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I N T E R F A C E S P E C I F I C A T I O N

A T L A S H Y D R O S W E E P D S

MAGNETIC TAPE RECORDING

Issued by: V.Geering, SAQ1

LIST OF CONTENTS

- 1 SCOPE OF APPLICABILITY
- 2 CONTENTS AND DEFINITIONS OF TRANSFERRED INFORMATION
- 2.1 OVERVIEW
- 2.1.1 Sources of Information
- 2.1.2 General Structure of Information
- 2.1.3 Quantity of Magnetic Tape
- 2.2 TRANSFERRED INFORMATION
- 2.2.1 Survey Parameter
- 2.2.2 Information about the Ship's Orientation and Motion
- 2.2.3 Measurement Values
- 2.2.4 Operation Parameter
- 3 SPECIFICATION OF INFORMATION TRANSFER
- 3.1 APPLICATION LAYER
- 3.1.1 Files
- 3.1.2 Records

3.2 PRESENTATION LAYER

3.3 TRANSPORT LAYER

- 3.3.1 Overview
- 3.3.2 Volume
- 3.3.3 Files
- 3.3.4 Blocks
- 3.3.5 Records
- 3.3.6 Examples

3.4 PHYSICAL LAYER

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1 SCOPE OF APPLICABILITY

The specification describes the present capability of the HYDROSWEEP DS equipment to output measurement data and other data as a magnetic tape recording.

The magnetic tape recording is provided for post-processing of the measured data on board or on shore.

This specification covers the entire set of the standard output data of the HYDROSWEEP DS equipment configuration implemented at present.

The output data of each individual HYDROSWEEP DS equipment implemented only forms a subset of the data mentioned in this specification. The output data formats differ only in the differing selection of the record types.

2 CONTENTS AND DEFINITIONS OF TRANSFERRED INFORMATION

2.1 OVERVIEW

2.2.1 SOURCES OF INFORMATION

Atlas HYDROSWEEP DS is a hydrographic "multi-beam echosounder" which provides measurements of depths, signal strengths, and a "mean velocity of sound in water" by 59 preformed beams (PFBs), which cover a sector of 90 degrees below the vessel. In the "survey mode" the fan of PFBs is oriented across the ship's axis, in the "calibration mode" it is oriented along the ship's axis.

The HYDROSWEEP DS system is also connected to a variety of other equipment of the vessel, such as

- navigation-/position determination system,
- gyro compass,
- speed log,
- motion sensor (roll, pitch, heave),
- sensor for water sound velocity.

Selected information from these sensors is acquired by the HYDROSWEEP DS system, partially used for operational control of the system, partially only fed through to the output.

2.1.2 GENERAL STRUCTURE OF INFORMATION

The smallest unit of the information to be evaluated as a single set is the "record combination".

Depending on the desired type and accuracy of postprocessing, there are different record combinations, some of them to be

evaluated additively, and some of them to be evaluated as alternatives to each other.

A Bathymetric Depth Postprocessing

A1 Postprocessing Without Corrections

It is sufficient to evaluate the record combination ERGNMESS.

ERGNMESS contains the PFB data of the survey mode fan:

- Depth values and lateral distances of the 59 PFBs.
- Ship's orientation and motion at the measurement instant.

A2 Postprocessing With Correction Possibilities

Instead of ERGNMESS, the associated record combination ERGNSLZT and the record combination ERGNHYDI are used.

The record combination ERGNSLZT assigned to ERGNMESS contains:

- Sound travelling times of the 59 PFBs of the survey mode fan.
- Ship's position, orientation and motion at the measurement instant.

ERGNHYDI contains:

- Sound velocity (Cmean and Ckeel).
- Draught, tide.

If a correction is to be made by means of the sound velocity profile recorded at the measurement location, the record combination ERGNCTDS is necessary as well.

ERGNCTDS contains the sound velocity profile value pairs that were input for the measurement instant.

B Backscattering Analysis

The record combinations ERGNAMPL and ERGNSLZT are required.

ERGNAMPL contains:

- Echo amplitudes of the 59 PFBs, determined at the output of the HYDROPSWEEP's bottom echo processor.
- Echo duration of the 59 PFBs.
- All parameters of the HYDROSWEEP DS that are needed for computing the area scattering strengths.

C Position Postprocessing

If the navigation system reports jumps in the ship's position, postprocessing of the geographical position is possible with the aid of the record combination ERGNPOSI.

ERGNPOSI contains:

- Magnitude and direction of the position jump.
- Identification of the position sensor used.

D Other Correction Possibilities

With the record combination ERGNEICH and with the associated record combination ERGNSLZT, information is available which makes it possible to correct various parameters. Content of ERGNEICH: Similar to ERGNMESS, but for the calibration fan.

E Compatibility with Older Systems

To ensure compatibility with older systems, the record

Saved: Friday, 14 March 2008 11:27:37

combination ERGNPARA is still included. Evaluation is not recommended.

2.1.3 QUANTITY OF MAGNETIC TAPE

The quantity of magnetic tape required depends mainly on the sounding period, which depends on the water depth.

Per magnetic tape (2500 feet), the following can be recorded (approximate values for logistic purposes):

- Depth up to 700 m: 5.5 h pure measurement operation
- Depth 5000 m: 60 h pure measurement operation

2.2 TRANSFERRED INFORMATION

2.2.1 SURVEY PARAMETERS

Cruise Name

Source: Navigation system or manual input, whichever is selected by the HYDROSWEEP operator.

Station Name

Source: Navigation system or manual input, whichever is selected by the HYDROSWEEP operator.

Track Number

The track is the lowest hierarchy designation of a survey section.

Source: Navigation system or manual input, whichever is selected by the HYDROSWEEP operator.

Date and Time

The date and time of the transmission instant (the time system is specified by the source).

Source: Navigation system or manual input, whichever is selected by the HYDROSWEEP operator.

The date and time are contained as a reference quantity in every record combination. They apply to all data contained in the record combination, unless specified otherwise in individual cases.

Ship's Position

Geographical position of the ship at the transmission instant (the reference grid is specified by the source).

Source: Navigation system.

The ship's position is contained as a reference quantity in every record combination. It applies to all data contained in the record combination, unless specified otherwise in individual cases.

Correction Value of Position (X-axis, Y-axis)

Value by which the ship's position was corrected relative to the ship's position at the preceding transmission instant.

Saved: Friday, 14 March 2008 11:27:37

Sign: + means "new position is easterly" (x-axis) or "new position is northerly" (y-axis)

Source: Navigation system.

Position Sensors

Navigation sensors whose data are used to determine the position.

Source: Navigation system.

Survey Section Time

Time which has elapsed since the beginning of the present survey section.

Source: HYDROSWEEP DS

2.2.2 INFORMATION ABOUT THE SHIP'S ORIENTATION AND MOTION

All values apply to the transmission instant (unless stated otherwise).

Heading

Angle between the direction of geographic north ("true north") and the ship's longitudinal axis in the ahead direction ("dead ahead").

Source: Navigation system.

Gyro Heading

Same as heading, but the source is: Gyro compass. For eleven PFBs distributed over the fan, the gyro heading which exists at the echo reception instant is transferred.

Course over Ground

Angle between the direction of geographic north ("true north") and the direction of the track over ground.

Source: Navigation system.

Longitudinal Speed, Transverse Speed

Ship's speed, referenced to the ship coordinates.

Sign: + means "speed ahead" or "speed to starboard".

Source: Navigation system. In the standard system configuration, the navigation system merely passes these values on to the HYDROSWEEP DS system in unchanged form from a two-component log.

Reference for Speed

The reference for speed indicates whether the longitudinal speed and transverse speed of the ship are relative to the sea bed (bottom track) or to the water (water track).

Source: Navigation system.

Speed over the Ground

The magnitude of the ship's speed over ground.
(Together with the course over ground, this magnitude represents the motion over ground.)

Source: Navigation system.

Roll Angle

Angle between the normal orientation of the ship and its actual orientation, measured about the ship's longitudinal axis.

Sign: + means "starboard side goes down".

Source: Reference platform.

Pitch Angle

Angle between the normal orientation of the ship and its actual orientation, measured about the ship's transverse axis.

Sign: + means "stern goes down".

Source: Reference platform.

Heave

Instantaneous vertical deviation of the HYDROSWEEP DS transducer from its long-term average position. A positive heave corresponds to a position above the mean value.

Source: Heave sensor. Conversion to the installation location of the HYDROSWEEP DS transducer is performed by the HYDROSWEEP DS.

Draught

Depth of water below the HYDROSWEEP DS transducer.

Source: Manual input by the HYDROSWEEP operator.

Tide

Height of the tide (water level relative to the local chart datum).

Source: Manual input by the HYDROSWEEP operator.

2.2.3 MEASUREMENT VALUES

Unless stated otherwise, all of the following values are determined by the HYDROSWEEP DS system.

Most of the following data are for individual PFBs. The PFBs are numbered consecutively as follows:

- Survey mode: PFB1 outer beam on port side
 PFB59 outer beam on starboard side

- Calibration mode: PFB1 outer beam astern
 PFB59 outer beam ahead

The fan of beams is stabilised electronically against the effects of roll and pitch. PFB30 is thus always the vertical beam.

Mean Velocity of Sound in Water

Mean velocity of sound in the water at the measurement location, averaged over the mean travelling distance of the sound.

Source: - HYDROSWEEP DS on the basis of the measurements in calibration mode, or
 - HYDROSWEEP DS on the basis of the sound speed profile, or
 - manual input, whichever is selected by the HYDROSWEEP operator.

Velocity of Sound in Water at the Keel

Source: Sound velocity sensor or manual input, whichever is selected by the HYDROSWEEP operator.

Sound Velocity Profile

Sound velocity in the water at the measurement location, stated as a function of the depth by means of value pairs.

Source: Manual input by the HYDROSWEEP operator.

Depth

Vertical distance between the transducer and the sea bed. In calibration mode, the depth is transferred for every PFB that is evaluated. (In survey mode, the smoothed depth is transferred instead of the depth.) The computation is based on the transferred mean velocity of sound in water. The heave value is taken into account. The draught and the tide value are not taken into account.

Lateral Distance

The horizontal distance between the transducer centre and the centre of the element of area on the sea bed that is probed by the PFB. In calibration mode, the lateral distance is transferred for every PFB that is evaluated. (In survey mode, the smoothed lateral distance is transferred instead of the lateral distance.)

Sound Travelling Time

The sound travelling time of the PFB from the transmission instant (centre of the transmission pulse) to the reception instant (centroid of that part of the reception pulse that is situated between the "3 dB down" points). The sound travelling time is transferred for every PFB that is evaluated.

Output Amplitude

The voltage amplitude of a received PFB, determined at the output of the HYDROSWEEP DS system's bottom echo processor. It is the RMS value averaged over the echo duration. The output amplitude is transferred for every PFB that is evaluated.

Echo Duration

The time between the "3 dB down" points of the output amplitude. The echo duration is transferred for every PFB that is evaluated.

Smoothed Depth

Definition and computation are the same as for depth, but, in addition, smoothing of the individual values is performed by

weighted averaging from

- the depth of the PFB to which the smoothed depth information refers,
- the depth values of the adjacent PFBs of the same sweep (two values on the right and two values on the left),
- the depth values of the same PFBs of the preceding sweeps and of the following sweeps (three values ahead and three values astern).

In the computation of the smoothed depth of each PFB, a total of 11 depth values are thus taken into account. The weighting decreases with increasing distance from the PFB to which the smoothed depth information refers.

In survey mode, the smoothed depth is transferred for every PFB that is evaluated. (In calibration mode, the depth is transferred instead of the smoothed depth.)

Smoothed Lateral Distance

Definition same as for lateral distance.

However, the computation is based on the smoothed depth instead of the depth.

In survey mode, the smoothed lateral distance is transferred for every PFB that is evaluated. (In calibration mode, the lateral distance is transferred instead of the smoothed lateral distance.)

2.2.4 OPERATION PARAMETERS

As operation parameters, all HYDROSWEEP DS variables needed for the backscattering analysis are transferred. They are listed and briefly defined in the following.

For further understanding, for the application of these data, and with regard to the relevant HYDROSWEEP DS constants, please see the Interface Specification "Data for Backscattering Analysis", document No. GE 6017 F 101 SB.

Operation Mode

The HYDROSWEEP DS mode selected during the measurement.

Swath Mode

Mode which defines angular coverage.

PFB Angle-Constant

Angle between adjacent PFBs.

Transmission Beam Angle

Angle between central axis of transmission beam and the vertical.

Transmission Beam Width

Transmission beam width between the "3dB down" points.

Transmission Level, LS

Nominal value of the transmission sound level specified by the

Saved: Friday, 14 March 2008 11:27:37

HYDROSWEEP DS computer (RMS value between the "3 dB down" points).

The transmission level is transferred for all transmission beams that are radiated.

Pulse Length, tau

The duration of the transmission beam between the "3 dB down" points.

The pulse length is transferred for all transmission beams that are radiated.

TVC Starting Gain, V0

Gain of the TVC amplifier, including the gain of the preamplifier at the transmission instant.

Factor for A(r) Compensation, A1

TVC gain increase per km of sound travelling distance (sound travelling distance computed with $c = 1500$ m/s). It is the factor for compensation of the frequency-dependent attenuation of sound in seawater, which the processor uses as the basis for the computation of the TVC function.

Start of Continuous $20 \lg r$ Compensation, R0

After the sound has travelled the distance R0 (computation with $c = 1500$ m/s), the TVC amplifier starts the correction of the geometrical spreading loss.

Start of "Increasing Interval Near", RB

After the sound has travelled the distance RB (computation with $c = 1500$ m/s), the "increasing interval near" begins.

"Increasing Interval Near", I3

The length of the "increasing interval near", expressed as the quotient $I3 = (RU - RB)/RB$, where RU is the end of the "increasing interval near".

"Increasing Interval", I2

The length of the "increasing interval far", including the "increasing interval near", expressed as the quotient $I2 = (RE - RB)/RB$, where RE is the end of the "increasing interval far". (The "increasing interval far" begins at RU.)

"TVC Increase Near", VA3

Increase in the TVC gain during the "increasing interval near".

TVC Increase, VA2

Increase in the TVC gain during the "increasing interval"; sum of the increase during the "increasing interval near" and the increase during the "increasing interval far".

Beamformer Basic Gain, V'BF

Basic gain of the beamformer. V'BF is transferred for every PFB group whose "beamformer basic gain" is specified individually by the processor.

Filter Gain, VFilt

Gain factor of the PFB filter.

3 SPECIFICATION OF INFORMATION TRANSFER

All user data are organised on the magnetic tape in the form of files.

3.1 APPLICATION LAYER

3.1.1 FILES

The following files are used:

- Tape header file
- Survey section file

Each tape contains one tape header file as the first file. It is followed by one or more survey section files.

3.1.2 RECORDS

Within the files, the user data are organised in the form of records. Furthermore, records without user data exist which are used only for organisation of the data transfer.

3.1.2.1 Types of Record

The following different types of record exist:

- Block number records
- Identifier records
- Data records

All user data are contained in the data records.

For standard application the following types of record exist, differing in their content and structure. Each type of record has a particular format and thus a particular length.

- Block number record
One type only
- Identifier record
One type only
- Data records
 - 1 tape header record (one type only)
 - 3 survey section header records (types 1, 2, 3)
 - 8 event records (types 1,2,3,4,6,7,10,11)
 - 11 measurement data records (types 1,2,3,4,5,6,7,8,9,10,11)
 - 1 auxiliary data record (type 1)

3.1.2.2 Record Combinations

The transfer of the records takes place in the form of defined groups, the "record combinations"; the selection and sequence of the record types are defined for each record combination. All record combinations begin with an identifier record, which is followed by one or more data records. The identifier record

Saved: Friday, 14 March 2008 11:27:37

contains the record combination name, from which, with the aid of the following listing, it is possible to identify the types of the data records which follow, i.e. how these data records are to be interpreted.

The following record combinations are transferred (instead of the identifier record type, the record combination name contained in the identifier record is stated):

a) In the tape header file:

- Record combination BANDHEAD, consisting of:
 - Identifier record bandhead
 - Tape header record

b) In the survey section file:

- Record combination MEABPDAT, consisting of:
 - Identifier record meabpdat
 - Survey section header record type 1
- Record combination MEABHYDI, consisting of:
 - Identifier record meabhydi
 - Survey section header record type 2
- Record combination MEABCOMM, consisting of:
 - Identifier record maebcomm
 - Survey section header record type 3
- Record combination ERGNHYDI, consisting of:
 - Identifier record ergnhydi
 - Event record type 1
- Record combination ERGNPARA, consisting of:
 - Identifier record ergnpara
 - Event record type 2
- Record combination ERGNPOSI, consisting of:
 - Identifier record ergnposi
 - Event record type 3
- Record combination ERGNEICH, consisting of:
 - Identifier record ergneich
 - Event record type 4
 - Measurement data record type 1
 - Measurement data record type 2
 - Measurement data record type 3
 - Measurement data record type 4
- Record combination ERGNMESS, consisting of:
 - Identifier record ergnmess
 - Event record type 4
 - Measurement data record type 1
 - Measurement data record type 2
 - Measurement data record type 3
 - Measurement data record type 4
- Record combination ERGNSLZT, consisting of:
 - Identifier record ergnslzt
 - Event record type 6
 - Measurement data record type 5
 - Measurement data record type 6
 - Measurement data record type 7
- Record combination ERGNCTDS, consisting of:
 - Identifier record ergnctds
 - Event record type 7

- Auxiliary data record type 1
(If there are more data than can be contained in one auxiliary data record, a further auxiliary data record of the same type is appended.)
- Record combination ERGNAMPL, consisting of:
 - Identifier record ergnaml
 - Event record type 10
 - Measurement data record type 8
 - Measurement data record type 9
 - Measurement data record type 10
 - Measurement data record type 11
- The HYDROSWEEP equipment can be configured that the record combination ERGNAMP5, consisting of:
 - Identifier record ergnamp5
 - Event record type 11
 - Measurement data record type 8
 - Measurement data record type 9
 - Measurement data record type 10
 - Measurement data record type 11
 is transferred instead of record combination ERGNAMPL .

3.1.2.3 Transfer Rate

The transfer of the record combination is event-controlled. The frequency of transfer of the individual record combination thus depends on various operational parameters and on events.

The various record combinations are recorded with the following dependences:

- BANDHEAD: Single record-combination of each tape header file.
- MEABPDAT: - At the beginning of each survey section file
 - After each start of magnetic tape recording
- MEABHYDI: - After each MEABPDAT
- MEABCOMM: - After each MEABHYDI
- ERGNPARA: - After each MEABCOMM.
 - Only if the equipment is in the "stand-by" or "search" state: Every whole minute
- ERGNHYDI: - If one or more values of the following parameters have changed:
 - Mean sound velocity used
 - Keel sound velocity used
 - Draught used
 - Tide value used.
 - After the first ERGNPARA after each start of magnetic tape recording.
 - After each change of the recording between two magnetic tape drives.
- ERGNPOSI: - When the navigation system reports that a position update has taken place.
 - When a GPS receiver is switched off (or, to be more precise, when the data of one of the existing GPS receivers are no longer being used for the determination of position data).
 - After the first ERGNHYDI after each start of magnetic tape recording if a previous

position fix has been occurred while the tape recording was switched off.

- ERGNEICH: Immediately after each measurement in the calibration mode. (The minimum time interval between two measurements is 1 second.)
- ERGNMESS: Immediately after each measurement in the survey mode. (The minimum time interval between two measurements is 1 second.)
- ERGNSLZT:
 - After each ERGNEICH
 - After each ERGNMESS
- ERGNCTDS: After completion of the input of a sound velocity profile.
- ERGNAMPL
respectively
ERGNAMP5: After each ERGNSLZT

For the standard cases, this leads to the transfer of the following record combinations in the sequence stated.

- At the beginning of each survey section file:
 - MEABPDAT
 - MEABHYDI
 - MEABCOMM
 - ERGNPARA
 - ERGNHYDI
 - ERGNPOSI
- At each measurement in the survey mode:
 - ERGNMESS
 - ERGNSLZT
 - ERGNAMPL or ERNAMP5
- At each measurement in the calibration mode:
 - ERGNEICH
 - ERGNSLZT
 - ERGNAMPL or ERGNAMP5

3.1.2.4 Description of the records

In the following, the record format and the transfer format of the items contained are specified. For the definition of the information contained, see para. 2.2.

Remarks (valid unless specified otherwise in individual cases):

- 1) All number fields, including signs if any, are written right-justified and are filled up with spaces (20H) on the left.
- 2) If a value is not available, spaces (20H) or zeros (30H) are transferred.
- 3) All decimal points are transferred at the specified places even if the corresponding value is not transferred.
- 4) In the case of positive values, a + (2BH) is transferred as the the sign (if a sign has been defined as part of the item).
- 5) Characters listed under "format" which are not explained

under "description" are constants which are transferred.

6) If no LSB value is stated, the scaling factor is 1.

BLOCK NUMBER RECORD

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Block number	nnnnnn	1
0006	2	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

1) The block number is the sequential number of the block within a file.

IDENTIFIER RECORD

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Record combination name	8 printable characters	
0008	2	Termination, CR(0DH) LF(0AH)	<CR><LF>	

TAPE HEADER RECORD

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Name of the actual magnetic tape	60 printable characters	1
0060	2	Name of the last magnetic tape	60 printable characters	1
0120	3	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

1) Source: HYDROSWEEP operator
The field is written left-justified, including any preceding blank fields entered by the operator, and is filled up with spaces (20H) on the right.

SURVEY SECTION HEADER RECORD TYPE 1

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Cruise name	12 printable characters	1
0012	2	Station name	12 printable characters	1
0024	3	Date (y=year m=month d=day)	yyyymmdd	
0032	4	Time (h=hour m=minute s=second)	hhmmss	
0038	5	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

1) Source: HYDROSWEEP operator
The field is written left-justified, including any preceding blank fields entered by the

operator, and is
 filled up with spaces (20H) on the right.

SURVEY SECTION HEADER RECORD TYPE 2

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1		120 printable characters	1
0120	2	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

1) Spare, spaces (20H) at present

SURVEY SECTION HEADER RECORD TYPE 3

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1		36 printable characters	1
0036	2	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

1) Spare, spaces (20H) at present

EVENT RECORD TYPE 1

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Ship's position, longitude (s=sign d=degree)	sddd.ddddddd	
0012	2	Ship's position, latitude (s=sign d=degree)	sddd.ddddddd	
0024	3	Date (y=year m=month d=day)	yyyymmdd	
0032	4	Time (h=hour m=minute s=second)	hhmmss	
0038	5	Survey section time (m=minute, s=second)	mmmmss	
0045	6	Draught (m=meter)	mm.m	
0049	7	Mean velocity of sound in water, Cmean (m=meter/second)	mmmm.mm	
0056	8	Velocity of sound in water at the keel, Ckeel (m=meter/second)	mmmm.mm	
0063	9	Tide (s=sign m=meter)	smm.mm	
0069	10	Termination, CR(0DH) LF(0AH)	<CR><LF>	

EVENT RECORD TYPE 2

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Ship's position, longitude (s=sign d=degree)	sddd.ddddddd	
0012	2	Ship's position, latitude (s=sign d=degree)	sddd.ddddddd	
0024	3	Date (y=year m=month d=day)	yyyymmdd	
0032	4	Time (h=hour m=minute s=second)	hhmmss	
0038	5	Survey section time (m=minute s=second)	mmmmss	
0045	6	Heading (d=degree)	ddd.d	
0050	7	Transverse speed (s=sign, m=meter/second)	smmmmmm.m	
0059	8	Longitudinal speed (s=sign m=meter/second)	smmmmmm.m	
0068	9	Reference for speed, x=B bottom track	x	

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x=W   water track
0069  10   Pitch angle (s=sign d=degree)      sd.d
0073  11   Track number                      nnnn
0077  12   Depth PFB 30 (m=meter)           mmmmm.m
0084  13   Termination, CR(0DH) LF(0AH)    <CR><LF>
    
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EVENT RECORD TYPE 3

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Ship's position, longitude (s=sign d=degree)	sddd.dddddd	
0012	2	Ship's position, latitude (s=sign d=degree)	sddd.dddddd	
0024	3	Date (y=year m=month d=day)	yyyymmdd	
0032	4	Time (h=hour m=minute s=second)	hhmmss	
0038	5	Survey section time (m=minute s=second)	mmmmss	
0045	6	Correction value of position, east (s=sign m=meter)	smmmmmm.	
0045	7	Correction value of position, north (s=sign m=meter)	smmmmmm.	
0059	8	Position sensors, (x=position sensor)	POSxxxxx	1
0067	9	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

1) Each "x" stands for a sensor whose data are used to determine the ship's position. These data are transferred unaltered in form and content, exactly as they were received from the navigation system.

The characters "POS" are added by the HYDROSWEEP DS system.

Definitions:

x = G First GPS system

x = g Second GPS system

All other flags are non-defined.

Recommendations:

D = DECCA Mainchain

L = LORAN

T = Transit SatNav

S = Syledis

O = Omega

EVENT RECORD TYPE 4

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Ship's position, longitude (s=sign d=degree)	sddd.dddddd	
0012	2	Ship's position, latitude (s=sign d=degree)	sddd.dddddd	
0024	3	Date (y=year m=month d=day)	yyyymmdd	
0032	4	Time (h=hour m=minute s=second)	hhmmss	
0038	5	Survey section time (m=minute s=second)	mmmmss	
0045	6	Heading (d=degree)	ddd.d	
0050	7	Transverse speed (s=sign m=meter/second)	smmmmmm.m	
0059	8	Longitudinal speed (s=sign m=meter/second)	smmmmmm.m	
0068	9	Reference for speed, x=B bottom track x=W water track	x	
0069	10	Pitch angle (s=sign d=degree)	sd.d	
0073	11	Track number	nnnn	
0077	12	Depth PFB 30 (m=meter)	mmmmmm.m	
0084	13	Scaling factor (m=meter)	m.mm	1
0088	14		2 printable character	2
0090	15	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

1) Multiplication factor for lateral distance and depth mantissa contained in the associated measurement data records
 Example: Item 13 value is 0.05, item 3 value of measurementdata record type 2 is 6420 means:
 Depth of PFB 32 is 321m.

2) Spare, at present the value 1 is recorded (20H 31H)

EVENT RECORD TYPE 6

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Ship's position, longitude (s=sign d=degree)	sddd.dddddd	
0012	2	Ship's position, latitude (s=sign d=degree)	sddd.dddddd	
0024	3	Date (y=year m=month d=day)	yyyymmdd	
0032	4	Time (h=hour m=minute s=second)	hhmmss	
0038	5	Heading (d=degree)	ddd.d	
0043	6	Course over ground (d=degree)	ddd.d	
0048	7	Speed over the ground (s=sign m=meter/second)	smmmmmm.m	
0057	8	Heave (s=sign m=meter)	smm.mm	
0063	9	Pitch angle (s=sign d=degree)	sd.d	
0067	10	Roll angle (s=sign d=degree)	sd.d	
0072	11	Sound travelling time PFB 30 (s=second LSB=0.0001)	sssss	
0078	12	Scaling factor (s=second)	s.ssss	1
0084	13	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

1) Multiplication factor for sound travelling time mantissa contained in the associated measurement data records
 Example: Item 12 value is 0.0010, item 3 value of measurementdata record type 6 is 3528 means:
 Sound travelling time of PFB 28 is 3.528 sec.

EVENT RECORD TYPE 7

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Ship's position, longitude (s=sign d=degree)	sddd.dddddd	
0012	2	Ship's position, latitude (s=sign d=degree)	sddd.dddddd	
0024	3	Date (y=year m=month d=day)	yyyymmdd	
0032	4	Time (h=hour m=minute s=second)	hhmmss	
0038	5	Number of sound velocity profile value pairs present in the associated auxiliary data record(s)	nn	
0040	6	Termination, CR(0DH) LF(0AH)	<CR><LF>	

EVENT RECORD TYPE 10

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Ship's position, longitude (s=sign d=degree)	sddd.dddddd	
0012	2	Ship's position, latitude (s=sign d=degree)	sddd.dddddd	
0024	3	Date (y=year m=month d=day)	yyyymmdd	
0032	4	Time (h=hour m=minute s=second)	hhmmss	
0038	5	Operation mode	x	

		x=S shallow water survey mode		
		x=M medium depth survey mode		
		x=D deep sea survey mode		
		x=s shallow water calibration mode		
		x=m medium depth calibration mode		
		x=d deep sea calibration mode		
0039	6	Transmission level starboard, [astern], LSs (d=dB rel 1uPa,m)	ddd	1
0042	7	Transmission level vertical, Lsv (d=dB rel 1uPa,m)	ddd	
0045	8	Transmission level port [ahead], LSp (d=dB rel 1uPa,m)	ddd	1
0048	9	Pulse length starboard [astern], taus (s=second LSB=0.001)	ss	1
0050	10	Pulse length vertical, tauv (s=second LSB=0.001)	ss	
0052	11	Pulse length port [ahead], tauP (s=second LSB=0.001)	ss	1
0054	12	TVC starting gain, V0 (d=dB)	dd	
0056	13	Factor for A(r) compensation, A1 (d=dB/km; LSB = 0.1)	dd	
0058	14	Start of continuous 20 lg r compensation, R0 (m=meter)	mmmm	
0062	15	Start of increasing interval near, RB (m=meter)	mmmmm	
0067	16	TVC-increase near, VA3 (d=dB)	dd	
0069	17	TVC-increase, VA2 (d=dB)	dd	
0071	18	Increasing interval near, I3 (LSB=0.001)	nnn	
0074	19	Increasing interval, I2 (LSB=0.001)	nnn	
0077	20	Beamformer basic gain PFB 27-30, V'BF (d=dB LSB=6)	d	
0078	21	Filter gain, Vfilt (s=sign d=dB)	sdd.d	
0083	22	Output amplitude PFB 30, UA (v=Veff LSB=2/256)	vvv	
0086	23	Echo duration (mantissa) PFB 30, mtau	nnn	
0089	24	Echo duration (scaling factor) PFB 27-30	x	
		x=0 1/1000000 sec		
		x=1 1/100000 sec		
		x=2 1/10000 sec		
		x=3 1/1000 sec		
		x=4 1/100 sec		
		x=5 1/10 sec		
		x=6 1 sec		
0090	25	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

1) Expressions in square brackets are related to calibration mode.

EVENT RECORD TYPE 11

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Ship's position, longitude (s=sign d=degree)	sddd.ddddddd	
0012	2	Ship's position, latitude (s=sign d=degree)	sddd.ddddddd	
0024	3	Date (y=year m=month d=day)	yyyymmdd	
0032	4	Time (h=hour m=minute s=second)	hhmmss	
0038	5	Operation mode	x	
		x=S shallow water survey mode		
		x=M medium depth survey mode		
		x=D deep sea survey mode		
		x=s shallow water calibration mode		
		x=m medium depth calibration mode		
		x=d deep sea calibration mode		
0039	6	Swath mode	x	
		x=0 90° coverage		
		x=1 120° coverage		
0040	7	PFB angle-constant, Ca (d=degree LSB=0.0001)	dddd	
0045	8	Transmission level starboard, outer, [astern, outer], LSso (d=dB rel 1uPa,m)	ddd	1
0048	9	Transmission level starboard, [astern], LSs (d=dB rel 1uPa,m)	ddd	1
0051	10	Transmission level vertical, Lsv (d=dB rel 1uPa,m)	ddd	
0054	11	Transmission level port [ahead], LSp (d=dB rel 1uPa,m)	ddd	1
0057	12	Transmission level port, outer [ahead, outer], LSpO (d=dB rel 1uPa,m)	ddd	1
0060	13	Pulse length starboard, outer [astern, outer],	ss	1

		taus (s=second LSB=0.001)		
0062	14	Pulse length starboard [astern], taus (s=second LSB=0.001)	ss	1
0064	15	Pulse length vertical, tauf (s=second LSB=0.001)	ss	
0066	16	Pulse length port [ahead], taup (s=second LSB=0.001)	ss	1
0068	17	Pulse length port, outer [ahead, outer], taupo (s=second LSB=0.001)	ss	1
0070	18	Transmission beam angle starboard, outer, [astern, outer], BAso (d=degree)	dd	1
0072	19	Transmission beam angle starboard, [astern], BAs (d=degree)	dd	1
0074	20	Transmission beam angle vertical, BAv (d=degree)	dd	
0076	21	Transmission beam angle port, [ahead], BAp (d=degree)	dd	1
0078	22	Transmission beam angle starboard, outer [astern, outer], BApo (d=degree)	dd	1
0080	23	Transmission beam width starboard, outer, [astern, outer], BWso (d=degree)	dd	1
0082	24	Transmission beam width starboard, [astern], BWs (d=degree)	dd	1
0084	25	Transmission beam width vertical, BWv (d=degree)	dd	
0086	26	Transmission beam width port, [ahead], BWp (d=degree)	dd	1
0088	27	Transmission beam width starboard, outer [astern, outer], BWpo (d=degree)	dd	1
0090	28	TVC starting gain, V0 (d=dB)	dd	
0092	29	Factor for A(r) compensation, A1 (d=dB/km; LSB = 0.1)	dd	
0094	30	Start of continuous 20 lg r compensation, R0 (m=meter)	mmmm	
0098	31	Start of increasing interval near, RB (m=meter)	mmmmm	
0103	32	TVC-increase near, VA3 (d=dB)	dd	
0105	33	TVC-increase, VA2 (d=dB)	dd	
0107	34	Increasing interval near, I3 (LSB=0.001)	nnn	
0110	35	Increasing interval, I2 (LSB=0.001)	nnn	
0113	36	Beamformer basic gain PFB 27-30, V'BF (d=dB LSB=6)	d	
0114	37	Filter gain, Vfilt (s=sign d=dB) s	sdd.d	2
0119	38	Output amplitude PFB 30, UA (v=Veff LSB=2/256)	vvv	
0122	39	Echo duration (mantissa) PFB 30, mtau	nnn	
0125	40	Echo duration (scaling factor) PFB 27-30 x=0 1/1000000 sec x=1 1/100000 sec x=2 1/10000 sec x=3 1/1000 sec x=4 1/100 sec x=5 1/10 sec x=6 1 sec	x	
0126	41	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

- 1) Expressions in square brackets are related to calibration mode.
- 2) The sign remains left-justified, the value remains right-justified. In the case of values smaller than 10 dB, the gap is filled up with spaces (20H).

MEASUREMENT DATA RECORD TYPE 1

(Lateral distances to starboard [ahead])

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Number of PFBs selected by the operator	nn	1
0002	2	Lateral distance (mantissa) PFB 31	nnnn	2
0006	3	Lateral distance (mantissa) PFB 32	nnnn	2
0010	4	Lateral distance (mantissa) PFB 33	nnnn	2
0014	5	Lateral distance (mantissa) PFB 34	nnnn	2
0018	6	Lateral distance (mantissa) PFB 35	nnnn	2
0022	7	Lateral distance (mantissa) PFB 36	nnnn	2
0026	8	Lateral distance (mantissa) PFB 37	nnnn	2
0030	9	Lateral distance (mantissa) PFB 38	nnnn	2
0034	10	Lateral distance (mantissa) PFB 39	nnnn	2
0038	11	Lateral distance (mantissa) PFB 40	nnnn	2

0042	12	Lateral distance (mantissa) PFB 41	nnnn	2
0046	13	Lateral distance (mantissa) PFB 42	nnnn	2
0050	14	Lateral distance (mantissa) PFB 43	nnnn	2
0054	15	Lateral distance (mantissa) PFB 44	nnnn	2
0058	16	Lateral distance (mantissa) PFB 45	nnnn	2
0062	17	Lateral distance (mantissa) PFB 46	nnnn	2
0066	18	Lateral distance (mantissa) PFB 47	nnnn	2
0070	19	Lateral distance (mantissa) PFB 48	nnnn	2
0074	20	Lateral distance (mantissa) PFB 49	nnnn	2
0078	21	Lateral distance (mantissa) PFB 50	nnnn	2
0082	22	Lateral distance (mantissa) PFB 51	nnnn	2
0086	23	Lateral distance (mantissa) PFB 52	nnnn	2
0090	24	Lateral distance (mantissa) PFB 53	nnnn	2
0094	25	Lateral distance (mantissa) PFB 54	nnnn	2
0098	26	Lateral distance (mantissa) PFB 55	nnnn	2
0102	27	Lateral distance (mantissa) PFB 56	nnnn	2
0106	28	Lateral distance (mantissa) PFB 57	nnnn	2
0110	29	Lateral distance (mantissa) PFB 58	nnnn	2
0114	30	Lateral distance (mantissa) PFB 59	nnnn	2
0118	31	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

- 1) The PFBs are always selected in ascending consecutive order, beginning with PFB 31.
- 2) - Instead of those PFBs which are not selected any alphanumerical characters are transferred.
- Instead of those selected PFBs which are recognised by the HYDOSWEEP equipment as incorrect measurement any alphanumerical characters are transferred. For recognition of the incorrect measurements see measurement data record 2.
- For scaling factor, see associated event record.
- In survey mode, it is not the lateral distance that is transferred, but the smoothed lateral distance.
- The PFBs that are nt selected by the are always the outer PFBs.

MEASUREMENT DATA RECORD TYPE 2
(Depth to starboard [ahead])

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Number of PFBs selected by the operator	nn	1
0002	2	Depth (mantissa) PFB 31	nnnn	2
0006	3	Depth (mantissa) PFB 32	nnnn	2
0010	4	Depth (mantissa) PFB 33	nnnn	2
0014	5	Depth (mantissa) PFB 34	nnnn	2
0018	6	Depth (mantissa) PFB 35	nnnn	2
0022	7	Depth (mantissa) PFB 36	nnnn	2
0026	8	Depth (mantissa) PFB 37	nnnn	2
0030	9	Depth (mantissa) PFB 38	nnnn	2
0034	10	Depth (mantissa) PFB 39	nnnn	2
0038	11	Depth (mantissa) PFB 40	nnnn	2
0042	12	Depth (mantissa) PFB 41	nnnn	2
0046	13	Depth (mantissa) PFB 42	nnnn	2
0050	14	Depth (mantissa) PFB 43	nnnn	2
0054	15	Depth (mantissa) PFB 44	nnnn	2
0058	16	Depth (mantissa) PFB 45	nnnn	2
0062	17	Depth (mantissa) PFB 46	nnnn	2
0066	18	Depth (mantissa) PFB 47	nnnn	2
0070	19	Depth (mantissa) PFB 48	nnnn	2
0074	20	Depth (mantissa) PFB 49	nnnn	2
0078	21	Depth (mantissa) PFB 50	nnnn	2
0082	22	Depth (mantissa) PFB 51	nnnn	2
0086	23	Depth (mantissa) PFB 52	nnnn	2
0090	24	Depth (mantissa) PFB 53	nnnn	2
0094	25	Depth (mantissa) PFB 54	nnnn	2
0098	26	Depth (mantissa) PFB 55	nnnn	2

Saved: Friday, 14 March 2008 11:27:37

0102	27	Depth (mantissa) PFB 56	nnnn	2
0106	28	Depth (mantissa) PFB 57	nnnn	2
0110	29	Depth (mantissa) PFB 58	nnnn	2
0114	30	Depth (mantissa) PFB 59	nnnn	2
0118	31	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

- 1) The PFBs are always selected in ascending consecutive order, beginning with PFB 31.
- 2) - Instead of those PFBs which are not selected any alphanumerical characters are transferred.
- Instead of those selected PFBs which are recognised by the HYDOSWEEP equipment as incorrect measurement value 0 (20H 20H 20H 30H) is transferred.
- For scaling factor, see associated event record.
- In survey mode, it is not the depth that is transferred, but the smoothed depth.

MEASUREMENT DATA RECORD TYPE 3

(Lateral distances to port [astern])

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Number of PFBs selected by the operator	nn	1
0002	2	Lateral distance (mantissa) PFB 29	nnnn	2
0006	3	Lateral distance (mantissa) PFB 28	nnnn	2
0010	4	Lateral distance (mantissa) PFB 27	nnnn	2
0014	5	Lateral distance (mantissa) PFB 26	nnnn	2
0018	6	Lateral distance (mantissa) PFB 25	nnnn	2
0022	7	Lateral distance (mantissa) PFB 24	nnnn	2
0026	8	Lateral distance (mantissa) PFB 23	nnnn	2
0030	9	Lateral distance (mantissa) PFB 22	nnnn	2
0034	10	Lateral distance (mantissa) PFB 21	nnnn	2
0038	11	Lateral distance (mantissa) PFB 20	nnnn	2
0042	12	Lateral distance (mantissa) PFB 19	nnnn	2
0046	13	Lateral distance (mantissa) PFB 18	nnnn	2
0050	14	Lateral distance (mantissa) PFB 17	nnnn	2
0054	15	Lateral distance (mantissa) PFB 16	nnnn	2
0058	16	Lateral distance (mantissa) PFB 15	nnnn	2
0062	17	Lateral distance (mantissa) PFB 14	nnnn	2
0066	18	Lateral distance (mantissa) PFB 13	nnnn	2
0070	19	Lateral distance (mantissa) PFB 12	nnnn	2
0074	20	Lateral distance (mantissa) PFB 11	nnnn	2
0078	21	Lateral distance (mantissa) PFB 10	nnnn	2
0082	22	Lateral distance (mantissa) PFB 9	nnnn	2
0086	23	Lateral distance (mantissa) PFB 8	nnnn	2
0090	24	Lateral distance (mantissa) PFB 7	nnnn	2
0094	25	Lateral distance (mantissa) PFB 6	nnnn	2
0098	26	Lateral distance (mantissa) PFB 5	nnnn	2
0102	27	Lateral distance (mantissa) PFB 4	nnnn	2
0106	28	Lateral distance (mantissa) PFB 3	nnnn	2
0110	29	Lateral distance (mantissa) PFB 2	nnnn	2
0114	30	Lateral distance (mantissa) PFB 1	nnnn	2
0118	31	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

- 1) The PFBs are always selected in ascending consecutive order, beginning with PFB 29.
- 2) - Instead of those PFBs which are not selected any alphanumerical characters are transferred.
- Instead of those selected PFBs which are recognised by the HYDOSWEEP equipment as incorrect measurement any alphanumerical characters are transferred. For recognition of the incorrect measurements see measurement data record 4.
- For scaling factor, see associated event record.
- In survey mode, it is not the lateral distance that is transferred, but the smoothed lateral distance.

Saved: Friday, 14 March 2008 11:27:37

MEASUREMENT DATA RECORD TYPE 4
(Depth to port [astern])

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Number of PFBs selected by the operator	nn	1
0002	2	Depth (mantissa) PFB 29	nnnn	2
0006	3	Depth (mantissa) PFB 28	nnnn	2
0010	4	Depth (mantissa) PFB 27	nnnn	2
0014	5	Depth (mantissa) PFB 26	nnnn	2
0018	6	Depth (mantissa) PFB 25	nnnn	2
0022	7	Depth (mantissa) PFB 24	nnnn	2
0026	8	Depth (mantissa) PFB 23	nnnn	2
0030	9	Depth (mantissa) PFB 22	nnnn	2
0034	10	Depth (mantissa) PFB 21	nnnn	2
0038	11	Depth (mantissa) PFB 20	nnnn	2
0042	12	Depth (mantissa) PFB 19	nnnn	2
0046	13	Depth (mantissa) PFB 18	nnnn	2
0050	14	Depth (mantissa) PFB 17	nnnn	2
0054	15	Depth (mantissa) PFB 16	nnnn	2
0058	16	Depth (mantissa) PFB 15	nnnn	2
0062	17	Depth (mantissa) PFB 14	nnnn	2
0066	18	Depth (mantissa) PFB 13	nnnn	2
0070	19	Depth (mantissa) PFB 12	nnnn	2
0074	20	Depth (mantissa) PFB 11	nnnn	2
0078	21	Depth (mantissa) PFB 10	nnnn	2
0082	22	Depth (mantissa) PFB 9	nnnn	2
0086	23	Depth (mantissa) PFB 8	nnnn	2
0090	24	Depth (mantissa) PFB 7	nnnn	2
0094	25	Depth (mantissa) PFB 6	nnnn	2
0098	26	Depth (mantissa) PFB 5	nnnn	2
0102	27	Depth (mantissa) PFB 4	nnnn	2
0106	28	Depth (mantissa) PFB 3	nnnn	2
0110	29	Depth (mantissa) PFB 2	nnnn	2
0114	30	Depth (mantissa) PFB 1	nnnn	2
0118	31	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

- 1) The PFBs are always selected in ascending consecutive order, beginning with PFB 29.
- 2) - Instead of those PFBs which are not selected any alphanumerical characters are transferred.
- Instead of those selected PFBs which are recognised by the HYDOSWEEP equipment as incorrect measurement value 0 (20H 20H 20H 30H) is transferred.
- For scaling factor, see associated event record.
- In survey mode, it is not the depth that is transferred, but the smoothed depth.

MEASUREMENT DATA RECORD TYPE 5
(Sound travelling time to starboard [ahead])

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Number of PFBs selected by the operator	nn	1
0002	2	Sound trav. time (mantissa) PFB 31	nnnn	2
0006	3	Sound trav. time (mantissa) PFB 32	nnnn	2
0010	4	Sound trav. time (mantissa) PFB 33	nnnn	2
0014	5	Sound trav. time (mantissa) PFB 34	nnnn	2
0018	6	Sound trav. time (mantissa) PFB 35	nnnn	2
0022	7	Sound trav. time (mantissa) PFB 36	nnnn	2
0026	8	Sound trav. time (mantissa) PFB 37	nnnn	2
0030	9	Sound trav. time (mantissa) PFB 38	nnnn	2
0034	10	Sound trav. time (mantissa) PFB 39	nnnn	2

0038	11	Sound trav. time (mantissa) PFB 40	nnnn	2
0042	12	Sound trav. time (mantissa) PFB 41	nnnn	2
0046	13	Sound trav. time (mantissa) PFB 42	nnnn	2
0050	14	Sound trav. time (mantissa) PFB 43	nnnn	2
0054	15	Sound trav. time (mantissa) PFB 44	nnnn	2
0058	16	Sound trav. time (mantissa) PFB 45	nnnn	2
0062	17	Sound trav. time (mantissa) PFB 46	nnnn	2
0066	18	Sound trav. time (mantissa) PFB 47	nnnn	2
0070	19	Sound trav. time (mantissa) PFB 48	nnnn	2
0074	20	Sound trav. time (mantissa) PFB 49	nnnn	2
0078	21	Sound trav. time (mantissa) PFB 50	nnnn	2
0082	22	Sound trav. time (mantissa) PFB 51	nnnn	2
0086	23	Sound trav. time (mantissa) PFB 52	nnnn	2
0090	24	Sound trav. time (mantissa) PFB 53	nnnn	2
0094	25	Sound trav. time (mantissa) PFB 54	nnnn	2
0098	26	Sound trav. time (mantissa) PFB 55	nnnn	2
0102	27	Sound trav. time (mantissa) PFB 56	nnnn	2
0106	28	Sound trav. time (mantissa) PFB 57	nnnn	2
0110	29	Sound trav. time (mantissa) PFB 58	nnnn	2
0114	30	Sound trav. time (mantissa) PFB 59	nnnn	2
0118	31	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

- 1) The PFBs are always selected in ascending consecutive order, beginning with PFB 31.
- 2) - Instead of those PFBs which are not selected any alphanumerical characters are transferred.
 - Instead of those selected PFBs which are recognised by the HYDOSWEEP equipment as incorrect measurement value 0 (20H 20H 20H 30H) is transferred.
 - For scaling factor, see associated event record.

MEASUREMENT DATA RECORD TYPE 6
 (Sound travelling time to port [astern])

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Number of PFBs selected by the operator	nn	1
0002	2	Sound trav. time (mantissa) PFB 29	nnnn	2
0006	3	Sound trav. time (mantissa) PFB 28	nnnn	2
0010	4	Sound trav. time (mantissa) PFB 27	nnnn	2
0014	5	Sound trav. time (mantissa) PFB 26	nnnn	2
0018	6	Sound trav. time (mantissa) PFB 25	nnnn	2
0022	7	Sound trav. time (mantissa) PFB 24	nnnn	2
0026	8	Sound trav. time (mantissa) PFB 23	nnnn	2
0030	9	Sound trav. time (mantissa) PFB 22	nnnn	2
0034	10	Sound trav. time (mantissa) PFB 21	nnnn	2
0038	11	Sound trav. time (mantissa) PFB 20	nnnn	2
0042	12	Sound trav. time (mantissa) PFB 19	nnnn	2
0046	13	Sound trav. time (mantissa) PFB 18	nnnn	2
0050	14	Sound trav. time (mantissa) PFB 17	nnnn	2
0054	15	Sound trav. time (mantissa) PFB 16	nnnn	2
0058	16	Sound trav. time (mantissa) PFB 15	nnnn	2
0062	17	Sound trav. time (mantissa) PFB 14	nnnn	2
0066	18	Sound trav. time (mantissa) PFB 13	nnnn	2
0070	19	Sound trav. time (mantissa) PFB 12	nnnn	2
0074	20	Sound trav. time (mantissa) PFB 11	nnnn	2
0078	21	Sound trav. time (mantissa) PFB 10	nnnn	2
0082	22	Sound trav. time (mantissa) PFB 9	nnnn	2
0086	23	Sound trav. time (mantissa) PFB 8	nnnn	2
0090	24	Sound trav. time (mantissa) PFB 7	nnnn	2
0094	25	Sound trav. time (mantissa) PFB 6	nnnn	2
0098	26	Sound trav. time (mantissa) PFB 5	nnnn	2
0102	27	Sound trav. time (mantissa) PFB 4	nnnn	2
0106	28	Sound trav. time (mantissa) PFB 3	nnnn	2
0110	29	Sound trav. time (mantissa) PFB 2	nnnn	2

0114	30	Sound trav. time (mantissa) PFB 1	nnnn	2
0118	31	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

- 1) The PFBs are always selected in ascending consecutive order, beginning with PFB 29.
- 2) - Instead of those PFBs which are not selected any alphanumeric characters are transferred.
 - Instead of those selected PFBs which are recognised by the HYDOSWEEP equipment as incorrect measurement value 0 (20H 20H 20H 30H) is transferred.
 - For scaling factor, see associated event record.

MEASUREMENT DATA RECORD TYPE 7
 (Gyro heading at receiving instant)

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Gyro heading PFB 1 (d=degree)	ddd.d	1
0005	2	Gyro heading PFB 6 (d=degree)	ddd.d	1
0010	3	Gyro heading PFB 11 (d=degree)	ddd.d	1
0015	4	Gyro heading PFB 16 (d=degree)	ddd.d	1
0020	5	Gyro heading PFB 21 (d=degree)	ddd.d	1
0025	6	Gyro heading PFB 30 (d=degree)	ddd.d	1
0030	7	Gyro heading PFB 39 (d=degree)	ddd.d	1
0035	8	Gyro heading PFB 44 (d=degree)	ddd.d	1
0040	9	Gyro heading PFB 49 (d=degree)	ddd.d	1
0045	10	Gyro heading PFB 54 (d=degree)	ddd.d	1
0050	11	Gyro heading PFB 59 (d=degree)	ddd.d	1
0055	12	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

- 1) The heading values refer to the receiving instant of the PFB concerned.

MEASUREMENT DATA RECORD TYPE 8
 (Output amplitudes to starboard [ahead])

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Beamformer basic gain PFB 31-34, V'BF (d=dB LSB=6)	d	
0001	2	Beamformer basic gain PFB 35-38, V'BF (d=dB LSB=6)	d	
0002	3	Beamformer basic gain PFB 39-42, V'BF (d=dB LSB=6)	d	
0003	4	Beamformer basic gain PFB 43-46, V'BF (d=dB LSB=6)	d	
0004	5	Beamformer basic gain PFB 47-50, V'BF (d=dB LSB=6)	d	
0005	6	Beamformer basic gain PFB 51-54, V'BF (d=dB LSB=6)	d	
0006	7	Beamformer basic gain PFB 55-58, V'BF (d=dB LSB=6)	d	
0007	8	Beamformer basic gain PFB 59, V'BF (d=dB LSB=6)	d	
0008	9	Number of PFBs selected by the operator	nn	1
0010	10	Output amplitude PFB 31, UA(v=Veff LSB=2/256)	vvv	2
0013	11	Output amplitude PFB 32, UA(v=Veff LSB=2/256)	vvv	2
0016	12	Output amplitude PFB 33, UA(v=Veff LSB=2/256)	vvv	2
0019	13	Output amplitude PFB 34, UA(v=Veff LSB=2/256)	vvv	2
0022	14	Output amplitude PFB 35, UA(v=Veff LSB=2/256)	vvv	2
0025	15	Output amplitude PFB 36, UA(v=Veff LSB=2/256)	vvv	2
0028	16	Output amplitude PFB 37, UA(v=Veff LSB=2/256)	vvv	2
0031	17	Output amplitude PFB 38, UA(v=Veff LSB=2/256)	vvv	2
0034	18	Output amplitude PFB 39, UA(v=Veff LSB=2/256)	vvv	2
0037	19	Output amplitude PFB 40, UA(v=Veff LSB=2/256)	vvv	2
0040	20	Output amplitude PFB 41, UA(v=Veff LSB=2/256)	vvv	2
0043	21	Output amplitude PFB 42, UA(v=Veff LSB=2/256)	vvv	2
0046	22	Output amplitude PFB 43, UA(v=Veff LSB=2/256)	vvv	2

0049	23	Output amplitude PFB 44, UA(v=Veff LSB=2/256)	vvv	2
0052	24	Output amplitude PFB 45, UA(v=Veff LSB=2/256)	vvv	2
0055	25	Output amplitude PFB 46, UA(v=Veff LSB=2/256)	vvv	2
0058	26	Output amplitude PFB 47, UA(v=Veff LSB=2/256)	vvv	2
0061	27	Output amplitude PFB 48, UA(v=Veff LSB=2/256)	vvv	2
0064	28	Output amplitude PFB 49, UA(v=Veff LSB=2/256)	vvv	2
0067	29	Output amplitude PFB 50, UA(v=Veff LSB=2/256)	vvv	2
0070	30	Output amplitude PFB 51, UA(v=Veff LSB=2/256)	vvv	2
0073	31	Output amplitude PFB 52, UA(v=Veff LSB=2/256)	vvv	2
0076	32	Output amplitude PFB 53, UA(v=Veff LSB=2/256)	vvv	2
0079	33	Output amplitude PFB 54, UA(v=Veff LSB=2/256)	vvv	2
0082	34	Output amplitude PFB 55, UA(v=Veff LSB=2/256)	vvv	2
0085	35	Output amplitude PFB 56, UA(v=Veff LSB=2/256)	vvv	2
0088	36	Output amplitude PFB 57, UA(v=Veff LSB=2/256)	vvv	2
0091	37	Output amplitude PFB 58, UA(v=Veff LSB=2/256)	vvv	2
0094	38	Output amplitude PFB 59, UA(v=Veff LSB=2/256)	vvv	2
0097	39	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

- 1) The PFBs are always selected in ascending consecutive order, beginning with PFB 31.
- 2) - Instead of those PFBs which are not selected any alphanumeric characters are transferred.
 - Instead of those selected PFBs which are recognised by the HYDOSWEEP equipment as incorrect measurement any alphanumeric characters are transferred. For recognition of the incorrect measurements see measurement data record 2.

MEASUREMENT DATA RECORD TYPE 9

(Output amplitudes to port [astern])

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Beamformer basic gain PFB 1-2, V'BF (d=dB LSB=6)	d	
0001	2	Beamformer basic gain PFB 3-6, V'BF (d=dB LSB=6)	d	
0002	3	Beamformer basic gain PFB 7-10 V'BF (d=dB LSB=6)	d	
0003	4	Beamformer basic gain PFB 11-14, V'BF (d=dB LSB=6)	d	
0004	5	Beamformer basic gain PFB 15-18, V'BF (d=dB LSB=6)	d	
0005	6	Beamformer basic gain PFB 19-22, V'BF (d=dB LSB=6)	d	
0006	7	Beamformer basic gain PFB 23-26, V'BF (d=dB LSB=6)	d	
0007	8	Beamformer basic gain PFB 27-30, V'BF (d=dB LSB=6)	d	
0008	9	Number of PFBs selected by the operator	nn	1
0010	10	Output amplitude PFB 29, UA (v=Veff LSB=2/256)	vvv	2
0013	11	Output amplitude PFB 28, UA (v=Veff LSB=2/256)	vvv	2
0016	12	Output amplitude PFB 27, UA (v=Veff LSB=2/256)	vvv	2
0019	13	Output amplitude PFB 26, UA (v=Veff LSB=2/256)	vvv	2
0022	14	Output amplitude PFB 25, UA (v=Veff LSB=2/256)	vvv	2
0025	15	Output amplitude PFB 24, UA (v=Veff LSB=2/256)	vvv	2
0028	16	Output amplitude PFB 23, UA (v=Veff LSB=2/256)	vvv	2
0031	17	Output amplitude PFB 22, UA (v=Veff LSB=2/256)	vvv	2
0034	18	Output amplitude PFB 21, UA (v=Veff LSB=2/256)	vvv	2
0037	19	Output amplitude PFB 20, UA (v=Veff LSB=2/256)	vvv	2
0040	20	Output amplitude PFB 19, UA (v=Veff LSB=2/256)	vvv	2
0043	21	Output amplitude PFB 18, UA (v=Veff LSB=2/256)	vvv	2
0046	22	Output amplitude PFB 17, UA (v=Veff LSB=2/256)	vvv	2
0049	23	Output amplitude PFB 16, UA (v=Veff LSB=2/256)	vvv	2
0052	24	Output amplitude PFB 15, UA (v=Veff LSB=2/256)	vvv	2
0055	25	Output amplitude PFB 14, UA (v=Veff LSB=2/256)	vvv	2
0058	26	Output amplitude PFB 13, UA (v=Veff LSB=2/256)	vvv	2
0061	27	Output amplitude PFB 12, UA (v=Veff LSB=2/256)	vvv	2
0064	28	Output amplitude PFB 11, UA (v=Veff LSB=2/256)	vvv	2
0067	29	Output amplitude PFB 10, UA (v=Veff LSB=2/256)	vvv	2
0070	30	Output amplitude PFB 9, UA (v=Veff LSB=2/256)	vvv	2
0073	31	Output amplitude PFB 8, UA (v=Veff LSB=2/256)	vvv	2
0076	32	Output amplitude PFB 7, UA (v=Veff LSB=2/256)	vvv	2
0079	33	Output amplitude PFB 6, UA (v=Veff LSB=2/256)	vvv	2

Saved: Friday, 14 March 2008 11:27:37

0082	34	Output amplitude PFB 5, UA (v=Veff LSB=2/256)	vvv	2
0085	35	Output amplitude PFB 4, UA (v=Veff LSB=2/256)	vvv	2
0088	36	Output amplitude PFB 3, UA (v=Veff LSB=2/256)	vvv	2
0091	37	Output amplitude PFB 2, UA (v=Veff LSB=2/256)	vvv	2
0094	38	Output amplitude PFB 1, UA (v=Veff LSB=2/256)	vvv	2
0097	39	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

- 1) The PFBs are always selected in descending consecutive order, beginning with PFB 29.
- 2) - Instead of those PFBs which are not selected any alphanumerical characters are transferred.
 - Instead of those selected PFBs which are recognised by the HYDOSWEEP equipment as incorrect measurement any alphanumerical characters are transferred. For recognition of the incorrect measurements see measurement data record 4.

MEASUREMENT DATA RECORD TYPE 10
 (Echo duration to starboard [ahead])

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Echo duration (scaling factor) PFB 31-34, sftau	x	1
0001	2	Echo duration (scaling factor) PFB 35-38, sftau	x	1
0002	3	Echo duration (scaling factor) PFB 39-42, sftau	x	1
0003	4	Echo duration (scaling factor) PFB 43-46, sftau	x	1
0004	5	Echo duration (scaling factor) PFB 47-50, sftau	x	1
0005	6	Echo duration (scaling factor) PFB 51-54, sftau	x	1
0006	7	Echo duration (scaling factor) PFB 55-58, sftau	x	1
0007	8	Echo duration (scaling factor) PFB 59, sftau	x	1
0008	9	Number of PFBs selected by the operator	nn	2
0010	10	Echo duration (mantissa) PFB 31, mtau	vvv	3
0013	11	Echo duration (mantissa) PFB 32, mtau	vvv	3
0016	12	Echo duration (mantissa) PFB 33, mtau	vvv	3
0019	13	Echo duration (mantissa) PFB 34, mtau	vvv	3
0022	14	Echo duration (mantissa) PFB 35, mtau	vvv	3
0025	15	Echo duration (mantissa) PFB 36, mtau	vvv	3
0028	16	Echo duration (mantissa) PFB 37, mtau	vvv	3
0031	17	Echo duration (mantissa) PFB 38, mtau	vvv	3
0034	18	Echo duration (mantissa) PFB 39, mtau	vvv	3
0037	19	Echo duration (mantissa) PFB 40, mtau	vvv	3
0040	20	Echo duration (mantissa) PFB 41, mtau	vvv	3
0043	21	Echo duration (mantissa) PFB 42, mtau	vvv	3
0046	22	Echo duration (mantissa) PFB 43, mtau	vvv	3
0049	23	Echo duration (mantissa) PFB 44, mtau	vvv	3
0052	24	Echo duration (mantissa) PFB 45, mtau	vvv	3
0058	26	Echo duration (mantissa) PFB 47, mtau	vvv	3
0061	27	Echo duration (mantissa) PFB 48, mtau	vvv	3
0064	28	Echo duration (mantissa) PFB 49, mtau	vvv	3
0067	29	Echo duration (mantissa) PFB 50, mtau	vvv	3
0070	30	Echo duration (mantissa) PFB 51, mtau	vvv	3
0073	31	Echo duration (mantissa) PFB 52, mtau	vvv	3
0076	32	Echo duration (mantissa) PFB 53, mtau	vvv	3
0079	33	Echo duration (mantissa) PFB 54, mtau	vvv	3
0082	34	Echo duration (mantissa) PFB 55, mtau	vvv	3
0085	35	Echo duration (mantissa) PFB 56, mtau	vvv	3
0088	36	Echo duration (mantissa) PFB 57, mtau	vvv	3
0091	37	Echo duration (mantissa) PFB 58, mtau	vvv	3
0094	38	Echo duration (mantissa) PFB 59, mtau	vvv	3
0097	39	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

- 1) x=0 1/1000000 sec
 x=1 1/100000 sec

Saved: Friday, 14 March 2008 11:27:37

x=2 1/10000 sec
 x=3 1/1000 sec
 x=4 1/100 sec
 x=5 1/10 sec
 x=6 1 sec

- 2) The PFBs are always selected in ascending consecutive order, beginning with PFB 31.
- 3) - Instead of those PFBs which are not selected any alphanumerical characters are transferred.
 - Instead of those selected PFBs which are recognised by the HYDOSWEEP equipment as incorrect measurement any alphanumerical characters are transferred. For recognition of the incorrect measurements see measurement data record 2.

MEASUREMENT DATA RECORD TYPE 11
 (Echo duration to port [astern])

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Echo duration (scaling factor) PFB 1-2, sftau	x	1
0001	2	Echo duration (scaling factor) PFB 3-6, sftau	x	1
0002	3	Echo duration (scaling factor) PFB 7-10, sftau	x	1
0003	4	Echo duration (scaling factor) PFB 11-14, sftau	x	1
0004	5	Echo duration (scaling factor) PFB 15-18, sftau	x	1
0005	6	Echo duration (scaling factor) PFB 19-22, sftau	x	1
0006	7	Echo duration (scaling factor) PFB 23-26, sftau	x	1
0007	8	Echo duration (scaling factor) PFB 27-30, sftau	x	1
0008	9	Number of PFBs selected by the operator	nn	2
0010	10	Echo duration (mantissa) PFB 29, mtau	vvv	3
0013	11	Echo duration (mantissa) PFB 28, mtau	vvv	3
0016	12	Echo duration (mantissa) PFB 27, mtau	vvv	3
0019	13	Echo duration (mantissa) PFB 26, mtau	vvv	3
0022	14	Echo duration (mantissa) PFB 25, mtau	vvv	3
0025	15	Echo duration (mantissa) PFB 24, mtau	vvv	3
0028	16	Echo duration (mantissa) PFB 23, mtau	vvv	3
0031	17	Echo duration (mantissa) PFB 22, mtau	vvv	3
0034	18	Echo duration (mantissa) PFB 21, mtau	vvv	3
0037	19	Echo duration (mantissa) PFB 20, mtau	vvv	3
0040	20	Echo duration (mantissa) PFB 19, mtau	vvv	3
0043	21	Echo duration (mantissa) PFB 18, mtau	vvv	3
0046	22	Echo duration (mantissa) PFB 17, mtau	vvv	3
0049	23	Echo duration (mantissa) PFB 16, mtau	vvv	3
0052	24	Echo duration (mantissa) PFB 15, mtau	vvv	3
0055	25	Echo duration (mantissa) PFB 14, mtau	vvv	3
0058	26	Echo duration (mantissa) PFB 13, mtau	vvv	3
0061	27	Echo duration (mantissa) PFB 12, mtau	vvv	3
0064	28	Echo duration (mantissa) PFB 11, mtau	vvv	3
0067	29	Echo duration (mantissa) PFB 10, mtau	vvv	3
0070	30	Echo duration (mantissa) PFB 9, mtau	vvv	3
0073	31	Echo duration (mantissa) PFB 8, mtau	vvv	3
0076	32	Echo duration (mantissa) PFB 7, mtau	vvv	3
0079	33	Echo duration (mantissa) PFB 6, mtau	vvv	3
0082	34	Echo duration (mantissa) PFB 5, mtau	vvv	3
0085	35	Echo duration (mantissa) PFB 4, mtau	vvv	3
0088	36	Echo duration (mantissa) PFB 3, mtau	vvv	3
0091	37	Echo duration (mantissa) PFB 2, mtau	vvv	3
0094	38	Echo duration (mantissa) PFB 1, mtau	vvv	3
0097	39	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

- 1) x=0 1/1000000 sec
 x=1 1/100000 sec
 x=2 1/10000 sec
 x=3 1/1000 sec
 x=4 1/100 sec

x=5 1/10 sec
 x=6 1 sec

- 2) The PFBs are always selected in descending consecutive order, beginning with PFB 29.
- 3) - Instead of those PFBs which are not selected any alphanumerical characters are transferred.
- Instead of those selected PFBs which are recognised by the HYDOSWEEP equipment as incorrect measurement any alphanumerical characters are transferred. For recognition of the incorrect measurements see measurement data record 4.

AUXILIARY DATA RECORD TYPE 1
 (Sound velocity profile)

Rel.Byte	Item	Name, Description, Scaling	Format	Remarks
0000	1	Depth (m=meter)	mmmmm	1
0005	2	Sound velocity belonging to item 1 (m=meter/second)	mmmm.m	1
0011	3	Depth (m=meter)	mmmmm	1
0016	4	Sound velocity belonging to item 3 (m=meter/second)	mmmm.m	1
0022	5	Depth (m=meter)	mmmmm	1
0027	6	Sound velocity belonging to item 5 (m=meter/second)	mmmm.m	1
0033	7	Depth (m=meter)	mmmmm	1
0038	8	Sound velocity belonging to item 7 (m=meter/second)	mmmm.m	1
0044	9	Depth (m=meter)	mmmmm	1
0049	10	Sound velocity belonging to item 9 (m=meter/second)	mmmm.m	1
0055	11	Depth (m=meter)	mmmmm	1
0060	12	Sound velocity belonging to item 11 (m=meter/second)	mmmm.m	1
0066	13	Depth (m=meter)	mmmmm	1
0071	14	Sound velocity belonging to item 13 (m=meter/second)	mmmm.m	1
0077	15	Depth (m=meter)	mmmmm	1
0082	16	Sound velocity belonging to item 15 (m=meter/second)	mmmm.m	1
0088	17	Depth (m=meter)	mmmmm	1
0093	18	Sound velocity belonging to item 17 (m=meter/second)	mmmm.m	1
0099	19	Depth (m=meter)	mmmmm	1
0104	20	Sound velocity belonging to item 19 (m=meter/second)	mmmm.m	1
0110	21	Termination, CR(0DH) LF(0AH)	<CR><LF>	

Remarks:

- 1) - The sequence of the value pairs corresponds to the sequence on the input mask of the HYDOSWEEP DS console.
- Transfer always takes place in pairs.
- The only value pairs that are transferred are those for which a sound velocity has been input.
- If less than 10 value pairs are input, spaces (20H) are set instead of the value pairs, that have not been input (gaps are filled in).
- If more than 10 value pairs are input, the value pairs not included in this record are written in a following record of the same type.

3.2 PRESENTATION LAYER

Only ASCII characters (00H to 7FH) are used.

3.3 TRANSPORT LAYER

3.3.1 OVERVIEW

The file structure and labelling are as defined by:

ISO 1001-1986 and DIN 66029, issue 9/87 and

ISO 1001-1979 and DIN 66029, issue 5/79

Any deviations from this are stated as such in the following.

The complete basic structure of a magnetic tape recording is shown in Fig. 3-1 (only available in WP-text).

3.3.2 VOLUME

The "volume" is the content of a magnetic tape.

It consists of a sequence of labels, tape marks, gaps and files.

Each volume begins with the label VOL1 (see 3.3.2.1) and ends with two consecutive tape marks.

Note: If the operator of the HYDROSWEEP DS equipment does not switch the tape recording off or over in good time before the end of the tape, the recording is interrupted at any place without conforming to ISO 1001 at this place. The receiving system should be able to process such a magnetic tape with appropriate support by the user.

Fig. 3 - 1 Structure of Volume (only available in WP-text)

3.3.2.1 Labels

The following labels are used:

-	Volume header label	VOL1
-	File header label	HDR1
-	File header label	HDR2
-	End-of-file label	EOF1
-	End-of-file label	EOF2

The labels have the following contents only (deviations from ISO 1001 in some cases)

-	VOL1:		
	Places	1 to 4	VOL1
		5 to 79	Space
		80	4
-	HDR1:		
	Places	1 to 4	HDR1
		5 to 27	Space
		28 to 31	0001
		32 to 35	0001
		36 to 39	0001
		40 and 41	00
		42 to 47	A space, followed by 00000
		48 to 53	000000
		54	Space
		55 to 60	000000
		61 to 80	Space
-	HDR2:		
	Places	1 to 15	HDR2D0819200132
		16 to 50	Spaces
		51 and 52	00
		53 to 80	Spaces
-	EOF1:		
	Places	1 to 4	EOF1

	5 to 54	Same as the corresponding fields in HDR1
	55 to 60	Number of file blocks which form the file
	61 to 80	Same as the corresponding fields in HDR2
- EOF2:		
Places	1 to 4	EOF2
	5 to 80	Same as the corresponding fields in HDR2

Labels are separated from each other by gaps or by tape marks.

3.3.2.2 Tape Marks

Standard file tape mark pattern

3.3.2.3 Gaps

Interblock gaps, length: 0.6 inch

Arrangement see figure 3-1.

3.3.3 FILES

Each file consists of one or more blocks.

The tape header file consists of one block only.

Each file has labels and tape marks (*) assigned to it as follows:

```
HDR1 HDR2 * File * EOF1 EOF2 *
```

The length of the survey section file is variable, and contains a maximum of 32006 records.

The length of the tape header file is 152 bytes.

The present file is finished and a new survey section file is started

- after a tape header file
- after input of a new track No.
- after no position data have arrived at the HYDROSWEEP DS equipment via the navigation data interface for 2 minutes
- 8 hours at the latest after the beginning of the present file
- at the latest, when the present file contains 32006 records
- at midnight.

3.3.4 BLOCKS

Each block consists of a sequence of record control words and records.

Each block begins with the block number record, followed immediately by a sequence of identifier records and data records. Each record is preceded by a record control word.

Except for the gaps in the tape recording, the blocks of a file are not separated from one another by separator characters.

The block length is variable and has a maximum value of 8192 bytes.

The recording of a block is started

- after the beginning of a file
- when the present block is so full that the present record no longer fits into the present block.

3.3.5 RECORDS

Each record consists exclusively of items without any further separator characters. The contents of the records is specified in Para 3.1.2.4.

A record control word is placed in front of each record.

Variable-length records are used (within the meaning of ISO 1001).

The maximum length of a record is 128 bytes

3.3.5.1 Record control word (RCW)

The RCW consists of four characters and expresses the sum of the length of the following record and of the RCW as a four-digit decimal number (filled up with zeros (30H) on the left).

3.3.6 EXAMPLES

Example 1:

File arrangement, labels and tape marks on a magnetic tape containing "n" survey section files.

```
VOL1 HDR1 HDR2 * tape header file * EOF1 EOF2 *
HDR1 HDR2 * survey section file 1 * EOF1 EOF2 *
HDR1 HDR2 * survey section file 2 * EOF1 EOF2 *
HDR1 HDR2 * survey section file 3 * EOF1 EOF2 *
HDR1 HDR2 * survey section file 4 * EOF1 EOF2 *
. . . . .
HDR1 HDR2 * survey section file n * EOF1 EOF2 **
```

Example 2:

Data of a magnetic tape containing a survey section file in hex and ASCII notation.

In this example, the file arrangement, labels and tape marks are as follows:

```
VOL1 HDR1 HDR2 * tape header file * EOF1 EOF2 *
HDR1 HDR2 * survey section file 1 * EOF1 EOF2 **
```

Because of the space requirement in this document, from the survey section only the beginning and one measurement in survey mode and one measurement in calibration mode is shown.

```
$0000 : 56 4F 4C 31 20 20 20 20 20 20 20 20 20 20 20 : VOL1
$0010 : 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 :
$0020 : 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 :
$0030 : 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 :
$0040 : 20 20 20 20 20 20 20 20 20 20 20 20 20 20 33 :
```

```
$0000 : 48 44 52 31 20 20 20 20 20 20 20 20 20 20 20 : HDR1
```

```

$0010 : 20 20 20 20 20 20 20 20 20 20 20 30 30 30 31 30 : 00010
$0020 : 30 30 31 30 30 30 31 30 30 20 30 30 30 30 20 : 001000100 00000
$0030 : 30 30 30 30 30 20 30 30 30 30 30 20 20 20 20 : 00000 000000
$0040 : 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 :

```

```

$0000 : 48 44 52 32 44 30 38 31 39 32 30 30 31 33 32 20 : HDR2D0819200132
$0010 : 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 :
$0020 : 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 :
$0030 : 20 20 30 30 20 20 20 20 20 20 20 20 20 20 20 : 00
$0040 : 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 :

```

TAPEMARK

```

$0000 : 30 30 31 32 30 30 30 30 30 31 0D 0A 30 30 31 34 : 0012000001__0014
$0010 : 42 41 4E 44 48 45 41 44 0D 0A 30 31 32 36 41 43 : BANDHEAD__0126AC
$0020 : 54 55 41 4C 20 54 41 50 45 20 20 20 20 20 20 20 : TUAL TAPE
$0030 : 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 :
$0040 : 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 :
$0050 : 20 20 20 20 20 20 20 20 20 20 20 4C 41 53 54 20 54 : LAST T
$0060 : 41 50 45 20 20 20 20 20 20 20 20 20 20 20 20 : APE
$0070 : 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 :
$0080 : 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 :
$0090 : 20 20 20 20 20 20 0D 0A :

```

TAPEMARK

```

$0000 : 45 4F 46 31 20 20 20 20 20 20 20 20 20 20 20 : EOF1
$0010 : 20 20 20 20 20 20 20 20 20 20 20 30 30 30 31 30 : 00010
$0020 : 30 30 31 30 30 30 31 30 30 20 30 30 30 30 20 : 001000100 00000
$0030 : 30 30 30 30 30 20 30 30 30 30 30 33 20 20 20 20 : 00000 000003
$0040 : 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 :

```

```

$0000 : 45 4F 46 32 44 30 38 31 39 32 30 30 31 33 32 20 : EOF2D0819200132
$0010 : 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 :
$0020 : 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 :
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TAPEMARK

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TAPEMARK

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TAPEMARK
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3.4 PHYSICAL LAYER

Medium	Magnetic tape
Tape Width	1/2 inch (0.498 +/- 0.002 inch)
Tape Thickness	1.5 mils
Tape Tension	8 oz
Reel Diameter	10.5 inches maximum
Reel Capacity	2500 feet maximum
Beginning of Tape and End of Tape Detectors	Photo-electric
Recording Mode	9 Track 1600 CPI Phase Encoded to ANSI X3.39-197