Binary File Format: B8

The envelope data for each channel can be recorded in a binary data file for use by post-processing software. Every ping cycle, one record (see Table 3-2) is stored with header information and raw data for each frequency channel. Each record is variable in length with a current maximum possible number of 6656 bytes, and can be compressed using a Huffman compression algorithm. The storage device for these files should have sufficient disk space free to store the vast amounts of data generated, especially when working in shallow water where the faster ping rate results in a larger volume of data being generated.

The binary data files are recorded using the following basic structural format:

File Type Id Preamble (40 bytes)
Data Records

The recording program will write data records to one file for up to 20000 pings, then the current file will be closed and a new one will be opened for subsequent data recording.

File Type Id Preamble

The first 40 bytes of the file are used for a file type identification preamble for the playback software to use to determine if the file is in the valid format supported by the version of software being used.

Example:

KEB D409-03167 V1.00 Huffman
(pad unused character locations with spaces)

where, KEB identifies the file as a KEL Binary file,
D409-03167 identifies the part number of the program used to record/convert the data,
V1.00 identifies the version of the program used to record/convert the data.
Huffman indicates that the data is in a compressed format (not present for uncompressed files)

After the File Type Id Preamble, the actual data records are stored as they are received. As soon as a record is received, it is recorded to the disk file. Records are recorded to the file in the same order as they were received (time stamps must be in sequential order). Multiple types of records can be stored in the binary file; ie Envelope data records, serial port sensor data records, configuration records, etc (only Envelope records are actually implemented at this time). The original data record format is shown in Table 3-2. The data can be stored in this format, or the user can enable data compression. When compression is enabled, each data record as shown in Table 3-2 has a Huffman compression algorithm applied to it. The result of the compression is stored in the file. The playback application runs the matching decompression algorithm to access the data records.

Record Preamble

Each data record is preceded by a Record Preamble that provides quick access, particularly for compressed records, to useful info about the record. This data is used by the PostSurvey application for faster analysis of the data statistics. See the following description about the Data Records for some of the field definitions.

FIELD DESCRIPTION	DATA TYPE	BYTE COUNT
Record Type Code	BYTE	1
File offset to start of record after the record preamble	long	4
Record Size expressed in bytes	long	4
Event mark code	BYTE	1
Byte Total		10

Data Records

Table 3-2: Variable Length Dual Channel Envelope Data Record Type: B8

FIELD DESCRIPTION	DATA FORMAT / RANGE	BYTE COUNT	BYTE OFFSET
Record Identification Information			
Record Id	B8h	1	00h
Record Length	data dependent	2	01h
Record Number	0 to 65536	2	03h
# of Channel Records	1-2	1	05h
		6	
Ping Specific Parameters Shared for Each Channel			
Time @ Start of Ping: hours	0 to 23	1	06h
Time @ Start of Ping: minutes	0 to 59	1	07h
Time @ Start of Ping: seconds	0 to 59	1	08h
Time @ Start of Ping: milliseconds	0 to 999	2	09h
Working Units Flag	0 = metres 1 = feet 2 = fathoms	1	0Bh
Speed of sound	1300 to 1700 m/s 4265 to 5577 ft/s 710 to 929 fm/s	2	0Ch
Start depth	0 to 10000	2	0Eh
End depth	10 to 12000	2	10h
Heave (expressed in cm, $^1/_{100}$ ft, $^1/_{100}$ fm)	data dependent	2	12h
Heave Latency	max. 9999 ms	2	14h
Tide	not used, loaded with 0	2	16h

FIELD DESCRIPTION	DATA FORMAT / RANGE	BYTE COUNT	BYTE OFFSET
Tide Latency	not used, loaded with 0	2	18h
Latitude (expressed in degrees)	data dependent	8	1Ah
Longitude (expressed in degrees)	data dependent	8	22h
Position Latency	max. 9999ms	2	2Ah
Record Latency	max. 9999ms	2	2Ch
Minimum Depth Limit	0 to 11000	2	2Eh
Maximum Depth Limit	20 to 12000	2	30h
Pinger Mode	0 = off, 1 = 1/8th second sweep 2 = 1/4th second sweep 3 = 1/2th second sweep 4 = 1 second sweep 5 = 2 second sweep 6 = 4 second sweep	1	32h
Primary Channel	0 = HF, 1 = LF	1	33h
Boat Speed	tba	4	34h
Boat Heading	tba	4	38h
Reserved Bytes	0	8	3Ch
		62	
High Frequency Channel Parameters			
HF SPM Frequency Code	0 to 31 (see Table 3-3)	1	44h
Number of HF Data Samples	0 - 65535 possible (currently fixed at 1600)	2	45h
Sample Data Type	00h indicates 8-bit unsigned data 01h indicates 16-bit unsigned data	1	47h
Transmit power level	frequency specific	1	48h
Analog Rx gain code	0 to 255	1	49h
Pulse length code	frequency specific	1	4Ah
Filter type code	frequency specific	1	4Bh
Draft (expressed in cm, $^{1}/_{100}$ ft, or $^{1}/_{100}$ fm)	0 to 10000 [cm] 0 to 32808 [$^{1}/_{100}$ ft] 0 to 5468 [$^{1}/_{100}$ fm]	2	4Ch
Digitized Depth (expressed in metres, feet, or fathoms)	0.00 to 12000.	4	4Eh
Multiplexer Channel	0 to 8	1	52h
Echo Strength (expressed in decibels)	-128 to 0	1	53h
Processing Gain	0 to 8	1	54h
Sensitivity	0 = Off 1 - 100	1	55h

FIELD DESCRIPTION	DATA FORMAT / RANGE	BYTE COUNT	BYTE OFFSET
TxBlank (expressed in dm, $^1/_{10}$ ft, $^1/_{10}$ fm)	0 to 3000 [dm] 0 to 9843 [$^1/_{10}$ ft] 0 to 1640 [$^1/_{10}$ fm]	2	56h
Echo Threshold Level	0 - 32767	2	58h
Reserved Bytes	0	6	5Ah
		28	
High Frequency Signal Data			
Signal Data	0 to 32767	variable	60h
		3200	
Low Frequency Channel Parameters			
LF SPM Frequency Code	128 to 159 (see Table 3-3)	1	CE0h
Number of LF Data Samples	0 - 65536 possible (currently fixed at 1600)	2	CE1h
Sample Data Type	00h indicates 8-bit unsigned data 01h indicates 16-bit unsigned data	1	CE3h
Transmit power	frequency specific	1	CE4h
Analog Rx gain code	0 to 255	1	CE5h
Pulse length code	frequency specific	1	CE6h
Filter type code	frequency specific	1	CE7h
Draft (expressed in cm, $^1/_{100}$ ft, $^1/_{100}$ fm)	0 to 10000 [cm] 0 to 32808 [$^1/_{100}$ ft] 0 to 5468 [$^1/_{100}$ fm]	2	CE8h
Digitized Depth (expressed in metres, feet, fathoms)	0.00 to 12000.	4	CEAh
Multiplexer Channel	0 to 8	1	CEEh
Echo Strength (expressed in decibels)	-128 to 0	1	CEFh
Processing Gain	0 to 8	1	CF0h
Sensitivity	Off, 1 - 100	1	CF1h
TxBlank (expressed in dm, $^1/_{10}$ ft, $^1/_{10}$ fm)	0 to 3000 [dm] 0 to 9843 [$^1/_{10}$ ft] 0 to 1640 [$^1/_{10}$ fm]	2	CF2h
Echo Threshold Level	0 - 32767	2	CF4h
Reserved Bytes	0	6	CF6h
		28	
Low Frequency Signal Data			
Signal Data	0 to 32767	variable	CFCh
		3200	
Event Mark Condition			

FIELD DESCRIPTION	DATA FORMAT / RANGE	BYTE COUNT	BYTE OFFSET
Event Mark Code	0 to 6	1	CE0h 1976h
Number of Event Mark Data Bytes	0 to 130	1	CE1h 1977h
Event Mark Number	0 to 65536	2	CE2h 1978h
Event Mark Annotation String	data dependent	variable (max = 128)	CE4h 197Ah
		132	
		6656	

The SPM Frequency code is the frequency identification code number read from the actual SPM hardware. For the HF channel, the raw 8-bit hex code is used. For the LF channel, the 8-bit hex code is bit-wise "or'ed" with 080h (MSB set to one); this enables the Echo Control and Post Survey applications to distinguish which channel has been recorded when an echosounder is only using one channel for data acquisition. The echosounder only sends the envelope data for the active channel and the Echo Control program only records the one channel; this saves on data transfer times and disk space requirements for the data recording

Table 3-3: SPM Frequency Code Definitions

SPM Frequency	HF Code (raw code)		LF Code (raw code | 80h)	
	Binary	Hexadecimal	Binary	Hexadecimal
3.5	00001000	08	10001000	88h
7.0	00001110	0E	10001110	8E
12	00001001	09	10001001	89
15	00010010	12	10010010	92
24	00000010	02	10000010	82
26	00001111	0F	10001111	8F
28	00000011	03	10000011	83
30	00000111	07	10000111	87
33	00001011	0B	10001011	8B
38	00001010	0A	10001010	8A
41	00001100	0C	10001100	8C
50	00000001	01	10000001	81
100	00010001	11	10010001	91
120	00000100	04	10000100	84
150	00010000	10	10010000	90
200	00000000	00	10000000	80
208	00001101	0D	10001101	8D
210	00000110	06	10000110	86

Event marks can be initiated from a number of sources; the Event Mark code indicates the source of the event mark as described in Table 3-4. Serial Port and Hypack initiated event marks often have variable-length annotation strings recorded as well.

Table 3-4: Event Mark Code

Code #	Code Source
0	No Fix
1	Front Panel
2	Serial Port (320M printer uses internal and external annotation)
3	Remote
4	Internal Timebase
5	Serial Port (320M uses external annotation only)
6	SCSI Control Application
7	Hypack