3	Date/Time	mm-dd-yy hh:mm:ss.s	Time of fix
Fields 4 to 45 are repeated for all vehicles configured as either Primary or Secondary Event vehicles			
4	Lat	[N/S]dd mm.mmmm	Latitude[1]
5	Lon	[W/E]ddd mm.mmmm	Longitude[1]
6	Height	f.ff	Height relative to sea level. In case of sub-surface vehicle, depth is given as a negative.
7	Heading	f.ff	Vessel's heading (T)
8	CMG	f.ff	Vessel's course made good (Grid)
9	Speed	f.ff	Vessel's speed (knots)
10	Northing	[-]f.ff	Northing[2]
11	Easting	[-]f.ff	Easting[2]
12	Depth	f.ff	Water depth (m)
13	QC	f.ff	Not used
14	Offset	text	Name of the offset being tracked
15	Off-line	[-]f.ff	Distance offline (m)
16	Alongline	[-]f.ff	Distance alongline(m)
17	KiloPost	f.fff	Kilometer post
18	Layback	f.ff	The layback of the vessel in cases of vessel referenced to another as a Pipe track vehicle
19	Pitch	floating point number	Degrees
20	Roll	floating point number	Degrees
21	Temperature	floating point number	Degrees Celcius
22	Conductivity	floating point number	Millimho/cm
23	Pressure	floating point number	millibars
24	Salinity	floating point number	PSU (practical salinity units)
25	Sound Velocity	floating point number	Metres/sec
26	Oxygen Concentration	floating point number	µ Moles
27	Oxygen Saturation	floating point number	%
28	Altitude	floating point number	m
29	User Selected value	Number and units	A value the operator selected along with its units. This is only available from some devices and is likely from an analogue source where a voltage was digitized then scaled.
The following three fields, cable count, cable velocity, and cable tension are repeated 5 times for channels 1 through 5.			
30	Cable count	Floating point number	Cable count channel 1 (m)
31	Cable velocity	Floafint point number	Cable velocity channel 1 (m/min)
32	Cable tension	Floating point number	Cable tension channel 1 (tonnes)
45	Vessel	Text	Name of the vessel that preceding data applies to

[1] Working Ellispoid position

[2] Working Map Projection position, units are as configured for the Map Projection

CABLE EVENT FILES

Cable event file data and data point records are stored as ASCII, free formatted, comma-delimited fields as follows:

CABLE EVENT (*.CET) RECORDS

Field	Data	Format	Comment
1	Name	s	Event title
2	Date/Time	f.fff	PC time of event (s)
3	Icon	d	Icon index, see Icon list below
4	CRD	f.fff	Cumulative route distance (m)
5	IRD	f.fff	Incremental route distance (m)
6	CCD	f.fff	Cumulative cable distance (m)
7	ICD	f.fff	Incremental cable distance (m)
8	CumSlack	f.fff	Cumulative slack (%)
9	IncSlack	f.fff	Incremental clack (%)
10	CableTension	f.fff	Cable Tension (tones)
The following fields are repeated for all vehicles			
…	Lat	[N/S]dd mm.mmmm	Latitude of fix
…	Lon	[W/E]ddd mm.mmmm	Longitude of fix
…	Northing	[-]f.ff	Grid Northing of fix[1]
…	Easting	[-]f.ff	Grid Easting of fix[1]
…	Depth	f.fff	Water depth of fix (m)
…	Heading	f.ff	Vessel's heading (T)
…	CMG	f.ff	Vessel's course made good (Grid)
…	Speed	f.ff	Vessel's speed (knots)
…	CRD	f.ff	Cumulative Route Distance (m)
…	IRD	f.ff	Incremental Route Distance (m)
…	Vessel	s	Name of the vessel that the preceding data applies to

[1] Units are not included in the field and are based upon Map Projection units, default is metres.

ICON LIST

Value	Description
0	KM mark
1	Splice Box
2	Transition
3	Repeater
4	Branch
5	Transition-Cable end
6	Square
7	Circle
8	Triangle

TRANSPONDER FILES

Transponder file data and data point records are stored as ASCII, free formatted, comma-delimited fields as follows:

TRANSPONDER (*.XPT) RECORDS

Field	Data	Format	Comment
1	Name	text	Station name
2	Latitude	s	Latitude of monument in dd mm ss.ssss
3	Longitude	s	Longitude of monument in dd mm ss.ssss
4	Depth	f.fff	Depth of monument (m)
5	Sensor Offset	f.fff	Vertical offset of depth sensor from the transducer
6	Sensor Calibration	f.fff	Depth sensor calibration value to be added to a (negative) depth value (m).
7	Rx Code	s	Receive frequency or command
8	Tx Code	s	Transmit frequency or channel
9	Beacon Code	s	For a USBL beacon, the beacon ID
10	Transponder Type	d	Integer code defining the transponder type/application (see Transponder Types table)
11	Range correction	f.fff	Turn around time not accounted for by the LBL system (ms)
12	TQ Count	d	Transponder temperature sensor count
13	TQ Time	f.fff	Time temperature count was obtained (s)
12	Address	s	Transponder address
13	Model	s	Transponder model (see Transponder Models table)
14	Network	s	Name network transponder is associated with
15	Number Cyclic Commands	d	In case of Cyclic transponder, number of commands uploaded to transponder
16	IIF	s	Individual interrogation frequency or channel
Next field repeated for every cyclic command (Num Cyclic Cmds)			
17…	Cyclic Cmd	s	Command uploaded to the Cyclic transponder, in the order they were uploaded
…	Digiquartz	d	Digiquartz depth sensor flag, 0=non-digiquartz; 1=digiquartz
…	Inclinometer sensor	d	Inclinometer code, 0=no inclinometer; 1= internal inclinometer; 2=external inclinometer
…	Conductivity sensor	d	Conductivity sensor flag, 0=no sensor; 1=sensor
…	Depth Rating for digiquartz	d	Digiquartz sensor depth rating, 0=not deep water rated; 1 deep water rated
…	Quick Measurement	d	Digiquartz short observation period flag
…	Water Density	f.fff	Water density (kg/m^3)
…	Formula Number	d	Formula used index, currently only 1 available so value is always 1
…	Atmospheric	f.fff	Atmospheric pressure value (mb)

	Pressure		
…	Height Of Instrument above monument	f.fff	Height of the transducer above the monument (m)
…	Double Occupancy	d	Double occupancy flag (i.e. multiple transponders located at this station), 0=No; 1=yes
…	Number of Other Occupants	d	Number of transponders located at this station
Next field repeated for every occupant index (5)			
…	Occupant	d	Index of transponder(s) in this file of other co-located transponders
The following 14 fields contain the digiquartz depth sensor calibration coefficients			
…	Digiquartz calibration coefficients	f.ffffff	Digiquartz coefficient fields are in the following order: X0, Y1, Y2, Y3, C1, C2, C3, D1, D2, T1, T2, T3, T4, T5
	Digiquartz observation period	f.ffffff	The digiquartz observation period for the Rovnav MK4 (s)
The following fields contain the statistical data derived from a calibration:			
…	Error Ellipse major axis	f.ffffff	Absolute station error ellipse semi-major axis (m)
…	Error Ellipse minor axis	f.ffffff	Absolute station error ellipse semi-minor (m)
…	Error Ellipse orientation	f.ffffff	Absolute station error ellipse orientation (d)
…	A Posteriori baselines only	f.ffffff	The a posteriori variance factor for the baseline component only
…	Number of Relative Error Ellipses	d	The number of relative error ellipse associated with this station
The following 7 fields are repeated for each relative error ellipse			
…	error ellipse major axis	f.ffffffff	Relative station error ellipse semi-major axis (m)
…	error ellipse minor axis	f.ffffffff	Relative station error ellipse semi-minor axis (m)
…	error ellipse orientation	f.ffffffff	Relative station error ellipse orientation (d)
…	error ellipse easting	f.ffffffff	The Easting that the relative error ellipse is to be drawn graphically.
…	error ellipse northing	f.ffffffff	The Northing that the relative error ellipse is to be drawn graphically.
…	To X	f.ffffffff	The Easting of the station associated with this error ellipse
…	To Y	f.ffffffff	The Northing of the station associated with this error ellipse
The following fields contain the status of the transponder determined by querying the unit. Refer to the manufacturers manual for details.			
…	Reply channel	s	Individual Reply channel
…	range correction	f.fff	Turn around time (ms)
…	Firmware version	s	Firmware version
…	Jitter on	c	MK3: Jitter suppression flag (J=on, x=off MK4: ,not used, set to x

…	Tilted	c	MK3: not used, set to x MK4: indicates if transponder is on it side, J=tilted, x=not tilted
…	Lbl Power	d	Power level used to reply to CIF and IIF interrogations
…	First Telemetry Pulse	d	Power level used for the first pulse of a telemetry reply
…	Telemetry data power	d	Power level used for telemetry pulses after the first
…	Battery type	c	Battery type, N= Nickel Cadmium; A=Alkaline; L=Lithium
…	Battery count	d	Battery count
…	Battery override	c	Low battery override flag, O= On; x=off
…	Battery Count Alarm	c	Battery count alarm flag, B=count has exceeded low battery condition; x=count within tolerance
…	Battery voltage	f.fff	Battery voltage (v)
…	Enabled	c	Transponder enabled flag, E=enabled; D=disabled
…	CIF enabled	c	Transponder enabled to respond to CIF, E=enabled; D=disabled
…	IIF enabled	c	Transponder enabled to respond to IIF, E=enabled; D=disabled
…	USBL enabled	c	Transponder enabled to respond to USBL, E=enabled; D=disabled
…	Gain	d	Transponder receiver gain setting
…	IIF reply mode	s	IIF reply mode, CRF, FSI, RLY or Fnn
…	Wait before transmit	f.fff	Wait before transmission (s)
…	Wait before reply	f.fff	Wait during reception (s)
…	Wait between telemetry	f.fff	Wait during cycle (s)
…	Address	s	Transponder address
…	Simultaneous receiver card	d	Simultaneous receiver card flag, 2=installed; 1=not installed; 0=unknown
…	Power lbl	d	Transponder transmit low power level flag, 1=low power; 2=not low power
…	Time of this status data	f.fff	PC time of latest status query, regardless of type
Static Transceiver Parameters			
…	"~WFRG~Static~ Tcvr~Start"	s	Start of static transceiver settings indicator
…	CRP Latitude	f.ffffffff	Latitude of the CRP of fixed structure transceivers located on (degrees).
…	CRP Longitude	f.ffffffff	Longitude of the CRP of fixed structure transceivers located on (degrees).
…	CRP Depth	f.fff	Depth of the CRP of fixed structure transceivers located on (m).
…	True Orientation	f.ffffffff	True azimuth of fixed structure transceivers located on ((degrees T).
…	Pitch	f.ffffffff	Pitch of fixed structure transceivers located on (degrees).

…	Roll	f.ffffffff	Roll of fixed structure transceivers located on (degrees).
…	Offset forward	f.fff	Fore/aft offset of transceiver from CRP (m)
…	Offset starboard	f.fff	Port/starboard offset of transceiver from CRP (m)
…	Offset Up	f.fff	Vertical offset of transceiver from CRP (m)
…	Transceiver Latitude	f.ffffffff	Latitude of the transceiver (degrees).
…	Transceiver Longitude	f.ffffffff	Longitude of the transceiver (degrees).
…	Transceiver Depth	f.fff	Depth of the transceiver (m).
…	Scale Offsets To Projection	d	Offset scale flag, 1 = scale offsets to map projection (absolute positioning); 0 = do not scale offsets to map projectin (relative positioning)
…	pitchCorrection	f.fff	Pitch correction determined for the transponders inclinometer (degrees).
…	rollCorrection	f.fff	Roll correction determined for the transponders inclinometer (degrees).
…	inclinometerModel	d	Inclinometer model index, 0= MK4 14.5°; 1=MK3 14.5°; 2=MK4 90°; 3=MK4 5°; 4=other
…	inclinometerFactor	f.fff	Scale factor for *other* inclinometer type.

TRANSPONDER TYPES

Code	Transponder Type
0	Fixed LBL Transponder
1	Relay LBL Transponder
2	LBL Responder
3	Simultaneous LBL Transponder
4	Cyclic LBL Transponder
5	Sequential LBL Transponder
6	Static LBL Transceiver
7	Static Simultaneous LBL Transponder
8	Dynamic Array LBL Transponder
9	Synchronized LBL Pinger
10	Fixed USBL Transponder
11	Dynamic USBL Transponder
12	Fixed USBL Pinger
13	Dynamic USBL Pinger
14	Fixed USBL Responder
15	Dynamic USBL Responder
16	Unknown

TRANSPONDER MODELS

Term	Transponder Model
Generic	Generic LBL Transponder or USBL beacon
MK-III	Sonardyne MK3 Compatt LBL transponder
MK-IV	Sonardyne MK4 Compatt LBL transponder
SIMRAD 400	Kongsberg-Simrad USBL beacon
SeaFac	SeaFac LBL transponder

SOUND VELOCITY FILES

Sound velocity file data and data point records are stored as ASCII, free formatted, comma-delimited fields as follows:

SOUND VELOCITY (*.VEL) RECORDS

Field	Data	Format	Comment
1	Type	d	Velocity type (not used, default = 0)
2	Depth	f.fff	Depth[1] (m)
3	Velocity	f.fff	Sound velocity (m/s)

[1] Sign convention for depth in file is negative. Upon loading, all depth values are forced to negative by WinFrog.

WINFROG RAW FILE FORMATS

Raw data files are stored as ASCII, free formatted, comma-delimited fields. Each record begins with a type code and is terminated with a carriage return line feed. The type code consists of three digits, followed by a dash, then the version number for the particular record followed by another dash and the letter W. The three-digit type codes are defined as follows:

TYPE 300 FORMAT

Field	Data	Format	Comment
1	Code	300	Vehicle Navigation Data
2	Vehicle Name	text	
3	Time	Floating Point Number (FPN)	GPS time in seconds of the raw data record
4	Center Latitude	FPN	Latitude of fix at CRP
5	Center Longitude	FPN	Longitude of fix at CRP
6	Center Height	FPN	Elevation of fix at CRP in meters
7	Reference Latitude	FPN	Latitude of fix at Tracked Offset
8	Reference Longitude	FPN	Longitude of fix at Tracked Offset
9	Depth	FPN	Water depth including offset and tide if enabled (m)
10	Heading	FPN	Vessel's heading – filtering and offsets applied if enabled (deg)
11	Course made good	FPN	Vessel's course made good – based on the vessels filtered northerly and easterly velocities (deg)
12	Speed	FPN	Vessel's speed - based on the vessels filtered northerly and easterly velocities (knots)
13	Speed North	FPN	Vessel's filtered northerly velocity (m/s)
14	Speed East	FPN	Vessel's filtered easterly velocity (m/s)
15	Last Data Time	FPN	Time of the previous position data (s) (i.e. the last time the PsnData data items were updated)
16	Position Alarm	Integer	Filtered position status indicator: 0 – Position is good 1 – Position is degraded (i.e. position calculation failed for > 15 seconds) 2 – Position is bad (i.e. position calculation failed for > 30 seconds)
17	Cable Count	FPN	In meters
18	Cable Tension	FPN	In metric tons
19	Cable Count Channel 2	FPN	In meters
20	Cable Tension Channel 2	FPN	In metric tons
21	Cable Burial Depth	FPN	In Centimeters
22	Cable Trench Depth	FPN	In Centimeters; includes trench depth offset
23	Number of Unknowns	Integer	Number of values solved for
24	Matrix[0][0]	FPN	Element 0,0 of the current filter covariance matrix
25	Matrix [0][2]	FPN	Element 0,2 of the current filter covariance matrix

Field	Data	Format	Comment
26	Matrix [1][1]	FPN	Element 1,1 of the current filter covariance matrix
27	Matrix [1][3]	FPN	Element 1,3 of the current filter covariance matrix
28	Matrix [2][2]	FPN	Element 2,2 of the current filter covariance matrix
29	Matrix [3][3]	FPN	Element 3,3 of the current filter covariance matrix
30	Distance To Event	FPN	Approximate dDistance to the next event (metres)
31	Height	FPN	Height above MSL or depth below surface in meters; includes applicable offsets
32	Speed Through Water	FPN	In Knots; not filtered
33	Cable Angle	FPN	Cable angle provided by cable counter device Degrees
34	Cable speed	FPN	Cable speed provided by cable counter (m/s or m/min)
35	Cable speed channel 2	FPN	Cable speed provided by cable counter (m/s or m/min)
36	Jet Knife Angle	FPN	Degrees
37	Jet Knife Depth	FPN	Metres
38	Desired winch speed	FPN	Cable model; m/min
39	Desired Tension	FPN	Cable model; tonnes
40	Depressor angle	FPN	Degrees
41	Stinger angle	FPN	Degrees
42	Cable count channel 3	FPN	Cable count provided by cable counter device metres
43	Cable tension channel 3	FPN	Cable tension provided by cable counter device Tonnes
44	Cable speed channel 3	FPN	Cable speed provided by cable counter (m/s or m/min)
45	Cable count channel 4	FPN	Cable count provided by cable counter device metres
46	Cable tension channel 4	FPN	Cable tension provided by cable counter device Tonnes
47	Cable speed channel 4	FPN	Cable speed provided by cable counter (m/s or m/min)
48	Cable count channel 5	FPN	Cable count provided by cable counter device metres
49	Cable tension channel 5	FPN	Cable tension provided by cable counter device Tonnes
50	Cable speed channel 5	FPN	Cable speed provided by cable counter (m/s or m/min)
51	Pitch	FPN	Degrees
52	Roll	FPN	Degrees
53	Roll Accuracy	FPN	Degrees
54	Pitch Accuracy	FPN	Degrees
55	Heave	FPN	Metres
56	Attitude Status	Integer	0=Good all other numbers=Bad
57	Heading accuracy	FPN	Degrees

Field	Data	Format	Comment
58	Heading flag	FPN	0=no aiding 1=GPS aiding 2=GPS and GAMS aiding
59	Altitude	FPN	Metres. Includes offset
60	Raw Altitude	FPN	Metres. Observed
61	Acoustic Id	Text	Beacon
62	Acoustic Status	Text	Good or Bad
63	Num LBL Observations	Integer	Number of LBL observations used in record
64	RMS of LBL Residuals	FPN	Metres
65	Std. Dev. of LBL Observations	FPN	Metres (root of trace of covariance matrix)
66	Depressor Height	FPN	Metres
67	Attitude update time	FPN	Time attitude data was received (seconds)
68	Depth update time	FPN	Time depth data was received (seconds)
69	Heading update time	FPN	Time heading data was received (seconds)
70	Position accuracy	FPN	Metres
71	Elevation accuracy	FPN	Metres
72*	Cable channel 1 source	Integer	0=Generic device, 1=Plantscape device
73*	Cable channel 2 source	Integer	0=Generic device, 1=Plantscape device
74*	Cable channel 3 source	Integer	0=Generic device, 1=Plantscape device
75*	Cable channel 4 source	Integer	0=Generic device, 1=Plantscape device
76*	Cable channel 5 source	Integer	0=Generic device, 1=Plantscape device
77*	Relative wind speed	FPN	Metres/second
78	Relative wind direction	FPN	Degrees
79	True wind speed	FPN	Metres/second
80	True wind direction	FPN	Degrees
81	Depth of magnetometer	FPN	Metres
82	Altitude of magetometer	FPN	Metres
83	Magnetic field	FPN	nT
84	Tide	FPN	Metres

* Cable channel data source are included in the raw record for the purpose of transferring information to WinFrog Smart Remotes only and are not loaded/supported in Ribbit. Fields 78 to 84 are processed by Ribbit.

Note: Above positions are filtered and are referenced to the working ellipsoid. (300 records sent over sockets to a remote computer have positions reference to WGS84)

Note: FPN = Floating Point Number

TYPE 302 FORMAT

Field	Data	Format	Comment
1	Code	302	GPS Data – NMEA GPGSA message: GPS DOP and active satellites
2	name	Text	Device name
3	fixMode	d	1 – Fix not available 2 – 2D fix 3 – 3D fix
4	heightMode	c	A = Automatics 2D/3D M = Manual, forced to operate in 2D or 3D mode
5	prnUsed[0]	d	GPS satellite tracked on channel 1
6	prnUsed[1]	d	GPS satellite tracked on channel 2
7	prnUsed[2]	d	GPS satellite tracked on channel 3
8	prnUsed[3]	d	GPS satellite tracked on channel 4
9	prnUsed[4]	d	GPS satellite tracked on channel 5
10	prnUsed[5]	d	GPS satellite tracked on channel 6
11	prnUsed[6]	d	GPS satellite tracked on channel 7
12	prnUsed[7]	d	GPS satellite tracked on channel 8
13	prnUsed[8]	d	GPS satellite tracked on channel 9
14	prnUsed[9]	d	GPS satellite tracked on channel 10
15	prnUsed[10]	d	GPS satellite tracked on channel 11
16	prnUsed[11]	d	GPS satellite tracked on channel 12
17	pdop	f.d	Position Dilution Of Precision
18	hdop	f.d	Horizontal Dilution Of Precision
19	vdop	f.d	Vertical Dilution Of Precision

TYPE 303 FORMAT

Field	Data	Format	Comment
1	Code	303-004	GPS Data – NMEA GGA message: Time, GPS fix data, position, and fix related data
2	Name	Text	Device name and the vehicle attached to
3	Time	Floating Point Number (FPN)	PC time in seconds (GPS time if available) the data was read
4	UTC	FPN	UTC time of fix in seconds – read from GGA data string output by the receiver
5	Latitude*	FPN	Latitude of fix DD.DDDDDDDD
6	Longitude*	FPN	Longitude of fix DD.DDDDDDDD
7	Status**	Integer	Fix quality : 0 = invalid 1 = GPS fix 2 = DGPS fix 3 = PPS 4 = RTK (fixed) 5 = RTK (float) 6 = Estimated (dead reckoning) 7 = Manual input 8 = Simulator Other codes may be available depending upon the receiver.
8	Satellites Used**	Integer	Number of satellites used
9	HDOP**	FPN	Horizontal Dilution Of precision
10	Altitude**	FPN	Meters, above mean sea level
11	Geoid Height**	FPN	Height of geoid in meters (mean sea level) above WGS84 ellipsoid
12	DGPS Age**	FPN	time in seconds since last DGPS update
13	Reference Station**	Integer	DGPS station ID number
14	Adjusted Time	FPN	PC time in seconds the position is deskewed to if latency data is available or WinFrog is synchronized to UTC.
15	Code	Integer	Hardware code that position is associated with, e.g. beacon ID if source is USBL or Pod ID if source is Traks.
16	Other Source Error	Integer	If the position source is some other sensor other than a GPS receiver. 0=OK, 1=Bad.
17	Other Source Status String	Integer	If the position source is some other sensor other than a GPS receiver this is that sensor's status string. This is device dependent.
18	Other Source Status Index	Integer	If the position source is some other sensor other than a GPS receiver this is the index to the Position status as decoded within the status string above. This is device dependent.
19	Selected As Primary	Integer	Indicates whether position source was configured as primary, 0 = no, 1 = yes.
20	Used As Primary	Integer	Indicates whether position source was actually used as primary for this epoch, 0 = no, 1 = yes.
21	Northing***	FPN	Northing
22	Easting***	FPN	Easting

*Latitude and longitude read directly from NMEA GGA string output by the GPS receiver unless the device was configured for NAD83, in which case the coordinates here are converted to WGS84.

** Data as read directly from NMEA GGA string output by the GPS receiver

*** The map coordinates are generated from the latitude and longitude when observed. They are on the datum and map projection, including the selected units (i.e. meters, feet etc.), currently selected when the coordinates were received. They are of the antenna, no offset is applied.

TYPE 304 FORMAT

Field	Data	Format	Comment
1	Code	304	GPS Data – NMEA GPGSV message: GPS satellites in view
2	name	text	Device name
3	satCount	dd	Number of satellites used
4	prn	d	Unique satellite identification (satellite PRN number)
5	sn	d	Signal to noise ratio
6	elev	d	Of satellite above the horizon, degrees, 90 degree maximum
7	azimuth	d	Of satellite, degrees True, 000 to 359

** prn, sn, elev, and azimuth are repeated for each Satellite used

TYPE 305 FORMAT

Field	Data	Format	Comment
1	Code	305	GPGPS Data
2	name	text	Device name
3	satCount*	dd	Number of satellites used
4	prn*	dd	Unique satellite identification number of a tracked GPS satellite
5	rangeRes*	d	Range residual (m)
6	hres*	f.d	Horizontal position residual (m)
7	vres*	f.d	Vertical position residual (m)

* data read directly from data string output by the GPS receiver

** PRN and RangeRes are repeated for each satellite used

TYPE 306 FORMAT

Field	Data	Format	Comment
1	Code	306	GPS Data – NMEA GPGST message: Position Error Statistics
2	name	text	Device name
3	time	f.dd	PC time in seconds
4	utc	f.dd	Time of fix in seconds – read from GST data string output by the receiver
5	rms*	f.d	RMS value of the pseudorange residuals
6	smjrA*	f.d	Error ellipse semi-major axis 1 sigma error (meters)
7	smjrB*	f.d	Error ellipse semi-minor axis 1 sigma error (meters)
8	smjrOrient*	f.d	Error ellipse orientation (degrees from true north)
9	latStd*	f.d	Latitude 1 sigma error (meters)
10	lonStd*	f.d	Longitude 1 sigma error (meters)
11	altStd*	f.d	Altitude 1 sigma error (meters)

* data read directly from data string output by the GPS receiver

TYPE 307 FORMAT

Field	Data	Format	Comment
1	Code	307	GPS UKO data
2	name	ssss	device name
3	altitudeReferenceDatum*	c	altitude reference datum
4	dataReceivedTime	f.dd	PC time in seconds (GPS time if available) the position data was read
5	dataAge*	f.dd	Data age
6	dataCorrectedTime	f.dd	dataReceivedTime – dataAge
7	utc*	f.dd	UTC time output by the device
8	numberOfRefStns*	d	Number of reference stations used
9	refStnIDs[0]*	d	Reference Station ID
10	refStnIDs[1]*	d	Reference Station ID
11	refStnIDs[2]*	d	Reference Station ID
12	refStnIDs[3]*	d	Reference Station ID
13	refStnIDs[4]*	d	Reference Station ID
14	refStnIDs[5]*	d	Reference Station ID
15	refStnIDs[6]*	d	Reference Station ID
16	refStnIDs[7]*	d	Reference Station ID
17	refStnIDs[8]*	d	Reference Station ID
18	refStnIDs[9]*	d	Reference Station ID
19	unitVariance*	f.ddd	Unit variance
20	fTestResult*	d	1 = Pass 0 = Fail
21	svIDFailedWTest*	ssss	SV W-test status
22	LMDE*	f.dd	LMDE
23	svID_LMDE	ssss	SV used for LMDE calculation

* data read directly from data string output by the device

TYPE 308 FORMAT

Field	Data	Format	Comment
1	Code	308	GPS DTM data
2	name	ssss	device name
3	time	f.d	PC time in seconds (GPS time if available) the position data was read
4	localDatumCode	ssss	W84 or 999
5	localDatumSubdivisionCode	c	
6	latitudeOffset	f.dddddd	
7	longitudeOffset	f.dddddd	
8	altitudeOffset	f.dddddd	
9	referenceDatumCode	ssss	

TYPE 309 FORMAT

Field	Data	Format	Comment
0	Code	309-005-W	USBL Data (Beacon)
1	name	Text	Operator entered device name
2	usblPitch	Floating Point Number (FPN)	Pitch of reference vessel in degrees, interpolated from the attitude datatype associated with the same vehicle.
3	usblRoll	FPN	Roll of reference vessel in degrees, interpolated from the attitude datatype associated with the same vehicle.
4	time	FPN	WinFrog time (seconds) the USBL data is valid for, currently the same as the data reception time stamp
5	code	Text	Beacon code
6	x	FPN	Raw USBL X value (meters)
7	y	FPN	Raw USBL Y value (meters)
8	z	FPN	Raw USBL Z value (meters), note this is negative for below hydrophone, positive for above hydrophone (possible when device is a surface rho/theta type)
9	status code	Text	Data error code direct from USBL system
10	error condition	Text	Error condition, options are no error condition (=0), error condition exists (=1) and warning condition (=2)
11	signal receive time	FPN	WinFrog timestamp in seconds for the USBL data telegram reception by WinFrog.
12	hydrophone time	FPN	WinFrog time in seconds that the hydrophone position is to be deskewed to, currently the same as the data reception timestamp
13	centerEasting	FPN	Calculated beacon vehicle CRP position map projection Easting (meters)
14	centerNorthing	FPN	Calculated beacon vehicle CRP position map projection Northing (meters)
15	CenterHeight	FPN	Calculated beacon vehicle CRP position height relative to water surface, i.e. below water surface is negative (meters)
16	RelativeUSBL EastCorrection	FPN	The correction applied to the surface navigation derived CRP position Easting to produce a Relative USBL based position (meters)
17	RelativeUSBLNorth Correction	FPN	The correction applied to the surface navigation derived CRP position Northing to produce a Relative USBL based position (meters)
18	slantRange	FPN	Slant range from the hydrophone head to the beacon, not corrected for vessel attitude. Note that this is decoded from the USBL telegram, not calculated. If the data is not directly available, this will be ‘0’.

19	twtt	FPN	Two-Way-Travel-Time for signal from hydrophone head to the beacon (ms)
20	heading	FPN	Heading decoded from the USBL system, relevant to the data epoch. (decimal degrees)
21	pitch	FPN	Pitch decoded from the USBL system, relevant to the data epoch. (decimal degrees)
22	roll	FPN	Roll decoded from the USBL system, relevant to the data epoch. (decimal degrees)
23	age	FPN	Age of data as decoded from the USBL system (s)
24	status	Text	Status of data as received from the USBL system, system dependent.
25	Ray bending	Integer	0 = Off 1 = On
26	Beacon data type	Integer	0 = Direction cosines 1 = XYZ
27	Athwart ships direction cosine	FPN	- Starboard
28	Along ships direction cosine	FPN	+ Fore
29	Travel time	FPN	Milliseconds Turn around time not removed
30	Corrected Heading	FPN	Heading from USBL with calibration value applied (decimal degrees)

TYPE 312 FORMAT

Field	Data	Format	Comment
0	Code	312-005-W	USBL Data (transceiver)
1	name	Text	Operator entered device name
2	usblPitch	Floating Point Number (FPN)	Pitch of reference vessel in degrees, interpolated from the attitude datatype associated with the same vehicle.
3	usblRoll	FPN	Roll of reference vessel in degrees, interpolated from the attitude datatype associated with the same vehicle.
4	time	FPN	WinFrog time (seconds) the USBL data is valid for, currently the same as the data reception time stamp
5	code	Text	Beacon code
6	x	FPN	Raw USBL X value (meters)
7	y	FPN	Raw USBL Y value (meters)
8	z	FPN	Raw USBL Z value (meters), note this is negative for below hydrophone, positive for above hydrophone (possible when device is a surface rho/theta type)
9	status code	Text	Data error code direct from USBL system
10	error condition	Text	Error condition, options are no error condition (=0), error condition exists (=1) and warning condition (=2)
11	signal receive time	FPN	WinFrog timestamp in seconds for the USBL data telegram reception by WinFrog.

12	hydrophone time	FPN	WinFrog time in seconds that the hydrophone position is to be deskewed to, currently the same as the data reception timestamp.
13	Mode	Integer	
14	Easting	FPN	Transceiver position
15	Northing	FPN	Transceiver position
16	Height	FPN	Transceiver position
17	Relative Positioning	Integer	0=No 1=Yes
18	Relative correction East	FPN	If the relative positioning is enabled then this is the correction applied
19	Relative correction North	FPN	If the relative positioning is enabled then this is the correction applied
20	slantRange	FPN	Slant range from the hydrophone head to the beacon, not corrected for vessel attitude. Note that this is decoded from the USBL telegram, not calculated. If the data is not directly available, this will be '0'.
21	twtt	FPN	Two-Way-Travel-Time for signal from hydrophone head to the beacon (ms)
22	heading	FPN	Heading decoded from the USBL system, relevant to the data epoch. (decimal degrees)
23	pitch	FPN	Pitch decoded from the USBL system, relevant to the data epoch. (decimal degrees)
24	roll	FPN	Roll decoded from the USBL system, relevant to the data epoch. (decimal degrees)
25	age	FPN	Age of data as decoded from the USBL system (s)
26	status	Text	Status of data as received from the USBL system, system dependent.
27	Ray bending	Integer	0 = Off 1 = On
28	Beacon data type	Integer	0 = Direction cosines 1 = XYZ
29	Athwart ships direction cosine	FPN	- Starboard
30	Along ships direction cosine	FPN	+ Fore
31	Travel time	FPN	Milliseconds Turn around time not removed
32	Corrected Heading	FPN	Heading from USBL with calibration value applied (decimal degrees)

TYPE 313 FORMAT

Field	Data	Format	Comment
1	Code	313	Transponder Data
2	name	text	Device name
3	time	Floating Point Number (FPN)	GPS time (seconds) the LBL data was read
4	lat	FPN	Latitude of transponder DD.DDDDDDDD
5	lon	FPN	Longitude of transponder DD.DDDDDDDD

TYPE 314 FORMAT

Field	Data	Format	Comment
1	Code	314-001-W	Point-to-point vector from GPS calculation
2	name	Text	Device name and vehicle associated with
3	dUseThisTime	Floating Point Number (FPN)	PC time used for calculation
4	dWinFrogTime	FPN	PC time of data reception
5	dDecodeTime	FPN	PC time as decoded from device (UTC)
6	iVectorStatus	Integer	Vector status: 0x00 Good, 0x01 Warning, 0x02 Bad, 0x80 Unknown
7	dAzimuth	FPN	Vector azimuth (degrees)
8	dDistance	FPN	Vector range (metres)
9	dDeltaHeight	FPN	Vector delta height (metres)
10	dCartesianX	FPN	Vector Cartesian dX
11	dCartesianX	FPN	Vector Cartesian dY
12	dCartesianX	FPN	Vector Cartesian dZ
13	dStdDevX	FPN	Vector X/Lon standard deviation (metres)
14	dStdDevY	FPN	Vector Y/Lat standard deviation (metres)
15	dStdDevZ	FPN	Vector Z/Ht standard deviation (metres)

TYPE 315 FORMAT

Field	Data	Format	Comment
1	Code	315	Sonardyne acoustic message data (Beacon)
2	name	Text	Device name
3	Message name	Text	6.1 (message identifier)
4	WinFrog time	Floating Point Number (FPN)	Time received
5	Telegram tx time	FPN	Time in telegram
6	Fix number	Integer	Message identifier
7	Tx transceiver index	Integer	Interrogating transceiver
8	Rx tranceiver Index	Integer	Receiving transceiver
9	Beacon index	Integer	Beacon code
10	Signal tx time	FPN	The time at which the interrogation was sent to the transponder
11	Signal rx time	FPN	The time at which the reply was received from the transponder
12	Rx pitch	FPN	The pitch angle of the ship at the time of the reply from the transponder. Sign convention: Bows up = +ve
13	Rx roll	FPN	The roll angle of the ship at the time of the reply from the transponder. Sign convention: Starboard down = +ve
14	Rx heading	FPN	The ship's heading at the time of the reply from the transponder
15	Signal travel time	FPN	The time between the interrogation and the reply. This time includes any turn around time in the transponder
16	Athwart ships direction cosine	FPN	The athwart ships direction cosine from the receiving transceiver to the transponder. This direction has been stabilized by VRU to a level reference
17	Along ships direction cosine	FPN	The fore/aft direction cosine from the receiving transceiver to the transponder. This direction has been stabilized by VRU to a level reference
18	Qb Sum	FPN	A measure of the quality of the direction data. A larger number is worse. There are 8 samples taken within each acoustic observation. The figure is the mean of the samples with Qbsum better than 0.025
19	Rx Signal Magnitude1	Integer	For 19 to 26 The magnitude of the received signal for each of the 8 samples in arbitrary units. 0-2048
20	Rx Signal Magnitude2	Integer	
21	Rx Signal Magnitude3	Integer	
22	Rx Signal Magnitude4	Integer	
23	Rx Signal Magnitude5	Integer	
24	Rx Signal Magnitude6	Integer	

25	Rx Signal Magnitude7	Integer	
26	Rx Signal Magnitude8	Integer	
27	Ray Bending	Integer	Was it enabled when data was observed 0 = No 1 = Yes

TYPE 316 FORMAT

Field	Data	Format	Comment
1	Code	316-001-W	Sonardyne acoustic message data (Transceiver)
2	name	Text	Device name
3	time	Floating Point Number (FPN)	WinFrog time (seconds) the USBL data is valid for, currently the same as the data reception time stamp
4	code	Text	Beacon code
5	x	FPN	Raw USBL X value (meters)
6	y	FPN	Raw USBL Y value (meters)
7	z	FPN	Raw USBL Z value (meters), note this is negative for below hydrophone, positive for above hydrophone (possible when device is a surface rho/theta type)
8	status code	Text	Data error code direct from USBL system
9	error condition	Text	Error condition, options are no error condition (=0), error condition exists (=1) and warning condition (=2)
10	signal receive time	FPN	WinFrog timestamp in seconds for the USBL data telegram reception by WinFrog.
11	hydrophone time	FPN	WinFrog time in seconds that the hydrophone position is to be deskewed to, currently the same as the data reception timestamp.

TYPE 319 FORMAT

Field	Data	Format	Comment
1	Code	319-001-W	AIS telegram (!AIVDM or !AIVDO) messages 1, 2, 3, and 5
2	name	Text	Device name
3	time	Floating Point Number (FPN)	WinFrog time (seconds) the dtat was received
4	index	Integer	Index of this vessel in the WinFrog array
5	Name	Text	Vessel name if received
6	MMSI	Integer	MMSI number of the vessel
7	IMO	Integer	IMO number of the vessel if received
8	status code	Integer	See NMEA 0183 for status definitions
9	latitude	FPN	Reported latitude if available decimal degrees (note 0 may indicate unavailable)
10	Longitude	FPN	Reported longitude if available decimal degrees (note 0 may indicate unavailable)
11	Northing	FPN	Northing in current map projection system
12	Eastimg	FPN	Easting in current map projection system
13	Heading	FPN	Reported heading if available decimal degrees (note 0 may indicate unavailable)
14	Speed	FPN	Reported Speed if available knots (note 0 may indicate unavailable)
15	COG	FPN	Reported course over ground if available decimal degrees (note 0 may indicate unavailable)

TYPE 323 FORMAT

Field	Data	Format	Comment
1	Code	323	Generic Data
2	name	Text	Device Name

TYPE 350 FORMAT

Field	Data	Format	Comment
1	Code	350	Vehicle Event Data
2	vehicle	Text	Vehicle name
3	evtType	Text	“Timed Event On”, “Distance Event On”, or “Event Off”

TYPE 351 FORMAT

Field	Data	Format	Comment
1	Code	351	Vehicle Event Position Data Version 2
2	vehicle	Text	Vehicle name
3	event	Integer	Event number
4	lat	Floating Point Number (FPN)	Latitude of fix at tracked offset
5	lon	FPN	Longitude of fix at tracked offset
6	time	FPN	Event time (GPS time in seconds)
7	depth	FPN	Water depth including offset and tide if enabled (m)
8	cmg	FPN	Vessel's course made good in degrees – based on the vessels filtered northerly and easterly velocities
9	speed	FPN	Vessel's speed in knots - based on the vessels filtered northerly and easterly velocities
10	Heading	FPN	Vessel's heading

Note: Above positions are filtered and are referenced to the working ellipsoid.

TYPE 352 FORMAT

Field	Data	Format	Comment
1	Code	352	Event Data
2	vehicle	text	Vehicle name
3	time	f.dd	PC time in seconds (GPS time if available) of the event
4	number	d	Event number
5		d	1
6	lat	[-]dd.mmmmmmmm	Latitude of fix at Tracked Offset
7	lon	[-]ddd.mmmmmmmm	Longitude of fix at CRP
8	height	f.dd	Height above MSL or depth below surface in meters; includes applicable offsets
9	depth	f.dd	Water depth including offset and tide if enabled (m)
10	offLine	f.dd	Offline distance (m)
11	alongLine	f.dd	Alongline distance (m)
12	heading	f.dd	Vessel's heading in degrees – filtering and offsets applied if enabled
13	cmg	f.dd	Vessel's course made good in degrees – based on the vessels filtered northerly and easterly velocities
14	speed	f.dd	Vessel's speed in knots - based on the vessels filtered northerly and easterly velocities
15	rms	f.dd	
16	offsetName	ssss	Current tracked offset
17	vehicle	ssss	vehicle name
18	kP	f.dd	Current kilometer post
19	cableCount	f.dd	Current cable count (m)
20	cableTension	f.dd	Current cable tension (T)
21	cableSpeed	f.dd	Current cable payout speed (m/min)
22	cableAngle	f.dd	Current cable angle (deg)
23	burialDepth	f.dd	Current cable burial depth (cm)

- above positions are filtered

TYPE 353 FORMAT

Field	Data	Format	Comment
1	Code	353	Vehicle Position Data
2	vehicle	text	Vehicle name
3	missEvents	text	"Missed Events dd to dd"

TYPE 372 FORMAT

Field	Data	Format	Comment
1	Code	372	Elevation Data
2	device	text	Device name
3	time	f.dd	PC time in seconds (GPS time if available) the data was read
4	elev	f.dd	Elevation output from device in meters
5	status	d	0 – invalid data 1 – valid data
6	centerElev	f.dd	Elevation value adjusted by the sensor offsets (in meters)
7	rawData	f.dddddd	Raw pressure reading from device in PSI
8	temperature	f.dd	Temperature reading from device in Celsius
9	relativeHumidity	f.ddd	Relative Humidity reading from device

TYPE 373 FORMAT

Field	Data	Format	Comment
1	Code	373	Wind Data
2	device	text	Device Name
3	time	f.dd	PC time in seconds (GPS time if available) the data was read
4	Speed	f.dd	Wind speed in specified units (field 6)
5	Direction	f.d	Wind direction (relative or true specified in field 7)
6	Units		Wind speed units
7	Type		Wind direction type (relative or true)
8	Status	Character	Status (‘A’ or ‘V’)

TYPE 374 FORMAT

Field	Data	Format	Comment
1	Code	374	Wind Data
2	Device	Text	Device Name
3	Time	Floating Point Number (FPN)	PC time in seconds (GPS time if available) the data was read
4	Ship speed	FPN	Ship Speed in Knots
5	Ship Heading	FPN	Ship Heading (True)
6	Wind Speed true	FPN	In units specified in field 7
7	Wind Speed Units	Text	Knots
8	Wind Direction True	FPN	Degrees
9	Relative wind speed (apparent)	FPN	In units specified in field 10
10	Wind Speed Units	Text	Knots
11	Relative wind direction (apparent)	FPN	Degrees
12	Wind Direction Type	Text	“Rel” If the observed data was relative and the true data was calculated. “True” If the observed data was true and the relative data was calculated.
13	Status	Character	Status (‘A’ = valid, ‘V’ = not valid or “-“ status not available)

TYPE 375 FORMAT

Field	Data	Format	Comment
1	Code	375	Altitude record
2	Name	Text	Device Name
3	Time	Floating Point Number (FPN)	PC timestamp of data in seconds
4	Altitude	FPN	Sensor (raw) altitude
5	Altitude	FPN	CRP (reduced) altitude

TYPE 376 FORMAT

Field	Data	Format	Comment
1	Code	376-001-W	Special Elevation record
2	Name	Text	Device name and associated vehicle
3	Raw Data Time	Floating Point Number (FPN)	Raw data epoch in WinFrog time (seconds)
4	Sensor Depth Data	FPN	Raw depth sensor data (metres)
5	Sensor Elevation	FPN	Calculated elevation of sensor

TYPE 377 FORMAT

Field	Data	Format	Comment
1	Code	377-001-W	Special Elevation record
2	Name	Text	Device name and associated vehicle
3	Raw Data Time	Floating Point Number (FPN)	Raw data epoch in WinFrog time (seconds)
4	Sensor Depth Data	FPN	Raw depth sensor data (metres)
5	Injector DOB Mode	Integer	Burial depth mode (0=off, 1=using reference water depth, 2=using DTM seafloor depth)
6	DOB Flag	Integer	Burial depth status flag (0=calculation failed, if using water depth due to missing reference water depth, if using DTM due to DTM query failure, 1=OK)
7	Burial Depth	FPN	Calculated burial depth (cm, calculated by device)
8	Injector Elev Mode	Integer	Elevation mode (0=off, 1=elevation of cable, 2=elevation of trench bottom)
9	Elev Flag	Integer	Sensor elevation status flag (0=failed due to missing reference elevation, 1=OK)
10	Sensor Elevation	FPN	Calculated sensor elevation (metres)
11	Corrected Elevation	FPN	Corrected elevation, sensor elevation with vertical offset applied
12	Log North	FPN	CRP Northing (metres) used for DTM query, if positions not available from this data item (e.g. position data age is > 10 seconds) or if DTM not queried, this term is 0
13	Log East	FPN	CRP Easting (metres) used for DTM query, if positions not available from this data item (e.g. position data age is > 10 seconds) or if DTM not queried, this term is 0
14	Seafloor Depth Flag	Integer	Seafloor status flag (0=failure of DTM query, 1=OK)
15	Seafloor Depth	FPN	Seafloor depth from DTM (metres)

TYPE 380 FORMAT

Field	Data	Format	Comment
1	Code	380	Tide Data
2	name	Text	Device Name
3	time	Floating Point Number (FPN)	PC time in seconds (GPS time if available) the data was read
4	tide*	FPN	Tide level (m)
5	status*	Integer	0 = Bad Data 1 = Good Data

*data output directly from the device

TYPE 390 FORMAT

Field	Data	Format	Comment
1	Code	390	Dynamic Tracking and Pipe Catenary Data
2	PIPE CATENARY	Text	PIPE CATENARY
3	time	Floating Point Number (FPN)	PC time in seconds (GPS time if available) the data was read
4	Vehicle Name	Text	Vehicle that data is measured **from**
5	Index	Integer	If 6 is Yes then this is an index to the "from vehicle" offset list that is the reference point on the "from vehicle"
6	Use manual offset point or one from the list of the "from vehicles"	Text	Yes= Use reference point from offset list. No = Use manual entered values for reference point
7	Offset Port/Starboard	FPN	Reference point offset on "From Vehicle"
8	Offset Fore/Aft	FPN	Reference point offset on "From Vehicle"
9	Offset Up/Down	FPN	Reference point offset on "From Vehicle"
10	Index	Integer	If 11 is Yes then this is an index to the "to vehicle" offset list that is the reference point on the "to vehicle"
11	Use manual offset point or one from the list of the "to vehicles"	Text	Yes= Use reference point from offset list. No = Use manual entered values for reference point
12	Offset Port/Starboard	FPN	Reference point offset on "To Vehicle"
13	Offset Fore/Aft	FPN	Reference point offset on "To Vehicle"
14	Offset Up/Down	FPN	Reference point offset on "To Vehicle"
15	Offset name, "from vehicle"	Text	Name of offset point used on this vehicle if field 11 is yes
16	Offset name, "to vehicle"	Text	Name of offset point used on this vehicle if field 11 is yes
17	Vehicle name	Text	Vehicle that data is measured **to**
18	Northing "from vehicle"	FPN	Northing of reference point on vehicle
19	Easting "from vehicle"	FPN	Easting of reference point on vehicle
20	Height "from vehicle"	FPN	Height of reference point on vehicle
21	Northing "to vehicle"	FPN	Northing of reference point on vehicle
22	Easting "to vehicle"	FPN	Easting of reference point on vehicle
23	Height "to vehicle"	FPN	Height of reference point on vehicle
24	Index	Integer	Index of this dynamic target pairs (1 to 5)
25	Calculate pipe catenary	Text	Yes or No
26	Touch down depth source	Integer	0 = the water depth assigned to the ROV will be used for the catenary calculation. 1 = that the operator entered a manual value (field 27) will be used for the catenary calculation.

			2 = the depth assigned to the ROV will be used for the catenary calculation.
27	Manually entered depth	FPN	Depth the operator entered
28	Catenary depth	FPN	Depth used for catenary calculation
29	Layback	FPN	Distance between “from vehicle’s” reference point and “to vehicle’s” reference point to calculate catenary
30	Length	FPN	Calculated length of pipe to touch down
31	Angle	FPN	Calculated angle of pipe at the “from vehicle”
32	Water depth offset	FPN	Offset entered by operator which is added to the ROV’s water depth to get the vertical value for the catenary calculation. Used when item 26 = 1.
33	ROV altitude zero	Text	Yes or No **Yes means** that the altitude from the ROV device is zero indicating the water depth is bad. If the manual depth is used then this is always no. **No means** that the altitude from the ROV device is non-zero.
34	ROV depth offset	FPN	Offset entered by operator which is added to the ROV’s depth to get the vertical value for the catenary calculation. Used when item 26 = 2.

TYPE 400 FORMAT

Field	Data	Format	Comment
1	Code	400-002-W	Record identifier, version and source
2	Name	Text	Device name and vehicle it is associated with
3	Time	Floating Point Number (FPN)	WinFrog time stamp – PC time (seconds)
4	Time	FPN	UTC time from data message
5	Time	FPN	WinFrog time stamp – milliseconds
6	System Mode	Integer	System mode status[1]
7	Navigation Status	Integer	Navigation Monitor status[1]
8	Latitude	FPN	Latitude output by device (degrees)
9	Longitude	FPN	Longitude output by device (degrees)
10	Depth	FPN	Depth output by device (m)
11	Altitude	FPN	Altitude output by device (m)
12	Roll	FPN	Roll output by device (degrees)
13	Pitch	FPN	Pitch output by device (degrees)
14	Heading	FPN	Heading output by device (degrees)
15	Velocity north	FPN	Velocity North output by device (m/s)
16	Velocity east	FPN	Velocity East output by device (m/s)
17	Velocity down	FPN	Velocity Down output by device (m/s)
18	Acceleration X	FPN	Acceleration North (m/s^2)
19	Acceleration Y	FPN	Acceleration East (m/s^2)
20	Acceleration Z	FPN	Acceleration down (m/s^2)
21	Roll rate	FPN	Rate of Roll output by device (degrees/s) Starboard down positive
22	Pitch rate	FPN	Rate of Pitch output by device (degrees/s) Bow up positive
23	Heading rate	FPN	Rate of Heading output by device (degrees/s)
24	Position X sigma	FPN	Latitude sigma output by device (m)
25	Position Y sigma	FPN	Longitude sigma output by device (m)
26	Position Z sigma	FPN	Depth sigma output by device (m)
27	Velocity X sigma	FPN	Velocity North sigma output by device (m/s)
28	Velocity Y sigma	FPN	Velocity East sigma output by device (m/s)
29	Velocity Z sigma	FPN	Velocity Down sigma output by device (m/s)
30	Latitude	FPN	Latitude input to device (degrees)
31	Longitude	FPN	Longitude input to device (degrees)
32	Depth	FPN	Depth input to device (m)
33	Salinity/Speed of sound	FPN	Salinity (ppt) or speed of sound (m/s) input to the device
34	Position quality	FPN	Position quality input to the device (m)
35	Time	FPN	Not used, always 0
36	Control	Integer	Control byte input to the device[1]
37	Data Validity	Integer	Data validity input to the device[1]
38	Mode control	Integer	Device mode settings[1]
39	Observation rejection	Integer	Device observation rejection information[1]
40	Cycles	Integer	Device processing cycles since last position update[1]

TYPE 401 FORMAT

Field	Data	Format	Comment
1	Code	401	Inertial Data
2	Name	Text	Inertial device name (name of vehicle data is associated with)
3	Time	Floating Point Number (FPN)	Record base PC time in seconds
4	Count	Integer	Number of epochs in record
5	Delta Time	FPN	Delta time from base time in seconds for data epoch
6	Fore/Aft	FPN	Raw fore/aft velocity in m/s
7	Port/Stbd	FPN	Raw port/starboard velocity in m/s
8	Up/Down	FPN	Raw up/down velocity in m/s
9	Status	Integer	Data status: 0 = Valid >0 = Not Valid

Note: Items 5 through 9 may be repeated giving a total of “Count” epochs.

TYPE 402 FORMAT

Field	Data	Format	Comment
1	Code	402	Speed Log Data
2	Name	Text	Speed log name
3	Time	Floating Point Number (FPN)	PC time in seconds (GPS time if available) the data was read
4	foreAft	FPN	Filtered fore/aft velocity in m/s
5	portStbd	FPN	Filtered port/stbd velocity in m/s
6	rUpDown	FPN	Raw up/down velocity in m/s
7	rforeAft	FPN	Raw fore/aft velocity in m/s
8	rPortStbd	FPN	Raw port/stbd velocity in m/s
9	wForeAft	FPN	Raw fore/aft speed thru water in m/s
10	wPortStbd	FPN	Raw port/stbd speed thru water in m/s
11	wUpDown	FPN	Raw up/down speed thru water in m/s
12	status	Integer	Data status: 0 – data relative to memory 1 – data relative to water 2 – data relative to bottom
13	Apply alignment correction	FPN	0 = no, 1 = yes
14	Alignment correction	FPN	degrees
15	Corrected Fore/aft	FPN	meters
16	Corrected Port/stbd	FPN	meters

TYPE 403 FORMAT

Field	Data	Format	Comment
1	Record ID and version	403-ddd-W	ddd is record version
2	name	s	Name of the associated device
3	time	f.fff	PC time of data epoch
4	data_format	d	Data format as configured at the device level: 0 Metric, 1 Marine, 2 English (see comments)
5	sample_time	f	Time decoded from data telegram and converted to PC time, no decimal place of seconds
6	water_velocity_beam1_X	f.ff	F/A through water velocity (beam 1), positive to bow
7	water_velocity_beam2_Y	f.ff	P/S through water velocity (beam 2), positive to port
8	water_velocity_beam3_Z	f.ff	Vertical through water velocity (beam 3)
9	water_velocity_status	d	Velocity status, 0 bad, 1 good
10	bottom_velocity_beam1_X	f.ff	F/A bottom lock velocity (beam 1), positive to bow
11	bottom_velocity_beam2_Y	f.ff	P/S bottom lock velocity (beam 2), positive to port
12	bottom_velocity_beam3_Z	f.ff	Vertical bottom lock velocity (beam 3)
13	bottom_velocity_status	d	Bottom lock velocity status, 0 bad, 1 good
14	range_to_bottom_beam1	f.ff	Range to bottom beam 1
15	range_to_bottom_beam2	f.ff	Range to bottom beam 2
16	range_to_bottom_beam3	f.ff	Range to bottom beam 3
17	amplitude_beam1	f	Amplitude of beam 1
18	amplitude_beam2	f	Amplitude of beam 2
19	amplitude_beam3	f	Amplitude of beam 3
20	percent_good_pings	d	Percentage of good returns
21	heading	f.ff	Heading (magnetic, degrees)
22	pitch	f.ff	Pitch (degrees), positive bow up
23	roll	f.ff	Roll (degrees), positive stbd up
24	mean_temperature	f.ff	Mean temperature over observation period
25	mean_pressure	f.ff	Mean temperature over observation period
26	input_power_level	f.f	
27	starting_location_sample_vertical	f.f	Start of the water column that the through water velocity data is sampled, relative to the head.
28	ending_location_sample_vertical	f.f	End of the water column that the through water velocity data is sampled, relative to the head.
29	distance_travel_X	f.f	Distance travelled in X axis during sampling
30	distance_travel_Y	f.f	Distance travelled in Y axis during sampling
31	calculated_depth	f.ff	Depth calculated from pressure observation. using either UNESCO or average water density formula, metres

TYPE 408 FORMAT

Field	Data	Format	Comment
1	Code	408	Gyro Data version 1
2	Name	text	Device name
3	Time	Floating point number	PC time in seconds (GPS time if available) the data was read (time of first heading record in data string)
4	6	Integer	Constant used by Ribbit
5	5	Integer	Constant used by Ribbit
6	Count	Integer	Number of observations in this record. Maximum 15.
7	Heading	Floating point number	Raw heading output from device (in degrees)
8	Status	Integer	From the device, set to zero if the device doesn't supply a status
9	Time difference	Floating point number	Difference in time of this observation from the timein field 3 (in seconds)
10	Accuracy	Floating point number	From the device , set to zero if the device doesn't supply an accuracy
11	Flag	Integer	From the device , set to zero if the device doesn't supply a flag

Note: items 7 through 11 may be repeated giving a total of "count" observation sets.

TYPE 409 FORMAT

Field	Data	Format	Comment
1	Code	409	Gyro Data version 3 This gyro record will appear if raw data is recorded **at** events as opposed to **always** or **with** events.
2	Name	text	Device name
3	Time	Floating point number	PC time in seconds (GPS time if available) the data was read (time of first heading record in data string)
4	Heading	Floating point number	Raw heading output from device (in degrees)
5	Status	Integer	From the device, set to zero if the device doesn't supply a status
6	Accuracy	Floating point number	From the device , set to zero if the device doesn't supply an accuracy
7	Flag	Integer	From the device , set to zero if the device doesn't supply a flag
8	Operator usage	Integer	0 = used as secondary 1 = used as prime heading source

TYPE 410 FORMAT (OBSOLETE)

Field	Data	Format	Comment
1	Code	410	Gyro Data version 2
2	name	text	Device name
3	time	f.dd	PC time in seconds (GPS time if available) the data was read (time of first heading record in data string)
4	heading	f.d	Raw heading output from device (in degrees)
5	status	d	
6	dTime	f.dd	Delta time from first time field (in seconds)

**heading, status, and dTime are repeated 15 times; if record was written when eventing was stopped and raw data was being logged With Events the record is padded with heading, status and dTime values of 0 to ensure it contains the appropriate number of fields for 15 data epochs.

TYPE 411 FORMAT

Field	Data	Format	Comment
1	Code	411	Echo Sounder Data
2	name	Text	Device name (_Transducer Name)
3	time	Floating point number	PC time in seconds (GPS time if available) the data was read (time of first depth record in data string)
4	depth	Floating point number	Depth read from device in meters
5	status	Integer	Device dependent generally 0 = bad data
6	dTime	Floating point number	Delta time from first time field (in seconds)

**depth, status, and dTime are repeated 15 times; if record was written when eventing was stopped and raw data was being logged With Events the record is padded with depth, status and dTime values of 0 to ensure it contains the appropriate number of fields for 15 data epochs.

TYPE 413 FORMAT

Field	Data	Format	Comment
1	Code	413 version 3	Attitude data
2	name	Text	Device name
3	time	Floating point number	PC time in seconds (GPS time if available) the data was read
4	pitch	Floating point number	Calculated pitch (degrees)
5	roll	Floating point number	Calculated roll (degrees)
6	status	Integer	0 = valid data 1 = invalid data
7	Roll Accuracy	Floating point number	m
8	Pitch Accuracy	Floating point number	m
9	Heave	Floating point number	m
10	Status Code	Integer	Device specific code
11	Pitch Rejected	Integer	0 = pitch not filtered out 1 = pitch rejected by filter
12	Roll Rejected	Integer	0 = roll not filtered out 1 = roll rejected by filter

Note: If logging raw data using **With Events** or **Always**, all attitude data is logged to the raw file. If logging raw data using **At Events**, only the last attitude data received is logged to the raw file.

TYPE 420 FORMAT

Field	Data	Format	Comment
1	Code	420	LBL Hydrophone Data
2	name	text	Device name
3	time	f.dd	PC time in seconds (GPS time if available)
4	sensorNorth	f.d	Hydrophone Northing (m)
5	sensorEast	f.d	Hydrophone Easting (m)
6	sensorHeight	f.d	Hydrophone height (m)
7	solRms	f.d	Solution RMS
8	lastSolutionStatus	dd	Last solution status
9	txCode	Text	Hydrophone tx code
10	ducerNum	ddd	Hydrophone number

**txCode repeated for each Hydrophone

TYPE 421 FORMAT

Field	Data	Format	Comment
0	Code	421-001-W	LBL Data
1	Name	text	Device name
2	Time	f.dd	PC time in seconds (GPS time if available)
3	sensorNorth	f.d	Transponder northing (m)
4	sensorEast	f.d	Transponder Easting (m)
5	sensorHeight	f.d	Transponder height (m)
6	solRms	f.d	Solution Root Mean Square Error (RMS)
7	lastSolutionStatus	ddd	Last solution status
8	txCode	text	Transponder transmit code
9	ducerNum	ddd	Transponder number
10	depth	f.dd	Transponder depth in meters For each transponder in the list
11	code	text	Transponder Code
12	travelTime	f.dd	Travel time from the transponder to the transducer in meters / second

TYPE 424 FORMAT

Field	Data	Format	Comment
0	Code	424-001-W	Acoustic Monitor Data
1	Name	text	Device name
2	Time	f.dd	PC time in seconds (GPS time if available)
3	Monitor ID	Integer	
4	Status	Text	“Good” = Solution was OK “Failed” = Solution was not OK
5	Num LBL Observations	Integer	Number of LBL observations used in record
6	RMS of LBL Residuals	Floating point number	Metres
7	Std. Dev. of LBL Observations	Floating point number	Metres

TYPE 432 FORMAT

Field	Data	Format	Comment
1	Code	432	RSIM Data
2	name	text	Device name
3	time	f.dd	PC time in seconds (GPS time if available) the data was read
4	utc*	f.dd	UTC Time
5	refStn*	ddd	ID of RTCM source
6	status	d	Status
7	dLat*	[-]f.ddd	Latitude correction
8	dLon*	[-]f.ddd	Longitude correction
9	dHeight*	f. dd	Height correction
10	satsUsed*	dd	Number of satellites
11	hdop*	f.dd	Horizontal Dilution Of Precision
12	dgpsAge*	f.d	Age of DGPS correction
13	refLat	[-]dd.mmmmmmmmmmm	Reference latitude
14	refLon	[-]ddd.mmmmmmmmmmm	Reference longitude
15	refHeight	f.ddd	Reference height

* data read directly from data string output by the device

TYPE 440 FORMAT

Field	Data	Format	Comment
1	Code	440	Radar Target NMEA TLL
2	Name	Text	Device name
3	Time	Floating point number	PC time in seconds (GPS time if available) the data was read
4	Target number	Integer	0-99
5	Latitude	Floating point number	+/- Latitude of target, degrees
6	Longitude	Floating point number	+/- Longitude of target, degrees
7	Name	Text	Target name
8	Time	Text	UTC time of data hhmmss.ss
9	Status	Character	Target status L,Q,T L=Lost Q=Query T=Tracking
10	Reference	Character	Null or R if target is a reference target to determine own ship position or speed

TYPE 441 FORMAT

Field	Data	Format	Comment
1	Code	441	Radar Target NMEA TTM
2	Name	Text	Device name
3	Time	Floating point number	WinFrog time od data receipt in seconds (epoch 1 Jan 1970)
4	Latitude	Floating point number	Latitude of target, degrees
5	Longitude	Floating point number	Longitude of target, degrees
6	Range	Floating point number	Metres
7	Bearing	Floating point number	From ship, degrees
8	Bearing type	Character	T= true R = relative for value above
9	Speed	Floating point number	Target speed, knots
10	Course	Floating point number	Target course, degrees
11	Course type	Character	T= true R = relative for value above
12	CPA	Floating point number	Distance of closest approach
13	Time CPA	Floating point number	Time of closest approach
14	Units	Character	Speed distance units K,N,S K=Kilometres or Kilometres/hour N=nautical miles or knots S=statue miles or statute miles per hour
15	Name	Text	Target name
16	Status	Character	Target status L,Q,T L=Lost Q=Query T=Tracking
17	Reference	Character	Null or R if target is a reference target to determine own ship position or speed
18	Time	Text	UTC time of data hhmmss.ss
19	Acquisition	Character	Type of Acquisition A,M,R A=Auto M=Manual R=Reported

TYPE 450 FORMAT

Field	Data	Format	Comment
1	Code	450	PSN Data output to DP
2	name	text	Vehicle name
3	time	f.dd	The last Position time in seconds
4	CenterLat	[-]dd.mmmmmmmm	Latitude of fix at CRP
5	CenterLon	[-]ddd.mmmmmmmm	Longitude of fix at CRP
6	waypointX	[-]dd.mmmmmmmm	Latitude of tracked waypoint
7	waypointY	[-]ddd.mmmmmmmm	Longitude of tracked waypoint
8	desiredBrg	f.ddd	Desired bearing computed based on current CRP position and tracked waypoint (degrees)
9	desiredSpeed	f.ddd	Desired speed based on output configuration
10	desiredRange	f.ddd	Current range from CRP to the tracked waypoint (meters)
11	currentX	f.ddddddd	Computed northing of tracked waypoint (meters)
12	currentY	f.ddddddd	Computed Easting of tracked waypoint (meters)

Note: Above positions are filtered and are referenced to the working ellipsoid.

TYPE 451 FORMAT

Field	Data	Format	Comment
1	code	451	Data telegram output by device
2	name	text	Device name
3	time	floating point number	AUV Position time in seconds
4	$PUSBA	text	Header
5	time	hh:mm:ss.sss	Hours:minutes:seconds
6	AUV latitude	DDMM.MMMM	Degrees (D) and minutes (M)
7	N or S	text	Hemisphere
8	AUV longitude	DDDMM.MMMM	Degrees (D) and minutes (M)
9	E or W	text	Hemisphere
	The next three values depend on operator selections. If the filter flag (field 22) is F then:		
10	Variance lat	floating point number	Meters^2 (Either the kalman filter value or the manual value is selected)
11	Variance long	floating point number	Meters^2 (Either the kalman filter value or the manual value is selected)
12	Covariance	floating point number	Either the kalman filter value or 0 if the manual value is selected
	If the filter flag (field 22) is R then:		
10	Variance lat	floating point number	Meters^2 (Either calculated using covariance law from the manually entered error range and bearing or manual value)
11	Variance long	floating point number	Meters^2 (Either calculated using covariance law from the manually entered error range and bearing or manual value)
12	Covariance	floating point number	Either calculated using covariance law from the manually entered error range and bearing or 0 if the manual values are selected
13	Standard deviation range	floating point number	Operator entered value
14	Standard deviation angle	floating point number	Operator entered value
15	Slant range	floating point number	Meters
16	Age of observation	integer	Seconds
17	Ship latitude	DDMM.MMMM	Degrees (D) and minutes (M)
18	N or S	text	Hemisphere
19	Ship longitude	DDDMM.MMMM	Degrees (D) and minutes (M)
20	E or W	text	Hemisphere
21	Height	floating point number	Meters
22	R or F	text	Filter flag

Note: The maximum length is 512 characters.

TYPE 452 FORMAT

Field	Data	Format	Comment
1	Code	452	RTCM output record
2	Name	Text	Device name
3	Time	Floating point number	Time in seconds that an RTCM record was sent.
4	Reference station	Integer	RTCM reference station number

TYPE 455 FORMAT

Field	Data	Format	Comment
1	Code	455	Analog Speed Data output
2	name	text	Vehicle name
3	time	f.dd	PC time in seconds (GPS time if available) of the first speed record in the data string
4	speed	f.d	When tracking a line, downline or offline speed (filtered, knots). Otherwise the vessel's speed in knots - based on the vessels filtered northerly and easterly velocities.
5	deltaTime	f.dd	Delta time from first time field (in seconds)

** speed and deltaTime are repeated 15 times

TYPE 456 FORMAT

Field	Data	Format	Comment
1	Code	456	Cable data
2	name	ssss	Device name
3	time	f.dd	PC time in seconds (GPS time if available) the data was read
4	OutTADStr	ssss	
5	OutSHPStr	ssss	
6	OutGLLStr	ssss	
7	OutLAYStr	ssss	
8	OutPORStr	ssss	
9	OutSTAStr	ssss	

TYPE 457 FORMAT

Field	Data	Format	Comment
1	Code	457	Cascade output data
2	name	ssss	Device name
3	time	f.dd	PC time in seconds (GPS time if available) the data was read
4	outDataStr	sss	Data string output by the device

TYPE 490 FORMAT

Field	Data	Format	Comment
1	Code	490	Plow Data version 4
2	Name	text	Device name
3	Time	floating point number	PC time in seconds (GPS time if available) the data was read
4	portPull	floating point number	Port tow tension (kN)
5	stbdPull	floating point number	Starboard tow tension (kN)
6	asLaidTension	floating point number	As laid tension (kN or tonnes)
7	depHeight	floating point number	Depressor height (cm)
8	trenchDepth	floating point number	Trench depth (cm)
9	pitch	floating point number	Pitch of plow (degrees)
10	roll	floating point number	Roll of plow (degrees)
11	subDepth	floating point number	Submerged depth of plow (m)
12	umbTension	floating point number	Umbilical tension (kN)
13	portSkidHeight	floating point number	Port skid height (cm)
14	stbdSkidHeight	floating point number	Starboard skid height (cm)
15	heading	floating point number	Heading of plow (degrees)
16	altitude	floating point number	Altitude of plow off seabed (cm)
17	speed	floating point number	Speed of plow (cm/s)
18	travel	floating point number	Distance traveled by plow (m)
19	shipTowTen	floating point number	Tow wire tension at ship (kN)
20	shipTowOut	floating point number	Length of tow wire out (m)
21	telTension	floating point number	Telephone cable tension (kN)
22	burialDepth	floating point number	Telephone cable burial depth (cm)
23	towTension	floating point number	Tow tension (kN or T)
24	calcTrenchDepth	floating point number	Calculated trench depth (cm)
25	calcBurialDepth	floating point number	Calculated burial depth (cm)
26	portSpeed	floating point number	Port speed (m/s)
27	stbdSpeed	floating point number	Starboard speed (m/s)
28	cableAngle	floating point number	Cable angle (deg)
29	towCableAngle	floating point number	Tow cable angle (deg)
30	plowSteerAngle	floating point number	Plow rudder angle (deg)
31	stingerAngle	floating point number	Plow stinger angle (deg)
32	depressorAngle	floating point number	Plow depressor angle (deg)
33	layback	floating point number	Distance of plow behind vessel (m)
34	Telemetry State	Integer	0=no telemetry; 1=OK
35	Comment	Text	Plow operator comment
36	Pump pressure	floating point number	As reported by plow, units vary
37	Blade pressure	floating point number	As reported by plow, units vary
38	Toe depth	floating point number	Calculated point on certain plows Metres
39	Toe offset	floating point number	Calculated point on certain plows metres
40	Toe latitude	floating point number	Calculated point on certain plows degrees
41	Toe longitude	floating point number	Calculated point on certain plows degrees
42	Tow angle port	floating point number	Angle at port side of bridal, degrees
43	Tow angle stbd	floating point number	Angle at port side of bridal, degrees
44	Tow force port	floating point number	force at port side of bridal, tonnes
45	Tow force stbd	floating point number	force at port side of bridal, tonnes

46	Cable count	floating point number	Telephone cable coun,t metres
47	Cable speed	floating point number	Telephone cable speed, metres/min
48	Cable angle, horz	floating point number	Angle at the plow, degrees
49	Sensor depth	floating point number	Applies only to injector shear, depth of sensor used to determine depth of burial metres

TYPE 491 FORMAT

Field	Data	Format	Comment
1	Code	491	Innovatum Data
2	name	text	Device name
3	time	f.dd	PC time in seconds (GPS time if available) the data was read
4	relHdg	ddd	Relative heading (degrees)
5	mode	d	Mode
6	solution	ddd	Solution
7	sigStrng	f.dd	Signal strength
8	horVid	ddd	Horizontal video overlay
9	depVid	ddd	Depth video overlay
10	srcType	ddd	Source type
11	horDisp	f.dd	Horizontal displacement (m)
12	horDispErr	f.dd	Horizontal displacement error (m)
13	vertDisp	f.dd	Vertical displacement (m)
14	vertDispErr	f.dd	Vertical displacement error (m)
15	burialDepth	f.dd	Burial depth (cm)
16	magCur	f.dd	Magnetic/Current (m)
17	altitude	f.ddd	Altitude (m)
18	pitch	f.dd	Pitch (deg)
19	roll	f.dd	Roll (deg)
20	absHdg	f.dd	Absolute Heading (deg)
21	timeSplit	f.dd	Time split (sec)
22	corrBurialDepth	f.dd	UnFiltered Front Burial Depth (cm)
23	rearSolution	ddd	Rear solution
24	rearX	f.dd	Rear X (m)
25	rearZ	f.dd	Rear Z (m)
26	corrBurialDepthBck	f.dd	UnFiltered Back Burial Depth (cm)

TYPE 492 FORMAT

Field	Data	Format	Comment
1	Code	492	Cable Counter Data version1
2	name	text	Device name
3	time	floating point number	PC time in seconds (GPS time if available) the data was read
4	Count channel 1	floating point number	Cable count (m)
5	Count To Event channel 1	floating point number	Distance to event (m)
6	velocity channel 1	floating point number	Cable payout speed (m/min)
7	tension channel 1	floating point number	Cable tension, scale and offset applied (tonnes)
8	scale channel 1	floating point number	Scale
9	offset channel 1	floating point number	Cable count offset (m)
10	Count channel 2	floating point number	Channel 2 cable count (m)
11	Count To Event channel 2	floating point numberf.dd	Channel 2 distance to event (m)
12	Velocity channel 2	floating point number	Channel 2 cable payout speed (m/min)
13	Tension channel 2	floating point number	Channel 2 cable tension, scale and offset applied
14	Scale channel 2	floating point number	Channel 2 Scale
15	Status channel 1	integer	Status
16	Status channel 2	integer	Channel 2 Status
17	Offset channel 2	floating point number	Channel 2 cable count offset (m)
18	Count channel 3	floating point number	Channel 3 cable count (m)
19	Count To Event channel 3	floating point number	Channel 3 distance to event (m)
20	Velocity channel 3	floating point number	Channel 3 cable payout speed (m/min)
21	Tension channel 3	floating point number	Channel 3 cable tension, scale and offset applied
22	Scale channel 3	floating point number	Channel 3 scale
23	Offset channel 3	floating point number	Channel 3 cable count offset (m)
24	Status channel 3	integer	Channel 3 status
25	Count channel 4	floating point number	Channel 4 cable count (m)
26	Count To Event channel 4	floating point number	Channel 4 distance to event (m)
27	Velocity channel 4	floating point number	Channel 4 cable payout speed (m/min)
28	Tension channel 4	floating point number	Channel 4 cable tension, scale and offset applied
29	Scale channel 4	floating point number	Channel 4 scale
30	Offset channel 4	floating point number	Channel 4 cable count offset (m)
31	Status channel 4	integer	Channel 4 status
32	cableAngle	floating point number	Cable angle (degrees)
33	Count channel 5	floating point number	Channel 5 cable count (m)
34	Count To Event channel 5	floating point number	Channel 5 distance to event (m)
35	Velocity channel 5	floating point number	Channel 5 cable payout speed (m/min)
36	Tension channel 5	floating point number	Channel 5 cable tension, scale and offset applied
37	Scale channel 5	floating point number	Channel 5 scale
38	Offset channel 5	floating point number	Channel 5 cable count offset (m)
39	Status channel 5	integer	Channel 5 status

40	Time channel 1	floating point number	Time data received
41	Time channel 2	floating point number	Time data received
42	Time channel 3	floating point number	Time data received
43	Time channel 4	floating point number	Time data received
44	Time channel 5	floating point number	Time data received

TYPE 493 FORMAT

Field	Data	Format	Comment
1	Code	493	TSS device data
2	Name	text	Device name
3	Time	f.dd	PC time in seconds (GPS time if available) the data was read
4	zverDistance	text	Vertical distance to cable (cm)
5	zaltitude	text	Altitude (cm)
6	zverDepth	text	Vertical depth of cable(cm)
7	zlatOffset	text	Lateral offset (cm)
8	ssCoil1	ddd	Coil 1 signal strength (mV)
9	ssCoil2	ddd	Coil 2 signal strength (mV)
10	ssCoil3	ddd	Coil 3 signal strength (mV)
11	ssCoil4	ddd	Coil 4 signal strength (mV)
12	dataPacketType	c	Data pack type (T for coordinates and signal or I for coordinates only)
13	checkCode	ddd	Check code
14	qualityControlFlag	text	'?' = SET ' (space)' = RESET

TYPE 494 FORMAT

Field	Data	Format	Comment
1	Code	494-001-W	Record ID, version and source (Cable Model Data)
2	name	Text	Device name Cable Model
3	time	Floating point number	PC time in seconds (GPS time if available) the data was read
4	Latitude	Floating point number	Latitude at touch down
5	Longitude	Floating point number	Longitude at touch down
6	slack	Floating point number	Desired slack to touch down (%)
7	slack	Floating point number	Incremental desired slack at touch down (%)
8	cable count	Floating point number	Cable count at touch down (m)
9	slack	Floating point number	Incremental slack at touch down (%)
10	KP	Floating point number	KP of touch down point (m)
11	depth	Floating point number	Water depth at touch down (m)
12	cable speed	Floating point number	Observed Cable speed (m/min)
13	max vessel speed	Floating point number	Maximum vessel speed (knots)
14	depth	Floating point number	Water depth at ship (m)
15	cable count	Floating point number	Cable count at ship (m)
16	KP	Floating point number	KP of ship (m)
17	spare	Floating point number	0
18	hydrodynamic constant	Floating point number	Hydrodynamic constant (degree-knots)
19	spare	Floating point number	0
20	slack	Floating point number	Slack at touch down (%)
21	spare	Floating point number	0
22	tension	Floating point number	Cable tension at ship (tonnes)
23	cable in water	Floating point number	Cable in water between ship and touch down (m)
24	cable weight in water	Floating point number	Cable weight in water (Kg/m)
25	cable type	Text	Cable type (LW, DA, etc.)
26	Reference point event name	Text	Name of event used as reference point for incremental calculations
27	Winch set speed	Floating point number	Desired payout speed to meet the slack requirement

TYPE 495 FORMAT

Field	Data	Format	Comment
1	Code	495	TSS 350 Data
2	name	text	Device name
3	time	f.dd	PC time in seconds (GPS time if available) the data was read
4	zverDistance	ssss	Vertical distance (cm)
5	zaltitude	ssss	Altitude (cm)
6	zverDepth	ssss	Vertical depth (cm)
7	zlatOffset	ssss	Lateral offset (cm)
8	skewAngle	ssss	Skew angle (deg)
9	ssS1Chan	d	Signal Strength on SL Channel
10	ssSvChan	d	Signal Strength on SV Channel
11	ssPlChan	d	Signal Strength on PL Channel
12	ssPvChan	d	Signal Strength on PV Channel
13	ssSfChan	d	Signal Strength on SF Channel
14	ssPfChan	d	Signal Strength on PF Channel
14	dataPacketType	c	T for coordinates and signal or I for coordinates only
15	checkCode	d	Check Code
16	qualityControlFlag	ssss	space for reset and ? for set

TYPE 496 FORMAT (V6)

Field	Data	Format	Comment
1	Code	496	ROV data
2	name	Text	Device name
3	time	Floating point number	PC time in seconds (GPS time if available) the data was read
4	depth	Floating point number	ROV depth (m)
5	depthOffset	Floating point number	User entered ROV depth offset (m)
6	heading	Floating point number	ROV heading (deg)
7	pitch	Floating point number	ROV pitch (deg)
8	roll	Floating point number	ROV roll (deg)
9	altimeter1	Floating point number	ROV altitude (m)
10	altimeter2	Floating point number	ROV altitude (m)
11	altimeterOffset	Floating point number	User entered ROV altimeter offset (m)
12	burialDepth	Floating point number	Burial depth (cm)
13	cableDirection	Floating point number	Cable direction
14	lateralOffset	Floating point number	Lateral offset
15	verticalOffset	Floating point number	Vertical offset
16	diveNo	Floating point number	Dive number
17	soundVel	Floating point number	Observed sound velocity (m/s)
18	QcCode	Integer	only bits 0-5 used (1 = valid, 0 = invalid) 0 - Digiquartz 1 - Conductivity 2 - Altimeter 3 - Internal temp 4 - Velocity of sound 5 - Salinity calculation

19	Jet knife angle	Floating point number	angle of jetting tool, degrees
20	Jet knife depth	Floating point number	depth of jetting tool, metres
21	CP probe 1	Floating point number	CP probe 1 data, volts
22	CP probe 2	Floating point number	CP probe 2 data, volts
23	Telemetry state	d	1=on, 0=off
24	Comment	Text	Comment received from ROV computer, maximum length 49 characters
25	Salinity	Floating point number	Parts per thousand
26	Temperature	Floating point number	Celsius
27	Pressure	Floating point number	Millibars
28	Density	Floating point number	Kg/m^3
29	Raw pressure count	Floating point number	Raw count from Digiquartz
30	Raw temperature count	Floating point number	Raw count from Digiquartz
31	Jet knife offset	Floating point number	Operator entered, applied to observed offset (m)
32	Horizontal Jet knife #1 offset	Floating point number	Between ROV center and knife (cm)
33	Horizontal Jet knife #2 offset	Floating point number	Between ROV center and knife (cm)
34	Conductivity	Floating point number	Millimho/cm
35	Oxygen Concentration	Floating point number	µ mole
36	Oxygen Saturation	Floating point number	%
37	User Value	Floating point number	Value as converted and scaled from an analogue channel
38	User Unit	Text	User entered units of above

(37 and 38 are repeated 5 more times for a total of 6 pairs of converted analogue data.)

TYPE 497 FORMAT

Field	Data	Format	Comment
1	Code	497-001	Record ID, version and source (Cable Model Data for smart remotes Version 1)
2	name	Text	Device name
3	“Cable Model”	Text	Cable Model
4	Time	Floating point number	PC time in seconds (GPS time if available) the data was read
5	Latitude	Floating point number	Latitude at touch down
6	Longitude	Floating point number	Longitude at touch down
7	slack	Floating point number	Desired slack to touch down (%)
8	slack	Floating point number	Incremental desired slack at touch down (%)
9	cable count	Floating point number	Cable count at touch down (m)
10	slack	Floating point number	Incremental slack at touch down (%)
11	KP	Floating point number	KP at touch down (m)
12	depth	Floating point number	Water depth at touch down (m)
13	cable speed	Floating point number	Observed cable speed (m/min)
14	max vessel speed	Floating point number	Maximum vessel speed (knots)
15	depth	Floating point number	Water depth at ship (m)
16	cable count	Floating point number	Cable count at ship (m)
17	Cable wt	Floating point number	Cable weight in air (N/M)
18	Cable diameter	Floating point number	Cable diameter (mm)
19	hydrodynamic constant	Floating point number	Hydrodynamic constant (degree-knots)
20	Desired Winch Speed	Floating point number	Desired winch speed (m/min)
21	slack	Floating point number	Slack at touch down (%)
22	slack	Floating point number	Slack at vessel (%)
23	tension	Floating point number	Cable tension at ship (tonnes)
24	cable in water	Floating point number	Length of cable in the water between ship and touch down (m)
25	cable weight in water	Floating point number	Cable weight in water (Kg/m)
26	cable type	Text	Cable type (LW, DA, etc.)
27	Reference point event name	Text	Name of event used as reference point for incremental calculations
28	Slack	Floating point number	Desired slack at vessel (%)
29	Alpha	Floating point number	Alpha term (degrees)
30	Beta	Floating point number	Beta term at ship (degrees)
31	Beta	Floating point number	Beta term at touch down (degrees)
32	Slack	Floating point number	Single transient slack (%)
33	Slack	Floating point number	Fill slack (%)
34	Slack	Floating point number	First transient slack (%)
35	Slack	Floating point number	Ship slack (%)
36	Slack	Floating point number	Safety slack (%)
37	Tension	Floating point number	Expected cable tension (tonnes)
38	Slack	Floating point number	Incremental slack at vessel(%)
39	Slack	Floating point number	Desired Incremental slack at vessel (%)

40	Event title from RPL	Text	Event title from RPL
41	Previous event title from RPL	Text	Previous Event title from RPL
42	Last cable event title	Text	Last cable event title
43	Last cable body title	Text	Last cable body title
44	Number of sections	Integer	Number of sections
45	Cable count	Floating point number	Desired cable count at ship (m)
46	spare	0.	
47	Depth	Floating point number	Water depth at bottom node (m)
48	Along Line	Floating point number	KP at ship (m)
49	Number nodes	integer	Number of nodes in water
50	Speed	Floating point number	Ship speed (knts)
51	Speed	Floating point number	Smoothed ship speed (knts)
52	Ahead behind	Floating point number	Ahead/behind icremental
53	Ahead behind	Floating point number	Ahead/behind total
54	Distance	Text	Last event title from RPL
55	Distance	Text	Next event title from RPL
56	Distance	Floating point number	Distance from touch down to next event (m)
57	Distance	Floating point number	Distance from touch down to last event (m)
58	Distance	Floating point number	Distance from ship to next event (m)
59	Distance	Floating point number	Distance from ship to last event (m)
60	Speed filtering	integer	Speed filtering setting (1=off; #=filter value)
61	Slack	Floating point number	Actual ship slack (%)
62	Distance	Floating point number	Distance to next cable event (m)
63	Cable event title	Text	Next cable event title
64	Max Beta	Floating point number	Maximum beta term at ship (degrees)
65	Code	Integer	Ignore high tension warning setting
66	Payout units	Integer	Cable payout units setting
67	Speed	Floating point number	Max ship speed (knots)
68	Code	Integer	Ignore high payout warning setting

TYPE 498 FORMAT

Field	Data	Format	Comment
1	Code	498	NORCOM ROV data
2	Name	Text	Device name
3	Time	Floating point number	PC time in seconds (GPS time if available) the data was read
4	Dive number	Integer	
5	Heading	Integer	ROV heading (deg)
6	Depth	Floating point number	ROV depth (m)
7	Altitude	Floating point number	ROV altitude (m)
8	Pitch	Floating point number	ROV pitch (deg)
9	Roll	Floating point number	ROV roll (deg)
10	Pressure	Integer	FTCM Millibars
11	Temperature	Integer	FTCM Celsius
12	Pressure	Integer	ATCM Millibars
13	Temperature	Integer	ATCM Celsius
14	Motor Temperature	Integer	Port Celsius
15	Motor Temperature	Integer	Starboard Celsius
16	Water Temperature	Integer	Sewater Celsius
17	Motor Current	Floating point number	Port amps
18	Motor Current	Floating point number	Starboard amps
19	Jetter deploy position	Integer	
20	Jetter deploy pressure	Integer	
21	Arm Width position	Floating point number	Port
22	Arm Width position	Floating point number	Starboard
23	Side Load pressure	Integer	Port
24	Side Load pressure	Integer	Starboard
25	Water pressure	Integer	
26	Nozzel tip position	Floating point number	Port
27	Nozzel tip position	Floating point number	Starboard
28	Speed	Floating point number	Ground knots
29	Distance	Floating point number	
30	Counter	Integer	Net turns counter
31	Burial depth	Integer	centimetres
32	Lateral displacement	Integer	centimetres
33	Heading	Integer	Ship degrees
34	Penetrometer	Integer	N1 factor
35	Penetrometer	Integer	N2 factor
36	Penetrometer	Floating point number	Extension Pressure
37	Penetrometer	Floating point number	Current Pressure
38	Penetrometer	Floating point number	Current Depth
39	Penetrometer	Integer	Kpal 1
40	Penetrometer	Integer	Kpal 2
41	Penetrometer	Integer	Max Kpal 1
42	Penetrometer	Integer	Max Kpal 2
43	Penetrometer	Floating point number	Pos at Max Depth 1
44	Penetrometer	Floating point number	Pos at Max Depth 2
45	Telemetry State	Integer	

TYPE 499 FORMAT

Field	Data	Format	Comment
1	Record Number	499-002	
2	Device Name	Text	
3	Data Time	Floating point number	Seconds
4	Telephone Cable Count	Floating point number	Metres
5	Telephone Cable Tension	Floating point number	Tonnes
6	Telephone Cable Speed	Floating point number	m/min
7	Telephone Cable Data Time	Floating point number	Seconds
8	Tow Cable Count	Floating point number	Metres
9	Tow Cable Tension	Floating point number	Tonnes
10	Tow Cable Speed	Floating point number	m/min
11	Tow Cable Data Time	Floating point number	Seconds
12	LCE Tension	Floating point number	Tonnes
13	LCE Data Time	Floating point number	Seconds
14	CDE1 Tension	Floating point number	Tonnes
15	CDE1 Data Time	Floating point number	Seconds
16	CDE2 Tension	Floating point number	Tonnes
17	CDE2 Data Time	Floating point number	Seconds
18	Emergency Stop	Integer	0 – Normal 1 – Emergency
19	Stonker State	Integer	0 – Open 1 – Closed
20	Plough Mode	Integer	1 – Ready 2 – Stop in Progress 3 – LTM Mode 4 – LR Mode 5 – RM Mode 6 – Error
21	Repeater Detected	Integer	0 – None Detected 1 – Repeater Detected 2 – Splice Box Detected
22	Cable Engine Mode	Integer	0 – Stopped 1 – MSM 2 – ASM 3 – BTM 4 – BSM 5 – Error
23	LCE Count	Floating point number	Metres
24	LCE Speed	Floating point number	m/min
25	CDE1 Count	Floating point number	Metres
26	CDE1 Speed	Floating point number	m/min
27	CDE2 Count	Floating point number	Metres
28	CDE2 Speed	Floating point number	m/min

TYPE 500 FORMAT

Field	Data	Format	Comment
1	Code	500	Rho Theta Data
2	name	text	Device Name
3	time	f.dd	PC time in seconds (GPS time if available) the data was read
4	code	ddd	Code (0 – 9)
5	range	f.dd	Range (m)
6	bearing	f.dd	Bearing (degrees)
7	verAngle	f.dd	Vertical Angle (degrees)
8	status	d	0 = Bad 1 = Good

TYPE 500 FORMAT (REPEATED)

Field	Data	Format	Comment
1	Code	500	Telemetry Data
2	name	text	Device Name
3	time	f.dd	PC time in seconds (GPS time if available) the data was read
4	centerLat	[-]dd.mmmmmmmm	Latitude at CRP
5	centerLon	[-]dd.mmmmmmmm	Longitude at CRP
6	centerHeight	f.dd	Height at CRP (m)
7	depth	f.dd	Water depth including offset and tide if enabled (m)
8	heading	fffff.d	Vessel's heading in degrees – filtering and offsets applied if enabled
9	advance	fffff.d	Vessel's course made good in degrees – based on the vessels filtered northerly and easterly velocities
10	speed	f.dd	Vessel's speed in knots - based on the vessels filtered northerly and easterly velocities
11	vNorth	f.dd	Vessel's filtered northerly velocity in m/s
12	vEast	f.dd	Vessel's filtered easterly velocity in m/s

TYPE 501 FORMAT

Field	Data	Format	Comment
1	Code	501	Telemetry Target Data
2	name	text	Device name
3	targetTime	Floating point number	Computer processor time of the last time target data was received (milliseconds)
4	targetCode	Integer	Target code
5	Enabled	Integer	3 = enabled
6	lat	Floating point number	Latitude of target degrees
7	lon	Floating point number	Longitude of target degrees

TYPE 503 FORMAT

Field	Data	Format	Comment
1	Code	503	Innovatum SeaREX Data
2	name	text	Device name
3	targetTime	f.dd	Computer processor time of the last time target data was received (seconds)
4	Date	yyyy-mm-dd	Text from device
5	Time	HH:MM:SS	Text from device
6	Front Signal Strength	f.dd	
7	Front Solution	d	0 = no signal 1 = valid direction only 2 = valid horizontal displacement only 3 = valid horiz. & vert. displacements
8	Front Horizontal Displacement	f.dd	Meters
9	Front Horizontal Disp. Error	f.dd	Meters
10	Front Vertical Displacement	f.dd	Meters
11	Front Vertical Disp. Error	f.dd	Meters
12	Front Burial Depth	f.dd	Meters
13	Front Radial Mag. Current Flowing	f.dd	
14	Front Source Type	d	0 = single & 1 = complex
15	Front Relative Heading	f.dd	Degrees
16	Rear Signal Strength	f.dd	
17	Rear Solution	d	0 = no signal 1 = valid direction only 2 = valid horizontal displacement only 3 = valid horiz. & vert. displacements
18	Rear Horizontal Displacement	f.dd	Meters
19	Rear Horizontal Disp. Error	f.dd	Meters
20	Rear Vertical Displacement	f.dd	Meters
21	Rear Vertical Disp. Error	f.dd	Meters
22	Rear Burial Depth	f.dd	Meters
23	Rear Radial Mag. Current Flowing	f.dd	Meters
24	Rear Source Type	d	0 = single & 1 = complex
25	Rear Relative Heading	f.dd	Degrees
26	ROV Depth	f.dd	Meters
27	Mode	d	1 = passive 2 = active DC 3 = active AC
28	Altitude	f.dd	Meters
29	Pitch	f.dd	Degrees
30	Roll	f.dd	Degrees
31	Absolute Heading	f.dd	Degrees
32	corrBurialDepth	f.dd	Corrected Front Burial Depth (m)
33	corrBurialDepthBck	f.dd	Corrected Back Burial Depth (m)

TYPE 507 FORMAT

Field	Data	Format	Comment
1	Code	507	Compass Data
2	name	text	Device name
3	time	f.dd	PC time in seconds (GPS time if available) the data was read
4	numCompassRecs	ddd	Number of compass records (max 64)
5	id	ddd	Compass ID
6	heading	f.d	Raw heading from device
7	status	d	0 = OK / Good data 1 = Data not available or Bad

**ID, Heading, and Status are repeated for each compass record

TYPE 508 FORMAT

Field	Data	Format	Comment
1	Code	508	Depth Data
2	name	text	Device name
3	time	f.dd	PC time in seconds (GPS time if available) the data was read
4	numDepthRecs	ddd	Number of depth records
5	id	ddd	Device ID
6	depth	f.d	Raw heading from device (m)
7	status	d	0 = Data OK / Good 1 = Data not available / Bad

**ID, Depth, and Status are repeated for each depth record

TYPE 509 FORMAT

Field	Data	Format	Comment
1	Code	509	Fin Data
2	name	text	Device name
3	time	f.dd	PC time in seconds (GPS time if available) the data was read
4	numFinAngleRecs	ddd	Number of fin records
5	id	ddd	Device ID
6	angle	f.d	Raw fin angle from device
7	status	d	0 = Data OK / Good 1 = Data not available / Bad

**ID, Angle, and Status are repeated for each fin record

TYPE 510 FORMAT

Field	Data	Format	Comment
1	Code	510	Survey line Tracking Data
2	vehName	text	Vehicle name
3	name	text	Line name
4	Enabled	ddd	0 = line tracking off 1 = line tracking on (forward) 2 = line tracking on (reverse)
5	alongLine	f.dd	Alongline distance* (m)
6	offLine	f.dd	Offline distance* (m)
7	downLineSpeed	f.dd	Downline speed** (m/s)
8	offLineSpeed	f.dd	Offline speed** (m/s)
9	Azimuth	ffffff.dd	Azimuth of segment (deg)
10	GeoAzimuth	ffffff.dd	Geographic Azimuth of segment (deg)
11	Length	f.dd	Length of segment (m)
12	currentSegment	ddd	Segment number
13	layback	f.dd	layback true distance (m)
14	laybackHeading	ffffff.dd	Layback heading (deg)
15	kilopost	f.ddd	Kilometer post at tracked offset
16	displayCurrSegm	ddd	Display current segment (0 = false, 1 = true)
17	displaySegmAnnot	ddd	Display current segment annotation (0 = false, 1 = true)
18	useCorridor	ddd	Enable checking for ship position inside corridor (0 = false, 1 = true)
19	MaxDistOffLine	f.d	Width of corridor (m)

* - computed using filtered Northing and Easting position of the tracked offset

** - computed based on the vessels filtered northerly and easterly velocities

TYPE 511 FORMAT

Field	Data	Format	Comment
1	Code	511	Line Tracking Data
2	vehName	text	Vehicle name
3	name	s	Line name (maximum 35 characters)
4	firstNode	d	The node number of the first node contained in the record[1]
5	type	d	Not Used
6	StartShot	d	Number identifier of the first shotpoint downline
7	firstShotDDL	f.fff	Distance downline to the first shotpoint
8	startKP	f.fffff	KP at the start of the line
9	kpDir		KP increment/decrement control flag: • 1 = increments, line in original state • 2 = increments, line reversed • -1 = decrements line in original state -2 = decrements, line reversed
10	numNodes	d	Total number of nodes in the line
11	scalable	d	Scaleable KP flag, 0= normal, 1=scalable
12	kpScaleLimits	f.ff	Allowable deviation from calculated KP distances between nodes for scaleable KPs entered, (%)
The following 5 fields are repeated for each node of the line contained in the record, up to 5			
13	node[i].lat	f.fffffffff	Latitude of node (decimal of degrees)
14	node[i].lon	f.fffffffff	Longitude of node (decimal of degrees)
15	node[i].z	f.ff	Elevation of node relative to MSL (m)
16	node[i].radius	f.ff	Radius of curve at the node (m)
17	node[i].kp	f.ff	KP for the node (km)

Comments: positions giving on working ellispoid

[1]This record can be used in multiples to form a sequence of records that together contain all the node information for a given line. Each record can contain up to 5 nodes.

TYPE 512 FORMAT

Field	Data	Format	Comment
1	Code	512	Waypoint Tracking Data
2	vehName	text	Vehicle name
3	time	f.dd	PC time in seconds (GPS time if available)
4	Enabled	ddd	0 = Waypoint tracking Off 1 = Waypoint tracking On
5	alarmOn	ddd	0 = Waypoint alarm Off 1 = Waypoint enter alarm On 2 = Waypoint depart alarm On
6	alarmRange	f.dd	Alarm range

TYPE 513 FORMAT

Field	Data	Format	Comment
1	Code	513	Waypoint Data
2	vehName	text	Vehicle name
3	time	f.dd	PC time in seconds (GPS time if available)
4	name	text	Tracked waypoint name
5	lat	[-]dd.mmmmmmmm	Latitude of waypoint
6	lon	[-]ddd.mmmmmmmm	Longitude of waypoint
7	icon	dd	Waypoint icon
8	circle	f.dd	Circle radius (m)
9	color	ddd	Waypoint color
10	elev	f.dd	Waypoint elevation (m)

TYPE 513 FORMAT (REPEATED)

Field	Data	Format	Comment
1	Code	513	Password data
2	vehName	ssss	Vehicle Name
3	time	ssss	
4	userName	ddd	
5	userLevel	ssss	
6	password	ddd	
7	currentUser		

TYPE 514 FORMAT

Field	Data	Format	Comment
1	Code	514	Log Data
2	Name	text	Name of log event
3	Time	f.dd	PC time in seconds (GPS time if available) the log was taken

TYPE 515 FORMAT

Field	Data	Format	Comment
1	Code	515	Ship Data
2	vehName	text	Vehicle name
3	wpName	text	Waypoint name
4	time	f.dd	PC time in seconds (GPS time if available)
5	rangeToWp	f.dd	Range to waypoint (m)
6	bearingToWp	fffff.d	Bearing to waypoint (degrees)
7	Enabled	d	0 = Waypoint tracking Off 1 = Waypoint tracking On

TYPE 516 FORMAT

Field	Data	Format	Comment
1	Code	516	Offset Record
2	aVehName	text	Vehicle Name
3	name	text	Offset Name
4	x	f.dd	X component of offset (m)
5	y	f.dd	Y component of offset (m)
6	z	f.dd	Z component of offset (m)
7	plot	ddd	0 = Hide offset position 1 = Display offset position
8	plotLabel	ddd	0 = Hide offset label 1 = Display offset label

TYPE 517 FORMAT

Field	Data	Format	Comment
1	Code	517	Picture Record
2	pen	d	0 = Pen up 1 = Pen down 2 = Picture header 3 = Picture text
	if pen < 2		
3	lat	[-]dd.mmmmmmmm	Picture point latitude
4	lon	[-]ddd.mmmmmmmm	Picture point longitude
	if pen = 2		
3	name	text	header name
4	color	ddd	A 32-bit value used to specify an RGB color
5	green	ddd	
6	blue	ddd	
7	linetype	d	0 = solid 1 = dashed
	if pen = 3		
3	textString	text	Text
4	color	ddd	Text color
5	lat	f.dddddddd	Text position – latitude
6	lon	f.dddddddd	Text position – longitude
7	textSize	f.dd	Text size
8	rotation	f.dd	Text rotation
9	justification	d	Text justification

TYPE 518 FORMAT

Field	Data	Format	Comment
1	Code	518	Waypoint file data
2	Name	text	Waypoint file name
3	Time	f.dd	Time waypoint file was changed (seconds)

TYPE 519 FORMAT

Field	Data	Format	Comment
1	Code	519	Log Data
2	Time	f.dd	Time waypoint file was changed (seconds)
3	Layback	f.dd	in meters
4	Bearing	f.dd	in degrees

TYPE 555 FORMAT

Field	Data	Format	Comment
1	Code	555	Streamer data
2	vehName	ssss	Vehicle name
3	streamerNumber	d	Streamer number
4	numberOfBearingRecs	d	Number of bearing records
5	status	d	Heading status
6	heading	f.d	Heading (deg)
7	status	d	Depth status
8	depth	f.d	Depth (m)

- Heading status and Heading are repeated for every bearing record
- Depth status and Depth are repeated for every depth record

TYPE 556 FORMAT

Field	Data	Format	Comment
1	Code	556	Streamer configuration data
2	vehName	ssss	Vehicle name
3	streamerNumber	d	Streamer number
4	pos	d	
5	definedPos	c	
6	source1Id	c	
7	source1VesselId	c	
8	source2Id	c	
9	source2VesselId	c	
10	streamerId	c	
11	tailBuoyId	c	
12	tailBuoy2Id	c	
13	unitMeter	d	
14	layBack	f.dd	
15	strmr1StID	d	
16	strmrIDInc	d	
17	stationInterval	f.dd	
18	numOfStations	d	
19	defaultRcvrDepth	f.dd	
20	compassLayBack	f.dd	
21	compassInterval	f.dd	
22	numOfCompasses	d	
23	lastCompassToTb	f.dd	
24	magneticDeclination	f.dd	
25	bearAccuracy	f.dd	
26	distAccuracy	f.dd	
27	streamerHead	ssss	
28	streamerTail	ssss	
29	source1	ssss	
30	source2	ssss	
31	calculationMode	d	
32	drawStreamer	d	
33	drawStreamerProfile	d	
34	strmrColor	d	
35	compassUse[0]	d	
36	compassUse[1]	d	
37	compassIntervals	c	**
	- compassIntervals repeated 64 time		

TYPE 560 FORMAT

Field	Data	Format	Comment
1	Code	560	Line Tracking Data
2	vehName	text	Vehicle name
3	time	f.dd	PC time in seconds (GPS time if available)
4	name	text	Line name
5	type	ddd	Line type (0 = solid, 1 = dashed)
6	StartShot	ddd	Start Shot number
7	firstShotDDL	f.ddd	First shot downline distance (m)
8	startKP	f.ddddd	Start kilometer post
9	kpDir	ddd	Kilometer post direction
10	numNodes	ddd	Number of nodes
11	scalable	ddd	0 = Design KP 1 = Scalable KP
12	kpScaleLimits	f.dd	Line KP scale limit (%)
13	lat	[-]dd.mmmmmmmm	Latitude of node
14	lon	[-]ddd.mmmmmmmm	Longitude of node
15	z	f.dd	Elevation of node (m)
16	radius	f.dd	Radius of curve at the node (m)
17	kp	f.dd	KP of node

**lat, lon, z, radius, and kp are repeated for each node

TYPE 600 FORMAT

Field	Data	Format	Comment
1	Code	600	Layback data
2	vehName	text	Vehicle name
3	fromVeh	text	From vehicle name
4	fromVehNum	ddd	From vehicle number
5	toVeh	text	To vehicle name
6	toVehNum	ddd	To vehicle number
7	layback	f.dd	Layback (m)
8	offset	f.dd	Offset (m)
9	refFAOffset	f.dd	Reference Forward or Aft offset (m)
10	refPSOffset	f.dd	Reference Port or Starboard offset (m)

TYPE 700 FORMAT

Field	Data	Format	Comment
1	Code	700	Fairleads Data
2	vehName	text	Vehicle name
3	name	text	Fairlead name
4	y	f.dd	Port or starboard offset of the fairlead with respect to the vehicle's origin (m)
5	x	f.dd	Forward or aft offset of the fairlead with respect to the vehicle's origin (m).
6	n	f.dd	Design anchor position Northing (m)
7	e	f.dd	Design anchor position Easting (m)
8	ancN	f.dd	Current Northing of anchor (m)
9	ancE	f.dd	Current Easting of anchor (m)
10	plot	d	0 = False 1 = True
11	state	d	0 = on tug 1 = on barge
12	target	d	0 = no target 1 = target set
13	rngToMid0	f.d	Midbouy 0 distance from anchor (m)
14	rngToMid1	f.d	Midbouy 1 distance from anchor (m)
15	rngToMid2	f.d	Midbouy 2 distance from anchor (m)
16	drawRunLine	d	0 = False 1 = True
17	tugVehNum	ddd	Tug Vehicle number with anchor

TYPE 701 FORMAT

Field	Data	Format	Comment
1	Code	701	Anchor control data
2	vehName	text	Vehicle name
3	anchorNumber	ddd	Anchor number
4	refVehicle	ddd	Reference vehicle
5	aHTug	ddd	Tug number with anchor
6	state	d	0 = on tug 1 = on barge

TYPE 702 FORMAT

Field	Data	Format	Comment
1	Code	702	Anchor Data
2	tugVehNumber	ddd	Tug vehicle number
3	anchorNumber	ddd	Anchor number
4	txAnchorN	f.dd	Transmitted anchor position Northing (m)
5	txAnchorE	f.dd	Transmitted anchor position Easting (m)
6	drawRunLine	d	0 = False 1 = True

TYPE 777 FORMAT

Field	Data	Format	Comment
1	Code	777	MGD77 Data
2	name	text	vehicle name
3	time	f.dd	Time of data (seconds)
4	lat	[-]dd.mmmmmmmm	Latitude
5	lon	[-]ddd.mmmmmmmm	Longitude
6	bathy	f.dd	Bathymetry value (99999.99 if NA)
7	mag	f.dd	magnetometer value (99999.99 if NA)
8	linename	text	Current tracked line name
9	fix	d	Fix number

TYPE 800 FORMAT

Field	Data	Format	Comment
1	Code	800	Raw Magnetometer Data V1
2	name	Text	Device name
3	time	Floating point number	PC time in seconds (GPS time if available) the data was read
4	magneticField	Floating point number	Magnetometer (nT)
5	signalStrength	Floating point number	Signal Strength
6	depth	Floating point number	Depth of fish (m)
7	quality	Integer	Quality
8	leak	Integer	Leak
9	tuning	Floating point number	Magnetic tuning voltage
10	voltage	Floating point number	Input voltage
11	Altitude	Floating point number	Altitude above bottom

TYPE 888 FORMAT

Field	Data	Format	Comment
1	Code	888-002	Raw heave data and version
2	name	text	device name
3	time	Floating point number	PC time in seconds (GPS time if available) the data was read
4	heave*	Floating point number	Heave
5	roll*	Floating point number	Roll
6	pitch*	Floating point number	Pitch
7	yaw*	Floating point number	Yaw
8	Heave velocity*	Floating point number	Metres/second
9	Heave acceleration*	Floating point number	Metres/second^2

* data read directly from the device

TYPE 900 FORMAT

Field	Data	Format	Comment
1	Code	900	GPS Data
2	name	text	Vehicle name
3	time	f.dd	Time of data (s)
4	speed	f.dd	Vessel's filtered speed (knots)
5	cmgTrue	f.dd	Coarse Made Good (True)
6	velNorthTrue	f.dd	Velocity North (True)
7	velEastTrue	f.dd	Velocity East (True)
8	cmgMagnetic	f.dd	Coarse Made Good (Magnetic)
9	velNorthMagnetic	f.dd	Velocity North (Magnetic)
10	velEastMagnetic	f.dd	Velocity East (Magnetic)

TYPE 901 FORMAT

Field	Data	Format	Comment
0	code	901-004-W	Acoustic Calibration Data – transponder/beacon station record containing the station position, transponder/beacon configuration, depth sensor information and statistics resulting from positioning calibration
1	lat*	Floating point	Latitude of station degrees
2	lon*	Floating point	Longitude of station degrees
3	x*	Floating point	Easting of station (m)
4	y*	Floating point	Northing of station (m)
5	z*	Floating point	Depth of transducer (m) (station + HI)
6	dsOffset	Floating point	Vertical offset from transducer to depth sensor (m)
7	dsCalib	Floating point	correction to be applied to compensate for atmospheric pressure or other calibration offsets. (Subtracted)
8	systemType	Integer	systemType = 4
9	address	Text	Transponder address
10	txCode	Text	Transponder LBL tx code/frequency
11	bcnCode	Text	Transponder USBL code
12	on	Integer	0 = Transponder off 1 = Transponder on
13	name	Text	Name of station
14	calFlag	Integer	Calibration flag (how will station be used in calibration)
15	rmsBaselines	Floating point number	RMS of baseline(m) observations associated with this station
16	rmsTotal	Floating point	RMS of all observations (m) associated with this station

17	errorEllipse[0]	Floating point	Error ellipse semi-major axis (m)
18	errorEllipse[1]	Floating point	Error ellipse semi-minor axis (m)
19	errorEllipse[2]	Floating point	Orientation of Error ellipse semi-major axis (deg)
20	iif	Text	Individual interrogation channel/frequency
21	rmsDepths	Floating point	RMS of depth (m) observations associated with this station
22	xponderType	Integer	The type of transponder as listed below: 0 = FIXED XPONDER, 1 = RELAY XPONDER, 2 = RESPONDER XPONDER, 3 = SIMUL XPONDER, 4 = CYCLIC XPONDER, 5 = SEQUENTIAL XPONDER, 6 = STATIC TRANSCEIVER, 7 = STATIC SIMULTANEOUS, 8 = DYNAMIC ARRAY, 9 = SYNCHRONIZED PINGER, 10 =USBL FIXED TRANSPONDER, 11 = USBL TRACK TRANSPONDER, 12 = USBL FIXED PINGER, 13 = USBL TRACK PINGER, 14 = USBL FIXED RESPONDER, 15 = USBL TRACK RESPONDER, 16 = XPONDER UNKNOWN
23	digiQuartz	Integer	DigiQuartz depth sensor flag: 0 = no digiquartz sensor 1 = digiquartz sensor fields 24 to 42 and 58 are used for digiquartz sensor settings
24	deepRating	Integer	DigiQuartz is depth rating: 0 = digiquartz is NOT deep rated 1 = digiquartz is deep rated
25	quickMeasurement	Integer	DigiQuartz is quick measurement flag: 0 = digiquartz observations are NOT from quick measurements 1 = digiquartz observations are from quick measurements
26	formulaNum	Integer	Pressure to depth formula: 1 = Average density 2 = UNESCO
27	waterDensity	Floating point	Water density value entered by the operator.
28	atmosphericPres	Floating point	Atmospheric pressure value entered by the operator.
29	coefficients[0]	Floating point	DigiQuartz calibration coefficients fields 29 to 42 X0

30	coefficients[1]	Floating point	Y1
31	coefficients[2]	Floating point	Y2
32	coefficients[3]	Floating point	Y3
33	coefficients[4]	Floating point	C1
34	coefficients[5]	Floating point	C2
35	coefficients[6]	Floating point	C3
36	coefficients[7]	Floating point	D1
37	coefficients[8]	Floating point	D2
38	coefficients[9]	Floating point	T1
39	coefficients[10]	Floating point	T2
40	coefficients[11]	Floating point	T3
41	coefficients[12]	Floating point	T4
42	coefficients[13]	Floating point	T5
43	heightOfInstrument	Floating point	Height of transponder/beacon transducer above station (HI)
44	sigmas[0]	Floating point	Standard deviation in Easting.
45	sigmas[1]	Floating point	Standard deviation in Northing.
46	sigmas[2]	Floating point	Standard deviation in depth.
47	corr[I]	Floating point	Corrections to approximate Easting coordinate.
48	corr[I]	Floating point	Corrections to approximate Northing coordinate.
49	corr[I]	Floating point	Corrections to approximate depth.
50	numRes	Integer	Number of residuals (and therefore observations) used in calibration in association with this station
51	dblOccupancy	Integer	Double occupancy flag: 0=only one transponder/beacon at this location 1=multiple transponders/beacons at this location
52	numOtherOccupants	Integer	Number of transponders/beacons at this location (5 max)
53	otherOccupantsIndex	Integer	Index to other transponder/beacon
54	otherOccupantsIndex	Integer	Index to other transponder/beacon
55	otherOccupantsIndex	Integer	Index to other transponder/beacon
56	otherOccupantsIndex	Integer	Index to other transponder/beacon
57	otherOccupantsIndex	Integer	Index to other transponder/beacon
58	latitude	Floating point	Latitude of work for digiquartz algorithms

* working ellipsoid

Note: A 901 record will appear for each transponder in the file

TYPE 902 FORMAT - BASELINE

Field	Data	Format	Comment
0	Code	902-001-W	Acoustic Calibration data – containing LBL baseline observations
1	Baseline	Text	"Baseline"
2	BaseLine Version	Integer	Baseline record version (0, 2 or 3)
3	fromCode	Text	Address of the transponder the baseline was measured from
4	fromName	Text	Name of the station the baseline was measured from
5	numLop	Integer	Number of ranges in the record
6	time	Floating point number	Time of first observation (PC time seconds) in record
	Version 0 fields		Baseline data
7	scaledLop	Floating point number	Scaled slant range (m)
8	rawLop	Floating point number	Raw TWTT obervation (ms)
9	toCode	Ttext	Transmit channel/frequency of the transponder the baseline was measured to
10	sigma	Floating point number	Standard deviation assigned to observation
	Version 2 fields		Baseline data
7	scaledLop	Floating point number	Scaled slant range (m)
8	rawLop	Floating point number	Raw TWTT obervation (ms)
9	toCode	Text	Transmit channel/frequency of the transponder the baseline was measured to
10	toAddress	Text	Address of the transponder the baseline was measured to
11	sigma	Floating point number	Standard deviation assigned to observation
	Version 3 fields		Baseline data
7	scaledLop	Floating point number	Scaled slant range (m)
8	rawLop	Floating point number	Raw TWTT obervation (ms)
9	toCode	Text	Transmit channel/frequency of the transponder the baseline was measured to
10	toAddress	Text	Address of the transponder the baseline was measured to
11	toName	Text	Name of the station the baseline was measured to
12	sigma	Floating point number	Standard deviation assigned to observation

TYPE 902 FORMAT - STATION

Field	Data	Format	Comment
0	Code	902-001-W	Acoustic Calibration data – containing LBL associated surface referenced LOPs
1	*a fixed string*	Ttext	"Station"
2	time	Floating point number	PC time (seconds) of epoch
3	lat	Floating point number	Vessel CRP latitude
4	lon	Floating point number	Vessel CRP longitude
5	heading	Floating point number	Vessel heading (deg)
6	advance	Floating point number	Vessel course made good (deg)
7	speed	Floating point number	Vessel speed (knots)
8	y	Floating point number	Vessel CRP Northing (m)
9	x	Floating point number	Vessel CRP Easting (m)
10	z	Floating point number	Vessel CRP Height (m)
11	numLop	Integer	Number of LOPs in the record
12	numSystem	Integer	Number of systems involved (e.g. 1 GPS receiver and 1 LBL unit would be 2)
The following fields are repeated for each LOP observed at this epoch. Note that each LBL range is 1 LOP, each GPS position is 2 LOPs (Northing and Easting) Each LOP data occupies 12 fields			
13	scaledLop	Floating point number	Scaled LOP: LBL = slant range (m) GPS = Northing/Easting (m)
14	rawLop	Floating point number	Raw LOP: LBL = TWTT (ms) GPS = WGS Latitude/Longitude
15	sigma	Floating point number	Standard deviation (m) applied to observation in calibration
16	systemNum	Integer	Number of system associated with this LOP
17	lopType	Integer	The type of Line of Position (LOP) data 0 = Transponder Slant Range 1= Hyperbola 2 = Northing 3 = Easting 6 = Bearing to a base station 7 = Depth
18	code	Text	Transmit channel/frequency of transponder for LBL LOP or N/E for GPS LOP
19	address	Text	Address of transponder or GPS device name
20	time	Floating point number	Time of observation (s)
21	velocity	Floating point number	Rate of change of LOP
22	pitch	Floating point number	Pitch of the vessel (deg) at observation time

23	roll	Floating point number	Roll of the vessel (deg) at observation time
24	name	Text	Name of station observed, blank for GPS

The following fields are repeated for each system involved in this epoch's observation.
Each system occupies 5 fields

25	name	Text	Name of LOP system device
26	type	Integer	Type of LOP system, default 4 (not used)
27	xOff	Floating point number	System port/stbd offset (m)
28	yOff	Floating point number	System fore/aft offset (m)
29	zOff	Floating point number	System heithg/depth offset (m)

TYPE 902 FORMAT – USBL STATION

Field	Data	Format	Comment
0	code	902-002-W	Acoustic Calibration data – containing USBL associated surface referenced LOPs
1	*a fixed string*	Text	"USBLStation"
2	time	Floating point number	PC time (seconds) of epoch
3	lat	Floating point number	Vessel CRP latitude
4	lon	Floating point number	Vessel CRP longitude
5	heading	Floating point number	Vessel heading (deg)
6	advance	Floating point number	Vessel course made good (deg)
7	speed	Floating point number	Vessel speed (knots)
8	y	Floating point number	Vessel CRP Northing (m)
9	x	Floating point number	Vessel CRP Easting (m)
10	numLop	Integer	Number of LOPs in the record
11	numSystem	Integer	Number of systems involved (e.g. 1 GPS receiver and 1 USBL unit would be 2)
12	applyRayBending	Integer	Ray bending flag: 0 = do not apply 1 = apply

The following fields are repeated for each LOP observed at this epoch.

NOTE: There are 3 USBL data types
Standard XYZ which is used to provide 3 LOPs: slant range, bearing and depth
Travel time which is used to provide 1 LOP: slant range
Direction cosines which is used to provide 3 LOPs: slant range, bearing and depth
NOTE: GPS position data provides 2 LOPs: Latitude/Northing and Longitude/Easting.

All LOPs are written out in their entirety to the calibration record.
Each LOP occupies 22 fields.

13	scaledLop	Floating point number	Scaled LOP[1]
14	rawLop	Floating point number	Raw LOP[2]
15	sigma	Floating point number	Standard deviation (m) applied to observation in calibration
16	dSigmaBearing	Floating point number	Not used
17	dSigmaDepth	Floating point number	Not used

18	systemNum	Integer	Number of system associated with this LOP
19	lopType	Integer	The type of Line of Position (LOP) data 0 = Slant Range 1= Hyperbola 2 = Northing 3 = Easting 6 = Bearing from a base station 7 = Depth
20	code	Text	Beacon ID for USBL LOP or N/E for GPS LOP
21	address	Text	Beacon ID for USBL LOP, device name for GPS LOP
22	time	Floating point number	LOP PC time (s)
23	rawDX	Floating point number	Raw X value: USBL XYZ = Observed X USBL travel time = TWTT (ms) USBL DirCos = Thwartship DirCos GPS = 0
24	rawDY	Floating point number	Raw Y value: USBL XYZ = Observed Y USBL travel time = 0 USBL DirCos = Foreaft DirCos GPS = 0
25	rawDZ	Floating point number	Raw Z value: USBL XYZ = Observed Z USBL travel time = 0 USBL DirCos = TWTT (ms) GPS = 0
26	reducedDX	Floating point number	Reduced X value: USBL XYZ = observed X corrected for USBL corrections and scaled to map projection USBL travel time = slant range (m) scaled to map projection USBL DirCos = X derived from DirCos, corrected for USBL corrections and scaled to map projection GPS = 0
27	reducedDY	Floating point number	Reduced Y value: USBL XYZ = observed Y corrected for USBL corrections and scaled to map projection USBL travel time = 0 USBL DirCos = Y derived from DirCos, corrected for USBL corrections and scaled to map projection GPS = 0

28	reducedDZ	Floating point number	Reduced Z value : USBL XYZ = observed Z corrected for USBL corrections and scaled to map projection USBL travel time = 0 USBL DirCos = Z derived from DirCos, corrected for USBL corrections and scaled to map projection GPS = 0
29	pitch	Floating point number	Pitch of the vessel (deg) at LOP epoch
30	roll	Floating point number	Roll of the vessel (deg) at LOP epoch
31	velocity	Floating point number	LOP velocity, 0 for USBL systems.
32	twttMode	Integer	TWTT flag: 0 = LOP is not only TWTT 1 = LOP is a TWTT only LOP Note: A Direction Cosine/TWTT data format is not flagged as a TWTT mode
33	name	Text	Name of station observed, blank for GPS
34	beaconDataType	Integer	Beacon type flag: 0 = Direction Cosines 1 = Standard XYZ (including TWTT)

The following fields are repeated for each system involved in this epoch's observation. Each system occupies 5 fields

35	name	Text	Name of LOP system device
36	type	Integer	Type of LOP system, default 4 (not used)
37	xOff	Floating point number	System port/stbd offset (m)
38	yOff	Floating point number	System fore/aft offset (m)
39	zOff	Floating point number	System heithg/depth offset (m)

[1] Dependent upon the LopType:
- 0 Slant range (m) corrected for USBL corrections and reduced to the map Projection (USBL)
- 1 Hyperbola
- 2 Map Projection Northing (m) (GPS)
- 3 Map Projection Easting (m) (GPS)
- 4 Not Used
- 5 Not Used
- 6 Bearing/angle from beacon (degrees) corrected for USBL corrections and reduced to Map Projection (USBL)
- 7 Depth (m) corrected for USBL corrections (USBL)

[2] Dependent upon the LopType:
- 0 True slant range (m) or TWTT (ms) (USBL)
- 1 Hyperbola
- 2 WGS 84 Latitude (degrees) (GPS)
- 3 WGS 84 Longitude (degrees) (GPS)

4 Not Used
5 Not Used
6 Bearing/angle to beacon (degrees) (USBL)
7 Depth (m) (USBL)

TYPE 903 FORMAT

Field	Data	Format	Comment
1	Code	903	Acoustic constraint data
2	*a fixed string*	text	"Constraints"
3	numLops	d	Number of LOP constraints
4	dataType	d	0 = azimuth 1 = baseline
5	scaledLop	f.ddddddddd	Scaled observation
6	rawLop	f.ddddddddd	Raw observation
7	fromStation	text	Name of the station the observation was measure from
8	fromCode	text	Code of the station the observation was measure from
9	fromAddress	text	Address of the station the observation was measure from
10	toStation	text	Name of the station the observation was measure to
11	toCode	text	Code of the station the observation was measure to
12	toAddress	text	Address of the station the observation was measure to
13	applied	d	1 = observation applied 0 = observation not applied

** field 4 through 13 repeated for 'numLops' times

TYPE 904 FORMAT

Field	Data	Format	Comment
1	Code	904	Depth Station Data
2	*a fixed string*	text	"Depths"
3	station name	d	
4	station code	d	
5	station address	f.ddddddddd	
6	digi quartz	f	1 = is digi quartz 0 = not digi quartz
7	num of LOPS	f	Number of LOP constraints
8	time	f.ddd	time of depth measurement
9	temperature count	f.ddd	temperature count
10	scaled LOP	f.ddd	scaled measurement
11	raw LOP	f.ddd	raw measurement
12	sigma	f.ddd	
13	depth error	f	
14	count Error	f	

** field 8 through 14 repeated for every depth LOP

TYPE 905 FORMAT

Field	Data	Format	Comment
1	Code	905-002-W	Base line summary data
2	*a fixed string*	text	“Baseline Summary”
3	Transponder name	text	Measured from
4	Transponder code	text	Code measured from
5	Transponder address	text	Address measured from
6	Number of records	integer	
7	Transponder name	text	Measured to
8	Transponder code	text	Code measured to
9	Transponder address	text	Address measured to
10	Forward attempts	integer	Number attempted measurements forward
11	Forward successful attempts	integer	Number attempted measurements forward that succedded
12	Forward failed	integer	Number attempted measurements forward that failed
13	Reverse attempts	integer	Number attempted measurements reverse
14	Reverse successful attempts	integer	Number attempted measurements reverse that succedded
15	Reverse failed	integer	Number attempted measurements reverse that failed
16	Sum raw ranges	Floating point	Sum of all ranges used
17	Sum reduced ranges	Floating point	Sum of all reduced ranges used
18	Sum forward ranges	Floating point	Sum of forward ranges used
19	Sum reduced forward ranges	Floating point	Sum of forward reduced ranges used
20	Sum reverse ranges	Floating point	Sum of reverse ranges used
21	Sum reduced reverse ranges	Floating point	Sum of reverse reduced ranges used
22	Number forward ranges	integer	Number forward ranges weighted in
23	Number reverse ranges	integer	Number reverse ranges weighted in

TYPE 908 FORMAT

Field	Data	Format	Comment
1	Code	908	Attitude use settings
2	UseAttitudeForGPS	text	UseAttitudeForGPS
3	Yes/No	text	Answer to above
4	UseAttitudeForLBL	text	UseAttitudeForLBL
5	Yes/No	text	Answer to above
6	UseAttitudeForUSBL	text	UseAttitudeForUSBL
7	Yes/No	text	Answer to above
8	UpdateShipPositionInUSBLXponderCal	text	UpdateShipPositionInUSBLXponderCal
9	Yes/No	text	Answer to above
10	UseUSBLTWTTRanges	text	UseUSBLTWTTRanges
11	Yes/No	text	Answer to above

TYPE 909 FORMAT

Field	Data	Format	Comment
1	Code	909-001-W	Acoustic data
2	*a fixed string*	text	“Calibration Gating”
3	rngResMode	d	0 = range residual gating off 1 = range residual gating on
4	rngResGate	f.d	range residual gating size
5	brgResMode	d	0 = bearing residual gating off 1 = bearing residual gating on
6	brgResGate	f.d	bearing residual gating size
7	bslResMode	d	0 = baseline residual gating off 1 = baseline residual gating on
8	bslResGate	f.d	baseline residual gating size
9	psnResMode	d	0 = position residual gating off 1 = position gating on
10	psnResGate	f.d	position residual gating size

TYPE 910 FORMAT

Field	Data	Format	Comment
1	Code	910-001-W	USBL Calibration Data
2	*a fixed string*	text	“USBL Calibration”
3	calBcnCode	text	Beacon code
4	totalNumObs	integer	Number of observations
5	numObsUsed	integer	Number of observations used
6	iterCount	integer	Number of iterations to converge
7	aPosteriori	Floating point	aPosteriori variance factor
8	velocityStdDev	Floating point	Velocity standard deviation
9	rotationStdDev	Floating point	Rotation standard deviation
10	pitchStdDev	Floating point	Pitch standard deviation
11	rollStdDev	Floating point	Roll standard deviation
12	velocity	Floating point	Computed velocity
13	rotation	Floating point	rotation
14	pitch	Floating point	Vessel pitch
15	roll	Floating point	Vessel roll
16	xOffData	Floating point	x data offset (m)
17	yOffData	Floating point	y data offset (m)
18	zOffData	Floating point	z data offset (m)
19	CalTime	text	“CalTime”
20	time	Floating point	Time of calibration is seconds

TYPE 910 FORMAT (USED IN FILE VERSIONS 1-3)

Field	Data	Format	Comment
1	Code	910-001-W	USBL Calibration Data
2	*a fixed string*	text	"USBL Calibration"
3	velocity	Floating point	Computed velocity
4	rotation	Floating point	rotation
5	pitch	Floating point	Vessel pitch
6	roll	Floating point	Vessel roll
7	xOffData	Floating point	x data offset (m)
8	yOffData	Floating point	y data offset (m)
9	zOffData	Floating point	z data offset (m)

TYPE 911 FORMAT

Field	Data	Format	Comment
1	Code	911	Sounder Data
2	name	Text	Device name(_transducer)
3	time	Floating point number	PC time in seconds (GPS time if available) the data was read
4	depth	Floating point number	Water depth output by the device (m)
5	status	Integer	Device dependent generally 0 = bad data

TYPE 916 FORMAT

Field	Data	Format	Comment
1	Code	916	Raw Profile Data
2	name	ssss	Vehicle Name
3	time	f.dd	PC time in seconds (GPS time if available) the data was read
4	X	f.dd	Profile point Easting (m)
5	Y	f.dd	Profile point Northing (m)
6	Z	f.dd	Profile point depth (m)
7	time-oldTime	f.dd	0.01 seconds

* positions are based on filtered positions referenced to the working ellipsoid
* depths referenced to the elevation of the CRP

TYPE 920 FORMAT

Field	Data	Format	Comment
1	Code	920-001-W	Acoustic Data
2	*a fixed string*	text	"Relative Error Ellipse"
3	FromTo	text	'from station' – 'to station'
4	A	Floating point	semi-major axis (m)
5	B	Floating point	semi-minor axis (m)
6	Azimuth	Floating point	semi-major axis azimuth (deg)
7	x	Floating point	Location to draw ellipse (easting)
8	y	Floating point	Location to draw ellipse (northing)
9	From easting	Floating point	Easting of from transponder
10	From northing	Floating point	northing of from transponder
11	To easting	Floating point	Easting of to transponder
12	To northing	Floating point	northing of to transponder

TYPE 921 FORMAT

Field	Data	Format	Comment
1	Code	920-001-W	Acoustic Data, general relative error ellipse information
2	Number of error ellipses	integer	
3	a posteriori	Floating point	Of all baselines
4	a posteriori	Floating point	Of all ranges
5	test	integer	Test of a posteriori 0=not tested 1=failed test 2=failed but too pessimistic a priori 3=passed
5	Statisticts available	integer	0=no 1=yes

TYPE 922 FORMAT

Field	Data	Format	Comment
1	Code	922	Base station information
2	name	text	Vehicle Name
3	easting	text	If easting have not been deweighted then the text "easting" will appear
4	northing	text	If northing have not been deweighted then the text "northing" will appear
5	depth	text	If depth have not been deweighted then the text "depth" will appear. I.e. if depth is to be solved for

* repeated for each base station

TYPE 923 FORMAT

Field	Data	Format	Comment
0	Code	923	Acoustic calibration file
1	Array offset	integer	Internal WinFrog use

TYPE 923 FORMAT

Field	Data	Format	Comment
0	Code	923-001-W	Raw File Static Vehicle data
1	name	ssss	Name of the vehicle
2	staticTime	f.dd	Time of the static vehicle
3	crpLatitude	[-]dd.mmmmmmmm	Latitude of the static vehicle's CRP
4	crpLongitude	[-]ddd.mmmmmmmm	Longitude of the static vehicle's CRP
5	crpNorth	f.ddd	Northing of the static vehicle's CRP in meters
6	crpEast	f.ddd	Easting of the static vehicle's CRP in meters
7	crpHeight	f.ddd	Height of the static vehicle's CRP in meters
8	orientation	f.ddddddd	Orientation of the static vehicle with respect to the transponder array
9	pitch	f.ddddddd	Pitch of the static vehicle
10	roll	f.ddddddd	Roll of the static vehicle

TYPE 998 FORMAT

Field	Data	Format	Comment
1	Code	998	Record type
2	Name	text	Device name
3	Time	float	Seconds
4	Speed Over Ground	float	Knots or m/s
5	Course Made Good (True)	float	Degrees
6	Velocity North (True)	float	Knots or m/s
7	Velocity East (True)	float	Knots or m/s
8	Course Made Good (Magnetic)	float	Degrees
9	Velocity North (Magnetic)	float	Knots or m/s
10	Velocity East (Magnetic)	float	Knots or m/s

TYPE 999 FORMAT

Field	Data	Format	Comment
1	Code	999	Time record (version 2)
2	Name	Text	TIME SYNC
3	Time Stamp	Floating point number	WinFrog time seconds from 1 Jan 1980
4	UTC	Floating point number	Time in telegram
5	NULL field		To maintain backwards compatibility
6	Local offset	Floating point number	Local time offset from time in telegram
7	Unfiltered delta time	Floating point number	Difference between timestamp for data and UTC. The UTC time is adjusted to local time based upon the local time offset entered in the configuration dialog for time synchronization.
8	Filtered delta time	Floating point number	Difference between central tendency of past 15 timestamps and UTC[1].
9	Clock adjusted flag	Integer	1 if clock was adjusted based on last epoch, 0 if clock was not adjusted.
10	Time clock adjusted	Floating point number	WinFrog time clock was reset, based on adjusted time. Adjustment is the amount given in field 8.

TYPE 1001 FORMAT

Field	Data	Format	Comment
1	Code	1001	Position Average-Waypoint Data
2	logComment	s	Operator entered comment, max 80 characters
3	numRcds	d	Number of position records in file
4	meanN	f.fff	Calculated mean Northing (m)
5	stdDevN	f.fff	Standard deviation of sample for Northings (m)
6	meanE	f.fff	Calculated mean Easting (m)
7	stdDevE	f.fff	Standard deviation of sample for Eastings (m)
8	meanLat	f.ffffff	Calculated mean latitude on the working ellipsoid (decimal of degrees)
9	meanLon	f.ffffff	Calculated mean longitude on the working ellipsoid (decimal of degrees)
10	meanHt	f.fff	Calculated mean height (above MSL, m)
11	stdDevHt	f.fff	Standard deviation of sample for height (m)
12	meanDp	f.fff	Calculated mean water depth (m)
13	stdDevDp	f.fff	Standard deviation of sample for water depth (m)
14	meanHeading	f.fff	Calculated mean heading (T, decimal of degrees)
15	stdDevHeading	f.fff	Standard deviation of sample for heading (decimal of degrees)
16	vehName	s	Name of vehicle
17	vehOffset	s	Name of active vehicle offset, “None” if none active
18	foreAftOffset	f.fff	Active offset fore/aft offset (m)
19	portStbdOffset	f.fff	Active offset port/starboard offset (m)
20	heightOffset	f.fff	Active offset vertical offset (m)

Comments: Positions giving on Working Map Projection and Working Ellipsoid

TYPE 1002 FORMAT

Field	Data	Format	Comment
1	Code	1002	Position Average-Results
2	wptName	s	Name of waypoint being tracked, “No Name if none being tracked
3	wptLat	f.ffffff	Waypoint latitude (decimal of degrees)
4	WptLon	f.ffffff	Waypoint latitude (decimal of degrees)

Comments: Positions giving on Working Map Projection and Working Ellipsoid

TYPE 1003 FORMAT

Field	Data	Format	Comment
1	Code	1003	Position Average-Line track & line
2	1510	d	Sub-record identifier, indicates the start of the line tracking parameters component of the record
3	vehName	s	Vehicle name (maximum 25 characters)
4	name	s	Line Name (maximum 35 characters)
5	Enabled	d	Enabled flag, 0=tracking off, 1= tracking on
6	segCont	d	Segment tracking mode: • 0 = automatic tracking • 1 = not used • 2 = force first segment • 3 = manual control
7	currentSeg	d	Number of currently tracked segment
8	windowingOn	d	Active segment determination control option, specifically windowing mode flag, 0=disabled, 1=enabled
9	windowSize	d	Number of segments either side of current segment WinFrog will look for the next segment to track when it determines the current one is not valid if Windowing mode is enabled
10	displayCurrSegm	d	Graphics display flag controls if current segment is highlighted, 0=disabled, 1=enabled
11	displaySegmAnnot	d	Graphics display flag controls if segments are annotated, includes curve points, 0=disabled, 1=enabled
12	useCorridor	d	Active segment determination control option, specifically if vehicle is outside the specified corridor, WinFrog will not attempt to determine the next segment to track, 0=disabled, 1=enabled

13	MaxDistOffLine	f.f	Width of corridor either side of the line (m)
14	506	d	Sub-Record identifier, indicates the start of the line data component of the record
15	vehName	s	Vehicle name (maximum 25 characters)
16	time	f.ff	Time record create in PC time (seconds)
17	name	s	Line Name (maximum 35 characters)
18	type	d	Not used
19	StartShot	d	Number identifier of the first shotpoint downline
20	firstShotDDL	f.fff	Distance downline to the first shotpoint
21	startKP	f.fffff	KP at the start of the line
22	kpDir		KP increment/decrement control flag: • 1 = increments, line in original state • 2 = increments, line reversed • -1 = decrements line in original state • -2 = decrements, line reversed
23	numNodes	d	Number of nodes in the line
24	scalable	d	Scaleable KP flag, 0= normal, 1=scalable
25	kpScaleLimits	f.ff	Allowable deviation from calculated KP distances between nodes for scaleable KPs entered, (%)
	The following 5 fields are repeated for each node of the line		
26	node[i].lat	f.fffffffff	Latitude of node (decimal of degrees)
27	node[i].lon	f.fffffffff	Longitude of node (decimal of degrees)
28	node[i].z	f.ff	Elevation of node relative to MSL (m)
29	node[i].radius	f.ff	Radius of curve at the node (m)
30	node[i].kp	f.ff	KP for the node (km)

Comments: Positions giving on Working Ellipsoid

TYPE 1010 FORMAT

Field	Data	Format	Comment
1	Code	1010	Position Average-Position Data
2	use	c	Flag indicating whether or not to use data in calculations, Y=use, N=don't use
3	time	f.ff	PC time of data (seconds)
4	n	f.fff	Vehicle Northing (m)
5	e	f.fff	Vehicle Easting (m)
6	ht	f.fff	Vehicle Height (relative to sea level) (m)
7	dp	f.fff	Water depth(m)
8	acc	f.ff	Accuracy assigned to position data for calculations (m)
9	resN	f.fff	Northing residual, mean – observed (m)
10	resE	f.fff	Easting residual, mean – observed (m)
11	resHt	f.fff	Height residual, mean – observed (m)
12	resDp	f.fff	Water depth residual, mean – observed (m)
13	heading	f.fff	Vehicle heading (decimal of degrees, T)
14	resHeading	f.fff	Heading residual, mean – observed (decimal of degrees)

Comments: Positions giving on Working Map Projection for the Vehicle's tracking point

TYPE 1510 FORMAT

Field	Data	Format	Comment
1	Code	1510	Position Average-Line track parameters
2	vehName	s	Vehicle name (maximum 25 characters)
3	name	s	Line Name (maximum 35 characters)
4	Enabled	d	Enabled flag, 0=tracking off, 1= tracking on
5	segCont	d	Segment tracking mode: • 0 = automatic tracking • 1 = not used • 2 = force first segment • 3 = manual control
6	currentSeg	d	Number of currently tracked segment
7	windowingOn	d	Active segment determination control option, specifically windowing mode flag, 0=disabled, 1=enabled
8	windowSize	d	Number of segments either side of current segment WinFrog will look for the next segment to track when it determines the current one is not valid if Windowing mode is enabled
9	displayCurrSegm	d	Graphics display flag controls if current segment is highlighted, 0=disabled, 1=enabled
10	displaySegmAnnot	d	Graphics display flag controls if segments are annotated, includes curve points, 0=disabled, 1=enabled
11	useCorridor	d	Active segment determination control option, specifically if vehicle is outside the specified corridor, WinFrog will not attempt to determine the next segment to track, 0=disabled, 1=enabled
12	MaxDistOffLine	f.f	Width of corridor either side of the line (m)

TYPE 1516 FORMAT

Field	Data	Format	Comment
1	Code	1516	Offset Data
2	VehName	text	Vehicle name
3	Enabled	d	0 = offset tracking not enabled 1 = offset tracking enabled
4	UseHeading	d	0 = CMG used in offset position calculation 1 = heading used in offset position calculation
5	Name	ssss	Offset name
6	X	f.dd	x offset (m)
7	Y	f.dd	y offset (m)
8	Z	f.dd	z offset (m)
9	Plot	d	0 = don't plot offset 1 = plot offset
10	PlotLabel	d	0 = don't plot label 1 = plot label

TYPE 1916 FORMAT

Field	Data	Format	Comment
1	Code	1916	Profiler Data
2	name	text	operator assigned name of the device
3	Time	f.dd	PC time of latest data input
4	profilerModel	d	designation of the profiler type, 0 = generic, 1 = Tritech DHSS
5	nmr_heads	d	number of heads in use
6	nmr_ranges	d	number of ranges per head logged in scan
7	last_scan_head	d	the head last updated
8	vp	f.dddd	the velocity of sound as decoded from the profiler
9	velocityUsed	f.dddd	the velocity of sound used in real-time processing
10	heading_true	f.ddd	the heading used to process the data in realtime
11	Pitch	f.dddddd	the pitch interpolated for the time of the scan
12	Roll	f.dddddd	the roll interpolated for the time of the scan
13	next_scan_nmr	d	the scan number
14	processed_ranges	d	is the data raw (=0) or processed (=1)

TYPE 1917 FORMAT

Field	Data	Format	Comment
1	Code	1917	Profiler Data
2	name	text	operator assigned name of the device
3	gps_time	f.ddd	the PC time the scan data was received by WinFrog
4	scan_time	f.ddd	the scan time output by the profiler
5	j	d	data index
6	scan_direction	d	the scan direction
7	duration	f.ddd	duration of the scan in
8	start_angle	f.dddddd	the scan start angle in degrees
9	step_angle	f.dddddd	the scan angle interval in degrees
10	orient	d	orientation of the head
11	head_setup	d	head setup as assigned by the operator (same as MultiRov
12	yOff	f.ddd	the fore/aft offset for the head, this may be the offset decoded from the profiler if the operator has set WinFrog to use these offsets
13	xOff	f.ddd	the port/stbd offset for the head, this may be the offset decoded from the profiler if the operator has set WinFrog to use these offsets
14	ZOff	f.ddd	the vertical offset for the head, this may be the offset decoded from the profiler if the operator has set WinFrog to use these offsets
15	AzOff	f.dddddd	the azimuth correction/offset
16	POff	f.dddddd	the pitch correction/offset
17	ROff	f.dddddd	the roll correction/offset for the head, this may be the offset decoded from the profiler if the operator has set WinFrog to use these offsets
18	AnOff	f.dddddd	angle offset, for generic profilers only
19	headNorth	f.ddd	the Northing of the head computed in realtime
20	HeadEast	f.ddd	the Easting of the head computed in realtime
21	headDepth	f.ddd	the depth of the head computed in realtime
22…	rawRanges	f.ddd	the raw data: in microseconds if travel time, metres if distance

USER DECOMPRESSION OF VEHICLE DATA SENT FROM A MASTER WINFROG TO A SMART REMOTE

To obtain the vehicle data sent by the master to smart remote computers, listen on port 7050 with UDP/IP protocol. You must be on the same network as the master WinFrog with the same sub-net mask to receive this data.

There are three messages that can be received on this port. Two are commands relate to the receiving of configuration data. These messages are uncompressed ASCII characters and are preceded with either 10000 or 10001 followed by a comma. These messages can be ignored. The third message contains the navigation information for all vessels in a single packet. It is compressed and begins with a two-byte binary integer, little endian, indicating the message size. The size does not include the first two bytes. The third byte indicates whether the first block is compressed or not and is used by the decompression routine. This byte does not necessarily indicate if the whole message is compressed or uncompressed, just the first block. The size of the compressed data should not exceed 50K. The decompression routine below uses “string” to dynamically allocate space for the uncompressed vehicle data.

The decompressed message will begin with STARTNPS<LF> and end with ENDNPS<LF>. Each line between the header and trailer is prefixed by a code indicating the message type. The messages that are sent depends on WinFrog’s configuration but will consist of and be in the following order: 300, 701, 494, 516, 1516, 600, 510, 512, 700, 556, and 555. These message types are described in the previous section of this appendix.

The following code segment describes the method to decompress.

1) Read the message.
2) Test if the message begins with ACSII 10000 or 10001.
If so ignore message
If not decompress by calling the function FastDecompress. The source code for this function and another that it uses, is given below.

```
#define FAST_BLK_SIZE     16384L
#define FLAG_COPIED         0x80
#define FLAG_COMPRESS    0x40
#define  S16   short int

// ********************************************************************
//
// Function Name:   FastDecompress
//
//
// Description:     This 16 bit function uses the FastDecompBlock() function to
//                        decompress a buffer of bytes.
//
// Notes/Warnings:
//
// Parameters:      Source        - pointer to the compressed data buffer
//                        Dest           - pointer to the raw data buffer
//                        SourceSize - size of the compressed data in bytes
```

```
//
// Returns:          raw data size
//
// ***************************************************************************


INT _export FastDecompress(BYTE *Source, string *decompressedStr, INT SourceSize)
{

        BYTE *Src = Source;
        INT bytes_left = SourceSize;
        INT total_size = 0;
        INT size, raw_size;

        BYTE *Dst = new BYTE[FAST_BLK_SIZE + 1024];

         bool first = true;

        while (bytes_left > 0)
        {
                // decompress a block
                size = *((S16 *)Src);
                raw_size = FastDecompBlock( &Src[2], Dst, (short int) size );
                if (first)
                {
                        first = false;
                        decompressedStr->assign( (char*)Dst, 0, raw_size );
                }
                else
                        decompressedStr->append( (char*)Dst, 0, raw_size );

                Src += (size + sizeof(S16));
                bytes_left -= (size + sizeof(S16));
                total_size += raw_size;
        }
        delete [] Dst;

        return total_size;

}   //  End of Function: FastDecompress( )


// ***************************************************************************
//
// Function Name:   FastDecompBlock
//
//
// Description:     A fast decompression routine for small blocks
//                  of bytes. Uses a fairly fast algorithm, but the
//                  compression ratio is not as high as PKZIP or other
//                  commercial utilities.
//
// Notes/Warnings:  Since you provide both buffers ahead of time, you must
```

```
//              know the worst case size of the compressed data and
//              have a large enough buffer allocated.
//              (original size + 2 should be sufficient.)
//
//
//
// Parameters:          Source      - buffer for reading the compressed data from
//                      Dest        - buffer for writing the raw data to
//                      SourceSize - size in bytes of the compressed data
//
// Returns:       Size in bytes of the raw data
//
// ***************************************************************************
WORD FastDecompBlock(BYTE *Source,BYTE *Dest,WORD SourceSize)
{
        WORD X = 4;
        WORD Y = 0;
        WORD Pos,Size,K;
        WORD Command = (Source[2] << 8) + Source[3];
        BYTE  Bit = 16;

        if (Source[0] == FLAG_COPIED)
        {
                memcpy(Dest,&Source[1],SourceSize-1);
                return (--SourceSize);
        }


        for (; X < SourceSize;)
        {
                if (Bit == 0)
                {
                        Command = (Source[X++] << 8);
                        Command += Source[X++];
                        Bit = 16;
                }
                if (Command & 0x8000)
                {
                        Pos = (Source[X++] << 4);
                        Pos += (Source[X] >> 4);
                        if (Pos)
                        {
                                Size = (Source[X++] & 0x0f)+3;
                                for (K = 0; K < Size; K++)
                                        Dest[Y+K] = Dest[Y-Pos+K];
                                Y += Size;
                        }
                        else
                        {
                                Size = (Source[X++] << 8);
                                Size += Source[X++] + 16;
                                for (K = 0; K < Size; K++)
                                        Dest[Y+K] = Source[X];
```

```
                                X++;
                                Y += Size;
                        }
                }
                else
                {
                        Dest[Y++] = Source[X++];
                }
                Command <<= 1;
                Bit--;
        }

        return(Y);
}   //  End of Function: FastDecompBlock( )
```