ICES PGHAC Report 2007

ICES Fisheries Technology Committee
ICES CM 2007/FTC:11
REF. WGFTFB

Report of the Planning Group on the HAC Data Exchange Format (PGHAC)

By Correspondence

International Council for the Exploration of the Sea
Conseil International pour l'Exploration de la Mer

H. C. Andersens Boulevard 44–46
DK-1553 Copenhagen V
Denmark
Telephone (+45) 33 38 67 00
Telefax (+45) 33 93 42 15
www.ices.dk
info@ices.dk

Recommended format for purposes of citation:

ICES. 2007. Report of the Planning Group on the HAC Data Exchange Format (PGHAC), By Correspondence. ICES CM 2007/FTC:11. 18 pp.

Contents

Executive Summary **1**

1 Terms of Reference **2**

2 Development of the HAC format –ToR b), d) and e) **2**

3 Review of the compliance of sounder manufacturer and the compatibility of post-processing software to the HAC format **3**

3.1 Compliance of sounder manufacturer and post-processing software to the HAC format 3

3.2 HacView a tool for checking HAC files 5

Annex 1: New Tuple definitions accepted in the HAC format **6**

Annex 2: Terms of Reference for PGHAC **14**

Executive Summary

The Planning Group on the HAC Data Exchange Format [PGHAC] worked by correspondence in 2006/2007 and reported to the Working Group on Fisheries Acoustic Science and Technology [WGFAST] at its annual meeting in Dublin, Ireland on the 26 April 2007.

Progress on the Terms of Reference for 2006 was presented to WGFAST with the following key points:

- No new development of tuples[1] in 2006.
- The final versions of MBES tuples (220, 2200, 2210) and trawl geometry tuple (50) proposed in 2005 were adopted, and they are described in this report.
- HAC compliance of sounder manufacturer and post-processing software is reviewed and summarized in a table.
- DFO will make its tool HacView available through PGHAC to the community members who want to deal with HAC format.

It should be emphasized that the HAC format is a good solution for merging EK60 (classical single beam echosounder) and ME70 (new multibeam echosounder) data in a unique file for later easier post processing as these two equipments appear to be complementary.

New Terms of Reference for PGHAC can be found in Annex 2.

1 Tuple: a labelled group of bytes encapsulating special type of information in the ***HAC*** format, which forms the basic structure of this format and that, gives the format its upgradeability and versatility property. Tuples belong to tuple families or classes that group the information by themes. Unique numbers, varying from 0 to 65535, identify each tuple. The ***HAC*** co-ordinating committee has to allocate these numbers to prevent any "collision" in the tuple usage by various groups around the world and to agree on the definition of the various fields of information they contain.

1 Terms of Reference

In response to the ICES Resolution of the 92nd Statutory Meeting, the Planning Group on the HAC Data Exchange Format [PGHAC] (Chair: Laurent Berger, France) worked by correspondence in 2007 to:

a) co-ordinate the further development of the HAC standard data exchange format;

b) provide information on the changes in the format and its evolution;

c) share information between manufacturers and users on the way acoustic data are processed and stored;

d) review the final version of tuples for multi-beam echosounders and support first data exchanges;

e) review the final version of a tuple for acoustic trawl geometry instruments and support its first uses.

The main topics addressed will be further detailed in this document.

2 Development of the HAC format –ToR b), d) and e)

The final versions of MBES tuples (220, 2200, and 2210) and trawl geometry tuple (50) are adopted based on the validation of their structure by PGHAC members and a one year data collection with this new format at Ifremer. The complete description of these tuples is given in *Annex 1*.

Latest development in ME70 echosounder have lead to the possibility to set new “deep level” parameters on the system, these new parameters are not currently needed for data analysis and not stored in proposed HAC tuples, if needed these parameters will be added as new fields in MBES tuples (MBES tuples are variable in length according to the format and can then grow in size if needed). More discussions will occur with new user of MBES.

From current description of HAC format (ICES CRR 278) a document will be updated with these new definitions in order to keep a unique document for the description of the format. This document will be made available by PGHAC at the user’s request.

3 Review of the compliance of sounder manufacturer and the compatibility of post-processing software to the HAC format

3.1 Compliance of sounder manufacturer and post-processing software to the HAC format

A data file is defined as ***HAC*** compliant if it conforms to the ***HAC*** syntax rules, contains the minimum required ***HAC*** tuples (ref ICES CRR 278).

A software application tool is defined as ***HAC*** compatible if it can read and/or write, and use a minimum number of commonly used basic tuples, in the little endian format used by PC platforms.

The list of basic tuples accepted in the standard HAC format is:

- 20 Geographic and time reference tuple
- 41 Platform attitude parameters tuple
- 42 Dynamic platform attitude parameters tuple
- 100 BioSonics Echosounder Tuple
- 200 SIMRAD EK500 Echosounder Tuple
- 210 SIMRAD EK60 Echosounder Tuple
- 901 Generic Echosounder Tuple – replaced previous version tuple 900
- 1000 BioSonics Channel Tuple
- 2000 SIMRAD EK500 Channel Tuple - original
- 2001 SIMRAD EK500 Channel Tuple - revised: 1) add Surface Blanking range 2) Save 2 dec. for angle offsets and 3dB beamwidth
- 2002 SIMRAD EK500 Channel Tuple patch tuple - Addition of both Sv and TS transducer gains
- 2100 SIMRAD EK60 Channel Tuple
- 4000 Split-beam detected single target parameters tuple
- 9001 Generic Channel Tuple– replaced previous version tuple 9000
- 10000 Standard Ping U32 – Time series of data samples Uncompressed 32-bit sample format range
- 10001 Ping U-32-16-angles Time series of split-beam off-axis angle sample data. Uncompressed 32-bit sample format range
- 10010 Ping C32 - Time series of samples. Compressed 32-bit sample format range
- 10011 Ping C-32-16-angles Time series of compressed split-beam off-axis angle sample data. Compressed 32-bit sample format range
- 10030 Ping U-16 - Time series of data samples. Uncompressed 16-bit sample format range
- 10031 Ping U-16-angles Time series of split-beam off-axis angle sample data. Uncompressed 16-bit sample format
- 10040 Ping C-16. Time series of samples. Compressed 16-bit sample format range
- 10090 Ping tuple for detected single targets
- 10100 General threshold - Constant and time-varied threshold
- 10140 Attitude data tuple
- 10142 Dynamic platform position tuple
- 11000 Environmental tuple

- 65534 End of file
- 65535 HAC signature

The following table represents the ability of some of the currently available data acquisition and analysis software to read and write the above list of tuples and therefore their HAC compatibility

	DATA ACQUISITION/PROCESSING SOFTWARE					
TUPLE NUMBER	CH1 (VER. 3.3.9)	CH2 (VER 2.3.7)	ECHOVIEW* (VER 3.5)	MOVIES+ (VER. 4.3)	SIMRAD ER60 (VER 2.1.0)	SCIFISH 2100
20	W	R	RW	RW	W	W
41	W	R		RW	W**	
42				RW		
100	W	R	R			
200	W	R	R	RW		
210	N/A	R		R	W	
901	N/A		RW	RW		W
1000	W	R	R			
2000	W	R	R	R		
2001	W	R	R	RW		
2002	W	R		RW		
2100	N/A	R		R	W	
4000			RW	RW	W	W
9001	N/A		RW	RW		W
10000	W	R	RW	R		
10001	W	R	RW			
10010	W	RW	R	R		
10011	W	RW	RW			W
10030		R		R	W	
10031		R			W	
10040	W	R	RW	RW		W
10090		R	RW	RW	W***	
10100	W	R	R	RW	W**	
10140	W	R		RW	W**	
10142		R		RW		
11000						
65534	W		RW	RW	W	W
65535	W		RW	RW	W	W

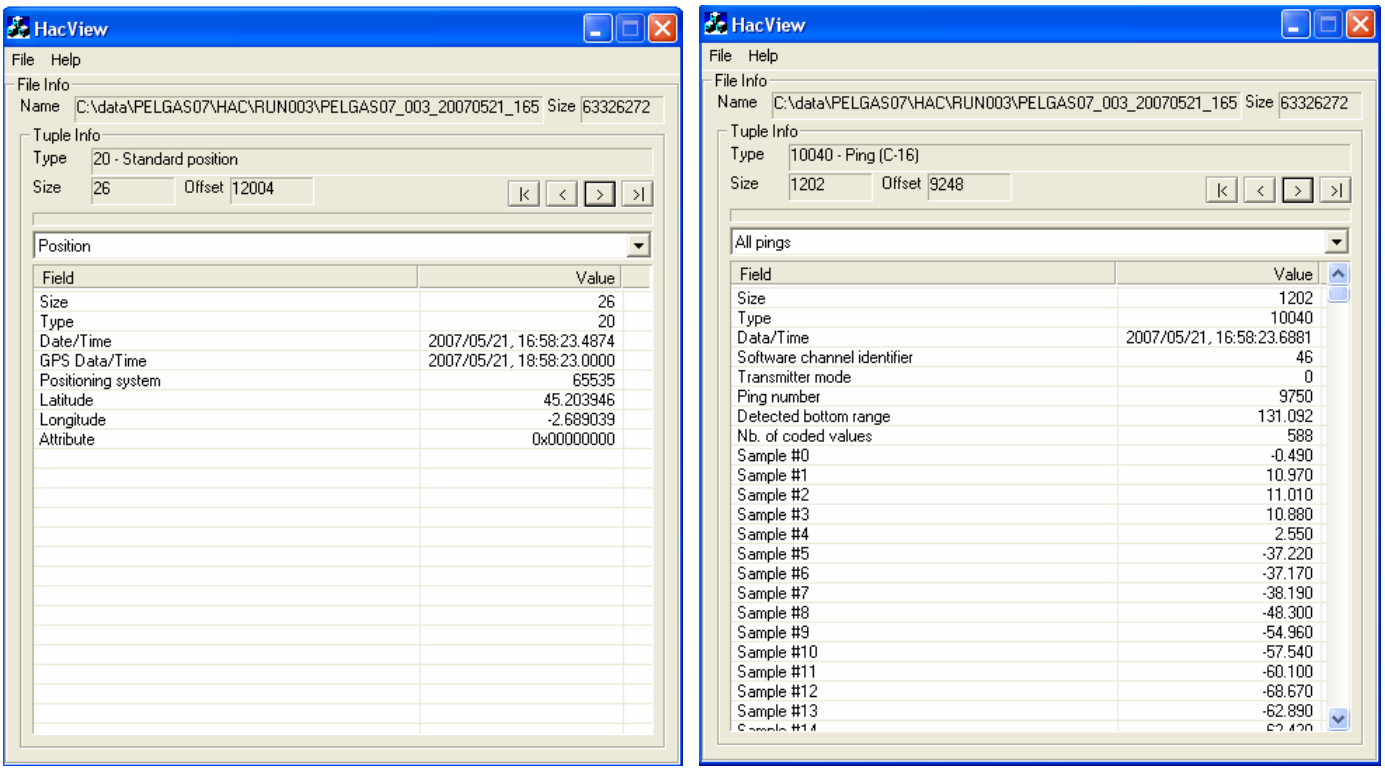
*** An up to date list of supported tuples in Echoview can be obtained from http://www.sonardata.com/WebHelp/Reference/File_formats/HAC_data_files.htm**

**** Planned in the list of evolutions for next version of ER60**

***** The depth of single target is currently outputted for tuple 10090 whereas HAC format request the range to the transducer (i.e. Range=Depth to the target–transducer depth–heave)**

3.2 HacView a tool for checking HAC files

HacView consist of one .exe file (HacView.exe). It enables to load a HAC file, check its validity in terms of structure and check numerically its content tuple by tuple.



Example of HacView screen for checking tuple 20 and 10040.

This tool is of great use for developers who want to debug HAC output. This tool developed by DFO for their own need is made available to ICES community through PGHAC. PGHAC thank DFO for this.

Annex 1: New Tuple definitions accepted in the HAC format

Table 1. MBES Echo sounder tuple 220.

OFFSET (BYTE)	FIELD	LENGTH (BYTES)	FORMAT	CONTENT	ENCODED UNITS	LIMIT RANGE
0	Tuple size	4	ULONG	Tuple data size: 174 bytes	Byte	174
4	Tuple type	2	USHORT	Tuple type code: 220. Tuple type code for the Simrad MBES	Unitless	220
6	Number of SW channels	2	USHORT	Number of software channels associated with this sounder	Unitless	[1 to 65535]
8	Echo sounder document identifier	4	ULONG	Unique identification number for the echosounder document (i.e. the group of channels).	Unitless	[0 to 4294967295]
12	Transducer name	50	CHAR	Example:	ASCII	50 characters
62	Transceiver software version	30	CHAR	Example: “020221”	ASCII	30 characters
92	Sound speed	2	USHORT	Mean speed of sound. 0.0 = Profile used, 6553.5 = Not available	0.1 m/s	[1400.0 to 1700.0 m/s]
94	Trigger mode	2	USHORT	1 = normal, 2 = external, 65535 = not available	unitless	[0 to 65535]
96	Ping interval	2	USHORT	0.0 = not known or variable	0.01 s	[0.00 to 655.35 s]
98	Pulse form	2	USHORT	1 = CW, 2 = FM, 65535 = not available	Unitless	[0 to 65535]
100	Pulse duration	4	ULONG	Duration of transmitted pulse	us	[0 to 65536 us]
104	Time sample interval	4	ULONG	Time between each sample	us	[1 to 65536 us]
108	Frequency beam spacing	2	USHORT	1 = Linear, 2 = Optimised, 65535 = not available	Unitless	[0 to 65535]
110	Frequency space shape	2	USHORT	1 = V, 2 = Inverse V, 3 = I, 65535 = not available	Unitless	[0 to 65535]
112	Transceiver power	4	ULONG	Transmit power referred to the transducer terminals 1=Max, 2=-3dB, 3=-6dB	Unitless	[0 to 4294967295] Presently: [1 – 3]
116	Transducer installation depth	4	ULONG	Installation depth of transducer relative the sea surface	0.0001 m	[0.0000 to 10000.0000 m]
120	Platform identifier	2	USHORT	Unique identifier of the installation platform of the transducer 65535 = unavailable	unitless	[0 – 65535]

OFFSET (BYTE)	FIELD	LENGTH (BYTES)	FORMAT	CONTENT	ENCODED UNITS	LIMIT RANGE
122	Transducer shape	2	USHORT	0= other 1= oval (which includes circular transducer) 2= rectangular 3= cross array 4= ring … 65535= not available	unitless	[0 – 65535] Presently: [0 – 4]
124	Transducer face alongship angle offset	4	LONG	Mechanical offset angle of the transducer face relative to the horizontal in the alongship plane of the attitude sensor co-ordinate system. Positive angles indicate the forward side is above the horizontal.	0.0001 deg	[-180.0000 to +180.0000 deg]
128	Transducer face athwartship angle offset	4	LONG	Mechanical offset angle of the transducer face relative to the horizontal in the athwartship plane of the attitude sensor co-ordinate system. Positive angles indicate the port side is above the horizontal.	0.0001 deg	[-180.0000 to +180.0000 deg]
132	Transducer rotation angle	4	LONG	Mechanical angle of rotation of alongship axis of transducer relative to alongship axis of attitude sensor co-ordinate system. Positive angles are clockwise rotation (to starboard).	0.0001 deg	[-180.0000 to +180.0000 deg]
136	Remarks	40	CHAR	SW version (example: “1.2.34.5678”)	ASCII	40 characters
176	Tuple attribute	4	LONG	Attribute of the tuple	Unitless	[-2147483648 to 2147483647]
180	Backlink	4	ULONG	Tuple size: 184 bytes	Byte	184

Table 2. MBES Echo channel tuple 2200.

OFFSET (BYTE)	FIELD	LENGTH (BYTES)	FORMAT	CONTENT	ENCODED UNITS	LIMIT RANGE
0	Tuple size	4	ULONG	Tuple data size: 178 bytes	Byte	178
4	Tuple type	2	USHORT	Tuple type code: 2200. Tuple type code for the Simrad MBES	Unitless	2200
6	Software channel identifier	2	USHORT	Unique identifier for this software data channel	Unitless	[0 to 65535]
8	Echosounder document identifier	4	ULONG	Identification number for the parent echosounder document	Unitless	[0 to 4294967295]
12	Frequency channel name	48	CHAR	Example:	ASCII	48 characters
60	Data type	2	USHORT	Type of data sampled: 0 = Electrical phase angles [Units: 180/128 degree] 1 = Electrical power [Units: dB re 1W] 2 = Sv [Volume backscattering strength in dB] 3 = TS [point target strength in dB] 4 = Complex voltage [Complex voltage from quadrants in split beam. Units: V]	Unitless	[0 to 65535]
62	Beam type	2	USHORT	Type of data sampled: 0 = Single beam of fan 1 = Split beam of fan 2 = Single reference beam 3 = Split beam reference beam	Unitless	[0 to 65535]
64	Acoustic frequency	4	ULONG	Acoustic frequency	Hz	[1000 to 1000000 Hz]
68	Start sample	4	ULONG	Number of samples offset from transducer face . 0=no offset	Unitless	[0 to 4294967295]
72	Alongship steering angle	4	LONG	Direction of the main axis of the acoustic beam in the alongship plane relative to the perpendicular to the transducer face. Zero (0) is perpendicular to the transducer face. Positive angles indicate the down-propagating sonar beam is oriented forward.	0.0001 deg	[-180.0000 to +180.0000 deg]
76	Athwartship steering angle	4	LONG	Direction of the main axis of the acoustic beam in the athwartship plane relative to the perpendicular to the transducer face. Zero (0) is perpendicular to the transducer face. Positive angles indicate the down-propagating sonar beam is oriented to starboard.	0.0001 deg	[-180.0000 to +180.0000 deg]

OFFSET (BYTE)	FIELD	LENGTH (BYTES)	FORMAT	CONTENT	ENCODED UNITS	LIMIT RANGE
80	Absorption coefficient	4	ULONG	Absorption of sound in the propagation medium	0.0001 dB/km	[0.0000 to 300.0000 dB/km]
84	Bandwidth	4	ULONG	Channel bandwidth	Hz	[100 to 100000 Hz]
88	Transmission power	4	ULONG	Transmit power referred to the transducer terminals	W	[0 to 10000 W]
92	Beam alongship angle sensitivity	4	ULONG	Electrical phase angle in degrees for one mechanical angle in the alongship (fore-aft) direction.	0.0001 El./mec. deg	[0.0000 to 100.0000]
96	Beam athwartship angle sensitivity	4	ULONG	Electrical phase angle in degrees for one mechanical angle in the athwartship (fore-aft) direction.	0.0001 El./mec. deg	[0.0000 to 100.0000]
100	Beam alongship 3 dB beam width	4	ULONG	Half power (3dB) beam width of the transducer in the alongship direction.	0.0001 deg	[1.0000 to 99.9999 deg]
104	Beam athwartship 3 dB beam width	4	ULONG	Half power (3dB) beam width of the transducer in the athwartship direction.	0.0001 deg	[1.0000 to 99.9999 deg]
108	Beam equivalent two-way beam angle	4	LONG	Equivalent two way beam opening solid angle. MacLennan and Simmonds, “Fisheries Acoustics”1992, section 2.3.	0.0001 dB	[-100.0000 to 0.0000 dB]
112	Beam gain	4	ULONG	Transducer gain used in power budget calculations for calculation of TS.	0.0001 dB	[0.0000 to 99.9999 dB]
116	Beam sA correction	4	LONG	Correction to transducer gain to obtain transducer gain used in power budget calculations for calculation of Sv (and sA). Transducer Sv gain = Transducer gain + Transducer sA correction.	0.0001 dB	[-10.0000 to +10.0000 dB]
120	Bottom detection minimum depth	4	ULONG	Minimum depth required for bottom detection.	0.0001 m	[0.0000 to 15000.0000 m]
124	Bottom detection maximum depth	4	ULONG	Maximum depth required for bottom detection.	0.0001 m	[0.0000 to 15000.0000 m]
128	Bottom detection minimum level	4	LONG	Bottom detection minimum level used in the bottom detector function. Ref. EK60 manual	0.0001 dB	[-80.0000 to 0.0000 dB]
132	Alongship TX/RX weighting identifier	2	USHORT	Unique identification number for transducer alongship TX/RX weighting array	Unitless	[0 to 65535]

Offset (byte)	Field	Length (bytes)	Format	Content	Encoded units	Limit range
134	Athwartship TX/RX weighting identifier	2	USHORT	Unique identification number for transducer athwartship TX/RX weighting array	Unitless	[0 to 65535]
136	Splitbeam alongship RX weighting identifier	2	USHORT	Unique identification number for transducer splitbeam alongship RX weighting array	Unitless	[0 to 65535]
138	Splitbeam athwartship RX weighting identifier	2	USHORT	Unique identification number for transducer splitbeam athwartship RX weighting array	Unitless	[0 to 65535]
140	Remarks	40	CHAR	Character string used for any comments to this channel.	ASCII	40 characters
180	Tuple attribute	4	LONG	Attribute of the tuple	Unitless	[-2147483648 to 2147483647]
184	Backlink	4	ULONG	Tuple size: 188 bytes	Byte	188

Table 3. MBES Echo sounder transducer weighting array tuple 2210.

OFFSET (BYTE)	FIELD	LENGTH (BYTES)	FORMAT	CONTENT	ENCODED UNITS	LIMIT RANGE
0	Tuple size	4	ULONG	Tuple data size: variable	Byte	[14 – 4294967295]
4	Tuple type	2	USHORT	Tuple type code: 2210.	Unitless	2210
6	Transducer weighting array identifier	2	USHORT	Unique identification number for transducer weighting array	Unitless	[0 to 65535]
8	Number of weighting values	4	ULONG	Mean speed of sound. 0.0 = Profile used, 6553.5 = Not available	Unitless	[0 to 4294967295]
12	Weighting value	2	USHORT	Weighting value	0.0001	[0 to 6.5535]practical range[0 to 1.0000]
...	Weighting value	2	USHORT	idem		
...	Optional field:Space	2	USHORT	When needed: Space to allow the next field to be aligned on an address that is a multiple of 4.	unitless	0
...	Tuple attribute	4	LONG	Attribute of the tuple:0 = original tuple, e.g. nothing special to mention1 = edited tupleOther attributes could be labeled by a code (e.g. tuple data quality). Negative codes should be used for special cases.	unitless	[-2147483648 – 2147483647]
...	Backlink	4	ULONG	Tuple size: variable (multiple of 4 bytes).	byte	[14 – 4294967295]

Table 4. Trawl geometry tuple (50).

OFFSET (BYTE)	FIELD	LENGTH (BYTES)	FORMAT	CONTENT	ENCODED UNITS	LIMIT RANGE
0	Tuple size	4	ULONG	Tuple data size: 42 bytes	byte	42
4	Tuple type	2	USHORT	Tuple type code: 50.	unitless	50
6	Time fraction	2	USHORT	Fraction of a second to add to the following CPU ANSI C time to get a time precision of 0.0001 s (Local time at which the platform position reading was taken).	0.0001 s	[0 – 6.5535 s] Practical range: [0 – 0.9999 s]
8	Time CPU ANSI C Standard time	4	ULONG	Local time at which the platform position was taken. ANSI C time given by the CPU clock, in seconds. Usually the CPU clock is set to local time.	s	[0 – 4294967295 s] i.e.: [up to year 2106]
12	Headrope depth	2	USHORT	Depth of headrope relative to sea surface	0.1 m	[0 – 6553.5]
14	Vertical opening	2	USHORT	Distance between headrope and footrope	0.1 m	[0 – 6553.5]
16	Headrope altitude	2	USHORT	Distance between headrope and the detected bottom	0.1 m	[0 – 6553.5]
18	Footrope altitude	2	USHORT	Distance between footrope and the detected bottom	0.1 m	[0 – 6553.5]
20	Footrope on bottom	2	USHORT	Footrope is on or off the bottom 0 = off 1 = on	unitless	[0 – 65535]
22	Horizontal opening 1	2	USHORT	Distance representing the horizontal opening of the trawl (distance between wings is often considered as the horizontal opening)	0.1 m	[0 – 6553.5]
24	Horizontal opening 2	2	USHORT	Distance between the doors of the trawl	0.1 m	[0 – 6553.5]
26	Port door alongship angle	2	SHORT	Inclination of the door relative to the horizontal plane in the fore-and-aft direction (X). Positive angles indicate front side up.	0.1 deg	[-3276.8 – 3276.7 deg] Practical range: [-90.0 – 90.0 deg]
28	Port door athwartship angle	2	SHORT	Inclination of the door relative to the horizontal plane in the starboard-and-port direction (Y). Positive angles indicate port side up.	0.1 deg	[-3276.8 – 3276.7 deg] Practical range: [-90.0 – 90.0 deg]
30	Alongship speed on footrope	2	USHORT	Alongship speed measured on footrope.	0.1 m/s	[0 – 6553.5]
32	Athwartship speed on footrope	2	USHORT	Athwartship speed measured on footrope.	0.1 m/s	[0 – 6553.5]

OFFSET (BYTE)	FIELD	LENGTH (BYTES)	FORMAT	CONTENT	ENCODED UNITS	LIMIT RANGE
34	Temperature	2	USHORT	Temperature measured on footrope.	0.1 °C	[0 – 6553.5]
36	Trawl filling 1	2	USHORT	Filling rate measured on the first part of the cod end 0 = off 1 = on	unitless	[0 – 65535]
38	Trawl filling 2	2	USHORT	Filling rate measured on the second part of the cod end 0 = off 1 = on	unitless	[0 – 65535]
40	Trawl filling 3	2	USHORT	Filling rate measured on the third part of the cod end 0 = off 1 = on	unitless	[0 – 65535]
42	Trawl filling 4	2	USHORT	Filling rate measured on the fourth part of the cod end 0 = off 1 = on	unitless	[0 – 65535]
44	Tuple attribute	4	LONG	Attribute of the tuple according to Annex 3. 0 = original 1 = edited 2 = temporary 3 = temporary + edited 4 = patched 5 = patched + edited …	unitless	[-2147483648 – 2147483647]
48	Backlink	4	ULONG	Tuple size: 52 bytes	byte	52

Annex 2: Terms of Reference for PGHAC

The **Planning Group on the HAC Data Exchange Format** [PGHAC] (Chair: Laurent Berger, France) will work by correspondence in 2007/2008 to:

a) co-ordinate the further development of the HAC standard data exchange format;

b) provide information on the changes in the format and its evolution;

c) share information between manufacturers and users on the way acoustic data are processed and stored;

If needed the group will meet during the next WGFAST meeting in on Monday 23 June 2008 following the ICES Fisheries Acoustic Symposium 16 to 20 June 2008.

PGHAC will report by 31 July 2008 for the attention of the Fisheries Technology Committee and will make its report available to WGFAST.

Supporting Information

PRIORITY:	Essential component of WGFAST activities. The group defines the standard data capture and exchange format for all acoustic instrumentation
SCIENTIFIC JUSTIFICATION AND RELATION TO ACTION PLAN:	Action Plan No: 1. The common data format (called ***HAC* - Hydro Acoustic**) is now already usable and shared by most of the users and manufacturers. It has been agreed that such a format must be allowed to evolve and that a group is needed to continue to work on the format in order to adapt it to the latest versions of equipment and to improve it. It is considered important that WGFAST be informed continuously on the changes in the format and its evolution; there is also a need to share information between manufacturers and users on the way acoustic data are processed and stored. This requires a permanent forum in order to deliver to the FAST members the up-dated versions of the HAC and to answer the questions of both users and manufacturers. The PG agreed that it could continue its work for the time being by correspondence. **NOTE:** a Tuple is a term from set theory which refers to a collection of one or more attributes.
RESOURCE REQUIREMENTS:	None required. No formal meetings are required and all business will be conducted by email
PARTICIPANTS:	The ***HAC group*** includes representatives from WGFAST member institutions, and representatives of fisheries software suppliers and fisheries sounder manufacturers. The normal composition will consist of one representative from each organisation or institution and an additional nominated chair from within the ***HAC*** group. The ***HAC*** group can ask for participation on a non-voting basis of any other experts, accepting this on a majority basis.
SECRETARIAT FACILITIES:	None
FINANCIAL:	No financial implications
LINKAGES TO ADVISORY COMMITTEES:	There are no direct linkages to the advisory committees
LINKAGES TO OTHER COMMITTEES OR GROUPS:	This Group is closely aligned to WGFAST. This work is valuable for any ICES group conducting acoustic resource and monitoring surveys.
LINKAGES TO OTHER ORGANIZATIONS:	This group works closely with industry in achieving its objectives.