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. 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.

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

d	integer value
f.ff	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	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	0 = true, on 1 = 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)

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

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.

Field	Data	Format	Comment
1	Fix#	d	Shotpoint (SP) 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	s	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.

RECEIVER (*.RCV) RECORDS

Field	Data	Format	Comment
1	Fix#	d	Shotpoint (SP) 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	s	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

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	s	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	s	Brief description of log entry
2	Date/Time	mm-dd-yy hh:mm:ss.s	Time of fix
Fields 3 to 18 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	Heading	f.ff	Vessel's heading (T)
7	CMG	f.ff	Vessel's course made good (Grid)
8	Speed	f.ff	Vessel's speed (knots)
9	Northing	[-]f.ff	Northing[2]
10	Easting	[-]f.ff	Easting[2]
11	Depth	f.ff	Water depth (m)
12	QC	f.ff	Not used
13	Offset	text	Name of the offset being tracked
14	Off-line	[-]f.ff	Distance offline (m)
15	Alongline	[-]f.ff	Distance alongline(m)
16	KiloPost	f.fff	Kilometer post
17	Layback	f.ff	The layback of the vessel in cases of vessel referenced to another as a Pipe track vehicle
18	Vessel	s	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 Pressure	f.fff	Atmospheric pressure value (mb)
…	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	GPS time in seconds of the raw data record
4	Center Latitude	Floating point number	Latitude of fix at CRP
5	Center Longitude	Floating point number	Longitude of fix at CRP
6	Center Height	Floating point number	Elevation of fix at CRP in meters
7	Reference Latitude	Floating point number	Latitude of fix at Tracked Offset
8	Reference Longitude	Floating point number	Longitude of fix at Tracked Offset
9	Depth	Floating point number	Water depth including offset and tide if enabled (m)
10	Heading	Floating point number	Vessel's heading – filtering and offsets applied if enabled (deg)
11	Course made good	Floating point number	Vessel's course made good – based on the vessels filtered northerly and easterly velocities (deg)
12	Speed	Floating point number	Vessel's speed - based on the vessels filtered northerly and easterly velocities (knots)
13	Speed North	Floating point number	Vessel's filtered northerly velocity (m/s)
14	Speed East	Floating point number	Vessel's filtered easterly velocity (m/s)
15	Last Data Time	Floating point number	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	Floating point number	In meters
18	Cable Tension	Floating point number	In metric tons
19	Cable Count Channel 2	Floating point number	In meters
20	Cable Tension Channel 2	Floating point number	In metric tons
21	Cable Burial Depth	Floating point number	In Centimeters
22	Cable Trench	Floating point number	In Centimeters; includes trench depth

Field	Data	Format	Comment
	Depth		offset
23	Number of Unknowns	Integer	Number of values solved for
24	Matrix[0][0]	Floating point number	Element 0,0 of the current filter covariance matrix
25	Matrix [0][2]	Floating point number	Element 0,2 of the current filter covariance matrix
26	Matrix [1][1]	Floating point number	Element 1,1 of the current filter covariance matrix
27	Matrix [1][3]	Floating point number	Element 1,3 of the current filter covariance matrix
28	Matrix [2][2]	Floating point number	Element 2,2 of the current filter covariance matrix
29	Matrix [3][3]	Floating point number	Element 3,3 of the current filter covariance matrix
30	Distance To Event	Floating point number	Approximate dDistance to the next event (metres)
31	Height	Floating point number	Height above MSL or depth below surface in meters; includes applicable offsets
32	Speed Through Water	Floating point number	In Knots; not filtered
33	Cable Angle	Floating point number	Cable angle provided by cable counter device Degrees
34	Cable speed	Floating point number	Cable speed provided by cable counter (m/s or m/min)
35	Cable speed channel 2	Floating point number	Cable speed provided by cable counter (m/s or m/min)
36	Jet Knife Angle	Floating point number	Degrees
37	Jet Knife Depth	Floating point number	Metres
38	Desired winch speed	Floating point number	Cable model; m/min
39	Desired Tension	Floating point number	Cable model; tonnes
40	Depressor angle	Floating point number	Degrees
41	Stinger angle	Floating point number	Degrees
42	Cable count channel 3	Floating point number	Cable count provided by cable counter device metres
43	Cable tension channel 3	Floating point number	Cable tension provided by cable counter device Tonnes
44	Cable speed channel 3	Floating point number	Cable speed provided by cable counter (m/s or m/min)
45	Cable count channel 4	Floating point number	Cable count provided by cable counter device metres
46	Cable tension channel 4	Floating point number	Cable tension provided by cable counter device Tonnes
47	Cable speed channel 4	Floating point number	Cable speed provided by cable counter (m/s or m/min)
48	Cable count channel 5	Floating point number	Cable count provided by cable counter device metres
49	Cable tension channel 5	Floating point number	Cable tension provided by cable counter device Tonnes

Field	Data	Format	Comment
50	Cable speed channel 5	Floating point number	Cable speed provided by cable counter (m/s or m/min)
51	Pitch	Floating point number	Degrees
52	Roll	Floating point number	Degrees
53	Roll Accuracy	Floating point number	Degrees
54	Pitch Accuracy	Floating point number	Degrees
55	Heave	Floating point number	metres
56	Attitude Status	Integer	0=Good all other numbers=Bad
57	Heading accuracy	Floating point number	Degrees
58	Heading flag	Floating point number	0=no aiding 1=GPS aiding 2=GPS and GAMS aiding
59	Altitude	Floating point number	Metres. Includes offset
60	Raw Altitude	Floating point number	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	Floating point number	Metres
65	Std. Dev. of LBL Observations	Floating point number	Metres (root of trace of covariance matrix)
66	Depressor Height	Floating point number	m
67	Attitude update time	Floating point number	Time attitude data was received (seconds)

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)

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	GPS Data – NMEA GGA message: Time, GPS fix data, position, and fix related 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 of fix in seconds – read from GGA data string output by the receiver
5	lat*	[-]dd.mmmmmmmm	Latitude of fix
6	lon*	[-]ddd.mmmmmmmm	Longitude of fix
7	status*	d	Fix quality : 0 = invalid 1 = GPS fix 2 = DGPS fix
8	satsUsed*	dd	Number of satellites used
9	hdop*	f.d	Horizontal Dilution Of precision
10	alt*	f.dd	Meters, above mean sea level
11	geoid*	f.dd	Height of geoid in meters (mean sea level) above WGS84 ellipsoid
12	dgpsAge	f.dd	time in seconds since last DGPS update
13	refStn*	d	DGPS station ID number

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

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	309-002-W	USBL Data
1	name	sssss	Operator entered device name
2	usblPitch	f.ff	Pitch of reference vessel in degrees, interpolated from the attitude datatype associated with the same vehicle.
3	usblRoll	f.ff	Roll of reference vessel in degrees, interpolated from the attitude datatype associated with the same vehicle.
4	time	f.fff	WinFrog time (seconds) the USBL data is valid for, currently the same as the data reception time stamp
5	code	ddd	Beacon code
6	x	f.fff	Raw USBL X value (meters)
7	y	f.fff	Raw USBL Y value (meters)
8	z	f.fff	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	d	Data error code direct from USBL system
10	error condition	d	Error condition, options are no error condition (=0), error condition exists (=1) and warning condition (=2)
11	signal receive time	f.fff	WinFrog timestamp in seconds for the USBL data telegram reception by WinFrog.
12	hydrophone time	f.fff	WinFrog time in seconds that the hydrophone position is to be deskewed to, currently the same as the data reception timestamp.
13	centerEasting	f.ff	Calculated beacon vehicle CRP position map projection Easting (meters)
14	centerNorthing	f.ff	Calculated beacon vehicle CRP position map projection Northing (meters)
15	CenterHeight	f.ff	Calculated beacon vehicle CRP position height relative to water surface, i.e. below water surface is negative (meters)
16	RelativeUSBL EastCorrection	f.ff	The correction applied to the surface navigation derived CRP position Easting to produce a Relative USBL based position (meters)
17	RelativeUSBLNorth	f.ff	The correction applied to the surface

	Correction		navigation derived CRP position Northing to produce a Relative USBL based position (meters)
18	slantRange	f.fff	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	f.fffff	Two-Way-Travel-Time for signal from hydrophone head to the beacon (ms)
20	heading	f.ff	Heading decoded from the USBL system, relevant to the data epoch. (decimal degrees)
21	pitch	f.fff	Pitch decoded from the USBL system, relevant to the data epoch. (decimal degrees)
22	roll	f.fff	Roll decoded from the USBL system, relevant to the data epoch. (decimal degrees)
23	age	f.fff	Age of data as decoded from the USBL system (s)
24	status	s	Status of data as received from the USBL system, system dependent.

TYPE 313 FORMAT

Field	Data	Format	Comment
1	Code	313	Transponder Data
2	name	text	Device name
3	time	f.dd	GPS time (seconds) the LBL data was read
4	lat	[-]dd.mmmmmmmm	Latitude of transponder
5	lon	[-]ddd.mmmmmmmm	Longitude of transponder

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
2	vehicle	text	Vehicle name
3	event	dd	Event number
4	lat	[-]dd.mmmmmmmm	Latitude of fix at tracked offset
5	lon	[-]ddd.mmmmmmmm	Longitude of fix at tracked offset
6	time	f.dd	Event time (GPS time in seconds)
7	depth	f.dd	Water depth including offset and tide if enabled (m)
8	cmg	f.dd	Vessel's course made good in degrees – based on the vessels filtered northerly and easterly velocities
9	speed	f.dd	Vessel's speed in knots - based on the vessels filtered northerly and easterly velocities

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	313	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	f.dd	PC time in seconds (GPS time if available) the data was read
4	Ship speed	f.dd	Ship Speed in Knots
5	Ship Heading	f.d	Ship Heading (True)
6	Wind Speed true	f.d	In units specified in field 7
7	Wind Speed Units	Text	Knots
8	Wind Direction True	f.d	Degrees
9	Relative wind speed (apparent)	f.d	In units specified in field 10
10	Wind Speed Units	Text	Knots
11	Relative wind direction (apparent)	f.d	Degrees
12	Wind Direction Type	Test	“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 380 FORMAT

Field	Data	Format	Comment
1	Code	380	Tide Data
2	name	text	Device Name
3	time	f.dd	PC time in seconds (GPS time if available) the data was read
4	tide*	f.dd	Tide level (m)
5	status*	d	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	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	Floating point number	Reference point offset on "From Vehicle"
8	Offset Fore/Aft	Floating point number	Reference point offset on "From Vehicle"
9	Offset Up/Down	Floating point number	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	Floating point number	Reference point offset on "To Vehicle"
13	Offset Fore/Aft	Floating point number	Reference point offset on "To Vehicle"
14	Offset Up/Down	Floating point number	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"	Floating point number	Northing of reference point on vehicle
19	Easting "from vehicle"	Floating point number	Easting of reference point on vehicle
20	Height "from vehicle"	Floating point number	Height of reference point on vehicle
21	Northing "to vehicle"	Floating point number	Northing of reference point on vehicle
22	Easting "to vehicle"	Floating point number	Easting of reference point on vehicle
23	Height "to vehicle"	Floating point number	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	Floating point number	Depth the operator entered
28	Catenary depth	Floating point number	Depth used for catenary calculation
29	Layback	Floating point number	Distance between “from vehicle’s” reference point and “to vehicle’s” reference point to calculate catenary
30	Length	Floating point number	Calculated length of pipe to touch down
31	Angle	Floating point number	Calculated angle of pipe at the “from vehicle”
32	Water depth offset	Floating point number	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	Floating point number	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 402 FORMAT

Field	Data	Format	Comment
1	Code	402	Speed Log Data
2	name	text	Speed log name
3	time	f.dd	PC time in seconds (GPS time if available) the data was read
4	foreAft	f.dd	Filtered fore/aft velocity in m/s
5	portStbd	f.dd	Filtered port/stbd velocity in m/s
6	rUpDown	f.dd	Raw up/down velocity in m/s
7	rforeAft	f.dd	Raw fore/aft velocity in m/s
8	rPortStbd	f.dd	Raw port/stbd velocity in m/s
9	wForeAft	f.dd	Raw fore/aft speed thru water in m/s
10	wPortStbd	f.dd	Raw port/stbd speed thru water in m/s
11	wUpDown	f.dd	Raw up/down speed thru water in m/s
12	status		Data status: 0 – data relative to memory 1 – data relative to water 2 – data relative to bottom

TYPE 410 FORMAT

Field	Data	Format	Comment
1	Code	410	Gyro Data
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

TYPE 411 FORMAT

Field	Data	Format	Comment
1	Code	411	Echo Sounder Data
2	name	text(_text)	Device name (_Transducer Name)
3	time	f.dd	PC time in seconds (GPS time if available) the data was read (time of first depth record in data string)
4	depth	f.dd	Depth read from device in meters
5	status	d	
6	dTime	f.dd	Delta time from first time field (in seconds)

**depth, status, and dTime are repeated 15 times

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

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 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
2	Name	text	Device name
3	Time	f.dd	PC time in seconds (GPS time if available) the data was read
4	portPull	f.dd	Port tow tension (kN)
5	stbdPull	f.dd	Starboard tow tension (kN)
6	asLaidTension	f.dd	As laid tension (kN)
7	depHeight	f.dd	Depressor height (cm)
8	trenchDepth	f.dd	Trench depth (cm)
9	pitch	f.dd	Pitch of plow (degrees)
10	roll	f.dd	Roll of plow (degrees)
11	subDepth	f.dd	Submerged depth of plow (m)
12	umbTension	f.dd	Umbilical tension (kN)
13	portSkidHeight	f.dd	Port skid height (cm)
14	stbdSkidHeight	f.dd	Starboard skid height (cm)
15	heading	f.dd	Heading of plow (degrees)
16	altitude	f.dd	Altitude of plow off seabed (cm)
17	speed	f.dd	Speed of plow (cm/s)
18	travel	f.dd	Distance traveled by plow (m)
19	shipTowTen	f.dd	Tow wire tension at ship (kN)
20	shipTowOut	f.dd	Length of tow wire out (m)
21	telTension	f.dd	Telephone cable tension (kN)
22	burialDepth	f.dd	Telephone cable burial depth (cm)
23	towTension	f.dd	Tow tension (kN or T)
24	calcTrenchDepth	f.dd	Calculated trench depth (cm)
25	calcBurialDepth	f.dd	Calculated burial depth (cm)
26	portSpeed	f.dd	Port speed (m/s)
27	stbdSpeed	f.dd	Starboard speed (m/s)
28	cableAngle	f.dd	Cable angle (deg)
29	towCableAngle	f.dd	Tow cable angle (deg)
30	plowSteerAngle	f.dd	Plow rudder angle (deg)
31	stingerAngle	f.dd	Plow stinger angle (deg)
32	depressorAngle	f.dd	Plow depressor angle (deg)
33	layback	f.dd	Distance of plow behind vessel (m)

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
2	name	text	Device name
3	time	f.dd	PC time in seconds (GPS time if available) the data was read
4	count	f.dd	Cable count (m)
5	countToEvent	f.dd	Distance to event (m)
6	velocity	f.dd	Cable payout speed (m/min)
7	tension	f.dd	Cable tension, scale and offset applied (tonnes)
8	scale	f.dd	Scale
9	offset	f.dd	Cable count offset (m)
10	countCh2	f.dd	Channel 2 cable count (m)
11	countToEventCh2	f.dd	Channel 2 distance to event (m)
12	velocityCh2	f.dd	Channel 2 cable payout speed (m/min)
13	tensionCh2	f.dd	Channel 2 cable tension, scale and offset applied
14	scaleCh2	ddd	Channel 2 Scale
15	status	ddd	Status
16	statusCh2	f.dd	Channel 2 Status
17	offsetCh2	f.dd	Channel 2 cable count offset (m)
18	countCh3	f.dd	Channel 3 cable count (m)
19	countToEventCh3	f.dd	Channel 3 distance to event (m)
20	velocityCh3	f.dd	Channel 3 cable payout speed (m/min)
21	tensionCh3	f.dd	Channel 3 cable tension, scale and offset applied
22	scaleCh3	f.dd	Channel 3 scale
23	offsetCh3	f.dd	Channel 3 cable count offset (m)
24	statusCh3	ddd	Channel 3 status
25	countCh4	f.dd	Channel 4 cable count (m)
26	countToEventCh4	f.dd	Channel 4 distance to event (m)
27	velocityCh4	f.dd	Channel 4 cable payout speed (m/min)
28	tensionCh4	f.dd	Channel 4 cable tension, scale and offset applied
29	scaleCh4	f.dd	Channel 4 scale
30	offsetCh4	f.dd	Channel 4 cable count offset (m)
31	statuseCh4	ddd	Channel 4 status
32	cableAngle	f.dd	Cable angle (degrees)

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	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	At touch down (m)
9	slack	Floating point number	Incremental slack at touch down (%)
10	KP	Floating point number	At touch down (m)
11	depth	Floating point number	At touch down (m)
12	cable speed	Floating point number	Observed m/min
13	max vessel speed	Floating point number	Maximum vessel (speed knots)
14	depth	Floating point number	Depth at ship (m)
15	cable count	Floating point number	At ship (m)
16	KP	Floating point number	At ship (m)
17	spare	Floating point number	0
18	hydrodynamic constant	Floating point number	Degree-knots
19	spare	Floating point number	0
20	slack	Floating point number	At touch down (%)
21	spare	Floating point number	0
22	tension	Floating point number	At ship (tonnes)
23	cable in water	Floating point number	between ship and touch down (m)
24	cable weight in water	Floating point number	Kg/m
25	cable type	Text	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

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)

TYPE 499 FORMAT

Field	Data	Format	Comment
1	Record Number	499-001	
2	Device Name	sssss	
3	Data Time	f.dd	Seconds
4	Telephone Cable Count	f.ddd	Metres
5	Telephone Cable Tension	f.ddddd	Tonnes
6	Telephone Cable Speed	f.ddd	m/min
7	Telephone Cable Data Time	f.d	Seconds
8	Tow Cable Count	f.ddd	Metres
9	Tow Cable Tension	f.ddddd	Tonnes
10	Tow Cable Speed	f.ddd	m/min
11	Tow Cable Data Time	f.d	Seconds
12	LCE Tension	f.ddddd	Tonnes
13	LCE Data Time	f.d	Seconds
14	CDE1 Tension	f.ddddd	Tonnes
15	CDE1 Data Time	f.d	Seconds
16	CDE2 Tension	f.ddddd	Tonnes
17	CDE2 Data Time	f.d	Seconds
18	Emergency Stop	d	0 – Normal 1 – Emergency
19	Stonker State	d	0 – Open 1 – Closed
20	Plough Mode	d	1 – Ready 2 – Stop in Progress 3 – LTM Mode 4 – LR Mode 5 – RM Mode 6 – Error
21	Repeater Detected	d	0 – None Detected 1 – Repeater Detected 2 – Splice Box Detected
22	Cable Engine Mode	d	0 – Stopped 1 – MSM 2 – ASM 3 – BTM 4 – BSM 5 – Error

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	f.dd	Computer processor time of the last time target data was received (milliseconds)
4	targetCode	d	Target code
5	Enabled	d	3 = enabled
6	lat	[-]dd.mmmmmmmm	Latitude of target
7	lon	[-]ddd.mmmmmmmm	Longitude of target

TYPE 501 FORMAT (REPEATED)

Field	Data	Format	Comment
1	Code	501	Range Range Data
2	name	text	Device Name
3	time	f.dd	PC time in seconds (GPS time if available) the data was read
4	code	text	Control station code
5	rawRange	f.d	Raw range to the control station
6	status	d	0 = raw range > 0. 1 = raw range !> 0.

** code, rawRange and status are repeated up to 8 times

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
2	name	ssss	Device name
3	time	f.dd	PC time in seconds (GPS time if available) the data was read
4	magneticField	f.dd	Magnetometer (nT)
5	signalStrength	f.dd	Signal Strength
6	depth	f.dd	Depth of fish (m)
7	quality	d	Quality
8	leak	d	Leak
9	tuning	f.dd	Magnetic tuning voltage
10	voltage	f.dd	Input voltage

TYPE 888 FORMAT

Field	Data	Format	Comment
1	Code	888	Raw heave data
2	name	text	device name
3	time	f.ddd	PC time in seconds (GPS time if available) the data was read
4	heave*	f.ddd	Heave
5	roll*	f.ddd	Roll
6	pitch*	f.ddd	Pitch
7	yaw*	f.ddd	Yaw

- 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	901-003-W	Acoustic Calibration Data – record for measured baselines
1	lat	Floating point number	Latitude of transducer degrees
2	lon	Floating point number	Longitude of transducer degrees
3	x*	Floating point number	Easting of transducer (m)
4	y*	Floating point number	Northing of transducer (m)
5	z*	Floating point number	Depth of transducer (m)
6	dsOffset	Floating point number	Vertical offset from transducer to depth sensor (m)
7	dsCalib	Floating point number	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 tx code
11	bcnCode	text	Transponder code
12	on	integer	0 = Transponder off 1 = Transponder on
13	name	text	Name of Transponder
14	calFlag	integer	calFlag = 1
15	rmsBaselines	Floating point number	Average RMS of all baselines (m)
16	rmsTotal	Floating point number	Total RMS of all baselines (m)
17	errorEllipse[0]	Floating point number	Error ellipse semi-major axis (m)
18	errorEllipse[1]	Floating point number	Error ellipse semi-minor axis (m)
19	errorEllipse[2]	Floating point number	Orientation of Error ellipse semi-major axis (deg)
20	iif	text	Individual response frequency
21	rmsDepths	Floating point number	
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	This value indicate the state of the Digi Quartz. Valid values are : 0 = no digiquartz active 1 = digiquartz active
24	deepRating	integer	This value indicate if the Digi Quartz is deep rated capable. Valid values are : 0 = digiquartz is NOT deep rated 1 = digiquartz is deep rated
25	Quick Measurement	integer	This value indicate if the Digi Quartz is capable of quick measurement. Valid values are : 0 = digiquartz is NOT capable of quick measurement 1 = digiquartz is capable of quick measurement
26	formulaNum	integer	This value indicates the formula to use to convert pressure to depth: 1 = Average density
27	waterDensity	Floating point number	This is the water density value entered by the operator.
28	Atmospheric Pressure	Floating point number	This is the atmospheric pressure value entered by the operator.
29	coefficients[i]	Floating point number	These are the Digi Quartz coefficient values used with the formula number to calculate the water depth. There are a total of 14 parameters.
43	Height of instrument	Floating point number	Height transponder is above monument
44	Standard deviation	Floating point number	Computed standard deviction East, North and depth.
47	corrections	Floating point number	Correction to approximate coordinates East, North Depth.
48	Number observations	integer	
49	Double	integer	0=only one transponder at this

	transponders		location 1=mor than one transponder at this location
50	Number of other transponders	integer	Number of transponders at this location (5 max)
51	Other transponders	integer	Index to other transponders

* 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	LBL Calibration data
1	Baseline	text	“Baseline”
2	BaseLine Version	D	Baseline record version (0, 2 or 3)
3	fromCode	text	Code of the transponder the baseline was measure from
4	fromName	text	Name of the transponder the baseline was measure from
5	numLop	d	Number of ranges in the record
6	time	f.dd	time of observation (seconds)
	Version 0 members		Baseline data
7	scaledLop	f.ddd	Scaled range (m)
8	rawLop	f.ddd	Raw range (m)
9	toCode	Ssss	Code of the transponder the baseline was measure to
10	toAddress	Ssss	Address of the transponder the baseline was measure to
11	toName	Ssss	Name of the transponder the baseline was measure to
12	sigma	f.dd	Standard deviation (m)
			Note : Baseline data is based on the Baseline version number from Item #2 above.

TYPE 902 FORMAT - STATION

Field	Data	Format	Comment
0	Code	902-001-W	LBL Calibration data
1	*a fixed string*	Ssss	“Station”
2	time	f.dd	time of observation (seconds)
3	lat	[-]dd.mmmmmmmm	Station latitude
4	lon	[-]ddd.mmmmmmmm	Station longitude
5	heading	f.dd	Station heading (deg)
6	advance	f.dd	Station course made good (deg)
7	speed	f.ddd	Station speed
8	y	f.ddd	Station Northing (m)
9	x	f.ddd	Station Easting (m)
10	z	f.ddd	Station Height (m)
11	numLop	d	Number of ranges in the record
12	numSystem	d	numSystem = 2
13	scaledLop	f.ddd	Scaled range (m)
14	rawLop	f.ddddddd	Raw range (m)
15	sigma	f.dd	Standard deviation (m)
16	systemNum	d	System number
17	lopType	d	The type of Line of Position (LOP) data lopType = 0 : Transponder Range lopType = 1 : hyperbola lopType = 2 : northing lopType = 3 : easting lopType = 4 : ?? lopType = 5 : ?? lopType = 6 : bearing to a base station
18	code	ssss	Code of transponder
19	address	ssss	Address of transponder
20	time	f.dd	Time of observation (s)
21	velocity	f.dd	Velocity of the vessel
22	pitch	f.dd	Pitch of the vessel (deg)
23	roll	f.dd	Roll of the vessel (deg)
24	name	ssss	Name of device
25	name	ssss	Name of LOP system device
26	type	d	Type of LOP system Type = 0 : ??
27	xOff	f.dd	Calibration port / stbd offset (m)
28	yOff	f.dd	Calibration fore / aft offset (m)
29	zOff	f.dd	Calibration depth offset (m)
			* fields 13-24 repeated for each range to a transponder plus 2 for the GPS position ** fields 25-29 repeated for each system (GPS and LBL)

TYPE 902 FORMAT – USBL STATION

Field	Data	Format	Comment
0	Code	902-001-W	LBL Calibration data
1	*a fixed string*	s	"USBLStation"
2	time	f.ff	time of observation (seconds)
3	lat	[-]ff.ffffffff	Station latitude (degrees)
4	lon	[-]fff.ffffffff	Station longitude (degrees)
5	heading	f.ff	Station heading (deg)
6	advance	f.fffff	Station course made good (deg)
7	speed	f.fffff	Station speed
8	y	f.fff	Station Northing (m)
9	x	f.fff	Station Easting (m)
10	numLop	d	Number of LOPs in the record
11	numSystem	d	Number of data items (systems) in the record

The fields 12 to 29 are repeated for each LOP.

NOTE: USBL data produces slant range, bearing and depth LOPs but only one instance of the data is written to the calibration file, the slant range LOP. The bearing and depth LOPs are recreated during the loading of the calibration file. In addition, a USBL system may provide a TWTT value. In this case, a separate LOP is written to the calibration file for this LOP, without any associated bearing or depth LOPs.

NOTE: GPS data produces 2 LOPs, Latitude/Northing and Longitude/Easting.

12	scaledLop	f.ffffff	Scaled LOP[1]
13	rawLop	f.ffffffff	Raw LOP[2]
14	sigma	f.ff	Standard deviation (m)
15	systemNum	d	System number
16	lopType	d	The type of Line of Position (LOP) data lopType = 0 : Transponder Range lopType = 1 : hyperbola lopType = 2 : northing lopType = 3 : easting lopType = 4 : not used lopType = 5 : not used lopType = 6 : bearing to a beacon lopType = 7 : depth
17	code	s	Beacon code
18	address	s	Beacon address
19	time	f.ff	Time of measurement (s)
20	rawDX	f.ffffffff	Raw X value (m), if LOP is not associated with a USBL system, this values is 0
21	rawDY	f.ffffffff	Raw Y value (m), if LOP is not associated with a USBL system, this values is 0
22	rawDZ	f.ffffffff	Raw Z value (m), if LOP is not associated with a USBL system, this values is 0
23	reducedDX	f.ffffffff	Reduced X value (m), if LOP is not

			associated with a USBL system, this values is 0
24	reducedDY	f.ffffffff	Reduced Y value (m), if LOP is not associated with a USBL system, this values is 0
25	reducedDZ	f.ffffffff	Reduced Z value (m), if LOP is not associated with a USBL system, this values is 0
26	pitch	f.ff	Pitch of the vessel (deg)
27	roll	f.ff	Roll of the vessel (deg)
28	velocity	f.ff	LOP velocity, 0 for USBL systems.
29	twttMode	d	TWTT flag, if the data is based upon a TWTT value, this flag is set 1, otherwise it is 0

The fields 30 to 34 are repeated for system whose data is included in the record.

30	name	ssss	Name of the system (GPS or USBL)
31	type	d	Calibration system type, currently set to 4 for GPS and USBL
32	xOff	f.ff	LOP system port/stbd offset (m)
33	yOff	f.ff	LOP system fore/aft offset (m)
34	zOff	f.ff	LOP system depth/elevation offset (m)

[1] Dependent upon the LopType:
- 0 Slant range (m) 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 to beacon (degrees) reduced to Map Projection (USBL)
- 7 Depth (m) (USBL)

[2] Dependent upon the LopType:
- 0 True slant range (m) (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	f.dd	PC time in seconds (GPS time if available) the data was read
4	depth	f.dd	Water depth output by the device (m)
5	status	d	0 = bad data 1 = good 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.ddddddddd	Orientation of the static vehicle with respect to the transponder array
9	pitch	f.ddddddddd	Pitch of the static vehicle
10	roll	f.ddddddddd	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	GPS ZDA Data
2	Name	text	Device name
3	Utc	f	UTC time from GPZDA message (s)
4	Time	f	PC time in seconds (GPS time if available) the data was read
5	utc-time	f	

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( )
```