508^{XT}

Data Format Manual

Ref. 10020524 AG

August 22, 2019

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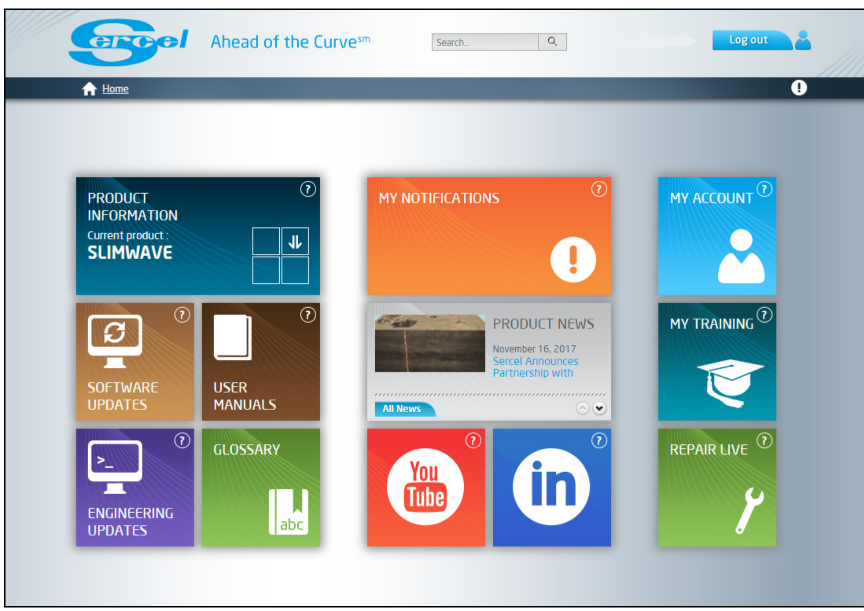

Figure 2-1 My Sercel Homepage

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Regulatory Information

CE European Union Statement

508 products meet the essential requirements of Directives RED 2014/53/UE (Radio), 2014/30/UE (EMC), 2014/35/UE (Low Voltage) and 2011/65/UE (ROHS).

WARNING

The 508 products are class-A devices. In residential areas, the user may be requested to take appropriate measures in the event of RF interference caused by these devices.

FCC US Statement

SERCEL products comply with U.S. FCC according to FCC CFR47 Part 15.

Operation is subject to the following two conditions:

(1) These devices may not cause harmful interference, and

(2) These devices must accept any interference received, including interference that may cause undesired operation

Note Sercel products has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This system generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this system in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC Canadian Statement

SERCEL products comply with Industry Canada EMI Class A requirements according to ICES-003 and RSS Gen.

Les produits SERCEL sont conformes aux exigences Classe A de l'Industrie Canada selon les normes NMB-003 et CNR Gen.

Note These devices comply with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:
(1) These devices may not cause interference; and
(2) These devices must accept any interference, including interference that may cause undesired operation of the device.

China Regulation

508 Products comply with China ROHS 2.

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Revision history

Date of revision	Rev.	Chapters or pages affected	Description of revision or reason for change
April 2015	AB		Initial Revision.
May 2017	AC	page 226	- SEG-D Output file format rev 3.0 (wireless)
Dec. 2017	AD	page 128 page 152 page 285	- SEG-D format rev 1.0 (Wireless) - SEG-D format rev 2.1 (Wireless) - Observer Report Format (Wireless)
Apr. 2018	AE		- Release 508XT V2.0
May 2019	AF	page 268 page 276 page 89	- updated bytes 21-31 in Table 10-31 - note concerning extra auxes for DCM use - Navigation message structure for 508TZ operation
Aug. 2019	AG	page 110	- Navigation software message structure

1 SPS Input File Format (Rev. 0)

2 SPS Input File Format (Rev. 2.1)

7 SEG-D Output File Format Rev 1.0 (Wireless)

8 SEG-D Output File Format Rev 2.1 (Wireless)

9 SEG-D Output File Format Rev 3.0

10 SEG-D Output File Format Rev 3.0 (Wireless)

Chapter 1

SPS Input File Format (Rev. 0)

The Processing Support format contained in this chapter is reproduced by courtesy of Shell Internationale Petroleum Maatschappij B. V., the initiator of this format. This chapter includes the following sections:

508XT System Documentation

Documentation included with the 508XT system is available on the accompanying USB key provided with your system (ref. 10040994) or on the My Sercel Extranet. If you do not have a My Sercel account please click the following link to request access.

My Sercel account request

Documentation for the 508XT system consists of the following manuals:

- **Installation Manual**: provides an introduction to the 508XT system, installation information, a few instructions for the operator to get started, and reference information that will help you select a 508XT configuration tailored to your needs.
- **Functional Manual Volume 1**: describes the parameters displayed on the 508XT system's Graphic User Interface (GUI) and how to use each window.
- **Functional Manual Volume 2 (DCM)**: describes the Data Completion Manager (DCM) application.
- **Data Format Manual**: contains information on logged data and on interfaces (description of Input/Output formats, including the SEGD format).
- **Technical Manual**: contains maintenance and repair information, including operating instructions for using the system's testers.

Introduction

The purpose of the format is to establish a common standard for the transfer of positioning and geophysical support data from land 3D field crews to seismic processing centres. In principal the format can also be used for land 2D surveys.

With the growth and increased complexity of land 3D surveys there is a need to establish a robust and standard procedure for logging, during acquisition, the positioning and geophysical spread relation data in a way that reduces errors, allows the field crews to quality control the data, and hence detect and correct errors before the data is transferred to the seismic centres.

Currently the quality control is carried out as the first stage in the processing centres. Experience has shown that most errors are only detected when the geophysical and coordinate information are integrated, and that often spread relation errors cannot be corrected, leading to the deletion of otherwise good quality records.

Providing the processing centres with checked disk(s) in a standard format, containing all relevant field data will significantly reduce the time spent by the processing centres on initial quality control and increase the quality of the end product.

Field system

The field crews must have an acquisition management system to generate the SPS format during the survey. Errors will be reduced both during recording and during the generation of the SPS format if automated procedures are introduced at survey set-up and during daily recording. Figure 1-1 shows the main elements of such a system. The Field Database, Topographical computations and 3D recording management are the minimum elements required to support the generation of the SPS format.

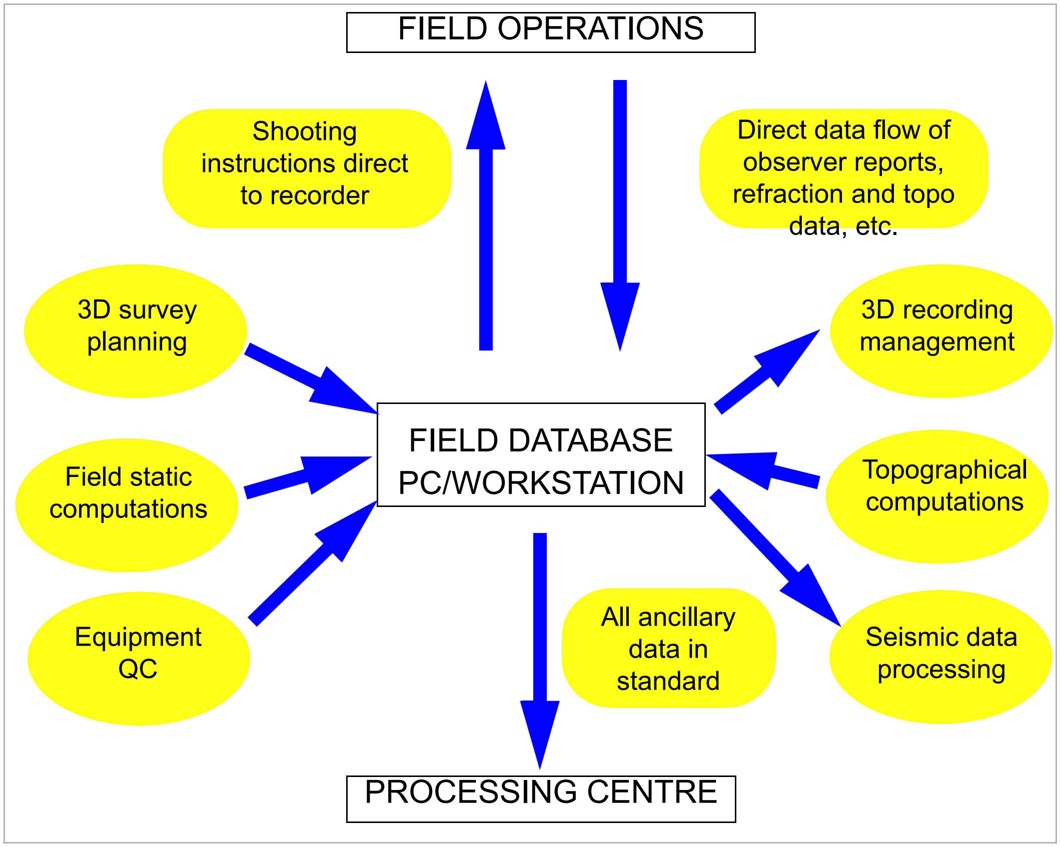

Figure 1-1 Field Acquisition Management System

A direct link to and from seismic recording instrument is strongly recommended.

Figure 1-2 shows the preferred method of data exchange between the system and the seismic recording instrument.

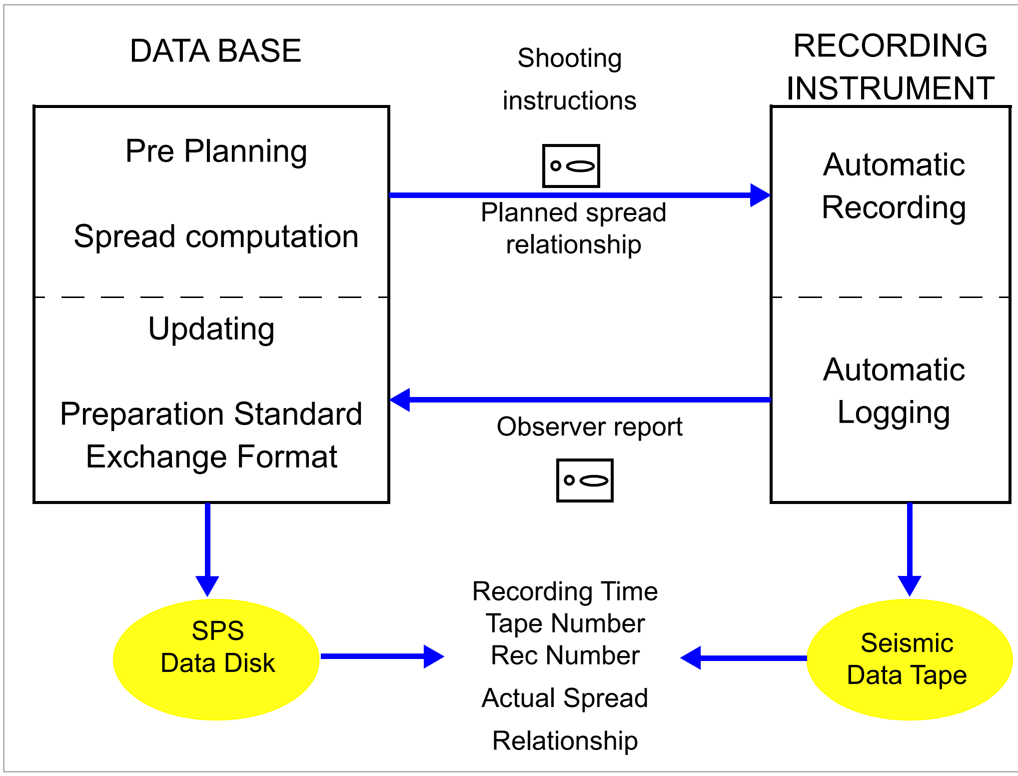

Figure 1-2 Automatic Recording

The key information required to relate the seismic records and the corresponding positioning and geophysical support data is written in the seismic headers and in SPS.

SHELL processing support format for land 3D surveys

General

Coordinates and elevations of geophysical lines may be determined by interpolation between observed break points in the line. The point files contain coordinates and elevations of all geophysical points (observed and interpolated) and of all permanent markers. The shotpoint and relational files are to be sorted chronologically, and the receiver file is to be sorted in ascending sequence of line, point and point index numbers.

In order to avoid ambiguities each physical position in the field (shotpoint or receiver group) must have a unique name.

Data record specification

The data set consists of three files with a block of header records. For magnetic tapes each file is terminated by a record containing "EOF" in col. 1-3.

First file	**Receiver File**: "Point Records" with details of receiver groups or permanent markers.
Second File	**Source File**: "Point Records" with details of shotpoints (power source).
Third File	**Cross-Reference File**: "Relation Record" specifying for each shotpoint its record number and the relation between recording channel numbers and receiver groups.

Data record sorting order

File	Records	Sort fields and sorting order
Receiver	‘R’	Line name, Point number, Point index.
Source	‘S’	Julian day and Time of recording shotpoint.
Cross-Reference	‘X’	Sorted in the same order as the Source File.

Format for land survey data on 9-track tape

Tape specifications and tape layout

Half-inch magnetic tape	:	IBM compatible, non-label.
Number of tracks	:	9.
Number of bytes per inch	:	6250 (1600 is a permissible alternative).
Mode	:	EBCDIC coded.
Record length	:	80 bytes.
Block size	:	1600 bytes (20 logical records). Physically separated by inter-record gap.

An “EOF” statement followed by an IBM tape mark shall be written after the end of a file and a tape shall be closed by two IBM tape marks.

In general, a tape may contain one or more files depending on the type of survey. Each file shall start with a number of ‘Header Records’ followed by ‘Data Records’ and closed by an EOF statement and an IBM tape mark.

Format for land survey data on floppy disc

Disc specifications and layout

Format: MS DOS compatible ASCII files.

Record length: 80 bytes, followed by carriage return (col 81) and line feed (col 82).

3.5” or 5.25” formatted disc (any size: 360/720 K byte or 1.4/1.2 Mbyte). File name to relate to the project, date and sequence. To denote file type extension name must be prefixed with:

‘S’	for shotpoint records	e. g.	PRJX90.S01
‘R’	for receiver records	e. g.	PRJX90.R01
‘X’	for relational records	e. g.	PRJX90.X01

In general, a disc may contain one or more files depending on the type of survey. Each file shall start with a number of ‘Header Records’ followed by ‘Data Records’.

Header record specification

Each file shall start with a number of header records which contain information about, and parameters controlling, all the data records which follow.

The general format for a header record shall be:

		Cols	Formats
a.	Record identifier “H”	1	A1
b.	Header record type	2-3	I2
c.	Header record type modifier	4	I1
d.	Parameter description	5-32	7A4
e.	Parameter data	33-80	See below

Header record type H0 to H20 are mandatory for all surveys even if a “N/A” entry is required (”N/A” is not allowed for H18). Header records of types H21 to H25 are mandatory as far as they are applicable to the projection used.

Requirements for projection definition include the following header records:

Transverse Mercator	:	H220, H231, H232, H241, H242
UTM	:	H19, H220.
Stereographic	:	H231, H232, H241, H242.
Oblique Mercator	:	H231, H232, H241, H242, H259 and H256 or H257 or H258.
Lambert Conical	:	H210, H220, H231, H232, H241, H242.

Header record type H26 is a free format statement for any other relevant information.

Formats of parameter data fields for each of the header record types shall be:

Type	Parameter description Pos: 5-32	Parameter	
		Pos.	Format
H00	SPS format version num.	33-80	12A4
H01	Description of survey area	33-80	12A4
H02	Date of survey	33-80	12A4
H021	Post-plot date of issue	33-80	12A4
H022	Tape/disk identifier	33-80	12A4
H03	Client	33-80	12A4
H04	Geophysical contractor	33-80	12A4
H05	Positioning contractor	33-80	12A4
H06	Pos. proc. contractor	33-80	12A4
H07	Field computer system(s)	33-80	12A4
H08	Coordinate location	33-80	12A4
H09	Offset to coord. location	33-80	12A4
H10	Clock time w.r.t. GMT	33-80	12A4
H11	Spare	33-80	12A4
H12	Geodetic datum,-spheroid	33-80	3A4, 3A4,F12.3,F12.7
H13	Spare	33-80	12A4
H14	Geodetic datum parameters	33-80	3(F8.3),4F(6.3)
H15	Spare	33-80	12A4
H16	Spare	33-80	12A4
H17	Vertical datum description	33-80	12A4
H18	Projection type	33-80	12A4
H19	Projection zone	33-80	12A4
H20	Description of grid units	33-56	6A4
H201	Factor to metre	33-46	F14.8
H210	Lat. of standard parallel(s)	33-56	2(I3,I2,F6.3, A1)

Type	Parameter description Pos: 5-32	Parameter	
		Pos	Format
H220 H231 H232 H241 H242 H256 H257 H258 H259	Long. of central meridian Grid origin Grid coord. at origin Scale factor Lat., Long. scale factor Lat. long. initial line Circular bearing of H256 Quadrant bearing of H256 Angle from skew	33-44 33-56 33-56 33-44 33-56 33-56 33-44 33-44 33-44	v 2(I3,I2,F6.3, A1) 2(F11.2,A1) F12.10 2(F11.2, A1) 4(I3, I2,F6.3, A1) I3, I2, F7.4 A1, 2I2,F6.3, A1 I3, I2,F7.4
H26	Any other relevant information This record can be repeated as required.	5-80	19A4
H30 H31	Project code and description Line number format	33-78 33-80	3A2,10A4 12A4

Instrument code (I) tables

Header Records:	H400-H419: code 1, H420-H439: code 2... H560-H579: code 9

Instrument code must be entered in col 33-34, for example: ‘1,’ ‘2,’... ‘9,’

Type	Parameter description Pos: 5-32	Parameter	
		Pos	Format
H400	Type, Model, Polarity	33-80	12A4
H401	Crew name, Comment	33-80	12A4
H402	Sample int. Record Len.	33-80	12A4
H403	Number of channels	33-80	12A4
H404	Tape type, format, density	33-80	12A4
H405	Filter_alias Hz, dB pnt, slope	33-80	12A4
H406	Filter_notch Hz, -3 dB points	33-80	12A4
H407	Filter_low Hz, dB pnt, slope	33-80	12A4
H408	Time delay FTB-SOD app Y/N	33-80	12A4
H409	Multi component recording	33-80	12A4
H410	Aux. channel 1 contents	33-80	12A4
H411	Aux. channel 2 contents	33-80	12A4
H412	Aux. channel 3 contents	33-80	12A4
H413	Aux. channel 4 contents	33-80	12A4
H414	Spare	33-80	12A4
...	...	...	...
H419	Spare	33-80	12A4

Receiver code (Rx) tables

Header Records: H600-H609: code 1,
H610-H619: code 2...
H690-H699: code 10

Receiver code must be entered in cols 33-34. Example of possible codes:

G1..to.G9 for geophones H1..to.H9 for hydrophones

R1..to.R9 for multi comp. and other types

PM = Permanent marker KL = Kill or omit receiver station

Type	Parameter description Pos: 5-32	Parameter	
		Pos	Format
H600	Type, model, polarity	33-80	12A4
H601	Damp coeff, natural freq.	33-80	12A4
H602	Nunits, len(X), width(Y)	33-80	12A4
H603	Units spacing X, Y	33-80	12A4
H604	Spare	33-80	12A4
...	...	...	...
H609	Spare	33-80	12A4

For ‘PM’ and ‘KL’ use H26 records (free format description)

Source code (Sx) tables

Header Records: H700-H719: code 1,
H720-H739: code 2...
H880-H899: code 10

Source code must be entered in cols 33-34. Example of possible codes:

V1..to.V9 for vibroseis E1..to.E9 for explosive

A1..to.A9 for air gun W1..to.W9 for water gun

S1..to.S9 for other types KL = Kill or omit shotpoint

Type	Parameter description Pos: 5-32	Parameter	
		Pos	Format
H700	Type, model, polarity	33-80	12A4
H701	Size, vert. stk fold	33-80	12A4
H702	Nunits, len(X), width(Y)	33-80	12A4
H703	Units spacing X, Y	33-80	12A4

Following records are only required if **source type = Vibroseis V1..V9**

Type	Parameter description Pos: 5-32	Parameter	
		Pos	Format
H704	Control type	33-80	12A4
H705	Correlator, noise supp	33-80	12A4
H706	Sweep type, length	33-80	12A4
H707	Sweep freq start, end	33-80	12A4
H708	Taper, length start, end	33-80	12A4
H709	Spare	33-80	12A4
H710	Spare	33-80	12A4

Following records are only required if **source type = Explosive E1..E9**

Type	Parameter description Pos: 5-32	Parameter	
		Pos	Format
H711	Nom. shot depth, charge len.	33-80	12A4
H712	Nom. soil, drill method	33-80	12A4
H713	Weathering thickness	33-80	12A4
H714	Spare	33-80	12A4
H715	Spare	33-80	12A4

Following records are only required if

source type = air gun A1..A9

or = water gun W1..W9

Type	Parameter description Pos: 5-32	Parameter	
		Pos	Format
H716	P-P bar/m, prim/bubble	33-80	12A4
H717	Air pressure psi	33-80	12A4
H718	No. sub arrays, Nom depth	33-80	12A4
H719	Spare	33-80	12A4

Quality Control check records

Type	Parameter description Pos: 5-32	Parameter	
		Pos	Format
H990	R,S,X file quality control	33-60	2A4,I4,4A4
H991	Coord. status final/prov	33-68	4A4,I4,4A4

Point record specification

This record type contains details at the position of the shotpoint at the time of recording or at the position of a receiver at the time of first shotpoint recorded into the receiver.

Item	Definition of field	Cols	formats	Min.to Max.	Default	Units
1	Record identification	1-1	A1	“R” or “S”	None	-
2	Line name (left adj)	2-17	4A4	Free	None	-
3	Point number (right adj)	18-25	2A4	Free	None	-
4	Point index	26-26	I1	1-9	1	-
5	Point code*	27-28	A2	see below	None	-
6	Static correction	29-32	I4	-999 - 999	Blank	Msec
7	Point Depth	33-36	F4.1	0 - 99.9	None	Metre
8	Seismic datum	37-40	I4	-999 - 9999	None	Metre
9	Uphole time	41-42	I2	0 - 99	Blank	Msec
10	Water depth	43-46	F4.1 #	0 to 99.9/999	Blank	Metre
11	Map grid easting	47-55	F9.1		None	-
12	Map grid northing	56-65	F10.1		None	-
13	Surface Elevation	66-71	F6.1	-999.9 - 9999.9	None	Metre
14	Day of year	72-74	I3	1-999	None	-
15	Time hhmmss	75-80	3I2	000000-235959	None	-

Water depth should be read in as F5.1 to allow for 4 character decimal and integer values.

* Example Point codes:

0 to 9 - SERCEL Process Type.
“PM” - permanent marker, “KL” - kill or omit point

"G1" .."G9" "H1".."H9", "R1",.."R9" - receiver codes
"V1".."V9" "E1".."E9", "A1".."A9", "W1".."W9",
"S1".."S9".- source codes

Relation record specification

This record type is used to define the relation between the field record number and shotpoint and between recording channels and receiver groups. For each shotpoint there is at least one "Relation Record". Each of these records specifies a section of consecutively numbered channels and receiver groups. After a numbering gap or a change in line name or repositioning for the receiver groups a new "Relation Record" has to be given. Channel numbers should be in ascending order.

Fields 6, 7 and 8 must be identical to fields 2, 3 and 4 of the corresponding shotpoint record. While the receiver line and point numbers in fields 13, 14 and 15 must be the same as used in the receiver point records.

Item	Definition of field	Cols	formats	Min. to Max.	Default	Units
1	**Record identification**	1-1	A1	"X"	None	-
2	Field tape number (l adj)	2-7	3A2	Free	None	-
3	Field record number	8-11	I4	0-9999	None	-
4	Field record increment	12-12	I1	1-9	1	-
5	Instrument code	13-13	A1	1-9	1	-
6	Line name (left adj)	14-29	4A4	no default	None	-
7	Point number (right adj)	30-37	2A4	no default	None	-
8	Point index	38-38	I1	1-9	1	-
9	From channel	39-42	I4	1-9999	None	-
10	To channel	43-46	I4	1-9999	None	-
11	Channel increment	47-47	I1	1-9	1	-

Item	Definition of field	Cols	formats	Min. to Max.	Default	Units
12	Line name (left adj)	48-63	4A4	no default	None	-
13	From receiver (right adj)	64-71	2A4	no default	None	-
14	To receiver (right adj)	72-79	2A4	no default	None	-
15	Receiver index	80-80	I1	1-9	1	-

Note Alphanumeric (A) fields are to be left justified and Numeric (I and F) fields are to be right justified unless specified otherwise.

Note See Sercel SPS format with over 10000 traces (page 56).

Header record description

In **bold type** face are the parameter descriptions to be entered, left justified, into position 5-32.

In *italics* are examples of parameters to be entered, left justified, into position 33-80. Positions 33 and 34 must always contain the instrument or receiver or source code.

To enable parsing of free format (12A4) parameter fields the following rule should be used "The parameters entered into positions 33-80 must be separated by a comma and the parameter string must be terminated by a semi colon. Parameter text cannot contain commas ',' or semi colons ';'.

Note All units of distance are in metres except the grid coordinates whose units are defined by H20 and can be converted to metres using the conversion factor defined by H201.

H00 **SPS format version num**: The format version number and date of issue.
Example: SPS001,01.10.90;

H01 **Description of survey area**: The name of the country, survey area, survey type (land: L2D/L3D or Transition zone; TZ2D/TZ3D) and project number.
Example: The Netherlands,Dordrecht,L3D,0090GA;

H02 **Date of survey**: The date of recording first shotpoint of survey and the last date of survey on this file.
Example: 21.05.1990,28.05.1990;

H021 **Post-plot date of issue**: The date when this tape or disc was issued and confirmed checked.
Example: 30.05.90;

H022 **Tape/disk identifier**:
Example: 0090GA0;

H03 **Client**: The client's company name.
Example: NAM;

H04 **Geophysical contractor**: The company name of the main seismic contractor, and the seismic party name.
Example: Prakla Seismos,SON 1;

H05 **Positioning contractor**: The company name of contractor or sub-contractor responsible for the positioning survey/control in the field.
Example: Prakla Seismos,

H06 **Pos. proc. contractor**: The company name of contractor or sub-contractor responsible for the post processing of the positioning data.
Example: Prakla Seismos,SON 1;

H07 **Field computer system(s)**: The acquisition management system name, name of seismic recording instrument, and the method of direct transfer to/from the seismic recording instrument (if no direct transfer enter "***manual entry***").
Examples: CDB,SN368/FLUKE,FDOS discs; or None,SN368, manual entry;

H08 **Coordinate location**: The description of what the coordinates refer to.
Example: centre of source pattern and centre of receiver pattern;

H09 **Offset to coord. location**: The offset from a vessel or vehicle reference position to coordinate location as defined in H08, including method of angular offset used.
Example: 170M,180DEG from vessel gyro heading;

H10 **Clock time w.r.t. GMT**: The number of hours that the local (clock) time is behind or ahead of GMT
Example: +2;or -6; or 0;

H11 **Spare**

H12 **Geodetic datum,-spheroid**: Datum name, spheroid name, semi major axis (a), inverse flattening (1/f) as used for survey.
Example: RD datum Bessel 1841 6377397.155 299.15281

H13 Spare

H14 **Geodetic datum parameters**: Datum transformation parameters to WGS72 (dx,dy,dz,rx,ry,rz,ds) as used for survey.
Example: 595.000 11.300 478.900 0.000 0.000 0.000 0.000

The datum transformation parameters are defined by the following model:

x		dx		1	-rz	+ry		x	
y	=	dy	+ |scale | *	+rz	1	-rx	*	y	
z	(2)	dz		-ry	+rx	1		z	(1)

where: x,y,z are the geocentric cartesian coordinates in metres, dx, dy, dz are translation parameters in metres, rx, ry, rz are clockwise rotation defined in arcsecs, but converted to radians for use in the formula. Scale is [1+ds(10E-6)], where ds is in parts per million.

For this example (1) is RD datum, (2) is WGS72 datum.

H15 Spare

H16 Spare

H17 **Vertical datum description**: Name, type (i.e. equipotential, LAT or spheroidal), origin (name or lat,long) and undulation of vertical datum with respect to WGS72.
Example: NAP, Equipotential, Amsterdam, 0; or MSL-Syria,Equipotential, 34 degr N, 38 degr E, 23.6 m;

H18 **Projection type**: Type of map projection used
Example: Transverse Mercator;

H19 **Projection zone**: Zone and hemisphere for UTM projections.
Example: Zone 30, North;

H20 **Description of grid units**: Unit of coordinates.
Example: Metres; or International Feet; or Indian Feet; or American Feet;

H201 **Factor to metre**: The multiplication factor to convert grid units to metres. For American Feet the factor is:
Example: 030480061

H210 **Lat. of standard parallel(s)**: Latitude and longitude of standard parallel(s) as required for projection as per H18, in dddmmss.sss N/S. For 2 standard parallels of 5 degr N and 10 degr N:
Example: 0050000.0000100000.000N

H220 **Long. of central meridian**: Longitude of central meridian as required for projection as per H18 above, in dddmmss.sss E/W. For 15 degr 30 minE:
Example: 0153000.000E

H231 **Grid origin**: Latitude and longitude of the grid origin in dddmmss.sss N/S dddmmss.sss E/W. For 5 degr N and 15 deg 10 min and 25 secE:
Example: 0050000.000N0151025.000E

H232 **Grid coord. at origin**: Grid coordinates (Eastings and Northings) at the origin of the projection system. For false Easting of 500000 and false Northing of 0:
Example: 50000000.0E 0.00N

H241 **Scale factor**: Scale factor for defined projection.
Example: 0.9996000000

H242 **Lat.,Long. scale factor**: Latitude and longitude at which the scale factor (H241) is defined.
Example: 0050000.000N 151025.000E

H256 **Lat. Long. initial line**: The two points defining the initial line of projection, as latl, longl, lat2, long2. For 5, degr N, 20 degr E, 10 degr N, 30 degr E.
Example: 0050000.000N0200000.000E0100000.000N0300000.000E

H257 **Circular bearing of H256**: This is the true bearing to the east in the origin of the initial line of projection in dddmmss.ssss (max of 360 degrees).
Example: 1200000.0000

H258 **Quadrant bearing of H256**: Quadrant bearing of the initial line of projection in N/S ddmmss.sss E/W.
Example: S300000.000E

H259 **Angle from skew**: The angle between the skew and the rectified (North oriented) grid, in dddmmsss.sss.
Example: 0883000.0000

H26 **Free format in positions 5-80**: Any other information can be included using header records of this type.

H30 **Project code and description**: A six character code, the survey area name and survey type (see H01).
Example: 0090GA,Dordrecht,L3D;

H31 **Line number format**: Specifies the internal format of the line number field in the data records. The specification shall be:
NAME1(POS1:LEN1),NAME2(POS2:LEN2),NAME3(POS3:LEN3);
Where NAMEn is the name of the sub-identifier, POSn is the first character position within the line number field and LENn is the length of the sub field.
Example: BLOCK(1:4),STRIP(5:4),LINE NUMBER(9:8);
If no sub division of the field is required then enter 'LINE NUMBER(1:16);'

Seismic instrument header records

The user must define the set of code definitions for surveys, areas and vintages. Header record types H400-H419 are to be used to define tables for the first instrument code, and H420-H439 for the second up to H560-H579 for the ninth code. A new table must be defined, with a different code, for each instrument used or if any parameter in the table is changed.

The instrument code must always be in cols. 33-34, for example '1,' to '9,'

H400 **Type,Model,Polarity**: The type and model name of seismic recording instrument, the unique model number of the instrument and the polarity defined as SEG or NON SEG. The definition of SEG is "A **compression** shall be recorded as a **negative** number on tape and displayed as a **downward** deflection on monitor records".
Example: 1,SN368+LXU,12345,SEG;

H401 **Crew name,Comment**: The name of the crew and any other comments.
Example: 1,Prakla SON 1;

H402 **Sample int.,Record Length**: The recording sample rate and the record length on tape.
Example: 1,2MSEC,6SEC;

H403 **Number of channels**: The number of channels per record.
Example: 1,480;

H404 **Tape type, format, density**: The type of tape (9 track or cartridge), recording format of the data on tape and the recording density.
Example: 1,9 track,SEGD,6250;

H405 **Filter_alias Hz,dB pnt,slope**: The anti-alias or high-cut filter setting of the recording instrument or field boxes specified in hertz, the dB level at the frequency value and the filter slope in dB per octave.
Example: 177HZ,-6DB,72 DB/OCT;

H406 **Filter_notch Hz,-3db points**: The centre frequency of the filter setting of the recording instrument or field boxes specified in hertz and the frequency values at the -3dB points.
Example: 1,NONE;or 1,50,45,55;

H407 **Filter_low Hz,dB pnt,slope**: The low-cut filter setting of the recording instrument or field boxes specified in hertz, the dB level at the frequency value and the filter slope in dB per octave.
Examples: 1,NONE;or 1,8HZ,-3DB,18 DB/OCT;

H408 **Time delay,FTB-SOD app Y/N**: The value of any time delay and if the delay between field time break and start of data has been applied to the seismic data recorded on tape.
Example: 1,0 Msec,not applied;

H409 **Multi component recording**: Describes the components being recorded and their recording order on consecutive channels, allowed values are 'X','Y','Z'.
Examples: 1,Z; or 1,Z,X,Y;

H410 **Aux. channel 1 contents**: Describes the contents of an auxiliary channel.
Examples: 1,FTB; or 1,NONE;

H411 **Aux. channel 2 contents**

H412 **Aux. channel 3 contents**

H413 **Aux. channel 4 contents**

H414 **Spare**

to

H419 **Spare**

Seismic receiver header records

The user must define the set of code definitions for surveys, areas and vintages. Header record types H600-H609 are to be used to define tables for the first receiver code, and H610-H619 for the second up to H690-699 for the tenth code. A new table must be defined, with a different code, for each receiver type used or if any parameter in the tables is changed.

The receiver code must always be in cols. 33-34. Example of possible codes:

G1..to.G9 for geophones H1.. to.H9 for hydrophones

R1..to.R9 for multi comp. and other types

PM = Permanent marker KL = Kill or omit receiver station

H600 **Type,model,polarity**: The type (land geophone, marsh geophone, hydrophone), model name of seismic detector and the polarity defined as SEG or NON SEG. The definition of SEG is "A **compression** shall be recorded as a **negative** number on tape and displayed as a **downward** deflection on monitor records".
Example: G1,SM-4,1234,SEG;

H601 **Damping coeff,natural freq**
Example: G1,0.68,10Hz;

H602 **Nunits,len(X),width(Y)**: The number of elements in the receiver group, the inline and the cross-line dimension of the receiver group pattern.
Example: G1,12,25M,6M;

H603 **Units spacing X,Y**: The distance between each element of the receiver group, inline (X), and cross-line (Y).
Example: G1,4M,6M;

H604 **Spare**

to

H609 **Spare**

Seismic source header records

The user must define the set of code definitions for surveys, areas and vintages. Header record types H700-H719 are to be used to define tables for the first source code, and H720-H739 for the second up to H880-899 for the tenth code. A new table must be defined, with a different code, for each source type used if any parameter in the table is changed.

The source code must always be in cols. 33-34. Example of possible codes:

V1..to.V9 for vibroseis E1.. to.E9 for explosive

A1..to.A9 for air gun W1..to.W9 for water gun

S1..to.S9 for other types

KL = Kill or omit receiver shotpoint

H700 **Type,model,polarity**: Source type (explosive, air gun etc.), make or model and the polarity defined as SEG or NON SEG. The definition of SEG is “A **compression** shall be recorded as a **negative** number on tape and displayed as a **downward** deflection on monitor records”.
Examples: E1,EXPLOSIVE, SEISMOGEL 125 gram,SEG; or V1,VIBROSEIS,MERTZ 22,SEG EQU;

H701 **Size,vert. stk fold**: The total charge size, force or air volume of the source pattern, the vertical fold of stack or number of sweeps per VP.
Examples: E1,1000 gram,1; or V1,93 kN,1 SWEEP/VP;

H702 **Nunits,len(X),width(Y)**: The number of elements in the source pattern, the inline and the cross-line dimension of the source pattern.
Examples: E1,6,25M,0M; or V1,4 VIBS,25M,45M;

H703 **Units spacing X,Y**: The distance between each element of the source pattern, inline (X), and cross-line (Y).
Examples: E1,5M,0; or V1,8M,15M;

Following records are only required if source **type= Vibroseis V1..V9**

H704 **Control type**: The type of control used.
Example: V1,GND FORCE PHASE&AMPL LOCK;

H705 **Correlator,noise supp**: The type correlator/stacker, and the type of noise suppression applied before summing.
Example: V1,SERCELCS-2502,NO NOISE SUPP;

H706 **Sweep type,length**: The type and length of the sweep.
Example: V1,LINEAR,30 SECONDS;

H707 **Sweep frequency start,end**: The start and end frequency of the sweep.
Example: V1,5HZ,60HZ;

H708 **Taper,length start,end**: The type of taper and the taper length (start and end).
Example: V1,COSINE,500MSEC,500MSEC;

H709 **Spare**

H710 **Spare**

Following records are only required if source **type= Explosive E1..E9**

H711 **Nom. shot depth,charge len.**: The nominal shot depth, and the length of the charge.
Example: E1,15M,1M;

H712 **Nom.soil, drill method**: The nominal type of soil or near surface medium, and the method of drilling (flushing, hand auger, portable drill unit etc.).
Example: E1,CLAY,PORTABLE UNITS;

H713 **Weathering thickness**: The nominal depth to the base of weathered layer.
Example: V1,8-12M;

H714 **Spare**

H715 **Spare**

Following records are only required if source

type=air gun A1..A9

water gun W1..W9

H716 **P-P bar/m,prim/bubble**: The Peak-peak output in bar metres, and the primary to bubble ratio measured through a 0-125 Hz filter at a depth of 6 metres.
Example: A1,50,13:1;

H717 **Air pressure psi**: The nominal operating air pressure.
Example: A1,2000PSI;

H718 **No. sub arrays,nom depth**: The number of sub arrays and the nominal towing depth.
Example: A1,3,5.5M;

H719 **Spare**

Quality Control check records

H990 **R,S,X file quality control**: The date and time of the Q.C. check, and the name of the person who performed the quality control of the file.
Example: 01JUN90,0930,Mr J Smith;

H991 **Coord. status final/prov**: The status of the coordinates contained in the R and S files (final or provisional), the date and time of the status, the name of the surveyor responsible for the coordinate integrity.
Example: Final01jun90,930,Mr J.Jansen;

Point record description

2 **Line name**: Identifier for the shotpoint or receiver line. It can be composed of a block or strip number and a line number. The internal format of this field must be defined in the header.
Example: 89NM0122001

3 **Point number**: Identifier for the shotpoint or receiver group number defined as the centre of the source or receiver array as staked out in the field. The value should be read as a numeric and be right justified.

4 **Point index**: Identifier for the shotpoint or receiver index.

Shotpoint:To be 1 for original shot within the grid cell denoted by fields 2 and 3, and be incremented by 1 for each subsequent shot within the same grid cell. Exceptions: shots to be vertically stacked (unsummed vibroseis).

Receiver:To be 1 for the original positioning of a receiver group, and be incremented by 1 every time the receiver group is moved or repositioned, even when put back to any previous position.

5 **Point code**: A shotpoint or receiver code which is defined in the header by a table that describes the characteristics of the source or receiver group used at the point.

6 **Static correction**: The shotpoint or receiver static correction defined as a static time shift in Msec. that has been computed in the field to correct any seismic recording for the effects of elevation, weathering thickness, or weathering velocity at the point. The correction should be with reference to the seismic datum as defined by field 8 of this record. If no static was computed leave 'blank'.

7 **Point Depth**: The depth of the shotpoint source or receiver group. Defined in metres with respect to the surface down to the top of the charge or vertical receiver array. When the surface elevation can vary with time (e. g. a tidal water surface), then for shotpoints the value should be at the time of recording, and for receivers at the time of recording of the first shotpoint into that receiver. (See figures 3 and 4).

8 **Seismic datum**: Defined in metres as an offset to the datum defined in header record H17. It is +ve when above datum,-ve when below datum or zero when at datum. If the seismic datum is equal to H17, enter zero. (See figures 3 and 4).

9 **Uphole time**: Defined for a shotpoint as the vertical travel time to surface, recorded in msec and is always positive or zero. If no uphole was recorded leave 'blank'. Not defined for receiver leave 'blank', unless a reverse uphole is taken then the shotpoint definition applies.

10 **Water depth**: The measured (or reliably determined) height of water surface above the sea bed or water bottom. In case the water depth varies in time by more than one metre (e. g. tidal areas) then for shotpoints the value should be at the time of recording and for receivers at the time of recording of the first shotpoint into that receiver. The water depth value is always positive. (See figures 3 and 4).

11 **Map grid easting**: The easting for the point, in the coordinate system defined by header record H13.

12 **Map grid northing**: The northing for the point, in the coordinate system defined by header record H13. To accommodate large TM northing values for surveys straddling the equator, this field format has one more digit than UKOOA P1/84.

13 **Surface elevation**: The topographical surface with respect to the vertical datum defined by header record H17. The surface elevation is +ve when above datum, -ve when below datum or zero when at datum. When the surface elevation with respect to the datum can vary with time (e. g. a tidal water surface), then for shotpoints the value should be at the time of recording, and for receivers at the time of recording of the first shotpoint into that receiver. (See Figure 1-3 and Figure 1-4).

14 **Day of year**: The julian day. For shotpoints the value should be the day of recording, and for receivers the day of recording of the first shotpoint into that receiver. When the survey continues into the next year, the day should keep increasing and not be reset to zero (1st January would then be 366 or367).

15 **Time hhmmss**: The time taken from the clock of the master seismic recording instrument. For shotpoints the value should be the time of recording, and for receivers the time of recording of the first shotpoint into that receiver.

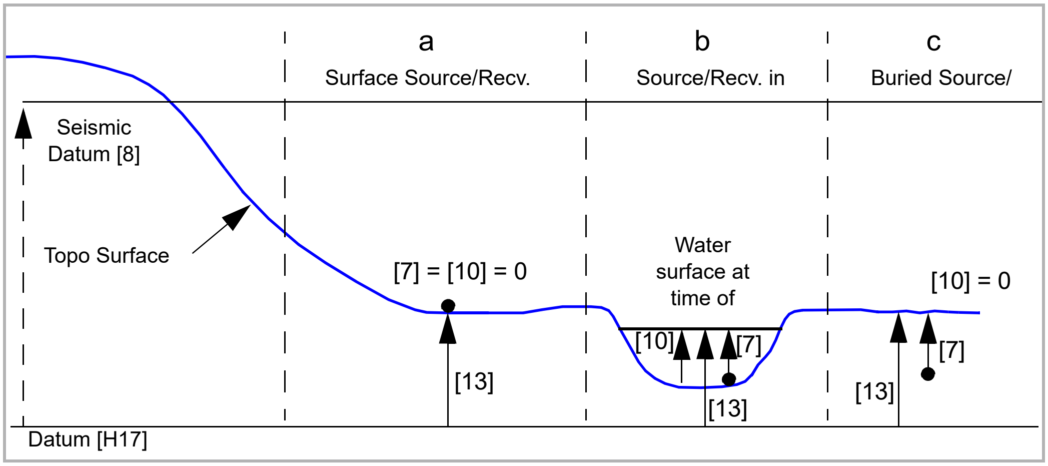

Figure 1-3 Land areas

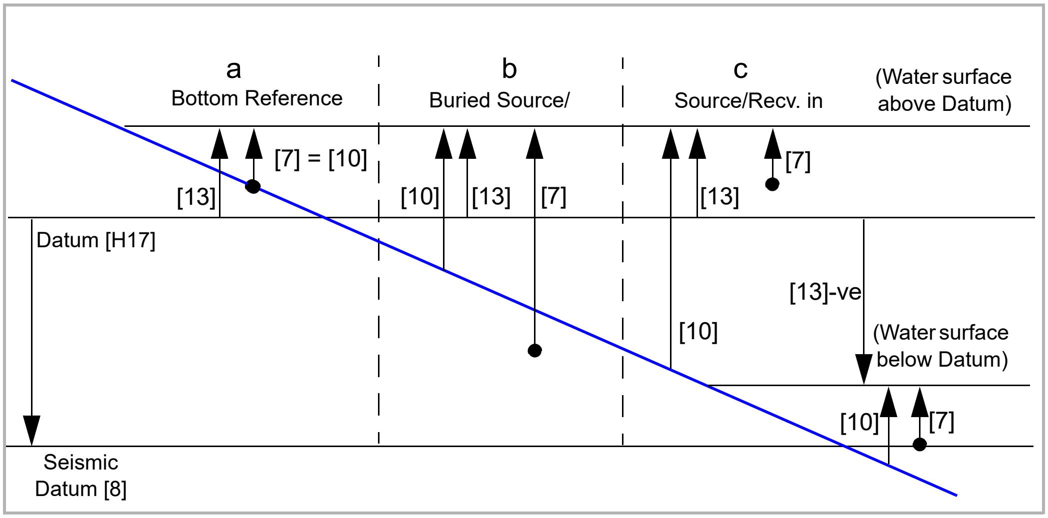

Figure 1-4 Tidal waters

[7]	= Point Depth
[10]	= Water Depth at time of recording
[13]	= Surface Elevation w.r.t. Datum [H17]
[x]	= Item number in Point Record

Relation record description

2 **Field tape number**: The identifier of the data carrier (tape) on which the seismic recording of the spread defined by this record is written. To accommodate alphanumeric tape numbers this field is defined as 3A2 and is left-justified in the field.

3 **Field record number**: The number of the seismic recording given by the field instrument used to record the spread defined by this record.

4 **Field record increment**: The increment for the field record numbers, defined to allow several consecutive records which recorded the same shotpoint and spread to be defined by one 'X' record' (eg. unsummed vibroseis records).

5 **Instrument code**: Defined in the header by a table that describes the type, and settings of the instrument used to record the spread defined by this record. See also Sercel SPS format with over 10000 traces (page 56).

6 **Line name**: Identifier for the shotpoint line. Must be identical to field 2 of the corresponding shotpoint record.

7 **Point number**: Identifier for the shotpoint number. Must be identical to field 3 of the corresponding shotpoint record.

8 **Point index**: Identifier for the shotpoint index. Must be identical to field 4 of the corresponding shotpoint record.

9 **From channel**: The seismic channel number as recorded in the seismic trace header corresponding to the data from the receiver group number defined by fields 12 and 13 of this record.

10 **To channel**: The seismic channel number as recorded in the seismic trace header corresponding to the data from the receiver group number defined by fields 12 and 14 of this record.

11 **Channel increment**: This field can be used for multi-component receivers when the three components (Z, X and Y) for one receiver point are recorded on three consecutive seismic channels. Then one 'X' record can define three components using a channel increment of 3. The components and their order are defined by the instrument code.

12 **Line name**: Identifier for the **receiver line** for the range of receivers defined by fields 13 and 14 of this record. The identifier must be identical to field 2 of the receiver point records that correspond to the same receiver line.

13 **From receiver**: Identifier for the **receiver group** number that corresponds to the From channel number defined in field 9. The identifier must be identical to field 3 of the receiver point record that corresponds to the same receiver group.

14 **To receiver**: Identifier for the **receiver group** number that corresponds to the To channel number defined in field 10. The identifier must be identical to field 3 of the receiver point record that corresponds to the same receiver group.

15 **Receiver index**: The receiver index value for the range of receivers defined by fields 12, 13 and 14 of this record. The combination of fields 12, 13, 15 and 12, 14, 15 must correspond to the same range of receivers as defined by records in the receiver point file.

Examples of SPS files

R file

```
H00 SPS format version num.        SPS001,08OCT1990 (SHELL EP 90-2935);
H01 Description of survey area     AREA X, XXX;
H02 Date of survey                 start : xx.xx.xx - end : xx.xx.xx;
H021Post-plot date of issue        xx/ x/xx;
H022Tape/disk identifier           AREAC.SPS;
H03 Client                         XXXXXX;
H04 Geophysical contractor         CONTRACTOR A;
H05 Positioning contractor         CONTRACTOR A;
H06 Pos. proc. contractor          CONTRACTOR A;
H07 Field computer system(s)       XXXXX, Manual entry;
H08 Coordinate location            Center of source and of receiver pattern;
H09 Offset from coord. location
H10 Clock time w.r.t GMT
H11 Spare
H12 Geodetic datum,-spheroid       Unknown      CLARKE 1880 6378249.145 293.4649960
H13 Spare
H14 Geodetic datum parameters
H15 Spare
H16 Spare
H17 Vertical datum description     MSL - mean sea level ;
H18 Projection type                UTM;
H19 Projection zone
H20 Description of grid units      METRES
H201Factor to meters                   1.00000000
H210Lat. of standard parallel(s)
H220Long. of central meridian       570000.000E
H231Grid origin                          0.000N 570000.000E
H232Grid coord. at origin            500000.00E       0.00N
H241Scale factor                   0.9995999932
H242Lat., long. scale factor             0.000N 570000.000E
H256Lat., long. initial line
H257Circular bearing of H256
H258Quadrant bearing of H256
H259Angle from skew
H26                                Undefined value is replaced by --- ;
H30 Project code and description   PROJ 1,AREA X,XXX;
H31 Line number format             Line number(1:16);
H400Type,ModelPolarity             1,XXXXX,   007;
H401Crew name,Comment              1,CONA_2503205;
H402Sample int.,Record len.        1,  4.00Msec,  4.00Sec;
H403Number of channels             1,  72;
H404Tape type,format, density      1,9 Tracks,DMX SEG D,6250;
H405Filter_alias Hz,dB pnt,slope   1, 89.0Hz,  0.1Db, 70.0Db/Oct;
H406Filter_notch Hz,-3Db points    1,None;
H407Filter_low Hz,dB pnt,slope     1,  0.0Hz,  0.1Db,  0.0Db/Oct;
H408Time delay FTB-SOD app Y/N     1,0 Msec , Not applied;
H409Multi component recording      1,Z;
```

```
H410Aux. channel 1 contents       1,None;
H411Aux. channel 2 contents       1,None;
H412Aux. channel 3 contents       1,None;
H413Aux. channel 4 contents       1,None;
H414Spare                         ;
H415Spare                         ;
H416Spare                         ;
H417Spare                         ;
H418Spare                         ;
H419Spare                         ;
H600Type,model,polarity           G1,G_LAND,SMU10,SEG;
H601Damp coeff,natural freq.      G1,  1.00, 12.00Hz;
H602Nunits,len(X),width(Y)        G1, 18, 10.00M,  1.00M;
H603Unit spacing X,Y              G1,  1.00M,  1.00M;
H604Spare                         ;
H605Spare                         ;
H606Spare                         ;
H607Spare                         ;
H608Spare                         ;
H609Spare                         ;
H610Type,model,polarity           R2,R,TEST,SEG;
H611Damp coeff,natural freq.      R2,  2.00, 10.00Hz;
H612Nunits,len(X),width(Y)        R2,  9,  9.00M,  0.00M;
H613Unit spacing X,Y              R2,  1.00M,  0.00M;
H614Spare                         ;
H615Spare                         ;
H616Spare                         ;
H617Spare                         ;
H618Spare                         ;
H619Spare                         ;
H26 PM,definition of used codes
H26 PG; geodetic point SA: satellite pt. IN: inertial point NG: levelling
H26 SU: surveyed unit  UH: up hole       WZ: WZ base        FO: old drilling
H26 NO: grid nodes     PC: marked point  BA: bench marks    BM: permanent mark
H26 PM: permanent mark xx: others
H26
H26
H26
H26
H26
H700Type,model,polarity           V1,Vibroseis,M22,SEG;
H701Size,vert. stk fold           V1,  550.00kN,  0Sweep/Vp;
H702Nunits,len(X),width(Y)        V1,  4Vibs,  12.50M,   0.00M;
H703Unit spacing X,Y              V1,  12.50M,   0.00M;
H704Control type                  V1,GROUND;
H705Correlator,noise supp         V1,XXXXXXX,No noise suppressed;
H706Sweep type,length             V1,Linear, 25.00Seconds;
H707Sweep freq start,end          V1,   5Hz,  60Hz;
H708Taper,length start,end        V1,Cosine, 250Sec, 250Sec;
H709Spare                         ;
H710Spare                         ;
H990R,S,X file quality control    24apr91,1740, Party manager;
H991Coord. status final/prov      Final  ,24Apr91,1740, Party manager;
H26 5678901234567890123456789012345678901234567890123456789012345678901234567890
H26      1         2         3         4         5         6         7         8
R1228.339       SU      1PM                    332399.8 2527821.8 112.1 48
R5606.146       MP      1PM                    328864.7 2528784.3 109.0 48
```

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RN061            SA      1PM                   331243.8 2527242.3 111.9 38
RN061.014        SA      1PM                   331559.4 2529156.0 113.1 38
RN061.044        SA      1PM                   331243.8 2527242.3 111.9 38
RN061.046        SA      1PM                   331869.6 2529868.8 114.8 38
RN061.055        SA      1PM                   325624.8 2529843.3 107.3 38
RN061.057        SA      1PM                   329870.5 2527395.5 110.9 38
RN061.064        SA      1PM                   328009.0 2526786.0 109.1 38
RN061.132        SA      1PM                   328834.3 2526103.3 106.0 39
RN061.133        SA      1PM                   327808.0 2525931.5 105.3 39
RN061.144        SA      1PM                   326671.4 2529636.0 107.6 39
RN061.145        SA      1PM                   327841.4 2529466.0 111.0 39
RN061.146        SA      1PM                   326231.5 2525979.5 105.7 39
RN061.154        SA      1PM                   332360.3 2529986.0 115.3 39
RN061.156        SA      1PM                   332117.1 2529566.3 113.5 39
RN061.157        SA      1PM                   331827.7 2529046.0 113.6 39
RN061.158        SA      1PM                   331351.5 2528459.0 111.8 39
RN061.159        SA      1PM                   331089.0 2528131.0 112.0 39
RN061.168        SA      1PM                   329568.2 2529906.3 110.8 39
RN061.176        SA      1PM                   325406.3 2527045.5 105.6 39
RN061.177        SA      1PM                   326660.8 2528523.5 108.0 39
RT030.039        SA      1PM                   332000.8 2525398.5 111.3 39
RT030.040        SA      1PM                   330592.7 2526285.8 109.3 39
RT030.041        SA      1PM                   331225.8 2527275.0 111.9 39
RT047.001        SA      1PM                   328949.9 2527403.5 109.1 39
RT138.001        SU      1PM                   332493.7 2526608.0 111.7 44
R91LW1124             2251G1     0.0  10       326260.1 2529068.5 106.8113071245
R91LW1124             2261G1     0.0  10       326300.5 2529039.3 106.8113071245
R91LW1124             2271G1     0.0  10       326341.0 2529009.8 106.9113071245
R91LW1124             2281G1     0.0  10       326381.4 2528980.5 106.9113071245
R91LW1124             2291G1     0.0  10       326421.9 2528951.0 107.0113071245
R91LW1124             2301G1     0.0  10       326462.3 2528921.8 107.0113071245
R91LW1124             2311G1     0.0  10       326502.8 2528892.3 107.1113071245
R91LW1124             2321G1     0.0  10       326543.2 2528862.8 107.3113071245
R91LW1124             2331G1     0.0  10       326583.5 2528833.5 107.4113071245
R91LW1124             2341G1     0.0  10       326624.1 2528804.4 107.5113071245
R91LW1124             2351G1     0.0  10       326664.6 2528774.8 107.6113071245
R91LW1124             2361G1     0.0  10       326705.0 2528745.3 107.7113071245
R91LW1124             2371G1     0.0  10       326745.4 2528716.0 107.9113071245
R91LW1124             2381G1     0.0  10       326785.9 2528686.5 108.0113071245
R91LW1124             2391G1     0.0  10       326826.3 2528657.3 107.9113071245
R91LW1124             2401G1     0.0  10       326866.8 2528627.8 107.8113071245
R91LW1124             2411G1     0.0  10       326907.3 2528598.3 107.7113071245
R91LW1124             2421G1     0.0  10       326947.7 2528569.0 107.6113071245
R91LW1124             2431G1     0.0  10       326988.2 2528539.5 107.5113071245
R91LW1124             2441G1     0.0  10       327028.6 2528510.3 107.4113071245
R91LW1124             2451G1     0.0  10       327069.0 2528480.8 107.3113071245
R91LW1124             2461G1     0.0  10       327109.5 2528451.5 107.3113071245
R91LW1124             2471G1     0.0  10       327150.0 2528422.0 107.7113071245
R91LW1124             2481G1     0.0  10       327190.4 2528392.8 108.2113071245
R91LW1124             2491G1     0.0  10       327290.9 2528363.3 108.6113071245
R91LW1124             2501G1     0.0  10       327271.3 2528333.8 109.1113071245
R91LW1124             2511G1     0.0  10       327311.8 2528304.5 109.6113071245
R91LW1124             2521G1     0.0  10       327352.3 2528275.0 110.0113071245
R91LW1124             2531G1     0.0  10       327392.7 2528245.8 110.5113071245
R91LW1124             2541G1     0.0  10       327433.2 2528216.3 111.0113071245
```

S file

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H00 SPS format version num.         SPS001,08OCT1990 (SHELL EP 90-2935);
H01 Description of survey area      AREA X, XXX;
H02 Date of survey                  start : xx.xx.xx - end : xx.xx.xx;
H021Post-plot date of issue         xx/ x/xx;
H022Tape/disk identifier            AREAC.SPS;
H03 Client                          XXXXXX;
H04 Geophysical contractor          CONTRACTOR A;
H05 Positioning contractor          CONTRACTOR A;
H06 Pos. proc. contractor           CONTRACTOR A;
H07 Field computer system(s)        None,XXXXX, Manual entry;
H08 Coordinate location             Center of source and of receiver pattern;
H09 Offset from coord. location
H10 Clock time w.r.t GMT
H11 Spare
H12 Geodetic datum,-spheroid        Unknown      CLARKE 1880 6378249.145 293.4649960
H13 Spare
H14 Geodetic datum parameters
H15 Spare
H16 Spare
H17 Vertical datum description      MSL - mean sea level ;
H18 Projection type                 UTM;
H19 Projection zone
H20 Description of grid units       METRES
H201Factor to meters                    1.00000000
H210Lat. of standard parallel(s)
H220Long. of central meridian        570000.000E
H231Grid origin                           0.000N 570000.000E
H232Grid coord. at origin             500000.00E       0.00N
H241Scale factor                    0.9995999932
H242Lat., long. scale factor              0.000N 570000.000E
H256Lat., long. initial line
H257Circular bearing of H256
H258Quadrant bearing of H256
H259Angle from skew
H26                                 Undefined value is replaced by --- ;
H30 Project code and description    PROJ 1,AREA X,XXX;
H31 Line number format              Line number(1:16);
H400Type,ModelPolarity              1,XXXXX,   007;
H401Crew name,Comment               1,CONA_2503205;
H402Sample int.,Record len.         1,  4.00Msec,  4.00Sec;
H403Number of channels              1,  72;
H404Tape type,format, density       1,9 Tracks,DMX SEG D,6250;
H405Filter_alias Hz,dB pnt,slope    1, 89.0Hz,  0.1Db, 70.0Db/Oct;
H406Filter_notch Hz,-3Db points     1,None;
H407Filter_low Hz,dB pnt,slope      1,  0.0Hz,  0.1Db,  0.0Db/Oct;
H408Time delay FTB-SOD app Y/N      1,0 Msec , Not applied;
H409Multi component recording       1,Z;
H410Aux. channel 1 contents         1,None;
H411Aux. channel 2 contents         1,None;
H412Aux. channel 3 contents         1,None;
H413Aux. channel 4 contents         1,None;
H414Spare                           ;
H415Spare                           ;
H416Spare                           ;
H417Spare                           ;
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H418Spare                          ;
H419Spare                          ;
H600Type,model,polarity            G1,G_LAND,SMU10,SEG;
H601Damp coeff,natural freq.       G1,  1.00, 12.00Hz;
H602Nunits,len(X),width(Y)         G1, 18, 10.00M,  1.00M;
H603Unit spacing X,Y               G1,  1.00M,  1.00M;
H604Spare                          ;
H605Spare                          ;
H606Spare                          ;
H607Spare                          ;
H608Spare                          ;
H609Spare                          ;
H610Type,model,polarity            R2,R,TEST,SEG;
H611Damp coeff,natural freq.       R2,  2.00, 10.00Hz;
H612Nunits,len(X),width(Y)         R2,  9,  9.00M,  0.00M;
H613Unit spacing X,Y               R2,  1.00M,  0.00M;
H614Spare                          ;
H615Spare                          ;
H616Spare                          ;
H617Spare                          ;
H618Spare                          ;
H619Spare                          ;
H26 PM,definition of used codes
H26 PG; geodetic point SA: satellite pt. IN: inertial point NG: levelling
H26 SU: surveyed unit  UH: up hole       WZ: WZ base        FO: old drilling
H26 NO: grid nodes     PC: marked point  BA: bench marks    BM: permanent mark
H26 PM:permanent mark  xx: others
H26
H26
H26
H26
H26
H700Type,model,polarity            V1,Vibroseis,M22,SEG;
H701Size,vert. stk fold            V1,  550.00kN,  0Sweep/Vp;
H702Nunits,len(X),width(Y)         V1,  4Vibs,  12.50M,   0.00M;
H703Unit spacing X,Y               V1,  12.50M,   0.00M;
H704Control type                   V1,GROUND;
H705Correlator,noise supp          V1,XXXXX,No noise suppressed;
H706Sweep type,length              V1,Linear, 25.00Seconds;
H707Sweep freq start,end           V1,   5Hz,  60Hz;
H708Taper,length start,end         V1,Cosine, 250Sec, 250Sec;
H709Spare                          ;
H710Spare                          ;
H990R,S,X file quality control     24apr91,1740, Party manager;
H991Coord. status final/prov       Final  ,24Apr91,1740, Party manager;
H26 5678901234567890123456789012345678901234567890123456789012345678901234567890
H26      1         2         3         4         5         6         7         8
S91LW1117            2251V1     0.0  10        326177.3 2529912.5 106.6113071245
S91LW1117            2261V1     0.0  10        326217.8 2528883.3 106.7113071455
S91LW1119            2271V1     0.0  10        326287.6 2528894.3 106.8113071612
S91LW1121            2281V1     0.0  10        326357.5 2528905.3 106.9113072045
S91LW1123            2291V1     0.0  10        326427.3 2528916.5 107.0113072512
S91LW1123            2301V1     0.0  10        326467.8 2528887.0 107.1113073445
S91LW1121            2311V1     0.0  10        326478.8 2528817.3 107.2113073612
S91LW1119            2321V1     0.0  10        326489.9 2528747.3 107.4113074510
S91LW1117            2331V1     0.0  10        326500.9 2528677.5 107.6113074803
S91LW1117            2341V1     0.0  10        326541.4 2528648.0 107.6113075023
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S91LW1119             2351V1     0.0  10        326611.3 2528659.3 107.6113075510
S91LW1121             2361V1     0.0  10        326681.1 2528670.3 107.6113080112
S91LW1123             2371V1     0.0  10        326750.9 2528681.3 107.8113080310
S91LW1123             2381V1     0.0  10        326791.4 2528652.0 108.8113080501
S91LW1121             2391V1     0.0  10        326802.4 2528582.0 107.5113081010
S91LW1119             2401V1     0.0  10        326813.5 2528512.3 107.2113081212
S91LW1117             2411V1     0.0  10        327824.6 2528442.5 106.9113081510
S91LW1117             2421V1     0.0  10        326865.0 2528413.0 106.9113081801
S91LW1119             2431V1     0.0  10        326934.8 2528424.0 107.1113082412
S91LW1121             2441V1     0.0  10        327004.7 2528435.0 107.2113082745
S91LW1123             2451V1     0.0  10        327074.5 2528446.3 107.3113083010
S91LW1123             2461V1     0.0  10        327115.0 2528416.8 107.4113083513
S91LW1121             2471V1     0.0  10        327126.0 2528347.0 107.7113083802
S91LW1119             2481V1     0.0  10        327137.1 2528277.0 107.7113083957
S91LW1117             2491V1     0.0  10        327148.2 2528207.3 107.5113084205
S91LW1117             2501V1     0.0  10        327188.6 2528177.8 107.7113085012
S91LW1119             2511V1     0.0  10        327258.5 2528189.0 108.5113085256
S91LW1121             2521V1     0.0  10        327328.3 2528200.0 109.6113085645
S91LW1123             2531V1     0.0  10        327398.1 2528211.0 108.6113091212
S91LW1123             2541V1     0.0  10        327438.6 2528181.8 110.4113091456
S91LW1122             2611V1     0.0  10        327710.0 2527959.8 108.6113091456
S91LW1121             2551V1     0.0  10        327449.7 2528111.8 111.2113091723
S91LW1122             2601V1     0.0  10        327663.7 2527981.0 110.7113091723
S91LW1122             2631V1     0.0  10        327785.0 2527893.0 108.5113091723
S91LW1119             2561V1     0.0  10        327460.7 2528042.0 112.8113093423
S91LW1119             2591V1     0.0  10        327582.1 2527953.8 114.2113093423
S91LW1119             2641V1     0.0  10        327784.3 2527806.8 112.5113093423
S91LW1117             2571V1     0.0  10        327471.8 2527972.8 114.9113094505
S91LW1123             2621V1     0.0  10        327754.1 2527952.5 108.6113101858
S91LW1117             2641V1     0.0  10        327771.1 2527754.8 109.2113102614
S91LW1117             2651V1     0.0  10        327779.2 2527748.8 110.3113103058
S91LW1119             2551V1     0.0  10        327824.6 2527777.5 107.4113103756
S91LW1117             2661V1     0.0  10        327835.8 2527707.8 108.8113104010
S91LW1119             2661V1     0.0  10        327865.2 2527748.0 108.3113104314
S91LW1119             2671V1     0.0  10        327905.7 2527718.8 108.2113104759
S91LW1121             2681V1     0.0  10        327975.5 2527729.8 108.4113105015
S91LW1123             2691V1     0.0  10        328045.3 2527710.8 108.3113105312
S91LW1123             2701V1     0.0  10        328085.8 2527711.5 108.3113105812
S91LW1121             2711V1     0.0  10        328096.9 2527641.5 108.5113110001
S91LW1119             2721V1     0.0  10        328107.9 2527571.8 108.7114080112
S91LW1117             2731V1     0.0  10        328119.0 2527502.0 108.8114080311
S91LW1117             2741V1     0.0  10        328159.4 2527472.5 108.6114080656
S91LW1119             2751V1     0.0  10        328235.2 2527491.8 108.6114080912
S91LW1121             2761V1     0.0  10        327494.8 2527494.8 108.6114081210
S91LW1123             2771V1     0.0  10        327369.0 2527505.8 108.7114081609
S91LW1123             2781V1     0.0  10        328409.4 2527476.3 108.7114081912
S91LW1121             2791V1     0.0  10        328420.5 2528181.8 108.7114082101
S91LW1119             2801V1     0.0  10        328431.5 2527336.8 108.7114082512
S91LW1117             2811V1     0.0  10        328442.6 2527266.8 108.6114083001
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X file

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H00 SPS format version num.        SPS001,08OCT1990 (SHELL EP 90-2935);
H01 Description of survey area     AREA X, XXX;
H02 Date of survey                 start : xx.xx.xx - end : xx.xx.xx;
H021Post-plot date of issue        xx/ x/xx;
H022Tape/disk identifier           AREAC.SPS;
H03 Client                         XXXXX;
H04 Geophysical contractor         CONTRACTOR A;
H05 Positioning contractor         CONTRACTOR A;
H06 Pos. proc. contractor          CONTRACTOR A;
H07 Field computer system(s)       None,XXXXX, Manual entry;
H08 Coordinate location            Center of source and of receiver pattern;
H09 Offset from coord. location
H10 Clock time w.r.t GMT
H11 Spare
H12 Geodetic datum,-spheroid       Unknown      CLARKE 1880 6378249.145 293.4649960
H13 Spare
H14 Geodetic datum parameters
H15 Spare
H16 Spare
H17 Vertical datum description     MSL - mean sea level ;
H18 Projection type                UTM;
H19 Projection zone
H20 Description of grid units      METRES
H201Factor to meters                   1.00000000
H210Lat. of standard parallel(s)
H220Long. of central meridian       570000.000E
H231Grid origin                          0.000N 570000.000E
H232Grid coord. at origin            500000.00E       0.00N
H241Scale factor                   0.9995999932
H242Lat., long. scale factor             0.000N 570000.000E
H256Lat., long. initial line
H257Circular bearing of H256
H258Quadrant bearing of H256
H259Angle from skew
H26                                Undefined value is replaced by --- ;
H30 Project code and description   PROJ 1,AREA X,XXX;
H31 Line number format             Line number(1:16);
H400Type,ModelPolarity             1,XXXXX,   007;
H401Crew name,Comment              1,CONA_2503205;
H402Sample int.,Record len.        1,  4.00Msec,  4.00Sec;
H403Number of channels             1,  72;
H404Tape type,format, density      1,9 Tracks,DMX SEG D,6250;
H405Filter_alias Hz,dB pnt,slope   1, 89.0Hz,  0.1Db, 70.0Db/Oct;
H406Filter_notch Hz,-3Db points    1,None;
H407Filter_low Hz,dB pnt,slope     1,  0.0Hz,  0.1Db,  0.0Db/Oct;
H408Time delay FTB-SOD app Y/N     1,0 Msec , Not applied;
H409Multi component recording      1,Z;
H410Aux. channel 1 contents        1,None;
H411Aux. channel 2 contents        1,None;
H412Aux. channel 3 contents        1,None;
H413Aux. channel 4 contents        1,None;
H414Spare                          ;
H415Spare                          ;
H416Spare                          ;
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H417Spare                        ;
H418Spare                        ;
H419Spare                        ;
H600Type,model,polarity          G1,G_LAND,SMU10,SEG;
H601Damp coeff,natural freq.     G1,  1.00, 12.00Hz;
H602Nunits,len(X),width(Y)       G1, 18, 10.00M,  1.00M;
H603Unit spacing X,Y             G1,  1.00M,  1.00M;
H604Spare                        ;
H605Spare                        ;
H606Spare                        ;
H607Spare                        ;
H608Spare                        ;
H609Spare                        ;
H610Type,model,polarity          R2,R,TEST,SEG;
H611Damp coeff,natural freq.     R2,  2.00, 10.00Hz;
H612Nunits,len(X),width(Y)       R2,  9,  9.00M,  0.00M;
H613Unit spacing X,Y             R2,  1.00M,  0.00M;
H614Spare                        ;
H615Spare                        ;
H616Spare                        ;
H617Spare                        ;
H618Spare                        ;
H619Spare                        ;
H26 PM,definition of used codes
H26 PG; geodetic point SA: satellite pt. IN: inertial point NG: levelling
H26 SU: surveyed unit  UH: up hole       WZ: WZ base        FO: old drilling
H26 NO: grid nodes     PC: marked point  BA: bench marks    BM: permanent mark
H26 PM: permanent mark xx: others
H26
H26
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H26
H26
H700Type,model,polarity          V1,Vibroseis,M22,SEG;
H701Size,vert. stk fold          V1,  550.00kN,  0Sweep/Vp;
H702Nunits,len(X),width(Y)       V1,  4Vibs,  12.50M,   0.00M;
H703Unit spacing X,Y             V1,  12.50M,   0.00M;
H704Control type                 V1,GROUND;
H705Correlator,noise supp        V1,XXXXX,No noise suppressed;
H706Sweep type,length            V1,Linear, 25.00Seconds;
H707Sweep freq start,end         V1,   5Hz,  60Hz;
H708Taper,length start,end       V1,Cosine, 250Sec, 250Sec;
H709Spare                        ;
H710Spare                        ;
H990R,S,X file quality control   24apr91,1740, Party manager;
H991Coord. status final/prov     Final  ,24Apr91,1740, Party manager;
H26 5678901234567890123456789012345678901234567890123456789012345678901234567890
H26     1         2         3         4         5         6         7         8
X100      11191LW1117             2251   1   37191LW1124             225      2611
X100      11191LW1117             2251  38   74191LW1132             225      2611
X100      21191LW1117             2261   1   38191LW1124             225      2621
X100      21191LW1117             2261  39   76191LW1132             225      2621
X100      31191LW1119             2271   1   39191LW1124             225      2631
X100      31191LW1119             2271  40   78191LW1132             225      2631
X100      41191LW1121             2281   1   40191LW1124             225      2641
X100      41191LW1121             2281  41   80191LW1132             225      2641
X100      51191LW1123             2291   1   41191LW1124             225      2651
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X100      51191LW1123      2291 42   82191LW1132      225   2651
X100      61191LW1123      2301  1   42191LW1124      225   2661
X100      61191LW1123      2301 43   84191LW1132      225   2661
X100      71191LW1121      2311  1   43191LW1124      225   2671
X100      71191LW1121      2311 44   86191LW1132      225   2671
X100      81191LW1119      2321  1   44191LW1124      225   2681
X100      81191LW1119      2321 45   88191LW1132      225   2681
X100      91191LW1117      2331  1   45191LW1124      225   2691
X100      91191LW1117      2331 46   90191LW1132      225   2691
X100     101191LW1117      2341  1   46191LW1124      225   2701
X100     101191LW1117      2341 47   92191LW1132      225   2701
X100     111191LW1119      2351  1   47191LW1124      225   2711
X100     111191LW1119      2351 48   94191LW1132      225   2711
X100     121191LW1121      2361  1   48191LW1124      225   2721
X100     121191LW1121      2361 49   96191LW1132      225   2721
X100     131191LW1123      2371  1   49191LW1124      225   2731
X100     131191LW1123      2371 50   98191LW1132      225   2731
X100     141191LW1123      2381  1   50191LW1124      225   2741
X100     141191LW1123      2381 51  100191LW1132      225   2741
X100     151191LW1121      2391  1   51191LW1124      225   2751
X100     151191LW1121      2391 52  102191LW1132      225   2751
X100     161191LW1119      2401  1   52191LW1124      225   2761
X100     161191LW1119      2401 53  104191LW1132      225   2761
X100     171191LW1117      2411  1   53191LW1124      225   2771
X100     171191LW1117      2411 54  106191LW1132      225   2771
X100     181191LW1117      2421  1   54191LW1124      225   2781
X100     181191LW1117      2421 55  108191LW1132      225   2781
X100     191191LW1119      2431  1   55191LW1124      225   2791
X100     191191LW1119      2431 56  110191LW1132      225   2791
X100     201191LW1121      2441  1   56191LW1124      225   2801
X100     201191LW1121      2441 57  112191LW1132      225   2801
X100     211191LW1123      2451  1   57191LW1124      225   2811
X100     211191LW1123      2451 58  114191LW1132      225   2811
X100     221191LW1123      2461  1   58191LW1124      225   2821
X100     221191LW1123      2461 59  116191LW1132      225   2821
X100     231191LW1121      2471  1   59191LW1124      225   2831
X100     231191LW1121      2471 60  118191LW1132      225   2831
X100     241191LW1119      2481  1   60191LW1124      225   2841
X100     241191LW1119      2481 61  120191LW1132      225   2841
X100     251191LW1117      2491  1   61191LW1124      225   2851
X100     251191LW1117      2491 62  122191LW1132      225   2851
X100     261191LW1117      2501  1   62191LW1124      225   2861
X100     261191LW1117      2501 63  124191LW1132      225   2861
X100     271191LW1119      2511  1   63191LW1124      225   2871
X100     271191LW1119      2511 64  126191LW1132      225   2871
X100     281191LW1121      2511  1   64191LW1124      225   2881
X100     281191LW1121      2521 65  128191LW1132      225   2881
X101      11191LW1123      2531  1   65191LW1124      225   2891
X101      11191LW1123      2531 66  130191LW1132      225   2891
X101      21191LW1123      2541  1   66191LW1124      225   2901
```
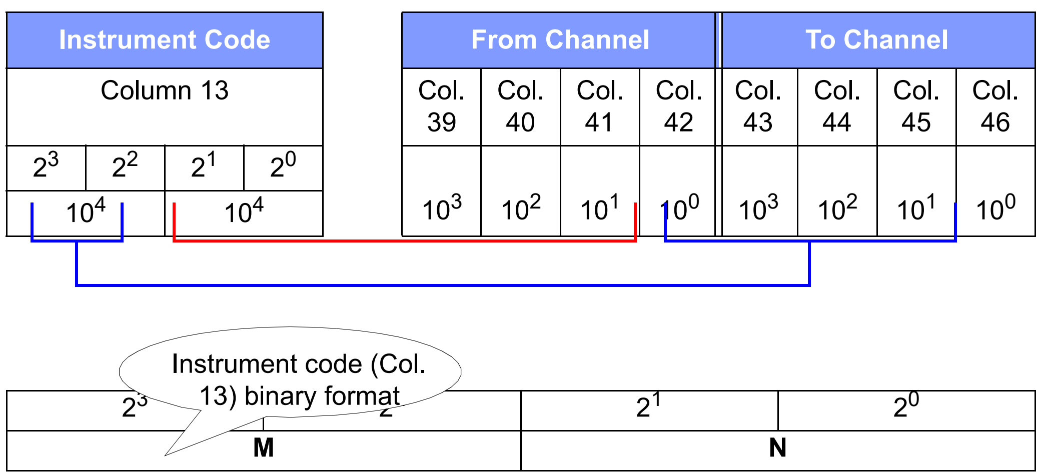

Sercel SPS format with over 10000 traces

Because the “**From channel**” and “**To channel**” fields in an SPS Relation file are limited to 9999, the standard SPS format does not make it possible to depict 10000 or more traces. In SPS Relation files generated by the 508XT, the “**Instrument Code**” field is used to encode a fifth digit (10^4) that allows you to export an SPS-R file with over 10000 active traces.

The Instrument Code hexadecimal value (0 to F) in Column No. 13 must be converted to binary format and interpreted as follows:



“From Channel” = $(N \times 10^4)$ + (value in columns 39 to 42).

“To Channel” = $(M \times 10^4)$ + (value in columns 43 to 46).

(See the examples on next page).

Instrument code = 4

From Channel = 9901

To Channel = 100

```
X5        503145510.0          1148.019901 10011200              5411
56101
```

Instrument code = 4

2^3	2^2	2^1	2^0
0	1	0	0
1		**0**	

"From Channel" = (**0** × 10^4) + (**9901**) = **9901**

"To Channel" = (**1** × 10^4) + (**100**) = **10100**

Instrument code = 5

From Channel = 101

To Channel = 1000

```
X5        503155510.0          1148.01 101100031201              5361
56601
```

Instrument code = 5

2^3	2^2	2^1	2^0
0	1	0	1
1		**1**	

"From Channel" = (**1** × 10^4) + (**101**) = **10101**

"To Channel" = (**1** × 10^4) + (**1000**) = **11000**

Chapter

2

SPS Input File Format (Rev. 2.1)

The Processing Support format contained in this chapter is reproduced by courtesy of Shell Internationale Petroleum Maatschappij B. V., the initiator of this format. The revisions to this document allow this format to conform to the new SEGD Rev 2.1 SEG Field Tape Standards as revised Jan, 2006. This chapter includes the following sections:

Introduction

The purpose of the format is to establish a common standard for the transfer of positioning and geophysical support data from 3D field crews to seismic processing centers. The format can also be used for other types of seismic surveys.

With the growth and increased complexity of land 3D surveys there was a need to establish a robust and standard procedure for logging, during acquisition, the positioning and geophysical spread relation data in a way that reduces errors, allows the field crews to quality control the data, and hence detect and correct errors before the data was transferred to the seismic processing centers.

Quality control was carried out as the first stage in the processing centers. Experience has shown that most errors are only detected when the geophysical and coordinate information are integrated, and that often spread relation errors could not be corrected, leading to the deletion of otherwise good quality records.

Providing the processing centers with checked data in a standard format, containing all relevant field data significantly reduced the time spent by the processing centers on initial quality control and increased the quality of the end products.

Comments on Revision 2.1

Recently, advances in acquisition technology and improvements in cost efficiencies have greatly increased the volume of data, in terms of channel counts, source/receiver densities, and surface area. This increase in the shear number of elements to account for has led to a situation where both the SEGD and the SPS formats can no longer adequately reflect the positioning and geophysical spread relation data. This was partially addressed in Revision 2.0 of the SEGD format, but was not reflected in an update to the SPS. To this end, this revision (2.1) to the SPS format has been undertaken in conjunction with Revision 2.1 of the SEGD format and has been named accordingly (in the absence of a revision 2.0 of the SPS).

It is the intent of this revision to act as a stop gap measure to meet the immediate needs of the community. To that end, the original text and formats have been left unchanged unless a clear need has been seen to make changes. Modifications to the format itself have been limited to address the pressing needs of current acquisition, and to encompass the likewise limited changes made to the SEGD format in Revisions 2.0 and 2.1. Although it was agreed by the SEG Technical Standards Committee that future SEG standards would use and revisions where possible would be compatible with the EPSG Geodetic Database (now part of OGP) this minor revision will not include this standard. Adoption of the EPSG Geodetic Database compatibility has been left for the next major SEGD/SPS Rev 3 document release.

Summary of Changes to the SPS Format for Rev. 2.1

The following list discusses some of the specific changes of Revision 2.1.

1. Addition of a line sequence number which will allow more than one production line per tape to be recorded as long as a unique combination of field file number and line sequence number are used per storage unit. See page 67 & page 76.
2. Point Record Specification table values and descriptions were modified to accommodate updated formats, defaults, justification and min/max units in keeping with SEGD Revision 2.1. Some header records will be rendered redundant or obsolete with new format, ie; H31 Line number format. See page 67.
3. Relation Record Specification table value and descriptions were modified to accommodate larger field record numbers, value changes on from and to channel items and updating formats, default values, justification and columnar entries in keeping with SEGD Revision 2.1. See page 74.
4. Geodetic datum updated to reflect WGS84 vs WGS72. See page 77.
5. Reference to UKOOA P1/84 updated to UKOOA P1/90. See page 87.
6. Example of SPS Format, R, S, and X files updated to reflect changes to new Revision 2.1 format. See page 90.

Controlling Organization

The SPS rev 2.1 is administered by the SEG Technical Standards Committee. Any questions, corrections or problems encountered in the format should be addressed to:

Society of Exploration Geophysicists

P.O. Box 702740

Tulsa, Ok 74170-2740

Attention: SEG Technical Standards Committee

Phone: (918) 497-5500

Fax: (918) 497-5557

Internet site: www.seg.org

Field system

The field crews must have an acquisition management system to generate the SPS format during the survey. Errors will be reduced both during recording and during the generation of the SPS format if automated procedures are introduced at survey set-up and during daily recording. Figure 2-1 shows the main elements of such a system. The Field Database, Topographical computations and 3D recording management are the minimum elements required to support the generation of the SPS format.

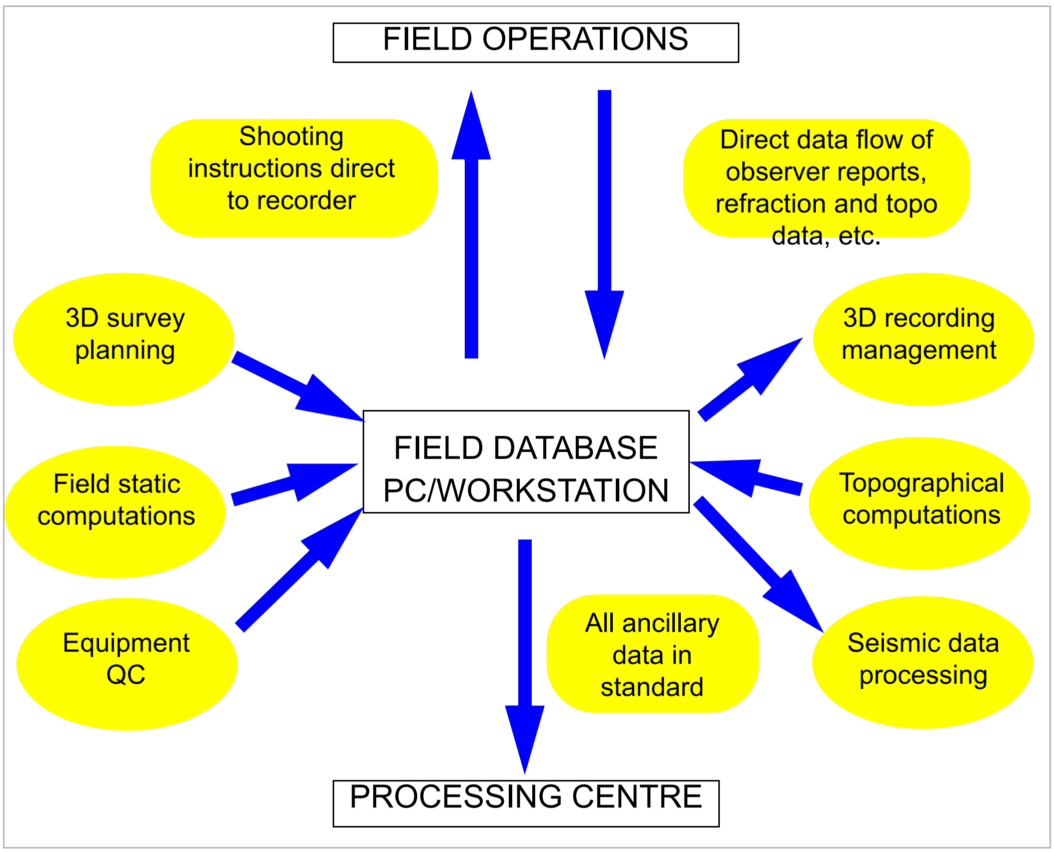


Figure 2-1 Field Acquisition Management System

A direct link to and from seismic recording instrument is strongly recommended. The 508XT has this capability.

Figure 2-2 shows the preferred method of data exchange between the system and the seismic recording instrument.

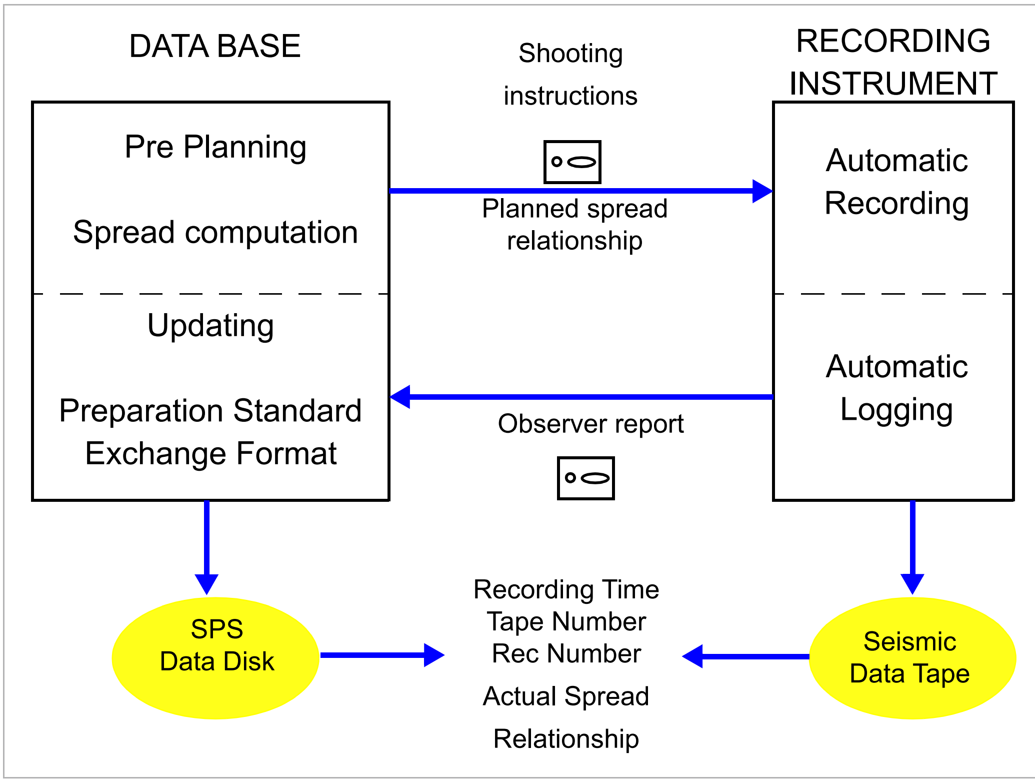


Figure 2-2 Automatic Recording

The key information required to relate the seismic records and the corresponding positioning and geophysical support data is written in the seismic headers and in SPS.

SHELL processing support format for land 3D surveys

General

Coordinates and elevations of geophysical lines may be determined by interpolation between observed break points in the line. The point files contains coordinates and elevations of all geophysical points (observed and interpolated) and of all permanent markers. The shotpoint and relational files are to be sorted chronologically, and the receiver file is to be sorted in ascending sequence of line, point and point index numbers.

In order to avoid ambiguities each physical position in the field (shotpoint or receiver group) must have a unique name.

Data record specification

The data set consists of three files with a block of header records. For magnetic tapes each file is terminated by a record containing "EOF" in col. 1-3.

First file	**Receiver File**: "Point Records" with details of receiver groups or permanent markers.
Second File	**Source File**: "Point Records" with details of shotpoints (power source).
Third File	**Cross-Reference File**: "Relation Record" specifying for each shotpoint its record number and the relation between recording channel numbers and receiver groups.

Data record sorting order

File	Records	Sort fields and sorting order
Receiver	'R'	Line name, Point number, Point index.
Source	'S'	Julian day and Time of recording shotpoint.
Cross-Reference	'X'	Sorted in the same order as the Source File.

Legacy Format for land survey data on 9-track tape

Tape specifications and tape layout

Half-inch magnetic tape	:	IBM compatible, non-label.
Number of tracks	:	9.
Number of bytes per inch	:	6250 (1600 is a permissible alternative).
Mode	:	EBCDIC coded.
Record length	:	80 bytes.
Block size	:	1600 bytes (20 logical records). Physically separated by inter-record gap.

An “EOF” statement followed by an IBM tape mark shall be written after the end of a file and a tape shall be closed by two IBM tape marks.

In general, a tape may contain one or more files depending on the type of survey. Each file shall start with a number of ‘Header Records’ followed by ‘Data Records’ and closed by an EOF statement and an IBM tape mark.

Legacy Format for land survey data on floppy disc

Disc specifications and layout

Format: MS DOS compatible ASCII files.

Record length: 80 bytes, followed by carriage return (col 81) and line feed (col 82).

3.5" or 5.25" formatted disc (any size: 360/720 Kbyte or 1.4/1.2 Mbyte). File name to relate to the project, date and sequence. To denote file type extension name must be prefixed with:

'S'	for shotpoint records	e. g.	PRJX90.S01
'R'	for receiver records	e. g.	PRJX90.R01
'X'	for relational records	e. g.	PRJX90.X01

In general, a disc may contain one or more files depending on the type of survey. Each file shall start with a number of 'Header Records' followed by 'Data Records'.

Header record specification

Each file shall start with a number of header records which contain information about, and parameters controlling, all the data records which follow.

The general format for a header record shall be:

		Cols	Formats
a.	Record identifier "H"	1	A1
b.	Header record type	2-3	I2
c.	Header record type modifier	4	I1
d.	Parameter description	5-32	7A4
e.	Parameter data	33-80	See below

Header record type H0 to H20 are mandatory for all surveys even if a "N/A" entry is required ("N/A" is not allowed for H18). Header records of types H21 to H25 are mandatory as far as they are applicable to the projection used.

Requirements for projection definition include the following header records:

Transverse Mercator	:	H220, H231, H232, H241, H242
UTM	:	H19, H220.
Stereographic	:	H231, H232, H241, H242.
Oblique Mercator	:	H231, H232, H241, H242, H259 and H256 or H257 or H258.
Lambert Conical	:	H210, H220, H231, H232, H241, H242.

Header record type H26 is a free format statement for any other relevant information.

Formats of parameter data fields for each of the header record types shall be:

Type	Parameter description Pos: 5-32	Parameter	
		Pos	Format
H00	SPS format version num.	33-80	12A4
H01	Description of survey area	33-80	12A4
H02	Date of survey	33-80	12A4
H021	Post-plot date of issue	33-80	12A4
H022	Tape/disk identifier	33-80	12A4
H023	Line sequence number	33-80	I5
H03	Client	33-80	12A4
H04	Geophysical contractor	33-80	12A4
H05	Positioning contractor	33-80	12A4
H06	Pos. proc. contractor	33-80	12A4
H07	Field computer system(s)	33-80	12A4
H08	Coordinate location	33-80	12A4
H09	Offset to coord. location	33-80	12A4
H10	Clock time w.r.t. GMT	33-80	12A4
H11	Spare	33-80	12A4
H12	Geodetic datum,-spheroid	33-80	3A4, 3A4,F12.3,F12.7
H13	Spare	33-80	12A4
H14	Geodetic datum parameters	33-80	3(F8.3),4F(6.3)
H15	Spare	33-80	12A4
H16	Spare	33-80	12A4
H17	Vertical datum description	33-80	12A4
H18	Projection type	33-80	12A4
H19	Projection zone	33-80	12A4
H20	Description of grid units	33-56	6A4
H201	Factor to meter	33-46	F14.8
H210	Lat. of standard parallel(s)	33-56	2(I3,I2,F6.3, A1)

Type	Parameter description Pos: 5-32	Parameter	
		Pos	Format
H220	Long. of central meridian	33-44	v
H231	00 origin	33-56	2(I3,I2,F6.3, A1)
H232	Grid coord. at origin	33-56	2(F11.2,A1)
H241	Scale factor	33-44	F12.10
H242	Lat., Long. scale factor	33-56	2(F11.2, A1)
H256	Lat. long. initial line	33-56	4(I3, I2,F6.3, A1)
H257	Circular bearing of H256	33-44	I3, I2, F7.4
H258	Quadrant bearing of H256	33-44	A1, 2I2,F6.3, A1
H259	Angle from skew	33-44	I3, I2,F7.4
H26	Any other relevant information This record can be repeated as required.	5-80	19A4
H30	Project code and description	33-78	3A2,10A4
H31	Line number format (Obsolete)	33-80	12A4

Instrument code (I) tables

Header Records: H400-H419: code 1,
H420-H439: code 2...
H560-H579: code 9

Instrument code must be entered in col 33-34, for example: ‘1,’ ‘2,’... ‘9,’

Type	Parameter description Pos: 5-32	Parameter	
		Pos	Format
H400	Type, Model, Polarity	33-80	12A4
H401	Crew name, Comment	33-80	12A4
H402	Sample int. Record Len.	33-80	12A4
H403	Number of channels	33-80	12A4
H404	Tape type, format, density	33-80	12A4
H405	Filter_alias Hz, dB pnt, slope	33-80	12A4
H406	Filter_notch Hz, -3 dB points	33-80	12A4
H407	Filter_low Hz, dB pnt, slope	33-80	12A4
H408	Time delay FTB-SOD app Y/N	33-80	12A4
H409	Multi component recording	33-80	12A4
H410	Aux. channel 1 contents	33-80	12A4
H411	Aux. channel 2 contents	33-80	12A4
H412	Aux. channel 3 contents	33-80	12A4
H413	Aux. channel 4 contents	33-80	12A4
H414	Spare	33-80	12A4
...	...	...	...
H419	Spare	33-80	12A4

Receiver code (Rx) tables

Header Records: H600-H609: code 1,
H610-H619: code 2...
H690-H699: code 10

Receiver code must be entered in cols 33-34. Example of possible codes:

G1..to.G9 for geophones H1..to.H9 for hydrophones

R1..to.R9 for multi comp. and other types

PM = Permanent marker KL = Kill or omit receiver station

Type	Parameter description Pos: 5-32	Parameter	
		Pos	Format
H600	Type, model, polarity	33-80	12A4
H601	Damp coeff, natural freq.	33-80	12A4
H602	Nunits, len(X), width(Y)	33-80	12A4
H603	Units spacing X, Y	33-80	12A4
H604	Spare	33-80	12A4
...	...	...	...
H609	Spare	33-80	12A4

For ‘PM’ and ‘KL’ use H26 records (free format description)

Source code (Sx) tables

Header Records:	H700-H719: code 1, H720-H739: code 2... H880-H899: code 10

Source code must be entered in cols 33-34. Example of possible codes:

V1..to.V9 for vibroseis	E1..to.E9 for explosive
A1..to.A9 for air gun	W1..to.W9 for water gun
S1..to.S9 for other types	KL = Kill or omit shotpoint

Type	Parameter description Pos: 5-32	Parameter	
		Pos	Format
H700	Type, model, polarity	33-80	12A4
H701	Size, vert. stk fold	33-80	12A4
H702	Nunits, len(X), width(Y)	33-80	12A4
H703	Units spacing X, Y	33-80	12A4

Following records are only required if **source type = Vibroseis V1..V9**

Type	Parameter description Pos: 5-32	Parameter	
		Pos	Format
H704	Control type	33-80	12A4
H705	Correlator, noise supp	33-80	12A4
H706	Sweep type, length	33-80	12A4
H707	Sweep freq start, end	33-80	12A4
H708	Taper, length start, end	33-80	12A4
H709	Spare	33-80	12A4
H710	Spare	33-80	12A4

Following records are only required if **source type = Explosive E1..E9**

Type	Parameter description Pos: 5-32	Parameter	
		Pos	Format
H711	Nom. shot depth, charge len.	33-80	12A4
H712	Nom. soil, drill method	33-80	12A4
H713	Weathering thickness	33-80	12A4
H714	Spare	33-80	12A4
H715	Spare	33-80	12A4

Following records are only required if

source type = air gun A1..A9

or = water gun W1..W9

Type	Parameter description Pos: 5-32	Parameter	
		Pos	Format
H716	P-P bar/m, prim/bubble	33-80	12A4
H717	Air pressure psi	33-80	12A4
H718	No. sub arrays, Nom depth	33-80	12A4
H719	Spare	33-80	12A4

Quality Control check records

Type	Parameter description Pos: 5-32	Parameter	
		Pos	Format
H990	R,S,X file quality control	33-60	2A4,I4,4A4
H991	Coord. status final/prov	33-68	4A4,I4,4A4

Point record specification

This record type contains details at the position of the shotpoint at the time of recording or at the position of a receiver at the time of first shotpoint recorded into the receiver.

Item	Definition of field	Cols	formats	Min.to Max.	Default	Just.	Units
1	Record identification	1-1	A1	“S” or “R”	None	N/A	-
2	Line name (left adj)	2-11	F10.2	-999999.99 to 9999999.99	None	Right	-
3	Point number (right adj)	12-21	F10.2	-999999.99 to 9999999.99	None	Right	-
+		22-23			Blank		Blank
4	Point index	24-24	I1	1 to 9	1	Right	-
*5	Point code*	25-26	A2	A#	None	Left	-
6	Static correction	27-30	I4	-999 to 999	Blank	Right	ms
7	Point Depth	31-34	F4.1	0 to 99.9	0	Right	header defined
8	Seismic datum	35-38	I4	-999 to 9999	0	Right	header defined
9	Uphole time	39-40	I2	0 to 99	Blank	Right	ms
10	Water depth	41-46	F6.1	0 to 9999.9	Blank	Right	header defined
11	Map grid easting	47-55	F9.1	None	None	Right	-
12	Map grid northing	56-65	F10.1	None	None	Right	-
13	Surface Elevation	66-71	F6.1	-999.9 to 9999.9	None	Right	Metre
14	Day of year	72-74	I3	1 to 999	None	Right	-
15	Time hhmmss	75-80	3I2	000000 to 235959	None	N/A	-

* Example Point codes:

0 to 9 - SERCEL Process Type.
“PM” - permanent marker, “KL” - kill or omit point
“G1” ..”G9” “H1”..”H9”, “R1”,..”R9” - receiver codes

“V1”..”V9” “E1”..”E9”, “A1”..”A9”, “W1”..”W9”,
“S1”..”S9”.- source codes

+ For compatibility reasons cols 22-23 are left blank.

Note

- Alphanumeric (A) fields are to be left justified and
- Numeric (I and F) fields are to be right justified unless specified otherwise.

Relation record specification

This record type is used to define the relation between the field record number and shotpoint and between recording channels and receiver groups. For each shotpoint there is at least one “Relation Record”. Each of these records specifies a section of consecutively numbered channels and receiver groups. After a numbering gap or a change in line name or repositioning for the receiver groups a new “Relation Record” has to be given. Channel numbers should be in ascending order.

Fields 6, 7 and 8 must be identical to fields 2, 3 and 4 of the corresponding shotpoint record. While the receiver line and point numbers in fields 13, 14 and 15 must be the same as used in the receiver point records.

Item	Definition of field	Cols	formats	Min. to Max.	Default	Just.
1	**Record identification**	1-1	A1	“X”	None	N/A
2	Field tape number (l adj)	2-7	3A2	Free	None	Right
3	Field record number	8-15	I8	0 to 16777216	None	Right
4	Field record increment	16-16	I1	1 to 9	1	Right
5	Instrument code	17-17	A1	1 to 9	1	Right
6	Line name	18-27	F10.2	-999999.99 to 9999999.99	None	Right
7	Point number	28-37	F10.2	-999999.99 to 9999999.99	None	Right
8	Point index	38-38	I1	1 to 9	1	Right

Item	Definition of field	Cols	formats	Min. to Max.	Default	Just.
9	From channel	39-43	I5	1 to 99999	None	Right
10	To channel	44-48	I5	1 to 99999	None	Right
11	Channel increment	49-49	I1	1 to 9	1	Right
12	Line name	50-59	F10.2	-999999.99 to 9999999.99	None	Right
13	From receiver	60-69	F10.2	-999999.99 to 9999999.99	None	Right
14	To receiver	70-79	F10.2	-999999.99 to 9999999.99	None	Right
15	Receiver index	80-80	I1	1 to 9	1	Right

Note Alphanumeric (A) fields are to be left justified and Numeric (I and F) fields are to be right justified unless specified otherwise.

Comment record specification (optional)

This record type is used for comments, for example to flag bad/noisy traces per record, test file details and another supplementary information normally given in the observers report.

Item	Definition of field	Cols	formats	Min. to Max.	Default	Units
1	Record identification	1-1	A1	"C"	None	-
2	Comment	2-80	79A1	Free	Blank	-

Header record description

The text in bold type face are the parameter descriptions to be entered, left justified, into positions 5-32. The text in italics are examples of parameters to be entered, left justified, into positions 33-80. Positions 33 and 34 must always contain the instrument or receiver or source code. To enable parsing of free format (12A4) parameter fields the following rule should be used “The parameters entered into positions 33-80 must be separated by a comma and the parameter string must be terminated by a semi colon. Parameter text cannot contain commas ',' or semi colons';' “.

Note All units of distance are in metres except the grid coordinates whose units are defined by H20 and can be converted to metres using the conversion factor defined by H201.

H00 **SPS format version num**: The format version number should be in this format.
Example: SPS 2.1;

H01 **Description of survey area**: The name of the country, survey area, survey type (land: L2D/L3D or Transition zone; TZ2D/TZ3D) and project number.
Example: The Netherlands,Dordrecht,L3D,0090GA;

H02 **Date of survey**: The date of recording first shotpoint of survey and the last date of survey on this file.
Example: 21.05.1990,28.05.1990;

H021 **Post-plot date of issue**: The date when this tape or disc was issued and confirmed checked.
Example: 30.05.90;

H022 **Tape/disk identifier**:
Example: 0090GA0;

H023 **Line sequence number**: The line sequence number allows more than one production line per tape as long as a unique combination of field file number and line sequence number are used per storage unit.
Example:5;

H03 **Client**: The client’s company name.
Example: NAM;

H04 **Geophysical contractor**: The company name of the main seismic contractor, and the seismic party name.
Example: Prakla Seismos,SON 1;

H05 **Positioning contractor**: The company name of contractor or sub-contractor responsible for the positioning survey/control in the field.
Example: Prakla Seismos,

H06 **Pos. proc. contractor**: The company name of contractor or sub-contractor responsible for the post processing of the positioning data.
Example: Prakla Seismos,SON 1;

H07 **Field computer system(s)**: The acquisition management system name, name of seismic recording instrument, and the method of direct transfer to/from the seismic recording instrument (if no direct transfer enter "***manual entry***").
Examples: CDB,SN368/FLUKE,FDOS discs; or None,SN368, manual entry;

H08 **Coordinate location**: The description of what the coordinates refer to.
Example: centre of source pattern and centre of receiver pattern;

H09 **Offset to coord. location**: The offset from a vessel or vehicle reference position to coordinate location as defined in H08, including method of angular offset used.
Example: 170M,180DEG from vessel gyro heading;

H10 **Clock time w.r.t. GMT**: The number of hours that the local (clock) time is behind or ahead of GMT
Example: +2;or -6; or 0;

H11 **Spare**

H12 **Geodetic datum,-spheroid**: Datum name, spheroid name, semi major axis (a), inverse flattening (1/f) as used for survey.
Example: RD datum Bessel 1841 6377397.155 299.15281

H13 Spare

H14 **Geodetic datum parameters**: Datum transformation parameters to WGS72 (dx,dy,dz,rx,ry,rz,ds) as used for survey.
Example: 595.000 11.300 478.900 0.000 0.000 0.000 0.000

The datum transformation parameters are defined by the following model:

x		dx		1 -rz +ry		x	
y	=	dy	+ |scale | *	+rz 1 -rx	*	y	
z	(2)	dz		-ry +rx 1		z	(1)

where: x,y,z are the geocentric cartesian coordinates in metres, dx, dy, dz are translation parameters in metres, rx, ry, rz are clockwise rotation defined in arcsecs, but converted to radians for use in the formula. Scale is [1+ds(10E-6)], where ds is in parts per million.

For this example (1) is RD datum, (2) is WGS84 datum.

H15 Spare

H16 Spare

H17 **Vertical datum description**: Name, type (i.e. equipotential, LAT or spheroidal), origin (name or lat,long) and undulation of vertical datum with respect to WGS84.
Example: NAP, Equipotential, Amsterdam, 0; or MSL-Syria,Equipotential, 34 degr N, 38 degr E, 23.6 m;

H18 **Projection type**: Type of map projection used
Example: Transverse Mercator;

H19 **Projection zone**: Zone and hemisphere for UTM projections.
Example: Zone 30, North;

H20 **Description of grid units**: Unit of coordinates.
Example: Metres; or International Feet; or Indian Feet; or American Feet;

H201 **Factor to metre**: The multiplication factor to convert grid units to metres. For American Feet the factor is:
Example: 030480061

H210 **Lat. of standard parallel(s)**: Latitude and longitude of standard parallel(s) as required for projection as per H18, in dddmmss.sss N/S. For 2 standard parallels of 5 degr N and 10 degr N:
Example: 0050000.0000100000.000N

H220 **Long. of central meridian**: Longitude of central meridian as required for projection as per H18 above, in dddmmss.sss E/W. For 15 degr 30 minE:
Example: 0153000.000E

H231 **Grid origin**: Latitude and longitude of the grid origin in dddmmss.sss N/S dddmmss.sss E/W. For 5 degr N and 15 deg 10 min and 25 secE:
Example: 0050000.000N0151025.000E

H232 **Grid coord. at origin**: Grid coordinates (Eastings and Northings) at the origin of the projection system. For false Easting of 500000 and false Northing of 0:
Example: 50000000.0E 0.00N

H241 **Scale factor**: Scale factor for defined projection.
Example: 0.9996000000

H242 **Lat.,Long. scale factor**: Latitude and longitude at which the scale factor (H241) is defined.
Example: 0050000.000N 151025.000E

H256 **Lat. Long. initial line**: The two points defining the initial line of projection, as latl, longl, lat2, long2. For 5, degr N, 20 degr E, 10 degr N, 30 degr E.
Example: 0050000.000N0200000.000E0100000.000N0300000.000E

H257 **Circular bearing of H256**: This is the true bearing to the east in the origin of the initial line of projection in dddmmss.ssss (max of 360 degrees).
Example: 1200000.0000

H258 **Quadrant bearing of H256**: Quadrant bearing of the initial line of projection in N/S ddmmss.sss E/W.
Example: S300000.000E

H259 **Angle from skew**: The angle between the skew and the rectified (North oriented) grid, in dddmmsss.sss.
Example: 0883000.0000

H26 **Free format in positions 5-80**: Any other information can be included using header records of this type.

H30 **Project code and description**: A six character code, the survey area name and survey type (see H01).
Example: 0090GA,Dordrecht,L3D;

H31 **Line number format (Obsolete)**: Specifies the internal format of the line number field in the data records. The specification shall be:
NAME1(POS1:LEN1),NAME2(POS2:LEN2),NAME3(POS3:LEN3);
Where NAMEn is the name of the sub-identifier, POSn is the first character position within the line number field and LENn is the length of the sub field.
Example: BLOCK(1:4),STRIP(5:4),LINE NUMBER(9:8);
If no sub division of the field is required then enter ‘LINE NUMBER(1:16);’

Seismic instrument header records

The user must define the set of code definitions for surveys, areas and vintages. Header record types H400-H419 are to be used to define tables for the first instrument code, and H420-H439 for the second up to H560-H579 for the ninth code. A new table must be defined, with a different code, for each instrument used or if any parameter in the table is changed.

The instrument code must always be in cols. 33-34, for example ‘1,’ to ‘9,’

H400 **Type,Model,Polarity**: The type and model name of seismic recording instrument, the unique model number of the instrument and the polarity defined as SEG or NON SEG. The definition of SEG is “A **compression** shall be recorded as a **negative** number on tape and displayed as a **downward** deflection on monitor records”.
Example: 1,SN368+LXU,12345,SEG;

H401 **Crew name,Comment**: The name of the crew and any other comments.
Example: 1,Prakla SON 1;

H402 **Sample int.,Record Length**: The recording sample rate and the record length on tape.
Example: 1,2MSEC,6SEC;

H403 **Number of channels**: The number of channels per record.
Example: 1,480;

H404 **Tape type, format, density**: The type of tape (9 track or cartridge), recording format of the data on tape and the recording density.
Example: 1,9 track,SEGD,6250;

H405 **Filter_alias Hz,dB pnt,slope**: The anti-alias or high-cut filter setting of the recording instrument or field boxes specified in hertz, the dB level at the frequency value and the filter slope in dB per octave.
Example: 177HZ,-6DB,72 DB/OCT;

H406 **Filter_notch Hz,-3db points**: The centre frequency of the filter setting of the recording instrument or field boxes specified in hertz and the frequency values at the -3dB points.
Example: 1,NONE;or 1,50,45,55;

H407 **Filter_low Hz,dB pnt,slope**: The low-cut filter setting of the recording instrument or field boxes specified in hertz, the dB level at the frequency value and the filter slope in dB per octave.
Examples: 1,NONE;or 1,8HZ,-3DB,18 DB/OCT;

H408 **Time delay,FTB-SOD app Y/N**: The value of any time delay and if the delay between field time break and start of data has been applied to the seismic data recorded on tape.
Example: 1,0 Msec,not applied;

H409 **Multi component recording**: Describes the components being recorded and their recording order on consecutive channels, allowed values are ‘X’,’Y’,’Z’.
Examples: 1,Z; or 1,Z,X,Y;

H410 **Aux. channel 1 contents**: Describes the contents of an auxiliary channel.
Examples: 1,FTB; or 1,NONE;

H411 **Aux. channel 2 contents**

H412 **Aux. channel 3 contents**

H413 **Aux. channel 4 contents**

H414 **Spare**

to

H419 **Spare**

Seismic receiver header records

The user must define the set of code definitions for surveys, areas and vintages. Header record types H600-H609 are to be used to define tables for the first receiver code, and H610-H619 for the second up to H690-699 for the tenth code. A new table must be defined, with a different code, for each receiver type used or if any parameter in the tables is changed.

The receiver code must always be in cols. 33-34. Example of possible codes:

G1..to.G9 for geophones H1.. to.H9 for hydrophones

R1..to.R9 for multi comp. and other types

PM = Permanent marker KL = Kill or omit receiver station

H600 **Type,model,polarity**: The type (land geophone, marsh geophone, hydrophone), model name of seismic detector and the polarity defined as SEG or NON SEG. The definition of SEG is "A **compression** shall be recorded as a **negative** number on tape and displayed as a **downward** deflection on monitor records".
Example: G1,SM-4,1234,SEG;

H601 **Damping coeff,natural freq**
Example: G1,0.68,10Hz;

H602 **Nunits,len(X),width(Y)**: The number of elements in the receiver group, the inline and the cross-line dimension of the receiver group pattern.
Example: G1,12,25M,6M;

H603 **Units spacing X,Y**: The distance between each element of the receiver group, inline (X), and cross-line (Y).
Example: G1,4M,6M;

H604 **Spare**

to

H609 **Spare**

Seismic source header records

The user must define the set of code definitions for surveys, areas and vintages. Header record types H700-H719 are to be used to define tables for the first source code, and H720-H739 for the second up to H880-899 for the tenth code. A new table must be defined, with a different code, for each source type used if any parameter in the table is changed.

The source code must always be in cols. 33-34. Example of possible codes:

V1..to.V9 for vibroseis E1.. to.E9 for explosive

A1..to.A9 for air gun W1..to.W9 for water gun

S1..to.S9 for other types

KL = Kill or omit receiver shotpoint

H700 **Type,model,polarity**: Source type (explosive, air gun etc.), make or model and the polarity defined as SEG or NON SEG. The definition of SEG is "A **compression** shall be recorded as a **negative** number on tape and displayed as a **downward** deflection on monitor records".
Examples: E1,EXPLOSIVE, SEISMOGEL 125 gram,SEG; or V1,VIBROSEIS,MERTZ 22,SEG EQU;

H701 **Size,vert. stk fold**: The total charge size, force or air volume of the source pattern, the vertical fold of stack or number of sweeps per VP.
Examples: E1,1000 gram,1; or V1,93 kN,1 SWEEP/VP;

H702 **Nunits,len(X),width(Y)**: The number of elements in the source pattern, the inline and the cross-line dimension of the source pattern.
Examples: E1,6,25M,0M; or V1,4 VIBS,25M,45M;

H703 **Units spacing X,Y**: The distance between each element of the source pattern, inline (X), and cross-line (Y).
Examples: E1,5M,0; or V1,8M,15M;

Following records are only required if source **type= Vibroseis V1..V9**

H704 **Control type**: The type of control used.
Example: V1,GND FORCE PHASE&AMPL LOCK;

H705 **Correlator,noise supp**: The type correlator/stacker, and the type of noise suppression applied before summing.
Example: V1,SERCELCS-2502,NO NOISE SUPP;

H706 **Sweep type,length**: The type and length of the sweep.
Example: V1,LINEAR,30 SECONDS;

H707 **Sweep frequency start,end**: The start and end frequency of the sweep.
Example: V1,5HZ,60HZ;

H708 **Taper,length start,end**: The type of taper and the taper length (start and end).
Example: V1,COSINE,500MSEC,500MSEC;

H709 Spare

H710 Spare

Following records are only required if source **type= Explosive E1..E9**

H711 **Nom. shot depth,charge len.**: The nominal shot depth, and the length of the charge.
Example: E1,15M,1M;

H712 **Nom.soil, drill method**: The nominal type of soil or near surface medium, and the method of drilling (flushing, hand auger, portable drill unit etc.).
Example: E1,CLAY,PORTABLE UNITS;

H713 **Weathering thickness**: The nominal depth to the base of weathered layer.
Example: V1,8-12M;

H714 Spare

H715 Spare

Following records are only required if source
type=air gun A1..A9
water gun W1..W9

H716 **P-P bar/m,prim/bubble**: The Peak-peak output in bar metres, and the primary to bubble ratio measured through a 0-125 Hz filter at a depth of 6 metres.
Example: A1,50,13:1;

H717 **Air pressure psi**: The nominal operating air pressure.
Example: A1,2000PSI;

H718 **No. sub arrays,nom depth**: The number of sub arrays and the nominal towing depth.
Example: A1,3,5.5M;

H719 Spare

Quality Control check records

H990 **R,S,X file quality control**: The date and time of the Q.C. check, and the name of the person who performed the quality control of the file.
Example: 01JUN90,0930,Mr J Smith;

H991 **Coord. status final/prov**: The status of the coordinates contained in the R and S files (final or provisional), the date and time of the status, the name of the surveyor responsible for the coordinate integrity.
Example: Final01jun90,930,Mr J.Jansen;

Point record description

2 **Line name**: Identifier for the shotpoint or receiver line. It is a numeric number with the format of F10.2. If no decimal point is provided it should be taken as implied. It can be composed of a block or strip number and a line number. The internal format of this field must be defined in the header.

3 **Point number**: Identifier for the shotpoint or receiver group number defined as the centre of the source or receiver array as staked out in the field. The value should be read as a numeric F10.2 and be right justified.

4 **Point index**: Identifier for the shotpoint or receiver index.

Shotpoint:To be 1 for original shot within the grid cell denoted by fields 2 and 3, and be incremented by 1 for each subsequent shot within the same grid cell. Exceptions: shots to be vertically stacked (unsummed vibroseis).

Receiver:To be 1 for the original positioning of a receiver group, and be incremented by 1 every time the receiver group is moved or repositioned, even when put back to any previous position.

5 **Point code**: A shotpoint or receiver code which is defined in the header by a table that describes the characteristics of the source or receiver group used at the point.

6 **Static correction**: The shotpoint or receiver static correction defined as a static time shift in Msec. that has been computed in the field to correct any seismic recording for the effects of elevation, weathering thickness, or weathering velocity at the point. The correction should be with reference to the seismic datum as defined by field 8 of this record. If no static was computed leave ‘blank’.

7 **Point Depth**: The depth of the shotpoint source or receiver group. Header defined units with respect to the surface down to the top of the charge or vertical receiver array. When the surface elevation can vary with time (e. g. a tidal water surface), then for shotpoints the value should be at the time of recording, and for receivers at the time of recording of the first shotpoint into that receiver. (See figures 3 and 4).

8 **Seismic datum**: Header defined units as an offset to the datum defined in header record H17. It is +ve when above datum,-ve when below datum or zero when at datum. If the seismic datum is equal to H17, enter zero. (See figures 3 and 4).

9 **Uphole time**: Defined for a shotpoint as the vertical travel time to surface, recorded in msec and is always positive or zero. If no uphole was recorded leave ‘blank’. Not defined for receiver leave ‘blank’, unless a reverse uphole is taken then the shotpoint definition applies.

10 **Water depth**: Header defined units of the measured (or reliably determined) height of water surface above the sea bed or water bottom. In case the water depth varies in time by more than one metre (e. g. tidal areas) then for shotpoints the

value should be at the time of recording and for receivers at the time of recording of the first shotpoint into that receiver. The water depth value is always positive. (See figures 3 and 4).

11 **Map grid easting**: The easting for the point, in the coordinate system defined by header record H13.

12 **Map grid northing**: The northing for the point, in the coordinate system defined by header record H13. To accommodate large TM northing values for surveys straddling the equator, this field format has one more digit than UKOOA P1/90.

13 **Surface elevation**: The topographical surface with respect to the vertical datum defined by header record H17. The surface elevation is +ve when above datum, -ve when below datum or zero when at datum. When the surface elevation with respect to the datum can vary with time (e. g. a tidal water surface), then for shotpoints the value should be at the time of recording, and for receivers at the time of recording of the first shotpoint into that receiver. (See Figure 2-3 and Figure 2-4).

14 **Day of year**: The julian day. For shotpoints the value should be the day of recording, and for receivers the day of recording of the first shotpoint into that receiver. When the survey continues into the next year, the day should keep increasing and not be reset to zero (1st January would then be 366 or367).

15 **Time hhmmss**: The time taken from the clock of the master seismic recording instrument. For shotpoints the value should be the time of recording, and for receivers the time of recording of the first shotpoint into that receiver.

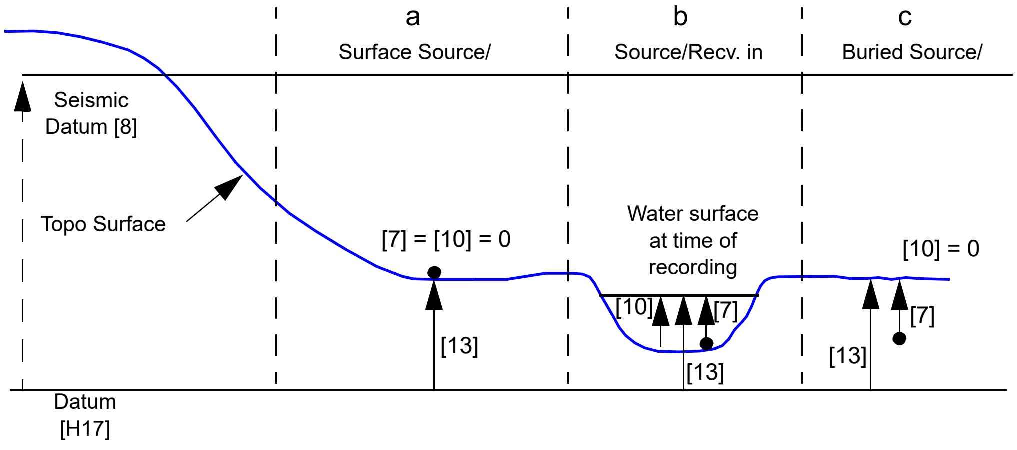


Figure 2-3 Land elevations

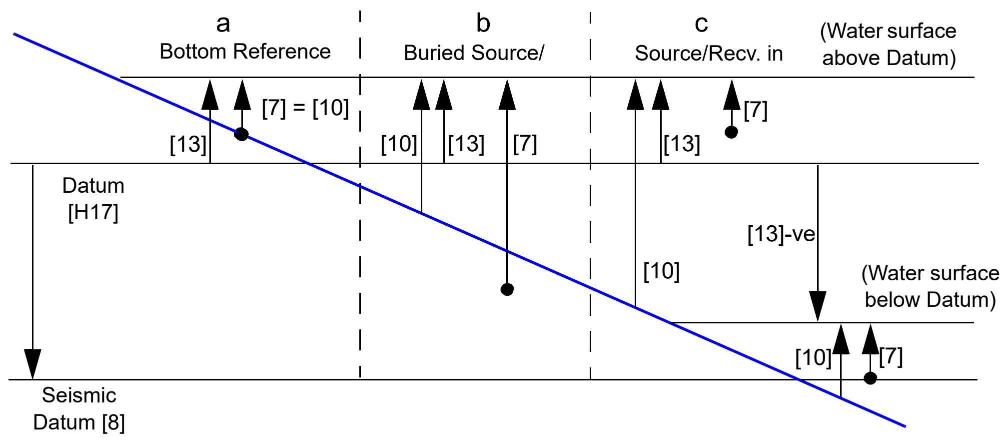


Figure 2-4 Tidal elevations

[7]	= Point Depth
[10]	= Water Depth at time of recording
[13]	= Surface Elevation w.r.t. Datum [H17]
[x]	= Item number in Point Record

Relation record description

2	**Field tape number**: The identifier of the data carrier (tape) on which the seismic recording of the spread defined by this record is written. To accommodate alphanumeric tape numbers this field is defined as 3A2 and is left-justified in the field.
3	**Field record number**: The number of the seismic recording given by the field instrument used to record the spread defined by this record.
4	**Field record increment**: The increment for the field record numbers, defined to allow several consecutive records which recorded the same shotpoint and spread to be defined by one 'X' record' (eg. unsummed vibroseis records).
5	**Instrument code**: Defined in the header by a table that describes the type, and settings of the instrument used to record the spread defined by this record.
6	**Line name**: Identifier for the shotpoint line. Must be identical to field 2 of the corresponding shotpoint record.
7	**Point number**: Identifier for the shotpoint number. Must be identical to field 3 of the corresponding shotpoint record.
8	**Point index**: Identifier for the shotpoint index. Must be identical to field 4 of the corresponding shotpoint record.
9	**From channel**: The seismic channel number as recorded in the seismic trace header corresponding to the data from the receiver group number defined by fields 12 and 13 of this record.
10	**To channel**: The seismic channel number as recorded in the seismic trace header corresponding to the data from the receiver group number defined by fields 12 and 14 of this record.
11	**Channel increment**: This field can be used for multi-component receivers when the three components (Z, X and Y) for one receiver point are recorded on three consecutive seismic channels. Then one 'X' record can define three components using a channel increment of 3. The components and their order are defined by the instrument code.
12	**Line name**: Identifier for the **receiver line** for the range of receivers defined by fields 13 and 14 of this record. The identifier must be identical to field 2 of the receiver point records that correspond to the same receiver line.
13	**From receiver**: Identifier for the **receiver group** number that corresponds to the From channel number defined in field 9. The identifier must be identical to field 3 of the receiver point record that corresponds to the same receiver group.

14 **To receiver**: Identifier for the **receiver group** number that corresponds to the To channel number defined in field 10. The identifier must be identical to field 3 of the receiver point record that corresponds to the same receiver group.

15 **Receiver index**: The receiver index value for the range of receivers defined by fields 12, 13 and 14 of this record. The combination of fields 12, 13, 15 and 12, 14, 15 must correspond to the same range of receivers as defined by records in the receiver point file.

Navigation message structure for 508TZ Operation

This record type is used as the accepted input format for external navigation software (e.g. Gator).

Item	Definition of field	Cols	Formats	Min. to Max.	Default	Units
0	Header	1-5	A5	"$SPS_"	None	-
1	Record Identification	6-6	A1	“S”	None	-
2	Line name (left adj)	7-16	F10.2	-999999.99 to 9999999.99	None	
3	Point Number (right adj)	17-26	F10.2	-999999.99 to 9999999.99	None	
+		27-28			Blank	
4	Point Index	29-29	I1	1 to 9	1	
5	Point Code	30-31	A2		Blank	
6	Static Correction	32-35	I4	-999 to 999	Blank	ms
7	Point depth	36-39	F4.1	0 to 99.9	0	m
8	Seismic datum	40-43	I4	-999 to 9999	0	m
9	Uphole time	44-45	I2	0 to 99	Blank	ms
10	Water depth	46-51	F6.1	0 to 9999.9	Blank	m
11	Map grid easting	52-60	F9.1		None	
12	Map grid northing	61-70	F10.1		None	

Item	Definition of field	Cols	Formats	Min. to Max.	Default	Units
13	Surface elevation	71-76	F6.1	-999.9 to 9999.9	None	m
14	Day of year	77-79	I3	1 to 999	None	
15	Time hhmmss[a]	80-85	3I2	000000 to 235959	None	
15.1	Decimal Point	86-86	A1	“.”	None	
15.2	Shot time in microseconds	87-92	I6	0-999999	None	µs
16.1	Separator (optional)	93-93	A1	“#”	None	
16.2	User Header (optional)	94-593	A500		None	

a. “Time” field must be provided in “UTC+0” format.

Where:
Ix = integer with x digits
Ax= string with x characters
yIx y integer with x digits
Fx.y = floating number with x integer digits and decimal digits

Examples of SPS files

R file

```
H00 SPS format version number   SPS 2.1;
H01 Description of survey area  Area A, Sparse 3-D, EXPLORATION;
H02 Date of survey              11.01.2006,21.01.2006;
H021Post/plot date of issue     22.01.2006;
H022Tape/disk identifier        B79437-B79503;
H03 Client                      SEG;
H04 Geophysical contractor      Contractor A;
```

```
H05 Positioning contractor      Contractor A;
H06 Pos. proc. contractor       Contractor A;
H07 Field computer system(s)    Sercel SN 408CMXL;
H08 Coordinate location         CENTRE OF SOURCE AND RECEIVER PATTERNS;
H09 Offset from coord. location 000M,000DEG;
H10 Clock time w.r.t. GMT       +3;
H11 Spare                       ;
H12 Geodetic datum,-spheroid    INTERNATIONAL 6378388.000 297.0000000
H13 Spare                       ;
H14 Geodetic datum parameters   -179.466-207.757 -54.446-2.598 0.287
0.843-1.000
H26 H14 are datum transformation parameters to WGS84
H15 Spare                       ;
H16 Spare                       ;
H17 Vertical datum description  MSL - mean sea level;
H18 Projection type             UTM;
H19 Projection zone             Zone 39, N;
H20 Description of grid units   METERS;
H201Factor to meter             1.00000000
H220Long. of central meridian   0510000.000E;
H231Grid origin                 0000000.000N0510000.000E;
H232Grid coord. at origin       00500000.00E00000000.00N;
H241Scale factor                0.9996000000;
H242Lat., long. scale factor    0000000.000N0510000.000E;
```

```
H30 Project code and descriptionArea A, Sparse 3-D,3D;

H400Type,Model,Polarity         1, Sercel,SN 408CMXL,SEG;

H401Crew name,Comment           1, S-51, Chief Ob. xxxxx;

H402Sample int.,Record Len.     1, 2msec, 6000msec;

H403Number of channels          1, 1920;

H404Tape type,format, density   1, cartridge 3590, Code 8058, 38000
bpi;

H405Filter_alias Hz,dB pnt,slope1, 200Hz,-3dB, 370.00;

H406Filter_notch Hz,-3dB points 1, NONE;

H407Filter_low Hz,dB pnt,slope  1, NONE;

H408Time delay FTB-SOD app Y/N  1, 0 MSEC, not applied;

H409Multi component recording   1, Z;

H410Aux. channel 1 contents     1, autocorrelation of true reference
delayed 1s;

H411Aux. channel 2 contents     1, autocorrelation of true reference
delayed 1s;

H412Aux. channel 3 contents     1, true reference;

H413Aux. channel 4 contents      1, return reference;

H414Spare                        ;

H415SPare                        ;

H416Spare                        ;

H417Spare                        ;

H26 SPS SEISMIC RECEIVER HEADER  RECORDS;

H26 DESCRIPTION OF RECEIVER CODE G1 (NORMAL GEOPHONE);

H26                              ;
```

```
H600Type,model,polarity          G1, Sensor, SM-24, SEG;
H601Damp coeff,natural freq.     G1, 0.685, 10Hz;
H602Nunits,len(X),width(Y)       G1, 36, 25.00m, 55.00m;
H603Unit spacing X,Y             G1, 5m, 5m;
H604Spare                        ;
H605Spare                        ;
H606Spare                        ;
H607Spare                        ;
H26 Description G1              G1, SAND, GRAVEL PLAIN, NORMAL PATTERN;
H26 DESCRIPTION OF RECEIVER CODE G2 (COMPRESSED GEOPHONE);
H610Type,model,polarity          G2, Sensor, SM-24, SEG;
H611Damp coeff,natural freq.     G2, 0.685, 10Hz;
H612Nunits,len(X),width(Y)       G2, 36, 20.00m, 55.00m;
H613Unit spacing X,Y             G2, 5m, 5m;
H614Description G2               G2, SAND, GRAVEL PLAIN, COMPRESSED
PATTERN;
H615Spare                        ;
H616Spare                        ;
H617Spare                        ;
H618Spare                        ;
H619Spare                        ;
H26 DESCRIPTION OF RECEIVER CODE G3 (BUNCHED GEOPHONE);
H620Type,model,polarity          G3, Sensor, SM-24, SEG;
H621Damp coeff,natural freq.     G3, 0.685, 10Hz;
```

```
H622Nunits,len(X),width(Y)        G3, 36, 0.00m, 25.00m;

H623Unit spacing X,Y              G3, 0m, 0m;

H624Description G3                G3, SAND, GRAVEL PLAIN, BUNCHED
PATTERN;

H625Spare                         ;

H626Spare                         ;

H627Spare                         ;

H628Spare                         ;

H629Spare                         ;

H26 SPS SEISMIC SOURCE HEADER RECORDS;

H26 DESCRIPTION OF SOURCE CODE   V6 (VIBROSEIS),PARALLELOGRAM PATTERN;

H26 GRAVEL PLAIN:                 ;

H800Type,model,polarity           V6, VIBROSEIS,VE432,SEG;

H801Size,vert. stk fold           V6, 70% of peak force, 1 SWEEP /
VIBRATOR/VP;

H802Nunits,len(X),width(Y)        V6, 5 VIBS, 48M, 0M;

H803Unit spacing X,Y              V6, 12M, 0M;

H804Control type                  V6, GNDFORCE;

H805Correlator,noise supp         V6, 408CMXL, NO NOISE SUPP;

H806Sweep type,length             V6, LINEAR UPSWEEP, 12sec;

H807Sweep freq start,end          V6, 4HZ, 84HZ;

H808Taper,length start,end       V6, COSINE, 1000MSEC, 1000MSEC;

H809Spare                        V6, All points on high side of median
line;

H810Spare                        ;
```

```
H820Type,model,polarity         V7, VIBROSEIS,VE432,SEG;
H821Size,vert. stk fold         V7, 70% of peak force, 1 SWEEP /
VIBRATOR/VP;
H822Nunits,len(X),width(Y)      V7, 5 VIBS, 48M, 0M;
H823Unit spacing X,Y            V7, 12M, 0M;
H824Control type                V7, GNDFORCE;
H825Correlator,noise supp       V7, 408CMXL, NO NOISE SUPP;
H826Sweep type,length           V7, LINEAR UPSWEEP, 12sec;
H827Sweep freq start,end        V7, 4HZ, 84HZ;
H828Taper,length start,end      V7, COSINE, 1000MSEC, 1000MSEC;
H829Spare                     V7, All points on low side of median line;
H830Spare                       ;
H840Type,model,polarity         V8, VIBROSEIS,VE432,SEG;
H841Size,vert. stk fold         V8, 70% of peak force, 1 SWEEP /
VIBRATOR/VP;
H842Nunits,len(X),width(Y)      V8, 5 VIBS, 48M, 0M;
H843Unit spacing X,Y            V8, 12M, 0M;
H844Control type                V8, GNDFORCE;
H845Correlator,noise supp       V8, 408CMXL, NO NOISE SUPP;
H846Sweep type,length           V8, LINEAR UPSWEEP, 12sec;
H847Sweep freq start,end        V8, 4HZ, 84HZ;
H848Taper,length start,end      V8, COSINE, 1000MSEC, 1000MSEC;
H849Spare                      V8, All points on secordary source lines;
H850Spare                       ;
```

```
H26 Percentage hold down weight 70% of peak force;

H990R,S,X file quality control  22/Jan/06,0930,Party Manager;

H991Coord. status final/prov    Final,22/Jan/06,1600,Party Manager;

H26      1         2         3         4         5         6         7
8

H26
5678901234567890123456789012345678901234567890123456789012345678901234
567890

R   5646.00 534450.00  1G1     0.0             238510.1 3058380.0  85.2
18213250

R   5646.00 534500.00  1G1     0.0             238540.0 3058380.0  84.3
18213250

R   5646.00 534550.00  1G1     0.0             238570.0 3058380.0  83.2
18213101

R   5646.00 534600.00  1G1     0.0             238600.0 3058380.0  82.4
18213101

R   5646.00 534650.00  1G1     0.0             238630.0 3058380.0  82.0
18212717

R   5646.00 534700.00  1G1     0.0             238660.0 3058380.0  81.9
18212717

R   5646.00 534750.00  1G1     0.0             238690.0 3058380.0  81.5
18212457

R   5646.00 534800.00  1G1     0.0             238720.0 3058380.0  81.8
18212457

R   5646.00 534850.00  1G1     0.0             238750.0 3058380.0  82.4
18212328
```

S file

```
H00 SPS format version number   SPS 2.1;
H01 Description of survey area  Area A, Sparse 3-D, EXPLORATION;
H02 Date of survey              19.01.2006,21.01.2006;
H021Post/plot date of issue     22.01.2006;
H022Tape/disk identifier        B79480;
H023Line sequence number        5;
H03 Client                      SEG;
H04 Geophysical contractor      Contractor A;
H05 Positioning contractor      Contractor A;
H06 Pos. proc. contractor       Contractor A;
H07 Field computer system(s)    Sercel SN 408CMXL;
H08 Coordinate location         CENTRE OF SOURCE AND RECEIVER PATTERNS;
H09 Offset from coord. location 000M,000DEG;
H10 Clock time w.r.t. GMT       +3;
H11 Spare                       ;
H12 Geodetic datum,-spheroid    INTERNATIONAL 6378388.000 297.0000000
H13 Spare                       ;
H14 Geodetic datum parameters   -179.466-207.757 -54.446-2.598 0.287
0.843-1.000
H26 H14 are datum transformation parameters to WGS84
H15 Spare ;
H16 Spare ;
H17 Vertical datum description  MSL - mean sea level;
```

```
H18 Projection type                UTM;

H19 Projection zone                Zone 39, N;

H20 Description of grid units      METERS;

H201Factor to meter                1.00000000

H220Long. of central meridian      0510000.000E;

H231Grid origin                    0000000.000N0510000.000E;

H232Grid coord. at origin          00500000.00E00000000.00N;

H241Scale factor                   0.9996000000;

H242Lat., long. scale factor       0000000.000N0510000.000E;

H30 Project code and descriptionArea A, Sparse 3-D,3D;

H400Type,Model,Polarity            1, Sercel,SN 408CMXL,SEG;

H401Crew name,Comment              1, S-51, Chief Ob. xxxxx;

H402Sample int.,Record Len.        1, 2msec, 6000msec;

H403Number of channels             1, 1920;

H404Tape type,format, density      1, cartridge 3590, Code 8058, 38000
bpi;

H405Filter_alias Hz,dB pnt,slope1, 200Hz,-3dB, 370.00;

H406Filter_notch Hz,-3dB points 1, NONE;

H407Filter_low Hz,dB pnt,slope     1, NONE;

H408Time delay FTB-SOD app Y/N     1, 0 MSEC, not applied;

H409Multi component recording      1, Z;

H410Aux. channel 1 contents        1, autocorrelation of true reference
delayed 1s;

H411Aux. channel 2 contents        1, autocorrelation of true reference
delayed 1s;
```

```
H412Aux. channel 3 contents     1, true reference;
H413Aux. channel 4 contents     1, return reference;
H414Spare                       ;
H415SPare                       ;
H416SPare                        ;
H417Spare                        ;
H26 SPS SEISMIC RECEIVER HEADER RECORDS;
H26 DESCRIPTION OF RECEIVER CODE G1 (NORMAL GEOPHONE);
H26 ;
H600Type,model,polarity          G1, Sensor, SM-24, SEG;
H601Damp coeff,natural freq.     G1, 0.685, 10Hz;
H602Nunits,len(X),width(Y)       G1, 36, 25.00m, 55.00m;
H603Unit spacing X,Y             G1, 5m, 5m;
H604Spare                        ;
H605Spare                        ;
H606Spare                        ;
H607Spare                        ;
H26 Description G1              G1, SAND, GRAVEL PLAIN, NORMAL PATTERN;
H26 DESCRIPTION OF RECEIVER CODE G2 (COMPRESSED GEOPHONE);
H610Type,model,polarity          G2, Sensor, SM-24, SEG;
H611Damp coeff,natural freq.     G2, 0.685, 10Hz;
H612Nunits,len(X),width(Y)       G2, 36, 20.00m, 55.00m;
H613Unit spacing X,Y             G2, 5m, 5m;
```

```
H614Description G2                G2, SAND, GRAVEL PLAIN, COMPRESSED
PATTERN;

H615Spare                         ;

H616Spare                         ;

H617Spare                         ;

H618Spare                         ;

H619Spare                         ;

H26 DESCRIPTION OF RECEIVER CODE G3 (BUNCHED GEOPHONE);

H620Type,model,polarity           G3, Sensor, SM-24, SEG;

H621Damp coeff,natural freq.      G3, 0.685, 10Hz;

H622Nunits,len(X),width(Y)        G3, 36, 0.00m, 25.00m;

H623Unit spacing X,Y              G3, 0m, 0m;

H624Description G3                G3, SAND, GRAVEL PLAIN, BUNCHED
PATTERN;

H625Spare                         ;

H626Spare                         ;

H627Spare                         ;

H628Spare                         ;

H629Spare                         ;

H26 SPS SEISMIC SOURCE HEADER RECORDS;

H26 DESCRIPTION OF SOURCE CODE   V6 (VIBROSEIS),PARALLELOGRAM PATTERN;

H26 GRAVEL PLAIN:                 ;

H800Type,model,polarity           V6, VIBROSEIS,VE432,SEG;

H801Size,vert. stk fold           V6, 70% of peak force, 1 SWEEP /
VIBRATOR/VP;
```

```
H802Nunits,len(X),width(Y)        V6, 5 VIBS, 48M, 0M;
H803Unit spacing X,Y              V6, 12M, 0M;
H804Control type                  V6, GNDFORCE;
H805Correlator,noise supp         V6, 408CMXL, NO NOISE SUPP;
H806Sweep type,length             V6, LINEAR UPSWEEP, 12sec;
H807Sweep freq start,end          V6, 4HZ, 84HZ;
H808Taper,length start,end        V6, COSINE, 1000MSEC, 1000MSEC;
H809Spare                         V6, All points on high side of median
line;
H810Spare                         ;
H820Type,model,polarity           V7, VIBROSEIS,VE432,SEG;
H821Size,vert. stk fold V7,       70% of peak force, 1 SWEEP /VIBRATOR/
VP;
H822Nunits,len(X),width(Y)        V7, 5 VIBS, 48M, 0M;
H823Unit spacing X,Y              V7, 12M, 0M;
H824Control type                  V7, GNDFORCE;
H825Correlator,noise supp         V7, 408CMXL, NO NOISE SUPP;
H826Sweep type,length             V7, LINEAR UPSWEEP, 12sec;
H827Sweep freq start,end          V7, 4HZ, 84HZ;
H828Taper,length start,end        V7, COSINE, 1000MSEC, 1000MSEC;
H829Spare                         V7, All points on low side of median
line;
H830Spare                         ;
H840Type,model,polarity           V8, VIBROSEIS,VE432,SEG;
```

```
H841Size,vert. stk fold          V8, 70% of peak force, 1 SWEEP /
VIBRATOR/VP;

H842Nunits,len(X),width(Y)       V8, 5 VIBS, 48M, 0M;

H843Unit spacing X,Y             V8, 12M, 0M;

H844Control type                 V8, GNDFORCE;

H845Correlator,noise supp        V8, 408CMXL, NO NOISE SUPP;

H846Sweep type,length            V8, LINEAR UPSWEEP, 12sec;

H847Sweep freq start,end         V8, 4HZ, 84HZ;

H848Taper,length start,end       V8, COSINE, 1000MSEC, 1000MSEC;

H849Spare                        V8, All points on secordary source
lines;

H850Spare                        ;

H26 Percentage hold down weight  70% of peak force;

H990R,S,X file quality control   22/Jan/06,0930,Party Manager;

H991Coord. status final/prov     Final,22/Jan/06,1600, Party Manager;

H26     1        2        3        4        5        6        7
8

H26
5678901234567890123456789012345678901234567890123456789012345678901234
567890

S   5713.00 542525.00  2V6              0       243355.0 3060390.0
60.6019001150

S   5603.00 542425.00  1V7              0       243295.0 3057090.0
71.1019001218

S   5601.00 542525.00  1V7              0       243355.0 3057030.0
72.7019001414
S   5715.00 542525.00  2V6              0       243355.0 3060450.0
61.0019001452
```

X file

```
H00 SPS format version number   SPS 2.1;
H01 Description of survey area  Area A, Sparse 3-D, EXPLORATION;
H02 Date of survey              19.01.2006,21.01.2006;
H021Post/plot date of issue     22.01.2006;
H022Tape/disk identifier        B79480;
H023Line sequence number        5;
H03 Client                      SEG;
H04 Geophysical contractor      Contractor A;
H05 Positioning contractor      Contractor A;
H06 Pos. proc. contractor       Contractor A;
H07 Field computer system(s)    Sercel SN 408CMXL;
H08 Coordinate location         CENTRE OF SOURCE AND RECEIVER PATTERNS;
H09 Offset from coord. location 000M,000DEG;
H10 Clock time w.r.t. GMT       +3;
H11 Spare                       ;
H12 Geodetic datum,-spheroid    INTERNATIONAL 6378388.000 297.0000000
H13 Spare                       ;
H14 Geodetic datum parameters   -179.466-207.757 -54.446-2.598 0.287
0.843-1.000
H26 H14 are datum transformation parameters to WGS84
H15 Spare                       ;
H16 Spare                       ;
H17 Vertical datum description  MSL - mean sea level;
```

```
H18 Projection type              UTM;

H19 Projection zone              Zone 39, N;

H20 Description of grid units    METERS;

H201Factor to meter              1.00000000

H220Long. of central meridian    0510000.000E;

H231Grid origin                  0000000.000N0510000.000E;

H232Grid coord. at origin        00500000.00E00000000.00N;

H241Scale factor                 0.9996000000;

H242Lat., long. scale factor     0000000.000N0510000.000E;

H30 Project code and descriptionArea A, Sparse 3-D,3D;

H400Type,Model,Polarity          1, Sercel,SN 408CMXL,SEG;

H401Crew name,Comment            1, S-51, Chief Ob. xxxxx;

H402Sample int.,Record Len.      1, 2msec, 6000msec;

H403Number of channels           1, 1920;

H404Tape type,format, density    1, cartridge 3590, Code 8058, 38000
bpi;

H405Filter_alias Hz,dB pnt,slope1, 200Hz,-3dB, 370.00;

H406Filter_notch Hz,-3dB points 1, NONE;

H407Filter_low Hz,dB pnt,slope   1, NONE;

H408Time delay FTB-SOD app Y/N   1, 0 MSEC, not applied;

H409Multi component recording    1, Z;

H410Aux. channel 1 contents      1, autocorrelation of true reference
delayed 1s;

H411Aux. channel 2 contents      1, autocorrelation of true reference
delayed 1s;
```

```
H412Aux. channel 3 contents      1, true reference;
H413Aux. channel 4 contents      1, return reference;
H414Spare                        ;
H415SPare                        ;
H416SPare                         ;
H417Spare                         ;
H26 SPS SEISMIC RECEIVER HEADER RECORDS;
H26 DESCRIPTION OF RECEIVER CODE G1 (NORMAL GEOPHONE);
H26                               ;
H600Type,model,polarity           G1, Sensor, SM-24, SEG;
H601Damp coeff,natural freq.      G1, 0.685, 10Hz;
H602Nunits,len(X),width(Y)        G1, 36, 25.00m, 55.00m;
H603Unit spacing X,Y              G1, 5m, 5m;
H604Spare                         ;
H605Spare                         ;
H606Spare                         ;
H607Spare                         ;
H26 Description G1               G1, SAND, GRAVEL PLAIN, NORMAL PATTERN;
H26 DESCRIPTION OF RECEIVER CODE G2 (COMPRESSED GEOPHONE);
H610Type,model,polarity           G2, Sensor, SM-24, SEG;
H611Damp coeff,natural freq.      G2, 0.685, 10Hz;
H612Nunits,len(X),width(Y)        G2, 36, 20.00m, 55.00m;
H613Unit spacing X,Y              G2, 5m, 5m;
```

```
H614Description G2                G2, SAND, GRAVEL PLAIN, COMPRESSED
PATTERN;

H615Spare                         ;

H616Spare                         ;

H617Spare                         ;

H618Spare                         ;

H619Spare                         ;

H26 DESCRIPTION OF RECEIVER CODE G3 (BUNCHED GEOPHONE);

H620Type,model,polarity           G3, Sensor, SM-24, SEG;

H621Damp coeff,natural freq.      G3, 0.685, 10Hz;

H622Nunits,len(X),width(Y)        G3, 36, 0.00m, 25.00m;

H623Unit spacing X,Y              G3, 0m, 0m;

H624Description G3                G3, SAND, GRAVEL PLAIN, BUNCHED
PATTERN;

H625Spare                         ;

H626Spare                         ;

H627Spare                         ;

H628Spare                         ;

H629Spare                         ;

H26 SPS SEISMIC SOURCE HEADER RECORDS;

H26 DESCRIPTION OF SOURCE CODE    V6 (VIBROSEIS),PARALLELOGRAM PATTERN;

H26 GRAVEL PLAIN:                 ;

H800Type,model,polarity           V6, VIBROSEIS,VE432,SEG;

H801Size,vert. stk fold           V6, 70% of peak force, 1 SWEEP /
VIBRATOR/VP;
```

```
H802Nunits,len(X),width(Y)          V6, 5 VIBS, 48M, 0M;

H803Unit spacing X,Y                V6, 12M, 0M;

H804Control type                    V6, GNDFORCE;

H805Correlator,noise supp           V6, 408CMXL, NO NOISE SUPP;

H806Sweep type,length               V6, LINEAR UPSWEEP, 12sec;

H807Sweep freq start,end            V6, 4HZ, 84HZ;

H808Taper,length start,end          V6, COSINE, 1000MSEC, 1000MSEC;

H809Spare                           V6, All points on high side of median
line;

H810Spare                           ;

H820Type,model,polarity             V7, VIBROSEIS,VE432,SEG;

H821Size,vert. stk fold             V7, 70% of peak force, 1 SWEEP /
VIBRATOR/VP;

H822Nunits,len(X),width(Y)          V7, 5 VIBS, 48M, 0M;

H823Unit spacing X,Y                V7, 12M, 0M;

H824Control type                    V7, GNDFORCE;

H825Correlator,noise supp           V7, 408CMXL, NO NOISE SUPP;

H826Sweep type,length               V7, LINEAR UPSWEEP, 12sec;

H827Sweep freq start,end            V7, 4HZ, 84HZ;

H828Taper,length start,end          V7, COSINE, 1000MSEC, 1000MSEC;

H829Spare                           V7, All points on low side of median
line;

H830Spare                           ;

H840Type,model,polarity             V8, VIBROSEIS,VE432,SEG;
```

```
H841Size,vert. stk fold          V8, 70% of peak force, 1 SWEEP /
VIBRATOR/VP;

H842Nunits,len(X),width(Y)       V8, 5 VIBS, 48M, 0M;

H843Unit spacing X,Y             V8, 12M, 0M;

H844Control type                 V8, GNDFORCE;

H845Correlator,noise supp        V8, 408CMXL, NO NOISE SUPP;

H846Sweep type,length            V8, LINEAR UPSWEEP, 12sec;

H847Sweep freq start,end         V8, 4HZ, 84HZ;

H848Taper,length start,end       V8, COSINE, 1000MSEC, 1000MSEC;

H849Spare                        V8, All points on secordary source
lines;

H850Spare                        ;

H26 Percentage hold down weight  70% of peak force;

H990R,S,X file quality control   22/Jan/06,0930,Party Manager;

H991Coord. status final/prov     Final,22/Jan/06,1600, Party Manager;

H26     1        2        3        4        5        6        7
8

H26
5678901234567890123456789012345678901234567890123456789012345678901234
567890

XB79480       111   5713.00 542525.002    1  3201   5646.00 534550.00
550500.001

XB79480       111   5713.00 542525.002  321  6401   5662.00 534550.00
550500.001

XB79480       111   5713.00 542525.002  641  9601   5678.00 534550.00
550500.001
```

```
XB79480        111    5713.00 542525.002  961 12801   5694.00 534550.00
550500.001

XB79480        111    5713.00 542525.002 1281 16001   5710.00 534550.00
550500.001

XB79480        111    5713.00 542525.002 1601 19201   5726.00 534550.00
550500.001

XB79480        211    5603.00 542425.001    1  3201   5646.00 534450.00
550400.001

XB79480        211    5603.00 542425.001  321  6401   5662.00 534450.00
550400.001

XB79480        211    5603.00 542425.001  641  9601   5678.00 534450.00
550400.001

XB79480        211    5603.00 542425.001  961 12801   5694.00 534450.00
550400.001

XB79480        211    5603.00 542425.001 1281 16001   5710.00 534450.00
550400.001
```

Chapter

3

Navigation Software Input Format

This chapter describes the accepted External Navigation software message structure for 508TZ operation.

Navigation software message structure for 508TZ Operation

Message Structure

The table below indicates the accepted message structure allowing the 508XT to read data from external navigation software.

Item	Definition of Field	Columns	Format	Min to Max	Default	Units
0	Header	1-5	A6	"$SPS_"	None	
1	Record identification	6-6	A1	"S"	None	-
2	Line name (left adj)	7-16	F10.2	-999999.99 to 9999999.99	None	-
3	Point number (right adj)	17-26	F10.2	-999999.99 to 9999999.99	None	-
+		27-28			Blank	-
4	Point Index	29-29	I1	1 to 9	1	-
5	Point Code	30-31	A2		Blank	-
6	Static Correction	32-35	I4	-999 to 999	Blank	ms
7	Point Depth	36-39	F4.1	0 to 99.9	0	m
8	Seismic Datum	40-43	I4	-999 to 9999	0	m
9	Uphole Time	44-45	I2	0 to 99	Blank	ms
10	Water depth	46-51	F6.1	0 to 9999.9	Blank	m
11	Map Grid Easting	52-60	F9.1		None	
12	Map Grid Northing	61-70	F10.1		None	
13	Surface Elevation	71-76	F6.1	-999.9 to 9999.9	None	m
14	Day of Year	77-79	I3	1 to 999	None	
15	Time hhmmss[1]	80-85	3I2	000000 to 235959	None	

Item	Definition of Field	Columns	Format	Min to Max	Default	Units
16	Decimal Point	86-86	A1	"."	None	
17	Shot time in Microseconds	87-92	I6	0-999999	None	µs
18	Separator (optional)	93-93	A1	"#"	None	
19	User Header (optional)	94-593	A500		None	

1. "Time" field must be provided in "UTC+0" format

Where:
- Ix = integer with x digits
- Ax = string with x characters
- yIx = y integer with x digits
- Fx.y = floating number with x integer digits and decimal digits

Chapter

4

APS Output Files

This chapter includes the following sections

Overview

This chapter describes the file formats used to export shot point attributes for source Quality Control tools when using vibrators. The files can be analyzed in the VE464 environment and graphically displayed in the Geographic Views.

The APS is:

- updated after each acquisition.
- one record for each vibrator

APS Output Files Specification

Data Format

The result are given for a range of temperature of [-40°C to +70°C], according the 508^{XT} specification.

Table 4-1

Item	Definition of Field	Cols.	Formats	Min to Max	Default	Units
1	Record identification	1-1	A1	“A”	None	-
2	Line name	2-17	4A4	Free	None	-
3	Point number	18-25	2A4	Free	None	-
4	Point index	26-26	I1	1-9	1	-
5	Vibrator fleet number	27-27	I1	Free	None	-
6	Vibrator number	28-29	I2	Free	None	-
7	Vibrator drive level	30-32	I3	0-100	None	%
8	Average phase	33-36	I4	-180 to 180	None	degree
9	Peak phase	37-40	I4	-180 to 180	None	degree

Table 4-1

Item	Definition of Field	Cols.	Formats	Min to Max	Default	Units
10	Average distor-tion	41-42	I2	0-99	None	%
11	Peak distortion	43-44	I2	0-99	None	%
12	Average force	45-46	I2	0-99	None	%
13	Peak force	47-49	I3	Free	None	%
14	Average ground stiffness	50-52	I3	Free	None	-
15	Average ground viscosity	53-55	I3	Free	None	-
16	Vib. position Eas-ting	56-64	F9.1	Free	None	meter
17	Vib. position Northing	65-74	F10.1	Free	None	meter
18	Vib. position ele-vation	75-80	F6.1	-999.9 to 9999.9	None	meter

Item 5 *: A single character can be recorded in column 27. If the Vibrator Fleet Number is a 2-digit number, then it is replaced by a letter with the following encoding: A=10, B=11, C=12, D=13, E=14, F=15, G=16, H=17, I=18, J=19, K=20, L=21, M=22, N=23, O=24, P=25, Q=26, R=27, S=28, T=29, U=30, V=31, W=32.*

***Items** 7 **to 18** : left blank if*

- *no vibrator attributes are available.*
- *GPS failure or bad quality.*

Unless the coordinates supplied by the radio positioning receiver to the DPG are already in a projection format, the vibrator coordinates are converted using the projection selected in the POSITIONING Setup window.

*The Elevation reported is the elevation contained in the **$GPGGA** messages from radiopositioning receivers (referenced to the geoidal model).*

Examples

```
H26

H26      1         2         3         4         5         6         7         8

H26 567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

H26

A         22741.0 13556.019 9 75   1  -2101774 78 26 38 327007.0 2806034.6 242.8

A         22745.0 13556.019 9 75   1  -2101475 80 24 37 327002.1 2806055.4 243.4

A         22749.0 13556.019 9 75   1  -1 91375 79 27 41 327006.5 2806078.2 243.6

A         22753.0 13554.019 9 75   1   2101575 79 24 37 326978.9 2806107.6 246.1

A         22747.0 13552.019 9 75   1  -2 91574 79 25 35 326955.4 2806070.3 246.4

A         22743.0 13552.019 9 75   1   2 91575 79 27 39 326955.7 2806045.3 245.5

A         22759.0 13824.012 2 75   2   4121674 81 18 27 330354.5 2806143.5 268.5

A         22755.0 13824.012 2 75   2   4 91474 79 25 24 330359.3 2806117.3 269.4

A         22751.0 13824.012 2 75   2   5121774 78 21 24 330357.7 2806092.5 270.7

A         22747.0 13824.012 2 75   2   4101474 79 18 27 330357.6 2806066.6 272.0

A         22743.0 13824.012 2 75   2   4 91474 78 20 29 330357.7 2806042.7 273.4

A         22749.0 14148.01121 75   1  -2112474 78 20 35 334405.4 2806081.7 259.5

A         22743.0 13652.012 2 75   2   7131872 81 31 15 328205.5 2806047.8 280.3

A         22761.0 14074.018 8 75   4  14205867 79 39 20 333480.2 2806157.8 243.5

A         22755.0 13312.011 1 75   1   2121774 78 30 17 323957.1 2806121.6 284.4

A         22741.0 13652.012 2 75   2   4111774 82 22 32 328207.2 2806034.3 278.1

A         22747.0 14148.01121 75   1   2112475 78 20 37 334402.7 2806068.2 259.9

A         22759.0 13312.011 1 75   0   1192674 77 45 25 323957.0 2806143.4 284.6

A         22745.0 13828.01c12 75   1   3 91475 78 30 24 330402.8 2806057.9 272.3

A         22743.0 13648.012 2 75   1   5112075 78 22 36 328156.5 2806040.5 276.8

A         22753.0 14076.018 8 75   2   5122278 82 20 34 333506.3 2806107.7 241.9

A         22757.0 13308.011 1 75   1   2143073 78 21 33 323908.3 2806130.3 285.8

A         22745.0 14148.01121 75   1   6173374 82 14 39 334404.1 2806056.3 261.0

A         22747.0 13648.012 2 75   2   4 81874 79 22 32 328158.8 2806066.9 277.8
```

```
A        22753.0 13308.011 1 75   1   4173671 79 14 30 323907.0 2806105.0 285.9
A        22757.0 14076.018 8
A        22751.0 13648.012 2 75   2   5131875 80 17 30 328155.1 2806090.2 278.5
A        22749.0 13308.011 1 75   1   5131973 75 32 23 323906.7 2806083.2 286.4
A        22745.0 14150.01121 75   2   5193470 80 20 30 334429.7 2806057.4 264.7
A        22749.0 13828.01c12 75   2   6163069 79 11 27 330405.2 2806076.3 268.7
```

Chapter 5 VAPS Output Files

This chapter includes the following sections

Overview

This chapter describes the file formats used to export shot point attributes for source Quality Control tools when using vibrators. Compared to APS out Files, "V" stands for Verbose. The files can be analyzed in the VE464 environment and graphically displayed in the Geographic Views.

The VAPS is:

- updated after each acquisition.
- one record for each vibrator

VAPS Output Files Specification

Data Format

The result are given for a range of temperature of [-40°C to +70°C], according the 508^{XT} specification.

Item	Definition of Field	Cols	Formats	Min. To Max.	Default	Units
1	Record identification	1-1	A1	"A"	None	-
2	Line name	2-17	4A4	Free	None	-
3	Point number	18-25	2A4	Free	None	-
4	Point index	26-26	I1	1-9	1	-
5	Vibrator fleet number	27-27	I1	Free	None	-
6	Vibrator number	28-29	I2	Free	None	-
7	Vibrator drive level	30-32	I3	0-100	None	%
8	Average phase	33-36	I4	-180 to 180	None	degree
9	Peak phase	37-40	I4	-180 to 180	None	degree
10	Average distortion	41-42	I2	0-99	None	%
11	Peak distortion	43-44	I2	0-99	None	%
12	Average force	45-46	I2	0-99	None	%

13	Peak force	47-49	I3	Free	None	%
14	Average ground stiffness	50-52	I3	Free	None	-
15	Average ground viscosity	53-55	I3	Free	None	-
16	Vib. position Easting	56-64	F9.1	Free	None	meter
17	Vib. position Northing	65-74	F10.1	Free	None	meter
18	Vib. position elevation	75-80	F6.1	-999.9 to 9999.9	None	meter
19	Shot Number	82-86	I5	1-99999	None	-
20	Acquisition Number	87-88	I2	1-32	None	-
21	2-digit vibrator fleet number	89-90	I2	1-32	None	-
22	Vib Status Code	91-92	I2	1-98	None	-
23	Mass 1 Warning	94-94	A1	Space or W	None	-
24	Mass 2 Warning	95-95	A1	Space or W	None	-
25	Mass 3 Warning	96-96	A1	Space or W	None	-
26	Plate 1 Warning	100-100	A1	Space or W	None	-
27	Plate 2 Warning	101-101	A1	Space or W	None	-
28	Plate 3 Warning	102-102	A1	Space or W	None	-
29	Plate 4 Warning	103-103	A1	Space or W	None	-
30	Plate 5 Warning	104-104	A1	Space or W	None	-
31	Plate 6 Warning	105-105	A1	Space or W	None	-
32	Force Overload	106-106		Space or F	None	-
33	Pressure Overload	107-107		Space or P	None	-
34	Mass Overload	108-108		Space or M	None	-
35	Valve Overload	109-109		Space or V	None	-
36	Excitation Overload	110-110		Space or E	None	-

37	Stacking Fold	111-112		1-32	None	-
38	Computation Domain	113-113		T or F	None	-
39	Ve432 Version	114-117		Free	None	-
40	Day of Year	118-120		1-999	None	-
41	Time hhmmss	121-126		000000-235959	None	-
42	HDOP	127-130		0.0-99.9	None	-
43	TB date (VE464 TB GPS time)	131-150		0 to18446744073709551615		

Item 5 *: A single character can be recorded in column 27. If the Vibrator Fleet Number is a 2-digit number, then it is replaced by a letter with the following encoding: A=10, B=11, C=12, D=13, E=14, F=15, G=16, H=17, I=18, J=19, K=20, L=21, M=22, N=23, O=24, P=25, Q=26, R=27, S=28, T=29, U=30, V=31, W=32.*

Items *7* ***to 18*** *: left blank if*

no vibrator attributes are available.

GPS failure or bad quality.

- Unless the coordinates supplied by the radio positioning receiver to the DPG are already in a projection format, the vibrator coordinates are converted using the projection selected in the POSITIONING Setup window.

- The Elevation reported is the elevation contained in the ***$GPGGA*** *messages from radiopositioning receivers (referenced to the geoidal model).*

Examples

```
         3         4         5         6         7         8         9         0         1         2         3         4
23456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789

56.019 9 75   1  -2101774 78 26 38 327007.0 2806034.6 242.8     34 109 1               1T N/A 56 40209 0.8     104578934597200
56.019 9 75   1  -2101475 80 24 37 327002.1 2806055.4 243.4    440 109 1               1T N/A 56 40314 0.8     104578941022800
56.019 9 75   1  -1 91375 79 27 41 327006.5 2806078.2 243.6    846 109 1               1T N/A 56 40357 0.8     104578945340000
54.019 9 75   1   2101575 79 24 37 326978.9 2806107.6 246.1   1252 109 1               1T N/A 56 40504 0.8     104578952066800
52.019 9 75   1  -2 91574 79 25 35 326955.4 2806070.3 246.4    642 109 1               1T N/A 56 40604 0.8     104578958018400
52.019 9 75   1   2 91575 79 27 39 326955.7 2806045.3 245.5    236 109 1               1T N/A 56 40654 0.8     104578963060000
24.012 2 75   2   4121674 81 18 27 330354.5 2806143.5 268.5   1894 102 1           P   1T N/A 56 54822 0.9     104579571836000
40.011 1 75   0   2111674 79 32 33 326807.3 2806030.7 256.7     32 101 1               1T N/A 56 64215 0.8     104579895124000
40.011 1 75   1   4152674 81 22 34 326803.2 2806056.2 257.8    438 101 1           P   1T N/A 56 64257 0.9     104579899340800
40.011 1 75   2   7224667 76 11 25 326804.0 2806081.4 259.3    844 101 1           P V 1T N/A 56 64328 0.8     104579902453200
40.011 1 75   3   7235160 77 12 20 326807.2 2806104.9 262.2   1250 101 1           P V 1T N/A 56 64401 0.8     104579905766400
40.011 1 75   0   0 0 0 0  0  0  0      0.0       0.0   0.0   1453 10110               1T N/A 56 64444 0.0     104579910047600
40.021 1 75   0   0 0 0 0  0  0  0      0.0       0.0   0.0   1453 10110               1T N/A 56 64537 0.0     104579915304400
40.011 1 75   3  10193167 79 24 17 326806.2 2806132.9 267.2   1656 101 1           P   1T N/A 56 64642 0.8     104579921830400
36.011 1 75   0   0 0 0 0  0  0  0      0.0       0.0   0.0   1858 10114               1T N/A 56 70344 0.0     104580024037600
16.012 2 75   2   6101772 78 22 20 330257.2 2806043.3 277.6    269 102 1           P   1T N/A 56 70451 0.8     104580030740000
12.012 2 75   1   4101674 78 31 25 330206.7 2806033.1 278.2     66 102 1               1T N/A 56 70607 0.7     104580038394800
12.012 2 75   2   5 91374 78 19 26 330206.8 2806055.4 277.8    472 102 1           P   1T N/A 56 70658 0.7     104580043432000
12.012 2 75   2   4111374 80 19 26 330207.0 2806082.0 277.2    878 102 1               1T N/A 56 70808 0.7     104580050442800
36.021 1 75   1   4174472 78 20 33 326756.8 2806142.9 262.6   1858 101 1           P V 1T N/A 56 70900 0.7     104580055663600
12.012 2 75   2   3121574 79 14 28 330205.8 2806105.0 276.8   1284 102 1               1T N/A 56 70913 0.7     104580056971600
36.011 1 75   1   3142674 84 22 31 326756.0 2806119.2 260.9   1452 101 1           P   1T N/A 56 70946 0.7     104580060279200
12.012 2 75   1   3101374 80 21 32 330207.8 2806131.0 274.1   1690 102 1               1T N/A 56 71015 0.7     104580063167200
36.011 1 75   3   8234861 77 11 20 326757.0 2806094.8 259.8   1046 101 1           P VE 1T N/A 56 71046 0.7    104580066236800
```

Chapter 6 COG Output Files

This chapter includes the following sections,

Overview

Information on the Centre Of Gravity of the source is logged into a daily file, identified by its julian day, that can be viewed and exported using the report Interface.

The coordinates of the COG are given for reading directly on the map (after Projection)

The COG is:

- updated computed after each VP unless an ABORT shot has been performed.

COG Output Files Specification

Data Format

The result are given for a range of temperature of [-40°C to +70°C], according the 508^{XT} specification.

Item	Definition of Field	Cols	Formats	Min. To Max.	Default	Units
1	Record identification	1-1	A1	“C”	None	-
2	Line name	2-17	4A4	Free	None	-
3	Point number	18-25	2A4	Free	None	-
4	Point Index	26-26	I1	1-9	1	-
5	COG status	28-28	I1	0 to 7	None	-
6	COG position Easting	30-38	F9.1	Free	None	meter
7	COG position Northing	40-49	F10.1	Free	None	meter
8	COG position elevation	51-56	F6.1	Free	None	meter
9	COG - Source deviation	60-69	F10.1	Free	None	meter

Item 8 *: the altitude correction specified in the Projection Setup is taken into account in computing the elevation. The Elevation reported is the elevation referenced to the geoidal model.*

Items 2 to 4 *: These information are from the SPS S in File*

Item 5 :

0= No Cog

The system was unable to calculate the COG.

1= Estimated Cog

*Although the GPS position from one or more vibrators was not available, an estimated COG was calculated, deduced from the vibrator pattern of the previous source point. The estimated COG lies within the allowable circle determined by the "**COG Radius Threshold**" specified in the Positioning Setup (no radial error)*

2= Estimated, Radial Error

*An estimated COG position was calculated (some vibrator positions were not available) and it does not fall within the allowable circle determined by the "**COG Radius Threshold**" (e.g. a status message was indicating that a vibrator failed to vibrate, so the estimated COG was calculated without the position of that vibrator, leading to a radial error).*

3= Actual Cog

All vibrator positions were available; the source COG was calculated and no radial error was found.

4= Radial Err.

*An actual COG position was calculated (i.e. all vibrator positions were available) but it does not fall within the allowable circle determined by the "**COG Radius Threshold**" specified in the Positioning Setup.*

5= Missing Position

One or more vibrator positions were not available. The system was unable to calculate the COG.

6= Inaccurate Cog

*An actual COG position was calculated. All vibrator positions were available, but one or more vibrator position standard deviations exceeded the "**Vib Position Accuracy Threshold**" specified in the **Setup** menu). As a result, the COG is regarded as inaccurate.*

7= Straight GPS Cog

All vibrator positions were available, the source COG was calculated, no radial error was found, but the GPS receivers were supplying positions with no differential corrections.

Examples

```
H26

H26      1         2         3         4         5         6         7         8

H26
5678901234567890123456789012345678901234567890123456789012345678901234567
890

H26

C        22741.0 13556.01 3  327007.0  2806034.6  242.8        3.4

C        22745.0 13556.01 3  327002.1  2806055.4  243.4        4.3

C        22749.0 13556.01 3  327006.5  2806078.2  243.6        3.1

C        22753.0 13554.01 3  326978.9  2806107.6  246.1        2.7

C        22747.0 13552.01 3  326955.4  2806070.3  246.4        1.8

C        22819.0 14574.01 7  339735.2  2806518.9  213.7        3.9

C        22743.0 13552.01 3  326955.7  2806045.3  245.5        1.6

C        22743.0 14040.01 4  333053.5  2806049.2  251.0        6.1
```

Chapter

7

SEG-D Output File Format Rev 1.0 (Wireless)

This chapter describes the SEGD format for the Unite system. It includes the following sections:

Unite version	Changes
1.0	Initial release
2.0	- Extended header, bytes 885-900. - Trace Header Extension #6, bytes 25-28.

Overview

The abbreviation in the "**fmt**" column gives the format of the value:

· **bcd** BCD

· **bin** unsigned binary

· **±bin** 2's complement signed binary

· **asc** ASCII

· **flt** IEEE single-precision

· **dbl** IEEE double-precision format

Other abbreviations:

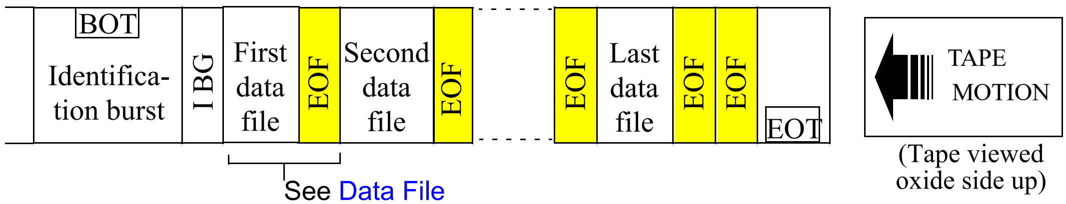
IBG = Inter Block Gap

EOF = End Of File

BOT = Beginning-of-Tape sticker

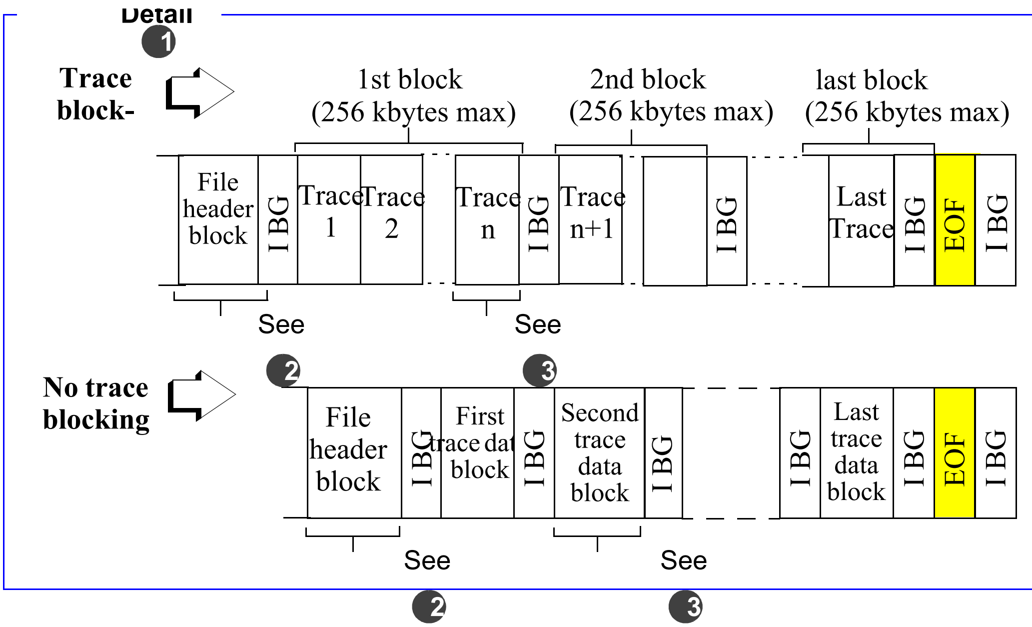
EOT = End-Of-Tape sticker

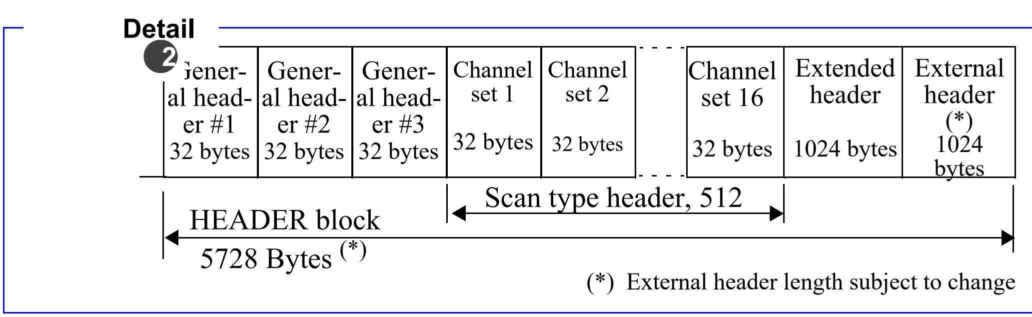
SEGD Rev 1

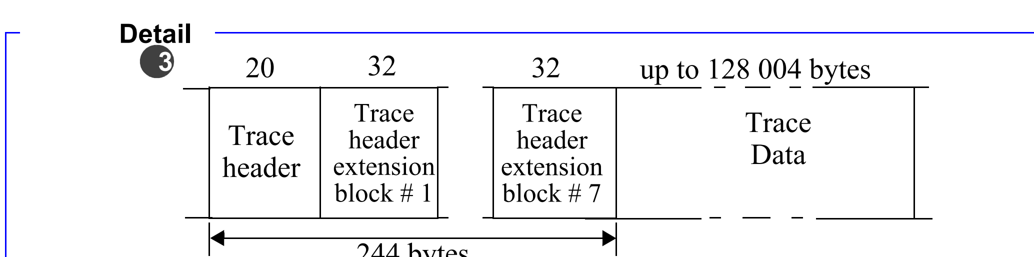


See Data File
(page 131)

Data File


Detail 1
Trace block-
1st block (256 kbytes max)
2nd block (256 kbytes max)
last block (256 kbytes max)
File header block
I BG
Trace 1
Trace 2
Trace n
Trace n+1
Last Trace
EOF
See 2
See 3
No trace blocking
First trace data block
Second trace data block
Last trace data block
See 2
See 3


Detail 2
General header #1 32 bytes
General header #2 32 bytes
General header #3 32 bytes
Channel set 1 32 bytes
Channel set 2 32 bytes
Channel set 16 32 bytes
Extended header 1024 bytes
External header (*) 1024 bytes
Scan type header, 512
HEADER block
5728 Bytes (*)
(*) External header length subject to change


Detail 3
20
32
32
up to 128 004 bytes
Trace header
Trace header extension block # 1
Trace header extension block # 7
Trace Data
244 bytes

File Header block

General Header Block #1	General Header Block #2	General Header Block #3	Channel Set #1	....	Channel Set#16	Extended Header	External Header
32 bytes	32 bytes	32 bytes	32 bytes		32 bytes	1024 bytes	1024 bytes

Scan Type header

General header block #1

Byte No.	Value	Fmt	Description	Notes
1 - 2	XXXX	bcd	Four-digit File number (0-9999)	If file nb > 9999, set to FFFF and *Extended File Nb* is used.
3 - 4	8058	bcd	Format code (32 IEEE demultiplexed)	
5 -10	7		General constants	UNITE.
11	XX	bcd	Last two digits of Year (0-99)	
12H	2	bcd	Number of additional blocks in general header	
12L-13	XXX	bcd	Julian day, 3 digits (1-366)	
14	XX	bcd	Hour of day (0-23)	
15	XX	bcd	Minute of hour (0-59)	
16	XX	bcd	Second of minute (0-59)	

Byte No.	Value	Fmt	Description	Notes
17	13	bcd	Manufacturer's code	
18-19	0	bcd	Manufacturer's serial number	
20-22	XXXXXX		Bytes per scan	000000 non blocked record 100000 blocked record
23	XX	bcd	Base scan interval: 4 = 0.25 ms 8 = 0.5 ms 10 = 1 ms 20 = 2 ms 40 = 4 ms	
24H	0		Polarity (untested)	
24L-25	0		Not used	
26H	X	bcd	Record type: 8 = normal 2 = test record	
26L-27	FFF		Record length (extended record length used)	
28	01	bcd	Scan type per record	
29	XX	bcd	Number of channel sets per record	16 for land operations.
30	00		Number of sample skew 32 byte extensions	
31	32	bcd	Extended header length	

Byte No.	Value	Fmt	Description	Notes
32	XX	bcd	External header length	The External Header is used to record additional user-supplied information in the header. The two digits (0-99) in this field specify the number of 32-byte fields in the External Header. If more than 99 External Header blocks are used, then this field is set to FF and General Header block #2 (bytes 8-9) indicates the number of External Header blocks.

General Header block # 2

Byte No.	Value	Fmt	Description	Notes
1 - 3	XXXXXX	bin	Expanded file number	0-999999
4 - 5	0		Extended Channel Sets/Scan Types (not used)	
6 - 7	0		Extended header blocks (not used)	
8 - 9	XXXX	bin	External header blocks	Used to specify the number of 32-byte fields in the External Header if greater than 99 (in that case, byte 32 in General Header block #1 is set to FF).
10	0		Not used	
11 - 12	1.0	bin	SEG-D Revision Number	
13 - 14	0		Number of Blocks of General Trailer	
15 - 17	XXXXXX	bin	Extended Record Length (0-128000 ms)	
18	0		Not used	
19	2	bin	General Header Block Number	
20 - 32	0		Not used	

General Header block # 3

Byte No.	Value	Fmt	Description	Notes
1 - 3	XXXXXX		Expanded file number	
4 - 8	XXXXX.XX	bin	Source Line Number (0-99999.99)	Defaults to GUI setup, or updated by navigation system.
9-13	XXXXX.XX	bin	Source Point Number (0-99999.99)	Defaults to GUI setup, or updated by navigation system.
14	XX	bin	Source Point Index (1-9)	
15	0		Phase Control (not recorded)	
16	0		Vibrator Type (not recorded)	
17-18	0		Phase angle (not recorded)	
19	3	bin	General Header Block Number	
20	XX	bin	Source Set Number	Defaults to GUI setup, or updated by navigation system.
21 - 32	0		Not used	

Scan Type Header

<table>
<tr><th>Byte No.</th><th>Value</th><th>Fmt</th><th>Description</th><th>Notes</th></tr>
<tr><td>1</td><td>01</td><td>bcd</td><td>Scan Type Header</td><td></td></tr>
<tr><td>2</td><td>XX</td><td>bcd</td><td>Channel Set Number</td><td></td></tr>
<tr><td>3- 4</td><td>XXXX</td><td>bin</td><td>Channel Set Starting Time</td><td>0 for Auxes.
Refraction Delay for Seis.
Units: 2 ms.</td></tr>
<tr><td>5- 6</td><td>XXXX</td><td>bin</td><td>Channel Set End Time</td><td>Record length for Auxes.
Refraction Delay
+ Record Length for Seis.
Units: 2 ms.</td></tr>
<tr><td>7-8</td><td>XXXX</td><td>±bin</td><td>Descale Multiplier
<table>
<tr><th rowspan="2">FDU or RAU-428</th><th>1600</th><th>400</th></tr>
<tr><td>AF6D</td><td>B76D</td></tr>
</table>
<table>
<tr><th>DSU-428 or DSU3-SA</th><td>AF6D</td></tr>
</table>
<table>
<tr><th rowspan="2">RAU</th><th>2500</th><th>650</th><td>mV(peak)</td></tr>
<tr><td>AD03</td><td>B503</td><td></td></tr>
</table>
</td><td>MSB is encoded on byte 8 and LSB on byte 7
Example for AF6D:
byte 8 = AF
byte 7 = 6D</td></tr>
<tr><td>9-10</td><td>XXXX</td><td>bcd</td><td>Number of channels in this channel set</td><td></td></tr>
</table>

Byte No.	Value	Fmt	Description	Notes
11H	X	bcd	Channel Type Identification: 1 = Seis 9 = Aux	
11L	0		Not used	
12H	0		Number of subscans exponent	
12L	3	bcd	Channel gain control method (fixed gain)	

Byte No.	Value	Fmt	Description	Notes
13-14	XXXX	bcd	Alias filter frequency at - 3dB point	

	0.25	0.5	1	2	4
FDU	1600	800	400	200	100
DSU	1600	800	400	200	100
DSU3-SA		800	400	200	100
RAU		858	429	215	107
RAU-428		800	400	200	100

Byte No.	Value	Fmt	Description			Notes
15-16	XX	bcd	Alias filter slope			
				FDU	370	
				DSU	370	
				DSU3-SA	370	
				RAU	370	
				RAU-428	370	
17-18	XX	bcd	Low-cut filter frequency			
				FDU	0	
				DSU	0	
				DSU3-SA	0	
				RAU	0	
				RAU-428	0	
19-20	XX	bcd	Low-cut filter slope			
				FDU	0	
				DSU	0	
				DSU3-SA	0	
				RAU	0	
				RAU-428	0	

Byte No.	Value	Fmt	Description	Notes
21-22	0		First Notch Frequency	
23-24	0		Second Notch Frequency	
25-26	0		Third Notch Frequency	
27-28	0		Extended channel set number	
29H	0		Extended header flag	
29L	7	bin	Trace Header Extensions	
30	XX	bin	Vertical Stack	
31	XX	bin	Streamer cable number	0 in land operations.
32	1	bin	Array forming (no array forming)	

Extended Header

Byte No.	Value	Fmt	Description	Notes
1 - 4	XXXX	bin	Acquisition length	1000 to 128000 ms
5-8	XXXX	bin	Sample rate	250, 500, 1000, 2000, 4000 µs
9-12	XXXX	bin	Total number of traces	1 to 100000
13-16	XXXX	bin	Number of Auxes	1 to 100000
17-20	XXXX	bin	Number of Seis traces	1 to 100000
21-24	XXXX	bin	Number of dead Seis traces	1 to 100000
25-28	XXXX	bin	Number of live Seis traces	1 to 100000
29-32	XXXX	bin	Type of source	0 = no source 1 = Impulsive 2 = Vibro
33-36	XXXX	bin	Number of samples in trace	1 to 128000
37-40	XXXX	bin	Shot number	1 to 9999
41-44	XXXX	flt	TB window	0 to 64 seconds

Byte No.	Value	Fmt	Description	Notes
45-48	XXXX	bin	Test record type	0 Normal record. 1 Field (Sensor) noise. 2 Field (Sensor) tilt. 3 Field (Sensor) crosstalk. 4 Instrument noise. 5 Instrument distortion. 6 Instrument gain/phase 7 Instrument crosstalk 8 Instrument common mode 9 Synthetic. 10 Field (Sensor) pulse. 11 Instrument pulse. 12 Field (Sensor) distortion. 13 Instrument gravity. 14 Field (Sensor) leakage 15 Field (Sensor) resistance
49-52	XXXX	bin	Spread first line	1 to 99999
53-56	XXXX	bin	Spread first number	1 to 99999
57-60	XXXX	bin	Spread number	1 to 32
61-64	XXXX	bin	Spread type	0 = N/A 1 = Generic 2 = Absolute
65-68	XXXX	bin	Timebreak	0 to 9999 microseconds
69-72	XXXX	bin	Uphole time	Microseconds Updated by navigation shooting or navigation system

Byte No.	Value	Fmt	Description	Notes
73-76	XXXX	bin	Blaster id	- MACHA blaster Id number (0 to 15) - or OPSEIS blaster 815 SAR Address (1 to 65535)

Byte No.	Value	Fmt	Description	Notes
77-80	XXXX	bin	Blaster status	**MACHA blaster status**: 2^0 Low battery. 2^1 High voltage ready. 2^2 Fired. 2^3 Fire error. **OPSEIS 815 blaster**: 2^0 Blaster ready for shot. 2^1 Blaster cap open. 2^2 Blaster uphole error. **SHOTPRO blaster status**: 0 No Fire (Radio Status Received but box did not fire). 1 Shot Fired and Status received. All OK. 2 No Status received (Radio Problem). 3 Status Received but no Uphole analog data (Radio problem). 4 Decoder Low Battery warning. 5 Up Hole Geophone resistance not measured or out of tolerance. 6 Cap resistance not measured or out of tolerance. 7 Automatic Uphole Time Pick not successful.

Byte No.	Value	Fmt	Description	Notes
81-84	XXXX	bin	Refraction delay	ms
85-88	XXXX	±bin	TB to T0 time	Microseconds
89-92	XXXX	bin	Internal time break	0 = no 1 = yes
93-96	XXXX	bin	Prestack within field units	0 = no 1 = yes
97-100	XXXX	bin	Noise elimination type	1 Off 2 Diversity Stack 3 Historic 4 Enhanced Diversity Stack
101-104	XXXX	bin	Low trace percentage	0 to 100%
105-108	XXXX	bin	Low trace value	0 to 132 dB
109-112	XXXX	bin	Number of windows (Div.) or Window length (Enhanced Div.)	1 to 64
113-116	XXXX	bin	Historic editing type or Overlap (Enhanced Div.)	1 = Zeroing 2 = Clipping
117-120	XXXX	bin	Noisy trace percentage	0 to 100%
121-124	XXXX	bin	Historic range	0 to 36 dB
125-128	XXXX	bin	Historic taper length 2's exponent	0 to 8
129-132	XXXX	bin	Threshold Hold/Var	1 = Hold 2 = Var
133-136	XXXX	bin	Historic threshold Init value	0 to 132 dB
137-140	XXXX	bin	Historic zeroing length	1 to 500 ms

Byte No.	Value	Fmt	Description	Notes
141-144	XXXX	bin	Type of process	1 No operation (raw data) 2 Stack 3 Correlation After stack 4 Correlation Before stack
145-272	XXXX	bin	Acquisition type tables	32 values (128 bytes)
273-400	XXXX	bin	Threshold type tables	32 values (128 bytes)
401-404	XXXX	bin	Stacking fold	1 to 32
405-484	XXXX	asc	Not used	
485-488	XXXX	bin	Record length	100 to 128000 ms
489-492	XXXX	bin	Autocorrelation peak time	1 to 128000 ms
493-496	XXXX	bin	Not used	
497-500	XXXX	bin	Correlation Pilot No.	1 to 100000
501-504	XXXX	bin	Pilot length	1000 to 128000 ms
505-508	XXXX	bin	Sweep length	1000 to 128000 ms
509-512	XXXX	bin	Acquisition number	1 to 32
513-516	XXXX	flt	Max of max, Aux	IEEE format, single precision
517-520	XXXX	flt	Max of max, Seis	IEEE format, single precision
521-524	XXXX	bin	Dump stacking fold	1..32
525-540	XXXX	asc	Tape label	ASCII text, 16 characters

Byte No.	Value	Fmt	Description	Notes
541-544	XXXX	bin	Tape number	1 to 9999
545-560	XXXX	asc	Software version	ASCII text, 16 characters
561-572	XXXX	asc	Date	ASCII text, 12 characters (dd mmm yyyy)
573-580	XXXX	dbl	Source easting	Defaults to GUI setup, or updated by navigation system
581-588	XXXX	dbl	Source northing	Defaults to GUI setup, or updated by navigation system
589-592	XXXX	flt	Source elevation	Defaults to GUI setup, or updated by navigation system
593-596	XXXX	bin	Slip sweep mode used	0 = No 1 = Yes
597-600	XXXX	bin	Files per tape	1 to 9999
601-604	XXXX	bin	File count	1 to 9999
605-764	XXXX	asc	Acquisition error description	ASCII text, 160 characters
765-768	XXXX	bin	Filter type	1 = Minimum Phase 2 = Linear Phase
769-772	XXXX	bin	Stack is dumped	0 = No; 1 = Yes
773-776	XXXX	bin	Stack sign (current)	0 = No 1 = Plus 2 = Minus
777-780	XXXX	bin	PRM Tilt Correction used	0 = No; 1 = Yes
781-844	XXXX	asc	Swath name	

Byte No.	Value	Fmt	Description	Notes
845-848	XXXX	bin	Operating mode	bit0 = 1 Standard bit1 = 1 Microseismic bit2 = 1 Slip-sweep bit3 = 1 SQC Dump (VSR) bit4 = 1 Guidance (Navigation)
849-852	XXXX	bin	Reserved	
853-856	XXXX	bin	No log	0 = No; 1 = Yes
857-860	XXXX	bin	Listening time	100 to 128000 ms
861-864	XXXX	bin	Type of dump	0 = Normal dump 1 = Raw dump 2 = Extra dump
865-868	XXXX	bin	Reserved	
869-872	XXXX	bin	Swath Id	
873-876	XXXX	bin	Seismic trace offset removal is disabled	0 = No (i. e. offset is removed) 1 = Yes (Microseismic mode)
877-884	XXXX	bin	GPS time of acquisition Time Break, expressed as the number of microseconds since January 6, 1980 at 0:00 a.m. UTC (signed integer).	Recorded if - “Time Management from GPS” option is selected (in Config window’s Crew setup) - and a GPS receiver is attached to the LCI-428.
885-888			Reserved.	
889-892			Reserved.	

Byte No.	Value	Fmt	Description	Notes
893-896			Reserved.	
897-900			Reserved.	
901-908	XXXX	bin	Reserved.	
909-916	XXXX	bin	Reserved.	
917-924	XXXX	bin	Reserved.	
925-932	XXXX	bin	Reserved.	
933-940	XXXX	bin	Reserved.	
941-948	XXXX	bin	Reserved.	
949-956	XXXX	bin	Reserved.	
957-964	XXXX	bin	Reserved.	
965-1024	0		Not used	

External Header

Byte No.	Value	Fmt	Description	Notes
1 - n	XXXX	asc	Concatenation of: - Info from shooting or navigation system, - User info from Config environment setup, - Source comment from operation window.	n = External Header Size parameter from GUI (Configuration window).

Trace Data block

Trace-header	Trace header exten-sion block # 1	Trace header exten-sion block #2	Trace header exten-sion block # 3	Trace header exten-sion block # 4	Trace header exten-sion block # 5	Trace header exten-sion block # 6	Trace header exten-sion block # 7	Trace data
20 bytes	32 bytes	32 bytes	32 bytes	32 bytes	32 bytes	32 bytes	32 bytes	*N* bytes
244 bytes								

$$N = \left(\frac{\text{acquisition length (ms)}}{\text{sample rate (ms)}} + 1\right) \times 4$$

$$\text{Number of samples per trace} = \left(\frac{\text{acquisition length (ms)}}{\text{sample rate (ms)}} + 1\right)$$

“+1” is there because the first sample is taken at Time Zero.

Trace header

Demultiplexed Trace Header

Byte No.	Value	Fmt	Description	Notes
1-2	XXXX	bcd	Four-digit file number (0-9999)	if file nb > 9999, set to FFFF and *Extended File Num* is used
3	01	bcd	Scan Type Number	
4	XX	bcd	Channel Set Number	
5-6	XXXX	bcd	Trace Number	
7-9	XXXX	bin	First Timing Word expressed in 1/256 ms steps (3.90625-µs steps).	Refraction delay
10	7	bin	Trace Header Extension	
11	0		Sample skew	
12	XX	bin	Trace edit 00 No edit applied. 02 Muted or dead prior to acquisition. 03 Edited by acquisition system.	Acquisition error or noise edited. See Reference Information in User's Manual Vol. 3.
13-15	XXXX.XX	bin	Time break window	
16-17	0		Extended channel set number	
18-20	XXXXXX		Extended file number	0-999999

Trace Header Extensions

Trace Header Extension Block # 1

Byte No.	Value	Fmt	Description	Notes
1-3	XXXXXX	bin	Receiver Line Number	For an **Auxiliary trace** from a DSD[(1)]: set to FFFFFF meaning that the RLN is recorded in the Extended Receiver Line field and includes a fractional part.
4-6	XXXXXX	bin	Receiver Point Number	For an **Auxiliary trace** from a DSD[(1)]: set to FFFFFF meaning that the RPN is recorded in the Extended Receiver Point field and includes a fractional part.
7	XX	bin	Receiver point index	
8-10	XXXXXX	bin	Number of samples per trace	

Byte No.	Value	Fmt	Description	Notes
11-15	0		Extended Receiver Line number	For an **Auxiliary trace** from a DSD(1): XX XX XX . YY stands for the line number of the location where the vibrator generated the sweep (source line information). The XXXXXX portion stands for the integer part of the line number. In compliance with the SEGD standard, the YY portion stands for the fraction (unsigned binary), meaning that 0.5 is encoded as 1×2^{-1} (YY = 0x8000).

(1) If "Post-annotation Logging" (Config window's Crew setup) and "SQC Dump" (Operation) options are enabled (e. g. for vib motion signal recording).

Trace Header Extension Block # 1 (continued)

Byte No.	Value	Fmt	Description	Notes
16-20	0		Extended Receiver Point number	For **Auxiliary trace** from DSD(1): XX XX XX . YY stands for the receiver point number of the location where the vibrator generated the sweep (Source Point Number information). The XXXXXX portion stands for the integer part of the point number. The YY portion stands for the fraction (unsigned binary).
21	XX	bin	Sensor SEGD code (not to be mistaken for the “Sensor Type Number” recorded in Trace Header Extension block # 2): 0 : not defined 1 : Hydrophone 2 : Geophone, Vertical 3 : Geophone, Horizontal, In-line 4 : Geophone, Horizontal, Crossline 5 : Geophone, Horizontal, other 6 : Accelerometer, Vertical 7 : Accelerometer, Horizontal, In-line 8 : Accelerometer, Horizontal, Crossline 9 : Accelerometer, Horizontal, other	
22-32	0		Not used	

(1) If “Post-annotation Logging” (Config window’s Crew setup) and “SQC Dump” (Operation) options are enabled (e. g. for vib motion signal recording).

Trace Header Extension block # 2

Byte No.	Value	Fmt	Description	Notes
1-8	XXXXXX XX	dbl	Receiver point easting	- **Seismic trace**: defaults to GUI setup, or updated by navigation system. - **Auxiliary trace** from DSD[(1)]: vibrator position easting.
9-16	XXXXXX XX	dbl	Receiver point northing	- **Seismic trace**: defaults to GUI setup, or updated by navigation system. - **Auxiliary trace** from DSD[(1)]: vib position northing.
17-20	XXXX	flt	Receiver point elevation	- **Seismic trace**: defaults to GUI setup, or updated by navigation system. - **Auxiliary trace** from DSD[(1)]: vib position elevation.
21	XX	bin	Sensor Type Number (1 to 9)	Each Sensor Type Number (created in the Line main window’s Survey setup) is associated with a specific set of sensor test limits. The Sensor Type Number should not be mistaken for the “Sensor SEGD code” recorded in Trace Header Extension block # 1.
22-24	0		Not used	
25-28	XXXX	bin	DSD identification No.	0 unless auxiliary trace from DSD[(1)]

Byte No.	Value	Fmt	Description	Notes
29-32	XXXX	bin	Extended Trace No.	

(1) If “Post-annotation Logging” (Config window’s Crew setup) and “SQC Dump” (Operation) options are enabled (e. g. for vib motion signal recording).

Trace Header Extension block # 3

Byte No.	Value	Fmt	Description	Notes
1-4	XXXX	flt	Resistance low limit	Only for geophones connected to FDU channels.
5-8	XXXX	flt	Resistance high limit	
9-12	XXXX	flt	Resistance value	ohms
13-16	XXXX	flt	Tilt limit	
17-20	XXXX	flt	Tilt value	% for FDU channels Degrees for DSU channels
21	X	bin	Resistance error	0 = No 1 = Yes
22	X	bin	Tilt error	0 = No 1 = Yes
23-32	0		Not used	

Non significant fields are set to FFFFFFFF.

Trace Header Extension block # 4

Byte No.	Value	Fmt	Description	Notes
1-4	XXXX	flt	Capacitance low limit	For hydrophones only
5-8	XXXX	flt	Capacitance high limit	
9-12	XXXX	flt	Capacitance value	nano farads
13-16	XXXX	flt	Cut off low limit	For hydrophones only
17-20	XXXX	flt	Cut off high limits	
21-24	XXXX	flt	Cut off value	Hz
25	X	bin	Capacitance error	0 = No 1 = Yes
26	X	bin	Cut off error	0 = No 1 = Yes
27-32	0		Not used	

Non significant fields are set to FFFFFFFF.

Trace Header Extension block # 5

Byte No.	Value	Fmt	Description	Notes
1-4	XXXX	flt	Leakage limit	Only for geophones connected to FDU channels.
5-8	XXXX	flt	Leakage value	Megohms.
9-16		dbl	Instrument Longitude.	(WGS84, value in degrees)
17-24		dbl	Instrument Latitude.	(WGS84, value in degrees)
25	X	bin	Leakage error.	0 = No 1 = Yes
26-28		ubin	Instrument horizontal position accuracy.	(mm)
29-32		flt	Instrument elevation.	(mm)

Non significant fields are set to FFFFFFFF.

Trace Header Extension block # 6

Byte No.	Value	Fmt	Description	Notes
1	XX	bin	Unit type 0x00 Not identified 0x01 FDU 0x03 RAU 0x1C DSU 0x20 VE464	See below for details (digital pilot)
2-4	XXXXXX	bin	Unit serial number	
5	X	bin	Channel number	
6-8		0	Spare	
9	X	bin	Assembly type 0x00 No assembly 0x01 | to | FDU or DSU link 0x10 | 0x24 AXCU 0x42 LSI 0xE0 FDU2S	0x01 to 0x10 = number of FDUs or DSUs in Link.
10-12	XXXXXX	bin	FDU or DSU assembly serial number	
13	X	bin	Location in FDU or DSU assembly	
14-16		0	Spare	

Byte No.	Value	Fmt	Description	Notes
17	XX	bin	Subunit type 0x01FDU1-408 0x0FFDU2S 0x15FDU-428 0x16DSU3-428 0x17QT-428 0x1FRAU 0x1EDSUGPS 0x21DSU1-428, short 0x22DSU3BV-428 0x24DSU1-428, long 0x25DSU3-SA 0x26RAU-428 0x60FDU-508 0X61DSU1-508 0x64VE464 0x66WTU-508	
18	X	bin	Channel type 0 Geophone 1 Hydrophone	
19-20		0	Spare	

Byte No.	Value	Fmt	Description	Notes
21-24	XXXX	flt	Sensor sensitivity	- FDU channels: FFFF FFFF. - DSU3-428 or DSU3-SA channels: 452 mV/m/s² (142 mV/m/s² for Tilt and Gravity tests). - DSU-408 channels: mV/m/s² . High Full Scale: 408 . Low Full Scale: 204
25-28			Reserved.	
29-32	0		Not used (0)	

Trace Header Extension block # 7

Byte No.	Value	Fmt	Description	Notes
1	XX	bin	Control unit type	0x30 LAUX-428 0x31 LCI-428 0x50 RAU 0x51 RAU-D 0xA0 SCI-508 0XA1 CX-508 0xA2 VE464 0xA4 WTU-508
2-4	XXXXXX	bin	Control unit serial number	
5	X	bin	Channel gain scale	
			FDU or RAU-428	
			1 — 1600 mV RMS	(0 dB)
			2 — 400 mV RMS	(12 dB)
			DSU3-428 or DSU3-SA	
			1 — 5 m/s^2	High Full Scale
			2 —	Low Full Scale
			RAU	
			1 — 2500 mV (peak)	(0 dB)
			2 — 650 mV (peak)	(12 dB)
6	X	bin	Channel filter	

Byte No.	Value	Fmt	Description		Notes
			FDU or RAU-428		
			1	0.8FN Minimum Phase	
			2	0.8FN Linear phase	
			DSU3-428 or DSU3-SA		
			1	0.8FN Minimum Phase	
			2	0.8FN Linear phase	
			RAU		
			1	0.9FN Minimum Phase	
			2	0.9FN Linear phase	

Trace Header Extension Block #7 (continued)

Byte No.	Value	Fmt	Description	Notes
7	X	bin	Channel data error: overscaling	
8	X	bin	Channel edited status 1 dead 2 acquisition/retrieve error 3 noise edition	
9-12	XXXX	flt	Channel sample to mV conversion factor	0 for Auxes (not computed). For details, see Reference Information in User's Manual Vol. 3

Byte No.	Value	Fmt	Description	Notes
13	XX	bin	Number of stacks noisy	
14	XX	bin	Number of stacks low	
15	XX	bin	Channel type id: 1 = Seis 9 = Aux	
16	XX	bin	Channel process 01 Raw data 02 Aux stack 03 Correlation, negative part 04 Correlation, positive part 05 Normal correlation 06 Seis stack	
17-20	XXXX	flt	Trace max value	
21-24	XXXX	bin	Trace max time	microseconds
25-28	XXXX	bin	Number of interpolations	See Reference Information in User’s Manual Vol. 3.
29-32	XXXX	bin	Seismic trace offset value (if offset removal is disabled).	0 if seismic trace offset removal is enabled (i. e. Extended Header bytes 873-876 = 0)

Trace data

Byte No.	Value	Description
1 2 3 4	S, C7 thru C 1 C0, Q-1 thru Q-7 Q-8 thru Q-15 Q-16 thru Q-23	Sample value represented in 32 bit floating point IEEE demultiplexed format

BCD value MSD	8	4	2	1	8	4	2	1	LSD
Binary value MSB	128	64	32	16	8	4	2	1	LSB

First sample	S	C7	C6	C5	C4	C3	C2	C1	1
	C0	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	2
	Q-8	Q-9	Q-10	Q-11	Q-12	Q-13	Q-14	Q-15	3
	Q-16	Q-17	Q-18	Q-19	Q-20	Q-21	Q-22	Q-23	4
Second sample	S	C7	C6	C5	C4	C3	C2	C1	5
	C0	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	6
	Q-8	Q-9	Q-10	Q-11	Q-12	Q-13	Q-14	Q-15	7
	Q-16	Q-17	Q-18	Q-19	Q-20	Q-21	Q-22	Q-23	8

Last sample	S	C7	C6	C5	C4	C3	C2	C1	
	C0	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	
	Q-8	Q-9	Q-10	Q-11	Q-12	Q-13	Q-14	Q-15	
	Q-16	Q-17	Q-18	Q-19	Q-20	Q-21	Q-22	Q-23	Last byte

Note The uphole trace delivered by the Opseis 812 blaster contains fewer samples than seismic traces do.

The samples of the uphole trace are padded with zeroes in order to have the same number of samples as on other traces.

Note IEEE Floating Point Format

BCD value MSD	8	4	2	1	8	4	2	1	LSD
Binary value MSB	128	64	32	16	8	4	2	1	LSB

Single precision value	S	C7	C6	C5	C4	C3	C2	C1
	C0	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7
	Q-8	Q-9	Q-10	Q-11	Q-12	Q-13	Q-14	Q-15
	Q-16	Q-17	Q-18	Q-19	Q-20	Q-21	Q-22	Q-23

Double precision value	S	C10	C9	C8	C7	C6	C5	C4
	C3	C2	C1	C0	Q-1	Q-2	Q-3	Q-4
	Q-5	Q-6	Q-7	Q-8	Q-9	Q-10	Q-11	Q-12
	Q-13	Q-14	Q-15	Q-16	Q-17	Q-18	Q-19	Q-20
	Q-21	Q-22	Q-23	Q-24	Q-25	Q-26	Q-27	Q-28
	Q-29	Q-30	Q-31	Q-32	Q-33	Q-34	Q-35	Q-36
	Q-37	Q-38	Q-39	Q-40	Q-41	Q-42	Q-43	Q-44
	Q-45	Q-46	Q-47	Q-48	Q-49	Q-50	Q-51	Q-52

- Single precision

31	30 23	22 0
s	e	f
s	C7 C0	Q-1 Q-23

value = $(-1)^s$ x 2^{e-127} x 1.f (a 0 value is encoded with e = f = 0).

Double precision

63	62	52	51		0
s	e		f		
s	C11	C0	Q-1		Q-52

value = $(-1)^s \times 2^{e-1023} \times 1.f$ (a 0 value is encoded with e = f = 0).

Chapter

8

SEG-D Output File Format Rev 2.1 (Wireless)

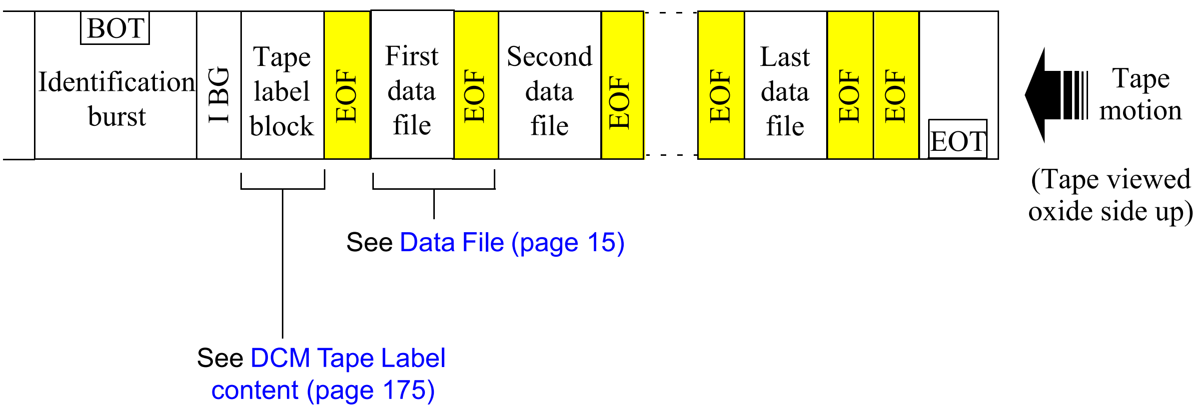
This chapter describes how the SEGD Rev. 2.1 standard is implemented in the DCM system. It includes the following sections

Changes introduced in Revision 2.1

SEGD standard Revision 2.1 supports "RECORD" (variable-length) and "FIXREC" (fixed-length) storage unit structures. SEGD Rev. 2.1 files from the DCM system are recorded with the "RECORD" structure.

SEGD standard Revision 2.1 requires a 128-byte label to be recorded at the beginning of each tape. That label is not recorded in the SEGD file.

An EOF is written between the tape label block and the first SEG-D file.



When recording to two tape drives simultaneously, a different tape label is generated for each tape drive.

Table 8-1 SEGD Rev. 2.1 file content

Changes	SEGD Rev 2.1 standard	Content generated by DCM
Storage Unit Label	See SEGD Rev 2.1 Tape Label (page 172)	See DCM Tape Label content (page 175)
General Header Block # 2 Bytes 11 and 12	SEG-D Revision Number	2.1
General Header Block # 2 Bytes 21 and 22	Sequence Number	Not used (all 0's)
Extended Header		Same as SEGD Rev. 1, but with an empty string in the Tape Label field (bytes 525-540).

SEGD Rev 2.1 Tape Label

The first 128 bytes of data on a Rev 2.1 (and Rev 2.0) tape must consist of ASCII characters and will constitute a storage unit label. This label is very similar to the RP-66 storage unit label. The label format is summarized in the table below.

If the tape media supports multiple partitions, SEG-D data may be written to any of the partitions of the tape, each beginning with a Storage Unit Label. Data from one partition can not "run-over" into a subsequent partition, each partition must be capable of being decoded in isolation.

On one tape, it is allowed to mix partitions containing SEG-D data with partitions containing non SEG-D formatted information.

Table 8-2

Field	Description	Bytes	Start - end byte
1	Storage unit sequence number	4	1 - 4
2	SEG-D Revision	5	5 - 9
3	Storage unit structure (fixed or variable)	6	10 - 15
4	Binding edition	4	16 - 19
5	Maximum block size	10	20 - 29
6	API Producer organization code	10	30 - 39
7	Creation date	11	40 - 50
8	Serial number	12	51 - 62
9	Reserved	6	63 - 68
10	Storage set identifier	60	
	- External Label Name	12	69 - 80
	- Recording Entity Name	24	81 - 104
	- User defined	14	105 - 118
	- Max number of shot records per field record	10	119 - 128

Field 1

The Storage Unit Sequence Number is an integer in the range 1 to 9999 that indicates the order in which the current storage unit occurs in the storage set. The first storage unit of a storage set has sequence number 1, the second 2, and so on. This number is represented using the characters 0 to 9, right justified with leading blanks if needed to fill out the field (No leading zeros). The rightmost character is in byte 4 of the label. This field is optional. If not used, it must be blank (filled with blank characters). This implies that this is the only storage unit within the storage set. Separate Storage Sets should be used for different data types.

Field 2

The SEG-D Revision field indicates which revision of SEG-D was used to record the data on this tape. SD2.1 indicates that the data was recorded using SEG-D, Revision 2.1 (SD2.0 in previous revision)- This field is required.

Field 3

Storage Unit Structure is a name indicating the record structure of the storage unit. This name is left justified with trailing blanks if needed to fill out the field. The leftmost character is in byte 10 of the label. For SEG-D, Rev 2.1 and 2.0 tapes, this field must contain "RECORD" or "FIXREC". This field is required.

- "RECORD" -- Records may be of variable length, ranging up to the Blocksize length specified in the maximum Block size field of the storage unit label (if not zero). If the maximum Block size specified is zero, then records may be of any length.
- "FIXREC" -- All records in the storage unit have the same length, namely that specified in the maximum Block size field of the storage unit label. Although all storage units in the same storage set must have a FIXREC structure, the maximum record length may be different in different storage units. When the FIXREC option is used, then the maximum record length field shall not be 0 (zero).

Field 4

Binding edition is the character B in byte 16 of the label followed by a positive integer in the range 1 to 999 (no leading zeros), left justified with trailing blanks if needed to fill out the field. The integer value corresponds to the edition of the Part 3 of the API, RP66 standard used to describe the physical binding of the logical format to the storage unit. This field is required.

Field 5

Maximum Block Size is an integer in the range of 0 to 4,294,967,295 (232-1), indicating the maximum block length for the storage unit, or 0 (zero) if undeclared. This number is represented using the characters 0 to 9, right justified, with leading blanks if necessary to fill out the field (no leading zeros). The rightmost character is byte 29 of the label. A valid value or 0 (zero) must be recorded.

Field 6

Producer organization code is an integer in the range of 0 to 4,294,967,295 (232-1) indicating the organization code of the storage unit producer. This number is represented using the characters 0 to 9, right justified, with leading blanks if necessary to fill out the field (NO leading zeros). The rightmost character is byte 39 of the label. This field may be empty, i.e. may contain all blanks, in which case no storage unit producer is specified (e.g. same as RP-66 V2).

Organization codes are assigned by POSC (API, American Petroleum Institute in previous revision), which maintains the current list of codes. To request a new organization code, contact:

POSC

24 Greenway Plaza

Suite 1000-B

Houston, TX 77046 USA

+1 713 784-1880 telephone

+1 713 784-9219 fax

info@posc.org

Field 7

Creation date is the earliest date that any current information was recorded on the storage unit. The date is represented in the form dd-MMM-yyyy, where yyyy is the year (e.g. 1996), MMM is one of (JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC), and dd is the day of the month in the range 1 to 31. Days 1 to 9 may have one leading blank. The separator is a hyphen (code 4510). This field is required.

Field 8

Serial number is an ID used to distinguish the storage unit from other storage units in an archive of an enterprise. The specification and management of serial numbers is delegated to organizations using this standard. If an external label is used the name/number must be a subset of the serial number or the External Label Name in Field 10, and must occupy the rightmost characters in the serial number (or External Label Name). This field is required.

Field 9

This field is reserved and should be recorded as all blanks (code 3210).

Field 10

The **Storage set identifier** is a descriptive name for the storage set. Every storage unit in the same storage set shall have the same value for the user defined portion of the storage set identifier in its storage unit label. Included in the Storage Set Identifier is the **External Label Name**. The characters in this field are right justified with leading blank characters as required. If the tape does not have a physical label, then this field must be blank. A physical label is optional, but if it exists, then this field is required only if the external label is different from the lower 6 characters of the Serial Number in field 8.

The next field in the Storage set identifier is the **Recording Entity Name**. This must contain the crew number or name, or some other unique identifier which will differentiate the recording entity which recorded this data from any other recording entity within the organization (as included in field 6). The 24 bytes may by any alphanumeric characters. If multiple recording systems are used on a vessel or crew, then data recorded on each system must be clearly distinguished. For example, an ABC Geophysical crew (party 13), on the M/V Gopher, recording data on two Zip 6000 recording systems might have a Recording Entity Name on tapes recording on the first recording system of:

ABC, Gopher, P13, Zip#1

On the second system, the Recording Entity Name might be:

ABC, Gopher, P13, Zip#2

The Recording Entity Name field is required.

USER DEFINED. The next 14 bytes in this field may contain any other user input information. The only restriction is that the data must be in ASCII.

Max Number of shot records per field record. Field Records are data between File Marks (10 bytes).

It is not acceptable to use an ANSI label (or any other label or data) prior to the Storage Unit Label.

An external, physical label is not required.

DCM Tape Label content

Table 8-3 Tape label content

Field	Start - End byte	Description	Content generated by DCM
1	1 - 4	Storage Unit sequence number	**Tape Number** field from “Records” setup (in Export window).

Table 8-3 Tape label content

2	5 - 9	SEG-D revision	"SD2.1"
3	10 - 15	Storage unit structure	"RECORD"
4	16 - 19	Binding edition	"B2 "
5	20 - 29	Maximum block size	" 0"
6	30 - 39	API Producer organization code	**Producer Code** field from “SEGD” setup (in Export window).
7	40 - 50	Creation date	Recording date of first file (i. e. recording date of Tape Label itself).
8	51 - 62	Serial number	**Prefix Serial #** field from “SEGD” setup, plus **Tape Number** field from “Records” setup (in Export window).
9	63 - 68	Reserved	" "
10		Storage set identifier	
	69 - 80	·External label name	**External Label** field from “SEGD” setup (in Export window).
	81 - 104	·Recording entity name	**Crew Name** field (16 characters) from the “Crew” setup in the Config window, plus the device name (8 characters) automatically generated by the Export processing.
	105 - 118	·User defined	**User Defined** field from “SEGD” setup (in Export window).
	119 - 128	·Max number of shots record per field record	1

Chapter

9

SEG-D Output File Format Rev 3.0

This chapter describes the SEG-D format Rev3.0 for the 508^{X}. It includes the following sections:

Overview

Abbreviations

The abbreviation in the "**fmt**" column gives the format of the value:

- **bcd:** BCD
- **ubin:** unsigned binary
- **bin:** 2's complement signed binary
- **asc:** ASCII
- **flt:** IEEE single-precision
- **dbl:** IEEE double-precision format

Note *An infinity value means a floating number with all the bits of the exponent set to 1 and all the bits of the mantissa set to 0. It normally means an unavailable value.*

Numbers with 0x ahead are in hexadecimal format.

Block Codes

Here below is a tab resuming the block names and codes used by the SEG-D Rev 3.0 norm and the ones specifically defined by Sercel. These codes (Hexadecimal) are written in the last byte of the corresponding block.

Table 9-1

Block Name	Size	Code (Hexa)
General Header Block #1	32	None
General Header Block #2	32	2
General Header Block #3 (Timestamp and size header)	32	3
General Header Block #4 (Vessel/Crew identification)	32	10
General Header Block #5 (Survey Area Name)	32	11
General Header Block #6 (Client identification)	32	12
General Header Block #7 (Job identification)	32	13
General Header Block #8 (Line identification)	32	14
Source Description Blocks: Vibrator	32	15

Table 9-1

Block Name	Size	Code (Hexa)
Source Description Blocks: Impulsive	32	16
Additional Source Info Block	32	20
Source Auxiliary Channel Reference Block	32	21
Coordinate Reference System Identification Block	32	55
Position Blocks	32	50
Position Blocks	32	51
Position Blocks	32	52
Scan Type Header	32	30
Scan Type Header	32	31
Scan Type Header	32	32
The Extended Header	32	None
The External Header	X.32	None
General Trailer Block	32	70
Demultiplexed Trace Header	20	None
Trace Header Extension # 1	32	40
Sensor Info Trace Header Extension	32	41
Timestamp Header	32	42
Measurement Header	32	61
Sercel SEG-D Revision Block	32	B0
Sercel Tape Block	32	B1
Sercel File Identification Block	32	B2
Sercel VP Identification Block	32	B3
Sercel Processing Details Block	32	B4

Table 9-1

Block Name	Size	Code (Hexa)
Sercel Stack Details Block	32	B5
Sercel Additional Vibrator Source Info	32	B6
Sercel Additional Explosive Source Info	32	B7
Sercel Trace Label Block	32	B8
Sercel Trace Identification Block	32	B9
Sercel Trace Edition and Processing Block	32	BA

Note All the details about the SEG-D Rev 3.0 format can be found here:
http://www.seg.org/documents/10161/77915/seg_d_rev3_0-jun2012.pdf

File Header Block

General Header Block #1

Table 9-2

Byte No.	Fmt	Description	Value	Comment
1-2	bcd	File number of four digits	FFFF	Sercel systematically use the extended file number (GHB#2, byte 1-3) even for values below 9999
3-4	bcd	Format code	8058	32 bit IEEE or 64 bit IEEE
5-10	bcd	General constants, 12 digits	0	0, Not used
11	bcd	Last two digits of year	0-99	UTC conversion of the GPS from the GHB#3, byte 1-8
12H	ubin	Number of additional blocks in general header	F	Sercel systematically use the extended number of additional blocks in general header (GHB#2, byte 23-24)
12L-13	bcd	Julian day, 3 digits	1-366	UTC conversion of the GPS from GHB#3, byte 1-8
14	bcd	Hour of day	0-23	UTC conversion of the GPS from GHB#3, byte 1-8
15	bcd	Minute of hour	0-59	UTC conversion of the GPS from GHB#3, byte 1-8
16	bcd	Second of minute	0-60	UTC conversion of the GPS from GHB#3, byte 1-8. The value 60 is a legal value of this field only during UTC leap seconds
17	bcd	Manufacturer’s code	13	Sercel code
18-19	bcd	Manufacturer’s serial nb	1	0: N/A 1: 508XT

Table 9-2

Byte No.	Fmt	Description	Value	Comment
20-22		Not Used	0	
23	bcd	Base scan interval	FF	Sercel systematically use the sampling interval (CSD, byte 24-26)
24H	ubin	Polarity	0	Untested
24L-25		Not used	0	
26H	bcd	Record type	2,8	0x08:normal 0x02:test record The other values are not used
26L-27	bcd	Record length from time zero (in increments of 0.5 times 1.024 sec)	0x0FFF	0x0FFF in normal recording mode.
28	bcd	Scan type per record	1	Only one scan type per record.
29	bcd	Number of channel sets per scan type (0-99)	FF	Sercel systematically use the extended number of channel set (GHB#2, byte 4-5) even for the values <= 99
30	bcd	Number of 32 byte fields added to the end of each scan type header in order to record the sample skew of all channels (0-99)	FF	Sercel systematically use the extended skew blocks (GHB#2, byte 9-10)) even for the values <= 99
31	bcd	Extended header length	FF	Sercel systematically use the extended header blocks (GHB#2, byte 6-8) even for the values <= 99

Table 9-2

Byte No.	Fmt	Description	Value	Comment
32	bcd	External header length	FF	Sercel systematically use the external header blocks (GHB#2, byte 28-30) even for the values <= 99

General Header Block #2

Table 9-3

Byte No.	Fmt	Description	Value	Comment
1-3	ubin	Extended file number	XXX	$2^{24} - 1$
4-5	ubin	Extended Channel Sets/ Scan Types	1-XX	The SEG-D V3.0 allows 0
6-8	ubin	Extended Header Blocks	1	
9-10	ubin	Extended Skew Blocks	0	
11	ubin	Major SEG-D Revision Number	3	
12	ubin	Minor SEG-D Revision Number	0	
13-16	ubin	Number of Blocks of General Trailer	0-XXXX	
17-20	ubin	Extended Record Length	0-XXXX	In normal recording mode, it's the maximum length of all the seismic traces. The trace length is peculiar to the channel set.
21-22	ubin	Record set number	0-65535	Swath Number
23-24	ubin	Extended Number of additional Blocks in the General Header	0-XX	
25-27	ubin	Dominant Sampling Interval	XXX	Sample Rate if all the seismic traces have the same sample rate. 0 otherwise. Micro-Second.
28-30	ubin	External Header Blocks	0-XXX	Quantity of 32 bytes blocks.
31		Undefined	0	

Table 9-3

Byte No.	Fmt	Description	Value	Comment
32	ubin	Header block type	2	General Header Block #2: 0x02

General Header Block #3 (Timestamp and size header)

Table 9-4

Byte No.	Fmt	Description	Value	Comment
1-8	bin	Time Zero for this record (SEG-D timestamp)	XXXXX XX	GPS time stamp of the first sample (after resynchronisation if applied)
9-16	ubin	Record Size	XXXXX XX	Total size of the SEG-D record in number bytes
17-24	ubin	Data Size	XXXXX XX	Total size of the headers and data in number of bytes without the general trailer.
25-28	ubin	Header Size	XXXXX XX	Total size of the general headers in number of bytes
29	ubin	Extended Recording Mode	0	1 for Extended Recording Mode, 0 for normal record.
30	ubin	Relative Time Mode	0	Set to 1 if this record does not contain absolute timestamps, 0 for normal record. 0 for the 508
31		Undefined	0	
32	ubin	Header block type	3	General Header Block #3: 0x03

General Header Block #4 (Vessel/Crew identification)

Table 9-5

Byte No.	Fmt	Description	Value	Comment
1-3	ascii	Abbreviated vessel or crew name	XXX	
4-31	ascii	Vessel or crew name	X-X	
32	ubin	Header block type	10	General Header Block #4: 0x10

General Header Block #5 (Survey Area Name)

Table 9-6

Byte No.	Fmt	Description	Value	Comment
1-31	ascii	Survey Area Name	X-X	
32	ubin	Header block type	11	General Header Block #5: 0x11

General Header Block #6 (Client identification)

Table 9-7

Byte No.	Fmt	Description	Value	Comment
1-31	ascii	Client identification	X-X	
32	ubin	Header block type	12	General Header Block #6: 0x12

General Header Block #7 (Job identification)

Table 9-8

Byte No.	Fmt	Description	Value	Comment
1-5	ascii	Abbreviated Job Identification	XXX	
6-31	ascii	Job Identification	X-X	
32	ubin	Header block type	13	General Header Block #7: 0x13

General Header Block #8 (Line identification)

Table 9-9

Byte No.	Fmt	Description	Value	Comment
1-7	ascii	Line Abbreviation	XXX	
8-31	ascii	Line Identification	X-X	
32	ubin	Header block type	14	General Header Block #8: 0x14

Source Description Blocks

Vibrator

Table 9-10

Byte No.	Fmt	Description	Value	Comment
1-3	ubin	Expanded file number	XXX	
4-6	bin	Source Line Number, Inte-ger	XXX	
7-8	bin	Source Line Number, Fraction	XX	
9-11	bin	Source Point Number, Integer	XXX	
12-13	bin	Source Point Number, Fraction	XX	
14	bin	Source Point Index	1	
15	ubin	Phase Control	3	Weighted sum
16	ubin	Vibrator Type	0	
17-18	bin	Phase angle	0	
19	ubin	Source Id	X	Vp number for Vp and Stack block. Vibrator number for Vibrator position block.
20	ubin	Source Set Number	X	0 for Vp and Stack block. Vp number for Vibrator position block.
21	ubin	Re-shoot Index	X	
22	ubin	Group Index	X	Stack Number, 0 for Vp block
23	ubin	Depth Index	1	
24-25	bin	Offset cross-line	8000	0x8000 (unknown)

Table 9-10

Byte No.	Fmt	Description	Value	Comment
26-27	bin	Offset in-line	8000	0x8000 (unknown)
28-29	ubin	Size	0	
30-31	ubin	Offset depth	8000	0x8000 (unknown)
32	ubin	Header block type	15	Source Description Block, Vibrator: 0x15

Explosive

Table 9-11

Byte No.	Fmt	Description	Value	Comment
1-3	ubin	Expanded file number	XXX	
4-6	bin	Source Line Number, Integer	XXX	
7-8	bin	Source Line Number, Fraction	XX	
9-11	bin	Source Point Number, Integer	XXX	
12-13	bin	Source Point Number, Fraction	XX	
14	bin	Source Point Index	1	
15-16	ubin	Depth	0	
17	ubin	Charge Length	0	
18	ubin	Soil Type	FF	
19	ubin	Source Id	X	Source Id
20	ubin	Source Set Number	0	
21	ubin	Re-shoot Index	X	
22	ubin	Group Index	X	0 if single stack, stack number for stack quantity >= 2
23	ubin	Depth Index	1	
24-25	bin	Offset cross-line	8000	0x8000 (unknown)
26-27	bin	Offset in-line	8000	0x8000 (unknown)
28-29	ubin	Size	0	
30-31	ubin	Offset depth	8000	0x8000 (unknown)

Table 9-11

Byte No.	Fmt	Description	Value	Comment
32	ubin	Header block type	16	Source Description Block, Explosive: 0x16

Additional Source Info Block

Table 9-12

Byte No.	Fmt	Description	Value	Comment
1-8	bin	Time	XXXXX XX	A time of 0 is indicates source fired at start of record
9	ubin	Source Status	0x00, 0x01 or 0xFF	Source Status (1 byte, unsigned binary) 00: Untested/unknown status 01: Source fired OK FF: Unknown error
10	ubin	Source Id	X	Vib or source number if single, 0 in other cases
11	ubin	Source Moving	0	
12-31	ascii	Error Description	X-X	For vibrator source, the vibrator status. “Ok” in explosive
32	ubin	Header block type	20	Additional Source Info Block: 0x20

Source Auxiliary Channel Reference Block

Table 9-13

Byte No.	Fmt	Description	Value	Comment
1	ubin	Source Id		
2	bcd	Channel 1, Scan Type Nbr		
3-4	ubin	Channel 1, Channel Set Nbr		
5-7	ubin	Channel 1, Trace Nbr		
8	bcd	Channel 2, Scan Type Nbr		
9-10	ubin	Channel 2, Channel Set Nbr		
11-13	ubin	Channel 2, Trace Nbr		
14	bcd	Channel 3, Scan Type Nbr		
15-16	ubin	Channel 3, Channel Set Nbr		
17-19	ubin	Channel 3, Trace Nbr		
20	bcd	Channel 4, Scan Type Nbr		
21-22	ubin	Channel 4, Channel Set Nbr		
23-25	ubin	Channel 4, Trace Nbr		
26	bcd	Channel 5, Scan Type Nbr		
27-28	ubin	Channel 5, Channel Set Nbr		
29-31	ubin	Channel 5, Trace Nbr		
32	ubin	Header block type	21	Source Auxiliary Channel Reference Block: 0x21

Coordinate Reference System Identification Block

Table 9-14

Byte No.	Fmt	Description	Value	Comment
1-31	Ascii	CRS ID	X-X	The Coordinate Reference System (CRS) identification in a textual format.
32	Ubin	Header block type	55	Coordinate Reference System identification Block: 0x55

Position Blocks

Table 9-15

Byte No.	Fmt	Description	Value	Comment
1-8	bin	Time of position	XXXXXX X	TB for (Or 0) for planned positions, $GGA time for measured positions
9-16	bin	Time of measurement/ calculation.	XXXXXX X	Idem time of position
17-20	flt	Vertical error quality estimate	7F8000 00 (infinite)	
21-24	flt	Horizontal error quality estimate	7F8000 00 (infinite)	
25-28	flt	Horizontal error quality estimate	7F8000 00 (infinite)	
29-30	ubin	Horizontal error quality estimate	0xFFFF	

Table 9-15

Byte No.	Fmt	Description	Value	Comment
31	ubin	Position type	X	01: Planned/preplot 02: Measured 03: Processed 04: Final 0F: Unknown
32	ubin	Header block type	50	Position Block 1: 0x50
33-40	dbl	First coordinate for coordinate tuple 1		Depend of the Location Data Stanza. Easting normally.
41-48	dbl	Second coordinate for coordinate tuple 1		Depend of the Location Data Stanza. Northing normally.
49-56	dbl	Third coordinate for coordinate tuple 1		Depend of the Location Data Stanza. Elevation normally.
57-58	ubin	Location Data Stanza ID1		
59	ubin	Position 1 Valid.	1	00: Not valid 01: Valid
60	ubin	Position 1 Quality	1	00: Quality Not Ok 01: Quality Ok
61-63		Undefined	0	0x0
64	ubin	Header block type	51	Position Block 2: 0x51
65-72	dbl	First coordinate for coordinate tuple 2	0	
73-80	dbl	Second coordinate for coordinate tuple 2	0	
81-88	dbl	Third coordinate for coordinate tuple 2	0	
89-90	ubin	Location Data Stanza ID2	0	
91	ubin	Position 2 Valid	0	

Table 9-15

Byte No.	Fmt	Description	Value	Comment
92	ubin	Position 2 Quality	0	
93-95		Undefined	0	0x0
96	ubin	Header block type	52	Position Block 3: 0x52

Scan Type Header

Table 9-16

Byte No.	Fmt	Description	Value	Comment
1	bcd	Scan Type Number	01	0x01
2-3	ubin	Channel Set Number	1-65535	
4	ubin	Channel type Identification	X	0x10 : Seis channel 0x70 : Aux channel 0x91 : Source signature/unfiltered 0x92 : Source signature/filtered 0x95 : Source base plate 0x96 : Source reference sweep 0x99 : Source Mass 0x9A : Source Excitation 0x9B : Source Valve 0x9C : Source Overload
5-8	bin	Channel set start time	0	A time stamp header is used
9-12	bin	Channel set end time	0	A time stamp header is used
13-16	ubin	Number of samples in each trace of this channel set	XXXX	
17-20	flt	Sample descale multiplication factor	XXXX	
21-23	ubin	Number of channels in this channel set	XXX	
24-26	ubin	Sampling Interval	500, 1000, 2000, 4000	In µS
27	ubin	Array Forming	1	

Table 9-16

<table>
<tr><th>Byte No.</th><th>Fmt</th><th>Description</th><th>Value</th><th>Comment</th></tr>
<tr><td>28</td><td>ubin</td><td>Number of Trace Header Extensions</td><td>X</td><td></td></tr>
<tr><td>29H</td><td>ubin</td><td>Extended Header flag</td><td>0</td><td></td></tr>
<tr><td>29L</td><td>ubin</td><td>Channel gain control method</td><td>3</td><td>fixed gain</td></tr>
<tr><td>30</td><td>ubin</td><td>Vertical Stack</td><td>X</td><td></td></tr>
<tr><td>31</td><td>ubin</td><td>Streamer Cable number</td><td>0</td><td></td></tr>
<tr><td>32</td><td>ubin</td><td>Header block type</td><td>30</td><td>Scan Type Header Block 1: 0x30</td></tr>
<tr><td>33-36</td><td>flt</td><td>Alias filter frequency in Hz</td><td>XXXX</td><td><table><tr><td>SR</td><td>0.5</td><td>1</td><td>2</td><td>4</td></tr><tr><td>FDU</td><td>800</td><td>400</td><td>200</td><td>100</td></tr><tr><td>DSU</td><td>800</td><td>400</td><td>200</td><td>100</td></tr></table></td></tr>
<tr><td>37-40</td><td>flt</td><td>Low cut filter setting in Hz</td><td>XXXX</td><td>User defined</td></tr>
<tr><td>41-44</td><td>flt</td><td>Alias filter slope</td><td>257</td><td>dB/octave</td></tr>
<tr><td>45-48</td><td>flt</td><td>Low cut filter slope</td><td>6</td><td>dB/octave (First order)</td></tr>
<tr><td>49-52</td><td>flt</td><td>Notch frequency setting</td><td>0</td><td></td></tr>
<tr><td>53-56</td><td>ft</td><td>Second notch frequency</td><td>0</td><td></td></tr>
<tr><td>57-60</td><td>ft</td><td>Third notch frequency</td><td>0</td><td></td></tr>
<tr><td>61</td><td>ubin</td><td>Filter phase</td><td>1,2</td><td>01: Minimum
02: Linear</td></tr>
<tr><td>62</td><td>ubin</td><td>Physical unit</td><td>X</td><td>0x00 : Unknown
0x06 : m.s-2
0x07 : Newton
0x10 : Ampere
0x14 : Millimeter
0x15 : Meter
0x0F : Volt</td></tr>
</table>

Table 9-16

Byte No.	Fmt	Description	Value	Comment
63		Undefined.	0	
64	ubin	Header block type	31	Scan Type Header Block 2: 0x31
65-68	ubin	Filter delay	0	
69-95	ascii	Description	X-X	Associated with the Channel Type identification (Byte 4) DSD Force (0x91) DSD Filtered Force (0x92) DSD Plate Acc (0x95) DSD Second Plate Acc (0x95) DSD reference sweep (0x96) DSD Mass Acc (0x99) DSD Mass Displacement (0x99) DSD Excitation (0x9A) DSD Valve Displacement (0x9B) DSD Overload (0x9C)
96	ubin	Header block type	32	Scan Type Header Block 3: 0x32

The Extended Header

Table 9-17

Byte No.	Fmt	Description	Value	Comment
1	ubin	Software version major	X	
2	ubin	Software version minor	X	
3-4	ubin	Software version patch	XX	
5-20	ascii	Software version label		Free Text
21-24	ubin	Number of characters in External Header	XXXX	
25-32				Padded with 0

The External Header

Table 9-18

Byte No.	Fmt	Description	Value	Comment
1-n*	ascii	Concatenation of: - Info from shooting or navigation sys-tem, - User info from environment setup - Source comment from operation win-dow	XXXX	

*Variable size multiple of 32bytes. The quantity of 32 bytes blocks is defined in the General Header Block 2 Byte 28, 29 and 30.

General Trailer Block

Table 9-19

Byte No.	Fmt	Description	Value	Comment
1	ubin	Block type		
2	ubin	ASCII or binary		
3-4		Undefined	0	
5-8	ubin	Block size		
9-24	ascii	Description		Reference on model and revision of data
25-31		Undefined	0	
32	ubin	Header block type (one byte, unsigned binary).	70	General Trailer Block: 0x70

Channel Header Blocks

Demultiplexed Trace Header

Table 9-20

Byte No.	Fmt	Description	Value	Comment
1-2	bcd	Four-digit file number (0-9999)	FFFF	Sercel systematically use the extended file number (DTH, byte 18-20) even for values below 9999
3	bcd	Scan Type Number	1	
4	bcd	Channel Set Number	FF	Sercel systematically use the extended channel set number (DTH, byte 16-17) even for values below 99
5-6	bcd	Trace Number	FFFF	Sercel systematically use the extended trace number (THE#1, byte 22-24) even for values below 9999
7-9	bin	First Timing Word	0	0 with systematic used of the Time Stamp Header
10	bin	Trace Header Extension	X	
11	bin	Sample skew	0	0 with systematic used of the Time Stamp Header
12	bin	Trace edit	0,3	00: No edition 03: Edited
13-15	bin	Time break window	XXX	
16-17	ubin	Extended channel set number	XX	
18-20	bin	Extended file number	XXX	

Trace Header Extension # 1

Table 9-21

Byte No.	Fmt	Description	Value	Comment
1-3	bin	Receiver line number	FFFFFF	Sercel systematically use the extended receiver line number (THE#1, byte 11-15) even for integer values
4-6	bin	Receiver point number	FFFFFF	Sercel systematically use the extended receiver point number (THE#1, byte 16-20) even for integer values
7	bin	Receiver point index	X	
8	ubin	Re-shoot Index	X	
9	ubin	Group Index	X	0x0 for vertical geophone 1C, vertical accelerometer 1C, hydrophone 0x01, 0x02, 0x03 for geophone 3C, accelerometer 3C (0x01=X in-line, 0x02=Y cross-line, 0x03=Z vertical)
10	ubin	Depth Index	1	
11-15	bin	Extended receiver line number	XXXXX	
16-20	bin	Extended receiver point number	XXXXX	
21	bin	Sensor SEGD code	X	
22-24	bin	Extended Trace Number	XXX	
25-28	bin	Number of samples	XXXX	
29	ubin	Sensor moving	0	

Table 9-21

Byte No.	Fmt	Description	Value	Comment
30		Undefined	0	0x00
31	ubin	Physical unit	06,0F	0F: Volt 06: m.s-2
32	ubin	Header block type	40	Trace Header Extension Block #1: 0x40

Sensor Info Trace Header Extension

Table 9-22

Byte No.	Fmt	Description	Value	Comment
1-8	bin	Equipment Test Time	0	0
9-12	flt	Sensor Sensitivity	XXXX	Factor to apply to the sample to get the result in the measure-ment unit.
13	ubin	Equipment Test Result	0	0x0
14-31	ascii	Serial Number	X-X	
32	ubin	Header block type	41	Sensor Info Trace Extension Block:0x41

Timestamp Header

Table 9-23

Byte No.	Fmt	Description	Value	Comment
1-8	bin	Time Zero for this data block	XXXXXXX	GPS time of the first sample. Could be different from the Tb GPS time if resynchronization.
9-31		Undefined	0	
32	ubin	Header block type	42	Time Stamp Header Block:0x42

Measurement Header

Table 9-24

Byte No.	Fmt	Description	Value	Comment
1-8	bin	Time Stamp		
9-12	flt	Measurement value	XXXX	
13-16	flt	Maximum Value	XXXX	
17-20	flt	Minimum Value	XXXX	
21-22	ubin	Quantity Class	XX	1045: Electrical Resistance: Resistance 1033: Dimensionless: Geophone tilt 1122: Plane angle: Acc Tilt 1045: Electrical Resistance: Leakage 1023: Capacitance: Capacitance 1061: Frequency: Cut-Off frequency See Note 1
23-24	ubin	Unit of Measure	XX	2100: Ohm: Resistance 2142: Euc: Geophone tilt 2110: Radian: Acc Tilt 2100: Ohm: Leakage 2031: Farad: Capacitance 2036: Hertz: Frequency See Note 1

Table 9-24

Byte No.	Fmt	Description	Value	Comment
25-26	ubin	Measurement Description code	XX	3000: Sensor Resistance: Resistance 3001: Analog Sensor Tilt: Geophone tilt 3002: Digital Sensor Tilt: Acc Tilt 3003: Sensor Leakage: Leakage 3004: Sensor Capacitance: Capacitance 3005: Sensor Cut-Off: Cut-Off See Note 1
27-31		Undefined	0	
32	ubin	Header block type	61	Measurement Header Block: 0x61

Note Details on:

http://www.seg.org/web/technical-standards-committee/wiki/-/wiki/Main/SegMeasurements

Sercel Blocks

In order to include extra information in the SEG-D file, Sercel defined some extra blocks.

Sercel SEG-D Revision Block

Table 9-25

Byte No.	Fmt	Description	Value	Comment
1-20	ascii	Sercel SEG-D version Label	X-X	ASCII text, 20 characters. Left justified, padded with space (0x20) characters.
21	ubin	Sercel SEG-D Version Major	X	
22	ubin	Sercel SEG-D Version Minor	X	
23	ubin	Sercel SEG-D Version Teeny	X	
24-31	ubin	Reserved	X-X	0x0
32	ubin	Header block type	B0	Sercel SEG-D version Block: 0xB0

This block is mandatory for all the Sercel products. It is always inserted at the fourth position in the general header immediately after the 3 first mandatory blocks.

Sercel Tape Block

Table 9-26

Byte No.	Fmt	Description	Value	Comment
1-4	bin	Input Filter identifier	XXXX	
5-8	bin	Minimum tape number for this filter	XXXX	
9-12	bin	Maximum tape number for this filter	XXXX	
13	bin	Tape number increment for this filter	X	

Table 9-26

Byte No.	Fmt	Description	Value	Comment
14-17	bin	Tape Number in this filter	XXXX	
18-21	bin	Maximum number of files per tape	XXXX	
22-25	bin	File rank on tape	XXXX	(File count)
32	ubin	Header block type	B1	Sercel Tape Block: 0xB1

Sercel File Identification Block

Table 9-27

Byte No.	Fmt	Description	Value	Comment
1-8	ubin	File generation time	X-X	GPS Time of the file generation
32	ubin	Header block type	B2	Sercel File Identification Block: 0xB2

Sercel VP Identification Block

Table 9-28

Byte No.	Fmt	Description	Value	Comment
1-16	ubin	VP uuid	X-X	See Note below
17	ubin	RetrieveType	0,1	0 : Field 1 : Simulator
18-21	ubin	Operating mode	XXXX	bit0 : 1 Normal bit1 : 1 Microseismic bit2 : 1 Shallow bit3 : 1 SQC Dump (VSR) bit4 : 1 Autonomous bit8 : 1 Guidance bit9 : 1 Slip Sweep Possible combinations are: 0x001 : Normal 0x002 : Microseismic 0x004 : Shallow 0x008 : SQC Dump 0x010 : Autonomous 0x101 : Guidance + Normal 0x104 : Guidance + Shallow 0x108 : Guidance + SQC Dump 0x110 : Guidance + Autonomous 0x201 : Slip Sweep + Normal 0x204 : Slip Sweep + Shallow 0x208 : Slip Sweep + SQC Dump 0x301 : Slip Sweep + Guidance + Normal 0x304 : Slip Sweep + Guidance + Shallow 0x308 : Slip Sweep + Guidance + SQC Dump
32	ubin	Header block type	B3	Sercel VP Identification Block: 0xB3

Note Details on: http://en.wikipedia.org/wiki/Universally_unique_identifier

Sercel Processing Details Block

Table 9-29

Byte No.	Fmt	Description	Value	Comment
1	ubin	Type of process	X	0 : N/A 1 : No operation (raw data) 2 : Stack 3 : Correlation After stack 4 : Correlation Before stack
2	ubin	Field retrieve type	X	0 : Normal record. 1 : Instrument noise. 2 : Instrument gain 3 : Instrument phase 4 : Instrument common mode 5 : Instrument distortion. 6 : Instrument crosstalk 7 : Instrument pulse. 10 : Field (Sensor) noise. 11 : Field (Sensor) resistance 12 : Field (Sensor) leakage 13 : Field (Sensor) tilt. 14 : Field (Sensor) distortion. 15 : Field (Sensor) pulse. 16 : Field (Sensor) gravity
3-6	ubin	Acquisition length in ms	XXXX	
7-10	ubin	Correlation length in ms	XXXX	
11-14	ubin	Pilot length in ms	XXXX	
15-18	ubin	Listening time in ms	XXXX	

Table 9-29

Byte No.	Fmt	Description	Value	Comment
19	ubin	Seismic DC offset removal method	X	0 : None 1 : Central Unit 2 : 0.15625 Hz low cut filter 3 : 0.3125 Hz low cut filter 4 : 0.625 Hz low cut filter 5 : 1.25 Hz low cut filter 6 : 2.5 Hz low cut filter 7 : Other low cut filter
20	ubin	System process id	X	
32	ubin	Header block type	B4	Sercel Processing Details Block: 0xB4

Sercel Stack Details Block

Table 9-30

Byte No.	Fmt	Description	Value	Comment
1-2	ubin	Intitial stacking fold	XX	Stacking fold configured in the process type
3-4	ubin	Effective stacking fold	XX	Can be lower than the Initial sta-cking fold
5	ubin	Type of dump	X	0 : Normal dump 1 : Raw dump 2 : Extra dump
32	ubin	Header block type	B5	Sercel Stack Details Block: 0xB5

Sercel Additional Vibrator Source Info

Table 9-31

Byte No.	Fmt	Description	Value	Comment
1	ubin	Number of vibrators per fleet	X	
2	ubin	Number of simultaneous sources	X	
32	ubin	Header block type	B6	Sercel Additional Vibrator Source Info: 0xB6

Sercel Additional Explosive Source Info

Table 9-32

Byte No.	Fmt	Description	Value	Comment
1-4	ubin	Uphole time in microse-conds	XXXX	
5-8	ubin	Blaster id	XXXX	
9-12	bin	Blaster status	XXXX	
13-16	flt	Time break window in ms	XXXX	
17	ubin	Internal time break	0,1	0 : No 1 : Yes
18	ubin	Number of simultaneous sources	X	
32	ubin	Header block type	B7	Sercel Additional Explosive Source Info Block: 0xB7

Sercel Trace Label Block

Table 9-33

Byte No.	Fmt	Description	Value	Comment
1-31	ascii	Trace Label	X-X	Naming of Auxiliary channels
32	ubin	Header block type	B8	Trace Label Block: 0xB8

Sercel Trace Identification Block

Table 9-34

Byte No.	Fmt	Description	Value	Comment
1-2	ubin	Unit Type	XX	0x0000 = Not Defined 0x0200 = FDU1-508 0x0300 = DSU1-508 0x03CD = VE464 DSD
3	ubin	Channel number		
4	ubin	Sensor type number	1-9	Each Sensor Type Number (created in the Line main window's Survey setup) is associated with a specific set of sensor test limits. The Sensor Type Number should not be mistaken for the “Sensor SEGD code” recorded in Trace Header Extension block # 1
5-6	ubin	Assembly type	XX	0x00xx with xx equal to the quantity of field units connected in the link (in hexa) (ex: 0x0006 : LINK6). 1F (31) is the max value.
7-10	ubin	Assembly serial number	XXXX	
11	ubin	Location in assembly	XX	Position of the unit in a link.
12-13	ubin	Controller type	XX	0x0101: SCI-508 0x0102: CX-508 0x03CD: VE464 DSD
14-17	ubin	Controller serial number	XXXX	
18-21	ubin	Index within acquisition	XXXX	Channel position in the spread
32	ubin	Header block type	B9	Sercel Trace Identification Block: 0xB9

Sercel Trace Edition and Processing Block

Table 9-35

Byte No.	Fmt	Description	Value	Comment
1	ubin	Channel overscaling error	0,1	0: No error 1: overscaling error
2-3	ubin	Channel edited status	X	0: No edition 1: mute 2: dead 3: outstanding
4-7	bin	Resynchronisation delay applied	XXXX	in micro-second (four bytes, signed binary)
8	ubin	Noise elimination type	X	0: Off 1: Diversity stack
9-10	ubin	Diversity number of win-dows	XX	0 if not defined
11	ubin	Channel processing type	XX	00: N/A 01: Raw data 02: Aux stack 03: Correlation, negative part 04: Correlation, positive part 05: Normal correlation 06: Seis stack
12	ubin	Is correlation trace refe-rence recorded?	0,1	1: The trace is recorded.
13-16	ubin	Correlation reference trace index within acquisi-tion	X	
17-20	flt	Removed DC Offset	XX	NAN if unknown
21	ubin	Channel gain scale	X	0: Not Defined 1: 0 dB 2: 12 dB 3: 24 dB

Table 9-35

Byte No.	Fmt	Description	Value	Comment
22	ubin	Tilt Correction status	X	0: Not Defined 1: Not applied 2: Applied
23-31		Not defined		
32	ubin	Header block type	BA	Sercel Trace Edition and Processing Block: 0xBA

Tape Label

SEGD V3.0 Tape Label

The first 128 bytes of data on a Rev 3.0 tape must consist of ASCII characters and will constitute a Storage Unit Label. This label is very similar to the RP-66 storage unit label. The Storage Unit Label is also often referred to as the “Tape Label” for historical reasons. The label format is summarized in the table below.

If the tape media supports multiple partitions, SEG-D data may be written to any of the partitions of the tape, each beginning with a Storage Unit Label. Data from one partition can not “run over” into a subsequent partition, each partition must be capable of being decoded in isolation.

On one tape, it is allowed to mix partitions containing SEG-D data with partitions containing non SEG-D formatted information.

Table 9-36

Field	Location	Description	Content generated by 508XT
1	1-4	Storage unit sequence number	Tape Number from input filter setup
2	5-9	SEG-D Revision	SD3.0
3	10-15	Storage unit structure (fixed or variable)	RECORD

Table 9-36

Field	Location	Description	Content generated by 508XT
4	16-19	Binding edition	B2
5	20-29	Maximum block size	0
6	30-39	API Producer organization code	469 (Sercel)
7	40-50	Creation date	Recording date of the tape label
8	51-62	Serial number	Tape Label field from input filter setup
9	63-68	Reserved	
11	69-80	External Label Name	External Tape Label field from input filter setup
12	81-104	Recording Entity Name	Crew Name from crew setup
13	105-118	User defined	User Defined Tape Label field from input filter setup
14	119-128	Max shot records per field record	1

Field 1

The **Storage Unit Sequence Number** is an integer in the range 1 to 9999 that indicates the order in which the current storage unit occurs in the storage set. The first storage unit of a storage set has sequence number 1, the second 2, and so on. This number is represented using the characters 0 to 9, right justified with leading blanks if needed to fill out the field (No leading zeros). The rightmost character is in byte 4 of the label. *This field is optional*. If not used, it must be blank (filled with blank characters). This implies that this is the only storage unit within the storage set. Separate Storage Sets should be used for different data types.

Field 2

The **SEG-D Revision** field indicates which revision of SEG-D was used to record the data on this tape. SD3.0 indicates that the data was recorded using SEG-D, Revision 3.0 (SD2.1 in previous revision) - *This field is required.*

Field 3

Storage Unit Structure is a name indicating the record structure of the storage unit. This name is left justified with trailing blanks if needed to fill out the field. The leftmost character is in byte 10 of the label. For SEG-D, Rev 3 tapes, this field must contain “RECORD” or “FIXREC”. *This field is required*.

“RECORD” — Records may be of variable length, ranging up to the Blocksize length specified in the maximum Block size field of the storage unit label (if not zero). If the maximum Block size specified is zero, then records may be of any length.

“FIXREC” — All records in the storage unit have the same length, namely that specified in the maximum Block size field of the storage unit label. Although all storage units in the same storage set must have a FIXREC structure, the maximum record length may be different in different storage units. When the FIXREC option is used, then the maximum record length field shall not be 0 (zero).

Field 4

Binding edition is the character B in byte 16 of the label followed by a positive integer in the range 1 to 999 (no leading zeros), left justified with trailing blanks if needed to fill out the field. The integer value corresponds to the edition of the Part 3 of the API, RP66 standard used to describe the physical binding of the logical format to the storage unit. *This field is required.*

Field 5

Maximum Block Size is an integer in the range of 0 to 4,294,967,295 ($2^{32}-1$), indicating the maximum block length for the storage unit, or 0 (zero) if undeclared. This number is represented using the characters 0 to 9, right justified, with leading blanks if necessary to fill out the field (no leading zeros). The rightmost character is byte 29 of the label. A valid value or 0 (zero) must be recorded. A value of 1 means byte stream device (e.g. disk). *It is highly recommended to indicate the maximum block length where possible, as this will determine the size buffer needed to read the data, and will enable reading the data at a more optimal speed (using multi-block read).*

Field 6

Producer organization code is an integer in the range of 0 to 4,294,967,295 ($2^{32}-1$) indicating the organization code of the storage unit producer. This number is represented using the characters 0 to 9, right justified, with leading blanks if necessary to fill out the field (NO leading zeros). The rightmost character is byte 39 of the label. *This field may be empty, i.e. may contain all blanks, in which case no storage unit producer is specified (i.e. same as RP-66 V2).*

Organization codes are assigned by Energistics, formerly the Petrotechnical Open Standards Consortium (POSC), which maintains the current list of codes. To request a new organization code, contact:

Energistics
24 E. Greenway Plaza
Suite 1315
Houston, TX 77046-2414 USA
+1 713 784-1880 telephone
+1 713 784-9219 fax
info@energistics.org

Field 7

Creation date is the earliest date that any current information was recorded on the storage unit. The date is represented in the form dd-MMM-yyyy, where yyyy is the year (e.g. 1996), MMM is one of (JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC), and dd is the day of the month in the range 1 to 31. Days 1 to 9 may have one leading blank. The separator is a hyphen (code 4510). *This field is required.*

Field 8

Serial number is an ID used to distinguish the storage unit from other storage units in an archive of an enterprise. The specification and management of serial numbers is delegated to organizations using this standard. If an external label is used the name/number must be a subset of the serial number or the External Label Name in Field 10, and must occupy the rightmost characters in the serial number (or External Label Name). *This field is required.*

Field 9

This field is reserved and should be recorded as all blanks (code 3210).

Filed 10 - 12

The **Storage set identifier** is a descriptive name for the storage set. Every storage unit in the same storage set shall have the same value for the **user defined portion** of the storage set identifier in its storage unit label. Included in the **Storage Set Identifier** is the **External Label Name**. The characters in this field are right justified with leading blank characters as required. If the tape does not have a physical label, then this field must be blank. A physical label is optional, but if it exists, then this field is required only if the external label is different from the lower 6 characters of the Serial Number in Field 8. The next field in the Storage set identifier is the **Recording Entity Name**. This must contain the crew number or name, or some other unique identifier which will differentiate the recording entity which recorded this data from any other recording entity within the organization (as included in field 6). The 24 bytes may by any alphanumeric characters. If multiple recording systems are used on a vessel or crew, then data recorded on each system must be clearly distinguished. For example, an

ABC Geophysical crew (party 13), on the M/V Gopher, recording data on two Zip 6000 recording systems might have a Recording Entity Name on tapes recording on the first recording system of:

ABC, Gopher, P13, Zip#1

On the second system, the Recording Entity Name might be:

ABC, Gopher, P13, Zip#2

The Recording Entity Name field is required.

Field 13

User Defined

The next 14 bytes in this field may contain any other user input information. The only restriction is that the data must be in ASCII.

Field 14

Max Number of shot records per field record. Field Records are data between File Marks (10 bytes).

It is not acceptable to use an ANSI label (or any other label or data) prior to the Storage Unit Label.

An external, physical label is not required.

Sercel Tape Label content

Table 9-37

Field	Location	Description	Start - end byte
1	1-4	Storage unit sequence number	Tape Number from input filter setup
2	5-9	SEG-D Revision	SD3.0
3	10-15	Storage unit structure (fixed or variable)	RECORD
4	16-19	Binding edition	B2
5	20-29	Maximum block size	0
6	30-39	API Producer organization code	469 (Sercel)
7	40-50	Creation date	Recording date of the tape label
8	51-62	Serial number	Tape Label field from input filter setup
9	63-68	Reserved	""

Table 9-37

Field	Location	Description	Start - end byte
11	69-80	External Label Name	External Tape Label field from input filter setup
12	81-104	Recording Entity Name	Crew Name from crew setup
13	105-118	User defined	User Defined Tape Label field from input filter setup
14	119-128	Max shot records per field record	1

Chapter

10

SEG-D Output File Format Rev 3.0 (Wireless)

This chapter describes Wireless version of the SEG-D format Rev3.0 for the DCM. It includes the following sections:

Overview

Abbreviations

The abbreviation in the "**fmt**" column gives the format of the value:

- **bcd:** BCD
- **ubin:** unsigned binary
- **bin:** 2's complement signed binary
- **asc:** ASCII
- **flt:** IEEE single-precision
- **dbl:** IEEE double-precision format

Note *An infinity value means a floating number with all the bits of the exponent set to 1 and all the bits of the mantissa set to 0. It normally means an unavailable value.*

Numbers with 0x ahead are in hexadecimal format.

Block Codes

The table below summarises the block names and codes used by the SEG-D Rev 3.0 standard, and those specifically defined by Sercel. These codes (Hexadecimal) are written in the last byte of the corresponding block.

Table 10-1

Block Name	Size	Code (Hexa)
General Header Block #1	32	None
General Header Block #2	32	2
General Header Block #3 (Timestamp and size header)	32	3
General Header Block #4 (Vessel/Crew identification)	32	10
General Header Block #5 (Survey Area Name)	32	11
General Header Block #6 (Client identification)	32	12
General Header Block #7 (Job identification)	32	13
General Header Block #8 (Line identification)	32	14
Source Description Blocks: Vibrator	32	15

Table 10-1

Block Name	Size	Code (Hexa)
Source Description Blocks: Impulsive	32	16
Additional Source Info Block	32	20
Source Auxiliary Channel Reference Block	32	21
Coordinate Reference System Identification Block	32	55
Position Blocks	32	50
Position Blocks	32	51
Position Blocks	32	52
Scan Type Header	32	30
Scan Type Header	32	31
Scan Type Header	32	32
The Extended Header	32	None
The External Header	X.32	None
General Trailer Block	32	70
Demultiplexed Trace Header	20	None
Trace Header Extension # 1	32	40
Sensor Info Trace Header Extension	32	41
Timestamp Header	32	42
Measurement Header	32	61
Sercel SEG-D Revision Block	32	B0
Sercel Tape Block	32	B1
Sercel File Identification Block	32	B2
Sercel VP Identification Block	32	B3
Sercel Processing Details Block	32	B4

Table 10-1

Block Name	Size	Code (Hexa)
Sercel Trace Label Block	32	B8
Sercel Trace Identification Block	32	B9
Sercel Trace Edition and Processing Block	32	BA
Sercel DCM Trace Header Extension Block	32	D0
Sercel Observer Comments Block	32	D1
Sercel System ID Header Block #1	32	D2
Sercel System ID Header Block #2	32	D3
Sercel System ID Header Block #3	32	D4
Sercel Origins Block	32	D5

Note All the details about the SEG-D Rev 3.0 format can be found here: http://www.seg.org/documents/10161/77915/seg_d_rev3_0-jun2012.pdf

File Header Block

General Header Block #1

Table 10-2

Byte No.	Fmt	Description	Value	Comment
1-2	bcd	File number of four digits	FFFF	Sercel systematically use the extended file number (GHB#2, byte 1-3) even for values below 9999
3-4	bcd	Format code	8058	32 bit IEEE or 64 bit IEEE
5-10	bcd	General constants, 12 digits	0	0, Not used
11	bcd	Last two digits of year	0-99	UTC conversion of the GPS from the GHB#3, byte 1-8
12H	ubin	Number of additional blocks in general header	F	Sercel systematically use the extended number of additional blocks in general header (GHB#2, byte 23-24)
12L-13	bcd	Julian day, 3 digits	1-366	UTC conversion of the GPS from GHB#3, byte 1-8
14	bcd	Hour of day	0-23	UTC conversion of the GPS from GHB#3, byte 1-8
15	bcd	Minute of hour	0-59	UTC conversion of the GPS from GHB#3, byte 1-8
16	bcd	Second of minute	0-60	UTC conversion of the GPS from GHB#3, byte 1-8. The value 60 is a legal value of this field only during UTC leap seconds
17	bcd	Manufacturer's code	13	Sercel code

Table 10-2

Byte No.	Fmt	Description	Value	Comment
18-19	bcd	Manufacturer's serial nb	1	0: N/A 1:508XT 2: Unite 4: DCM
20-22		Not Used	0	
23	bcd	Base scan interval	FF	Sercel systematically use the sampling interval (CSD, byte 24-26)
24H	ubin	Polarity	0	Untested
24L-25		Not used	0	
26H	bcd	Record type	2,8	0x08:normal 0x02:test record The other values are not used
26L-27	bcd	Record length from time zero (in increments of 0.5 times 1.024 sec)	0x0FFF	0x0FFF in normal recording mode.
28	bcd	Scan type per record	1	Only one scan type per record.
29	bcd	Number of channel sets per scan type (0-99)	FF	Sercel systematically use the extended number of channel set (GHB#2, byte 4-5) even for the values <= 99
30	bcd	Number of 32 byte fields added to the end of each scan type header in order to record the sample skew of all channels (0-99)	FF	Sercel systematically use the extended skew blocks (GHB#2, byte 9-10)) even for the values <= 99

Table 10-2

Byte No.	Fmt	Description	Value	Comment
31	bcd	Extended header length	FF	Sercel systematically use the extended header blocks (GHB#2, byte 6-8) even for the values <= 99
32	bcd	External header length	FF	Sercel systematically use the external header blocks (GHB#2, byte 28-30) even for the values <= 99

General Header Block #2

Table 10-3

Byte No.	Fmt	Description	Value	Comment
1-3	ubin	Extended file number	XXX	2^{24} - 1
4-5	ubin	Extended Channel Sets/Scan Types	1-XX	The SEG-D V3.0 allows 0
6-8	ubin	Extended Header Blocks	1	
9-10	ubin	Extended Skew Blocks	0	
11	ubin	Major SEG-D Revision Number	3	
12	ubin	Minor SEG-D Revision Number	0	
13-16	ubin	Number of Blocks of General Trailer	0-XXXX	
17-20	ubin	Extended Record Length	0-XXXX	In normal recording mode, it's the maximum length of all the seismic traces. The trace length is peculiar to the channel set.
21-22	ubin	Record set number	0-65535	Swath Number
23-24	ubin	Extended Number of additional Blocks in the General Header	0-XX	
25-27	ubin	Dominant Sampling Interval	XXX	Sample Rate if all the seismic traces have the same sample rate. 0 otherwise. Micro-Second.
28-30	ubin	External Header Blocks	0-XXX	Quantity of 32 bytes blocks.
31		Undefined	0	
32	ubin	Header block type	2	General Header Block #2: 0x02

General Header Block #3 (Timestamp and size header)

Table 10-4

Byte No.	Fmt	Description	Value	Comment
1-8	bin	Time Zero for this record (SEG-D timestamp)	XXXXXXX	GPS time stamp of the first sample (after resynchronisation if applied)
9-16	ubin	Record Size	XXXXXXX	Total size of the SEG-D record in number bytes
17-24	ubin	Data Size	XXXXXXX	Total size of the headers and data in number of bytes without the general trailer.
25-28	ubin	Header Size	XXXXXXX	Total size of the general headers in number of bytes
29	ubin	Extended Recording Mode	0	1 for Extended Recording Mode, 0 for normal record.
30	ubin	Relative Time Mode	0	Set to 1 if this record does not contain absolute timestamps, 0 for normal record. 0 for the 508
31		Undefined	0	
32	ubin	Header block type	3	General Header Block #3: 0x03

General Header Block #4 (Vessel/Crew identification)

Table 10-5

Byte No.	Fmt	Description	Value	Comment
1-3	ascii	Abbreviated vessel or crew name	XXX	
4-31	ascii	Vessel or crew name	X-X	
32	ubin	Header block type	10	General Header Block #4: 0x10

General Header Block #5 (Survey Area Name)

Table 10-6

Byte No.	Fmt	Description	Value	Comment
1-31	ascii	Survey Area Name	X-X	
32	ubin	Header block type	11	General Header Block #5: 0x11

General Header Block #6 (Client identification)

Table 10-7

Byte No.	Fmt	Description	Value	Comment
1-31	ascii	Client identification	X-X	
32	ubin	Header block type	12	General Header Block #6: 0x12

General Header Block #7 (Job identification)

Table 10-8

Byte No.	Fmt	Description	Value	Comment
1-5	ascii	Abbreviated Job Identifica-tion	XXX	
6-31	ascii	Job Identification	X-X	
32	ubin	Header block type	13	General Header Block #7: 0x13

General Header Block #8 (Line identification)

Table 10-9

Byte No.	Fmt	Description	Value	Comment
1-7	ascii	Line Abbreviation	XXX	
8-31	ascii	Line Identification	X-X	
32	ubin	Header block type	14	General Header Block #8: 0x14

Source Description Blocks

Vibrator

Table 10-10

Byte No.	Fmt	Description	Value	Comment
1-3	ubin	Expanded file number	XXX	
4-6	bin	Source Line Number, Integer	XXX	
7-8	bin	Source Line Number, Fraction	XX	
9-11	bin	Source Point Number, Integer	XXX	
12-13	bin	Source Point Number, Fraction	XX	
14	bin	Source Point Index	1	
15	ubin	Phase Control	3	Weighted sum
16	ubin	Vibrator Type	0	
17-18	bin	Phase angle	0	
19	ubin	Source Id	X	Vp number for Vp and Stack block. Vibrator number for Vibrator position block.
20	ubin	Source Set Number	X	0 for Vp and Stack block. Vp number for Vibrator position block.
21	ubin	Re-shoot Index	X	
22	ubin	Group Index	X	Stack Number, 0 for Vp block
23	ubin	Depth Index	1	
24-25	bin	Offset cross-line	8000	0x8000 (unknown)
26-27	bin	Offset in-line	8000	0x8000 (unknown)

Table 10-10

Byte No.	Fmt	Description	Value	Comment
28-29	ubin	Size	0	
30-31	ubin	Offset depth	8000	0x8000 (unknown)
32	ubin	Header block type	15	Source Description Block, Vibrator: 0x15

Impulsive

Table 10-11

Byte No.	Fmt	Description	Value	Comment
1-3	ubin	Expanded file number	XXX	
4-6	bin	Source Line Number, Integer	XXX	
7-8	bin	Source Line Number, Fraction	XX	
9-11	bin	Source Point Number, Integer	XXX	
12-13	bin	Source Point Number, Fraction	XX	
14	bin	Source Point Index	1	
15-16	ubin	Depth	0	
17	ubin	Charge Length	0	
18	ubin	Soil Type	FF	
19	ubin	Source Id	X	Source Id
20	ubin	Source Set Number	0	
21	ubin	Re-shoot Index	X	
22	ubin	Group Index	X	0 if single stack, stack number for stack quantity >= 2
23	ubin	Depth Index	1	
24-25	bin	Offset cross-line	8000	0x8000 (unknown)
26-27	bin	Offset in-line	8000	0x8000 (unknown)
28-29	ubin	Size	0	
30-31	ubin	Offset depth	8000	0x8000 (unknown)

Table 10-11

Byte No.	Fmt	Description	Value	Comment
32	ubin	Header block type	16	Source Description Block, Explosive: 0x16

Additional Source Info Block

Table 10-12

Byte No.	Fmt	Description	Value	Comment
1-8	bin	Time	XXXXXX X	A time of 0 is indicates source fired at start of record
9	ubin	Source Status	0x00, 0x01 or 0xFF	Source Status (1 byte, unsigned binary) 00: Untested/unknown status 01: Source fired OK FF: Unknown error
10	ubin	Source Id	X	Vib or source number if single, 0 in other cases
11	ubin	Source Moving	0	
12-31	ascii	Error Description	X-X	For vibrator source, the vibrator status. “Ok” in explosive
32	ubin	Header block type	20	Additional Source Info Block: 0x20

Source Auxiliary Channel Reference Block

Table 10-13

Byte No.	Fmt	Description	Value	Comment
1	ubin	Source Id		
2	bcd	Channel 1, Scan Type Nbr		
3-4	ubin	Channel 1, Channel Set Nbr		
5-7	ubin	Channel 1, Trace Nbr		
8	bcd	Channel 2, Scan Type Nbr		
9-10	ubin	Channel 2, Channel Set Nbr		
11-13	ubin	Channel 2, Trace Nbr		
14	bcd	Channel 3, Scan Type Nbr		
15-16	ubin	Channel 3, Channel Set Nbr		
17-19	ubin	Channel 3, Trace Nbr		
20	bcd	Channel 4, Scan Type Nbr		
21-22	ubin	Channel 4, Channel Set Nbr		
23-25	ubin	Channel 4, Trace Nbr		
26	bcd	Channel 5, Scan Type Nbr		
27-28	ubin	Channel 5, Channel Set Nbr		
29-31	ubin	Channel 5, Trace Nbr		
32	ubin	Header block type	21	Source Auxiliary Channel Reference Block: 0x21

Coordinate Reference System Identification Block

Table 10-14

Byte No.	Fmt	Description	Value	Comment
1-31	Ascii	CRS ID	X-X	The Coordinate Reference System (CRS) identification in a textual format.
32	Ubin	Header block type	55	Coordinate Reference System identification Block: 0x55

Position Blocks

Table 10-15

Byte No.	Fmt	Description	Value	Comment
1-8	bin	Time of position	XXXXXXX	TB for (Or 0) for planned positions, $GGA time for measured positions
9-16	bin	Time of measurement/ calculation.	XXXXXXX	Idem time of position
17-20	flt	Vertical error quality estimate	7F800000 (infinite)	
21-24	flt	Horizontal error quality estimate	7F800000 (infinite)	
25-28	flt	Horizontal error quality estimate	7F800000 (infinite)	
29-30	ubin	Horizontal error quality estimate	0xFFFF	

Table 10-15

Byte No.	Fmt	Description	Value	Comment
31	ubin	Position type	X	01: Planned/preplot 02: Measured 03: Processed 04: Final 0F: Unknown
32	ubin	Header block type	50	Position Block 1: 0x50
33-40	dbl	First coordinate for coordinate tuple 1		Depend of the Location Data Stanza. Easting normally.
41-48	dbl	Second coordinate for coordinate tuple 1		Depend of the Location Data Stanza. Northing normally.
49-56	dbl	Third coordinate for coordinate tuple 1		Depend of the Location Data Stanza. Elevation normally.
57-58	ubin	Location Data Stanza ID1		
59	ubin	Position 1 Valid.	1	00: Not valid 01: Valid
60	ubin	Position 1 Quality	1	00: Quality Not Ok 01: Quality Ok
61-63		Undefined	0	0x0
64	ubin	Header block type	51	Position Block 2: 0x51
65-72	dbl	First coordinate for coordinate tuple 2	0	
73-80	dbl	Second coordinate for coordinate tuple 2	0	

Table 10-15

Byte No.	Fmt	Description	Value	Comment
81-88	dbl	Third coordinate for coordinate tuple 2	0	
89-90	ubin	Location Data Stanza ID2	0	
91	ubin	Position 2 Valid	0	
92	ubin	Position 2 Quality	0	
93-95		Undefined	0	0x0
96	ubin	Header block type	52	Position Block 3: 0x52

Scan Type Header

Table 10-16

Byte No.	Fmt	Description	Value	Comment
1	bcd	Scan Type Number	01	0x01
2-3	ubin	Channel Set Number	1-65535	
4	ubin	Channel type Identification	X	0x10 : Seis channel 0x70 : Aux channel 0x91 : Source signature/unfiltered 0x92 : Source signature/filtered 0x95 : Source base plate 0x96 : Source reference sweep 0x99 : Source Mass 0x9A : Source Excitation 0x9B : Source Valve 0x9C : Source Overload
5-8	bin	Channel set start time	0	A time stamp header is used
9-12	bin	Channel set end time	0	A time stamp header is used
13-16	ubin	Number of samples in each trace of this channel set	XXXX	
17-20	flt	Sample descale multiplica-tion factor	XXXX	
21-23	ubin	Number of channels in this channel set	XXX	

Table 10-16

<table>
<tr><th>Byte No.</th><th>Fmt</th><th>Description</th><th>Value</th><th>Comment</th></tr>
<tr><td>24-26</td><td>ubin</td><td>Sampling Interval</td><td>500,
1000,
2000,
4000</td><td>In µS</td></tr>
<tr><td>27</td><td>ubin</td><td>Array Forming</td><td>1</td><td></td></tr>
<tr><td>28</td><td>ubin</td><td>Number of Trace Header Extensions</td><td>X</td><td></td></tr>
<tr><td>29H</td><td>ubin</td><td>Extended Header flag</td><td>0</td><td></td></tr>
<tr><td>29L</td><td>ubin</td><td>Channel gain control method</td><td>3</td><td>fixed gain</td></tr>
<tr><td>30</td><td>ubin</td><td>Vertical Stack</td><td>X</td><td></td></tr>
<tr><td>31</td><td>ubin</td><td>Streamer Cable number</td><td>0</td><td></td></tr>
<tr><td>32</td><td>ubin</td><td>Header block type</td><td>30</td><td>Scan Type Header Block 1: 0x30</td></tr>
<tr><td>33-36</td><td>flt</td><td>Alias filter frequency in Hz</td><td>XXXX</td><td><table><tr><td>SR</td><td>0.5</td><td>1</td><td>2</td><td>4</td></tr><tr><td>WTU</td><td>800</td><td>400</td><td>200</td><td>100</td></tr><tr><td>QS1</td><td>800</td><td>400</td><td>200</td><td>100</td></tr></table></td></tr>
<tr><td>37-40</td><td>flt</td><td>Low cut filter setting in Hz</td><td>XXXX</td><td>User defined</td></tr>
<tr><td>41-44</td><td>flt</td><td>Alias filter slope</td><td>257</td><td>dB/octave</td></tr>
<tr><td>45-48</td><td>flt</td><td>Low cut filter slope</td><td>6</td><td>dB/octave (First order)</td></tr>
<tr><td>49-52</td><td>flt</td><td>Notch frequency setting</td><td>0</td><td></td></tr>
<tr><td>53-56</td><td>ft</td><td>Second notch frequency</td><td>0</td><td></td></tr>
<tr><td>57-60</td><td>ft</td><td>Third notch frequency</td><td>0</td><td></td></tr>
<tr><td>61</td><td>ubin</td><td>Filter phase</td><td>1,2</td><td>01: Minimum

02: Linear</td></tr>
</table>

Table 10-16

Byte No.	Fmt	Description	Value	Comment
62	ubin	Physical unit	X	0x00 : Unknown 0x06 : m.s-2 0x07 : Newton 0x10 : Ampere 0x14 : Millimeter 0x15 : Meter 0x0F : Volt
63		Undefined.	0	
64	ubin	Header block type	31	Scan Type Header Block 2: 0x31
65-68	ubin	Filter delay	0	

Table 10-16

Byte No.	Fmt	Description	Value	Comment
69-95	ascii	Description	X-X	Associated with the Channel Type identification (Byte 4) DSD Force (0x91) DSD Filtered Force (0x92) DSD Plate Acc (0x95) DSD Second Plate Acc (0x95) DSD reference sweep (0x96) DSD Mass Acc (0x99) DSD Mass Displacement (0x99) DSD Excitation (0x9A) DSD Valve Displacement (0x9B) DSD Overload (0x9C)
96	ubin	Header block type	32	Scan Type Header Block 3: 0x32

SR	0.5	1	2	4
FDU	800	400	200	100
DSU	800	400	200	100

The Extended Header

Table 10-17

Byte No.	Fmt	Description	Value	Comment
1	ubin	Software version major	X	
2	ubin	Software version minor	X	
3-4	ubin	Software version patch	XX	
5-20	ascii	Software version label		Free Text
21-24	ubin	Number of characters in External Header	XXXX	
25-32				Padded with 0

The External Header

Table 10-18

Byte No.	Fmt	Description	Value	Comment
1-n*	ascii	Concatenation of: - Info from shooting or navigation system, - User info from environment setup - Source comment from operation window	XXXX	

*Variable size multiple of 32bytes. The quantity of 32 bytes blocks is defined in the General Header Block 2 Byte 28, 29 and 30.

General Trailer Block

Table 10-19

Byte No.	Fmt	Description	Value	Comment
1	ubin	Block type		
2	ubin	ASCII or binary		
3-4		Undefined	0	
5-8	ubin	Block size		
9-24	ascii	Description		Reference on model and revision of data
25-31		Undefined	0	
32	ubin	Header block type (one byte, unsigned binary).	70	General Trailer Block: 0x70

Channel Header Blocks

Demultiplexed Trace Header

Table 10-20

Byte No.	Fmt	Description	Value	Comment
1-2	bcd	Four-digit file number (0-9999)	FFFF	Sercel systematically use the extended file number (DTH, byte 18-20) even for values below 9999
3	bcd	Scan Type Number	1	
4	bcd	Channel Set Number	FF	Sercel systematically use the extended channel set number (DTH, byte 16-17) even for values below 99
5-6	bcd	Trace Number	FFFF	Sercel systematically use the extended trace number (THE#1, byte 22-24) even for values below 9999
7-9	bin	First Timing Word	0	0 with systematic used of the Time Stamp Header
10	bin	Trace Header Extension	X	
11	bin	Sample skew	0	0 with systematic used of the Time Stamp Header
12	bin	Trace edit	0,3	00: No edition 03: Edited
13-15	bin	Time break window	XXX	
16-17	ubin	Extended channel set number	XX	
18-20	bin	Extended file number	XXX	

Trace Header Extension # 1

Table 10-21

Byte No.	Fmt	Description	Value	Comment
1-3	bin	Receiver line number	FFFFFF	Sercel systematically use the extended receiver line number (THE#1, byte 11-15) even for integer values
4-6	bin	Receiver point number	FFFFFF	Sercel systematically use the extended receiver point number (THE#1, byte 16-20) even for integer values
7	bin	Receiver point index	X	
8	ubin	Re-shoot Index	X	
9	ubin	Group Index	X	0x0 for vertical geophone 1C, vertical accelerometer 1C, hydrophone 0x01, 0x02, 0x03 for geophone 3C, accelerometer 3C (0x01=X in-line, 0x02=Y cross-line, 0x03=Z vertical)
10	ubin	Depth Index	1	
11-15	bin	Extended receiver line number	XXXXX	
16-20	bin	Extended receiver point number	XXXXX	
21	bin	Sensor SEGD code	X	
22-24	bin	Extended Trace Number	XXX	
25-28	bin	Number of samples	XXXX	
29	ubin	Sensor moving	0	

Table 10-21

Byte No.	Fmt	Description	Value	Comment
30		Undefined	0	0x00
31	ubin	Physical unit	06,0F	0F: Volt 06: m.s-2
32	ubin	Header block type	40	Trace Header Extension Block #1: 0x40

Sensor Info Trace Header Extension

Table 10-22

Byte No.	Fmt	Description	Value	Comment
1-8	bin	Equipment Test Time	0	0
9-12	flt	Sensor Sensitivity	XXXX	Factor to apply to the sample to get the result in the measurement unit.
13	ubin	Equipment Test Result	0	0x0
14-31	ascii	Serial Number	X-X	
32	ubin	Header block type	41	Sensor Info Trace Extension Block:0x41

Timestamp Header

Table 10-23

Byte No.	Fmt	Description	Value	Comment
1-8	bin	Time Zero for this data block	XXXXXX X	GPS time of the first sample. Could be different from the Tb GPS time if resynchronization.
9-31		Undefined	0	
32	ubin	Header block type	42	Time Stamp Header Block:0x42

Measurement Header

Table 10-24

Byte No.	Fmt	Description	Value	Comment
1-8	bin	Time Stamp		
9-12	flt	Measurement Value	XXXX	
13-16	flt	Maximum Value	XXXX	
17-20	flt	Minimum Value	XXXX	
21-22	ubin	Quantity Class	XX	1045: Electrical Resistance: Resistance 1033: Dimensionless: Geophone tilt 1122: Plane angle: Acc Tilt 1045: Electrical Resistance: Leakage 1023: Capacitance: Capacitance 1061: Frequency: Cut-Off frequency See Note 1
23-24	ubin	Unit of Measure	XX	2100: Ohm: Resistance 2142: Euc: Geophone tilt 2110: Radian: Acc Tilt 2100: Ohm: Leakage 2031: Farad: Capacitance 2036: Hertz: Frequency See Note 1

Table 10-24

Byte No.	Fmt	Description	Value	Comment
25-26	ubin	Measurement Description code	XX	3000: Sensor Resistance: Resistance 3001: Analog Sensor Tilt: Geophone tilt 3002: Digital Sensor Tilt: Acc Tilt 3003: Sensor Leakage: Leakage 3004: Sensor Capacitance: Capacitance 3005: Sensor Cut-Off: Cut-Off See Note 1
27-31		Undefined	0	
32	ubin	Header block type	61	Measurement Header Block: 0x61

Note Details on:

http://www.seg.org/web/technical-standards-committee/wiki/-/wiki/Main/SegMeasurements

Sercel Blocks

In order to include extra information in the SEG-D file, Sercel has defined the following additional blocks.

Sercel SEG-D Revision Block

Table 10-25

Byte No.	Fmt	Description	Value	Comment
1-20	ascii	Sercel SEG-D version Label	UNITE	ASCII text, 20 characters. Left justified, padded with space (0x20) characters.
21	ubin	Sercel SEG-D Version Major	X	0x01
22	ubin	Sercel SEG-D Version Minor	X	0x00
23	ubin	Sercel SEG-D Version Teeny	X	0x00
24-31	ubin	Reserved	X-X	0x00
32	ubin	Header block type	B0	Sercel SEG-D version Block: 0xB0

This block is mandatory for all the Sercel products. It is always inserted at the fourth position in the general header immediately after the 3 first mandatory blocks.

Sercel Tape Block

Table 10-26

Byte No.	Fmt	Description	Value	Comment
1-4	bin	Input Filter identifier	XXXX	
5-8	bin	Minimum tape number for this filter	XXXX	
9-12	bin	Maximum tape number for this filter	XXXX	
13	bin	Tape number increment for this filter	X	
14-17	bin	Tape Number in this filter	XXXX	
18-21	bin	Maximum number of files per tape	XXXX	
22-25	bin	File rank on tape	XXXX	(File count)
32	ubin	Header block type	B1	Sercel Tape Block: 0xB1

Sercel File Identification Block

Table 10-27

Byte No.	Fmt	Description	Value	Comment
1-8	ubin	File generation time	X-X	GPS Time of the file generation
32	ubin	Header block type	B2	Sercel File Identification Block: 0xB2

Sercel VP Identification Block

Table 10-28

Byte No.	Fmt	Description	Value	Comment
1-16	ubin	VP uuid	X-X	See Note below
17	ubin	RetrieveType	0,1	0 : Field 1 : Simulator

Table 10-28

Byte No.	Fmt	Description	Value	Comment
18-21	ubin	Operating mode	XXXX	bit0 : 1 Normal bit1 : 1 Microseismic bit2 : 1 Shallow bit3 : 1 SQC Dump (VSR) bit4 : 1 Autonomous bit8 : 1 Guidance bit9 : 1 Slip Sweep Possible combinations are: 0x001: Normal 0x002 : Microseismic 0x004 : Shallow 0x008 : SQC Dump 0x010 : Autonomous 0x101 : Guidance + Normal 0x104 : Guidance + Shallow 0x108 : Guidance + SQC Dump 0x110 : Guidance + Autonomous 0x201 : Slip Sweep + Normal 0x204 : Slip Sweep + Shallow 0x208 : Slip Sweep + SQC Dump 0x301 : Slip Sweep + Guidance + Normal 0x304 : Slip Sweep + Guidance + Shallow 0x308 : Slip Sweep + Guidance + SQC Dump
32	ubin	Header block type	B3	Sercel VP Identification Block: 0xB3

Note Details on: http://en.wikipedia.org/wiki/Universally_unique_identifier

Sercel Processing Details Block

Table 10-29

Byte No.	Fmt	Description	Value	Comment
1	ubin	Type of process	X	0 : N/A 1 : No operation (raw data) 2 : Stack 3 : Correlation After stack 4 : Correlation Before stack

Table 10-29

Byte No.	Fmt	Description	Value	Comment
2	ubin	Field retrieve type	X	0 : Normal record. 1 : Instrument noise. 2 : Instrument gain 3 : Instrument phase 4 : Instrument common mode 5 : Instrument distortion. 6 : Instrument crosstalk 7 : Instrument pulse. 10 : Field (Sensor) noise. 11 : Field (Sensor) resistance 12 : Field (Sensor) leakage 13 : Field (Sensor) tilt. 14 : Field (Sensor) distortion. 15 : Field (Sensor) pulse. 16 : Field (Sensor) gravity
3-6	ubin	Acquisition length in ms	XXXX	
7-10	ubin	Correlation length in ms	XXXX	
11-14	ubin	Pilot length in ms	XXXX	
15-18	ubin	Listening time in ms	XXXX	

Table 10-29

Byte No.	Fmt	Description	Value	Comment
19	ubin	Seismic DC offset removal method	X	0 : None 1 : Central Unit 2 : 0.15625 Hz low cut filter 3 : 0.3125 Hz low cut filter 4 : 0.625 Hz low cut filter 5 : 1.25 Hz low cut filter 6 : 2.5 Hz low cut filter 7 : Other low cut filter
20	ubin	System process id	X	
32	ubin	Header block type	B4	Sercel Processing Details Block: 0xB4

Sercel Trace Identification Block

Table 10-30

Byte No.	Fmt	Description	Value	Comment
1-2	ubin	Unit Type	XX	0x0000: Unknown 0x0001: FDU1-408 0x0002: FDU3C 0x0004: FDU2M 0x0009: DSU3-408 0x000F: FDU2S 0x0010: DSU1-408 0x0015: FDU-428 0x0016: DSU3-428 0x0017: QT-428 0x0018: AQDSU 0x001F: RAU Cirrus 0x0025: DSU3SA 0x0026: RAU-428 0x0200: FDU1-508 0x0300: DSU1-508 0x03CD: VE464 DSD 0x0500: WTU-508
3	ubin	Channel number		
4	ubin	Sensor type number	1-9	Each Sensor Type Number (created in the Line main window’s Survey setup) is associated with a specific set of sensor test limits. The Sensor Type Number should not be mistaken for the “Sensor SEGD code” recorded in Trace Header Extension block # 1
5-6	ubin	Assembly type	XX	0x000n with n equal to the quantity of field units connected in the link (ex: 0x0006 = LINK6). 31 is the max value.

Table 10-30

Byte No.	Fmt	Description	Value	Comment
7-10	ubin	Assembly serial number	XXXX	
11	ubin	Location in assembly	XX	Position of the unit in a link.
12-13	ubin	Controller type	XX	0x0000: Unknown 0x0026: RAU 428 0x0028: RAU3 0x0083: LAUX 428 0x0088: LAUL 428 0x00C1: LRU 0x00C2: LAUR 428 0x0101: SCI-508 0x0102: CX-508 0x03C2: LCI 428 0x03CD: VE464 DSD 0x0500: WTU-508
14-17	ubin	Controller serial number	XXXX	
18-21	ubin	Index within acquisition	XXXX	Channel position in the spread
32	Ubin	Header block type	B9	Sercel Trace Identification Block: 0xB9

Sercel Trace Edition and Processing Block

Table 10-31

Byte No.	Fmt	Description	Value	Comment
1	ubin	Channel overscaling error	0,1	0 : No error 1 : overscaling error

Table 10-31

Byte No.	Fmt	Description	Value	Comment
2-3	ubin	Channel edited status	X	0000 : No edition 0001 : mute 0002 : dead 0003 : outstanding 1000 : Unknown 1001 : No RAU 1002 : Muted/Forced BIT 1003 : Data Rollover 1004 : Data not recorded 1005 : Parameter Mismatch 1006 : Forced Complete 1007 : Timing Lost 1008 : Reset acquisition 1009 : GPS Lock Lost 1010 : Timing Resync 1011 : Parameter Change 1012 : State Idle 1013 : State Standby 1014 : State Sleep 1015 : State Test 1016 : State Acquire 1017 : State Firmware 1018 : Protocol 1019 : Invalid Channel 1021 : No BIT result 1022 : No Sensor attached 1023 : Unsupported BIT 1024 : Corrupt Data 1025 : BIT Complete 1026 : File error 1027 : Acq type mismatch

Table 10-31

Byte No.	Fmt	Description	Value	Comment
4-7	bin	Resynchronisation delay applied	XXXX	in micro-second (four bytes, signed binary)
8	bin	Noise elimination type	X	0 : Off 1 : Diversity stack 2 : Historic 3 : Enhanced diversity stack
9-10	bin	Diversity number of windows	XX	0 if not defined
11	bin	Channel processing type	XX	00 : N/A 01 : Raw data 02 : Aux stack 03 : Correlation, negative part 04 : Correlation, positive part 05 : Normal correlation 06 : Seis stack
12	ubin	Is correlation trace reference recorded?	0,1	1 = The trace is recorded.
13-16	bcd	Correlation reference trace index within acquisition	X	
17-20	ubin	Removed DC Offset	XX	NAN if unknown
21	ubin	Channel gain scale	X	0 : Not defined 1 : 0dB 2 : 12dB 3 : 24dB

Table 10-31

Byte No.	Fmt	Description	Value	Comment
22	ubin	Tilt correction status	X	0 : Not defined 1 : Not applied 2 : Applied
23-31		Not defined		
32	ubin	Header block type	BA	Sercel Trace Edition and Processing Block: 0xBA

Senior Observer Comments Block

Table 10-32

Byte No.	Fmt	Description	Value	Comment
1-31	asc	Observer comment		ASCII text, 31 characters. Left justified, padded with space (0x20) characters.
32	ubin	Header block type	D1	Sercel Observer Comments Block: 0xD1

This general header block is optional. If the observer comment is longer than 31 characters, multiple of these blocks may be added with the comment split between them.

Sercel System ID Header Block 1

Table 10-33

Byte No.	Fmt	Description		Value
1-2	ubin	System ID	XX	Identifier of this set of System ID headers. Numbered incrementally within a SEG-D file, starting at 1.
3-4	ubin	System Type	XX	0 : None 1 : Unknown 2 : CM408 3 : Seal 4 : 408XL 5 : Seal428 6 : 428XL 7 : Seabed 8 : Unite or DCM 9 : VE 464 10 : 508XT
5-6	ubin	System software version - Major	XX	
7-8	ubin	System software version - Minor	XX	
9-10	ubin	System software version - Patch	XX	
11-12	ubin	System software version - Hotfix	XX	

Table 10-33

Byte No.	Fmt	Description		Value
13-20	asc	Server ID		ASCII text, 8 characters. Left justified, padded with space (0x20) characters. Some form of identifier for the server that the system was running on. For DCM this would typically be the Sercel Server ID used for licensing purposes
32	ubin	Header block type	D2	Sercel System ID Header Block 1: 0xD2

Sercel System ID Header Block 2

Table 10-34

Byte Nb	Fmt	Description	Notes	Comment
1-16	asc	System software version - Label		ASCII text, 16 characters. Left justified, padded with space (0x20) characters.
17-31	asc	System software version – Build ID		ASCII text, 15 characters. Left justified, padded with space (0x20) characters.
32	ubin	Header block type	D3	Sercel System ID Header Block 1: 0xD3

Sercel System ID Header Block 3

Table 10-35

Byte Nb	Fmt	Description	Notes	Comment
1-16	asc	Application name		ASCII text, 16 characters. Left justified, padded with space (0x20) characters.
17-31	asc	Application mode		ASCII text, 15 characters. Left justified, padded with space (0x20) characters.
32	ubin	Header block type	D4	Sercel System ID Header Block 1: 0xD4

Sercel Origins Block

Table 10-36

Byte Nb	Fmt	Description	Value	Comment
1-2	ubin	Origin 1 System ID	XX	The first recorded source of Meta-data/data for this SEG-D file. In the DCM, this would typically refer to the System ID Headers for the system that produced the original SEG-D imported to create the VP within the DCM.
3-4	ubin	Origin 2 System ID	XX	The second recorded source of Metadata/data for this SEG-D file.
5-6	ubin	Origin 3 System ID	XX	
7-8	ubin	Origin 4 System ID	XX	
9-10	ubin	Origin 5 System ID	XX	
11-12	ubin	Origin 6 System ID	XX	
13-14	ubin	Origin 7 System ID	XX	
15-16	ubin	Origin 8 System ID	XX	
17-18	ubin	Origin 9 System ID	XX	
19-20	ubin	Origin 10 System ID	XX	
32	ubin	Header block type	XX	Sercel System ID Header Block 1: 0xD5

This general header block is mandatory.

It is used to track up to 10 Systems (in processing order) that were involved in the production or processing of data/Meta-data of this SEG-D file.

Typically, we would expect to see at least Origin1 filled with the ID of the shooting system (i.e. a 508XT). However, because of the ability for the DCM to run in basecamp mode, or to re-import its own files, we could see more origins filled.

Sercel DCM Trace Header Extension Block

Table 10-37

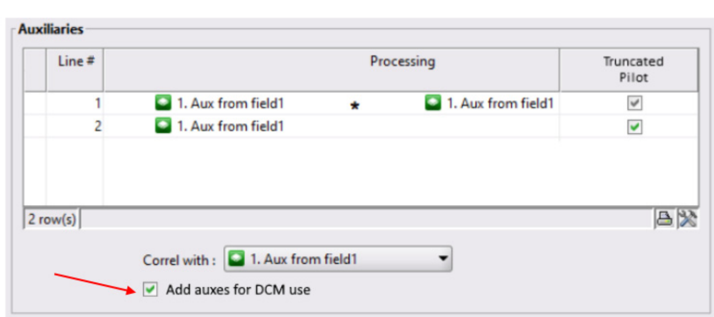
Byte Nb	Fmt	Description	Value	Comment
1	ubin	Gain	X	0 : Unknown 1 : 0 dB 2 : 12 dB 3 : 24 dB 4 : 36 dB
2	ubin	Data source	X	0 : Unknown 1 : RAU 2 : DH 3 : SEG-D v1 4 : SEG-D v3
32	ubin	Header block type	D0	Sercel System ID Header Block 1: 0xD0

This trace header extension is mandatory.

IMPORTANT

Patch 07: Extra auxes added for DCM use

Auxes used for correlation will be added in the SEGD file just after auxes declared in the process type if the process type is “Correl Before” or “Correl After” and if the check box "Add auxes for DCM use" is checked. The check box is available only for process type "Correl Before" and "Correl After".



It will be raw data not truncated. There will be one aux trace added for each stack.

In the trace header of these auxes traces:

- traceHeader/sercelTraceEditionProcessingBlock/channelProcessingType = “1 – Raw data”
- traceHeader/timestampBlock/timeZero = [T0 date of the corresponding stack in GPS time (us)]
- traceHeader/sercelTraceLabelBlock/label = DCM_STACK_%stackNb%_%basic_label%

where :

1. %stackNb% is the stack number
2. % basic_label% is the label of the basic used.

Tape Label

SEGD V3.0 Tape Label

The first 128 bytes of data on a Rev 3.0 tape must consist of ASCII characters and will constitute a Storage Unit Label. This label is very similar to the RP-66 storage unit label. The Storage Unit Label is also often referred to as the “Tape Label” for historical reasons. The label format is summarized in the table below.

If the tape media supports multiple partitions, SEG-D data may be written to any of the partitions of the tape, each beginning with a Storage Unit Label. Data from one partition can not “run over” into a subsequent partition, each partition must be capable of being decoded in isolation.

On one tape, it is allowed to mix partitions containing SEG-D data with partitions containing non SEG-D formatted information.

Table 10-38

Field	Location	Description	Content generated by 508XT
1	1-4	Storage unit sequence number	Tape Number from input filter setup
2	5-9	SEG-D Revision	SD3.0
3	10-15	Storage unit structure (fixed or variable)	RECORD
4	16-19	Binding edition	B2
5	20-29	Maximum block size	0
6	30-39	API Producer organization code	469 (Sercel)
7	40-50	Creation date	Recording date of the tape label

Table 10-38

Field	Location	Description	Content generated by 508XT
8	51-62	Serial number	Tape Label field from input filter setup
9	63-68	Reserved	
11	69-80	External Label Name	External Tape Label field from input filter setup
12	81-104	Recording Entity Name	Crew Name from crew setup
13	105-118	User defined	User Defined Tape Label field from input filter setup
14	119-128	Max shot records per field record	1

Field 1

The **Storage Unit Sequence Number** is an integer in the range 1 to 9999 that indicates the order in which the current storage unit occurs in the storage set. The first storage unit of a storage set has sequence number 1, the second 2, and so on. This number is represented using the characters 0 to 9, right justified with leading blanks if needed to fill out the field (No leading zeros). The rightmost character is in byte 4 of the label. *This field is optional*. If not used, it must be blank (filled with blank characters). This implies that this is the only storage unit within the storage set. Separate Storage Sets should be used for different data types.

Field 2

The **SEG-D Revision** field indicates which revision of SEG-D was used to record the data on this tape. SD3.0 indicates that the data was recorded using SEG-D, Revision 3.0 (SD2.1 in previous revision) - *This field is required.*

Field 3

Storage Unit Structure is a name indicating the record structure of the storage unit. This name is left justified with trailing blanks if needed to fill out the field. The leftmost character is in byte 10 of the label. For SEG-D, Rev 3 tapes, this field must contain “RECORD” or “FIXREC”. *This field is required*.

“RECORD” — Records may be of variable length, ranging up to the Blocksize length specified in the maximum Block size field of the storage unit label (if not zero). If the maximum Block size specified is zero, then records may be of any length.

“FIXREC” — All records in the storage unit have the same length, namely that specified in the maximum Block size field of the storage unit label. Although all storage units in the same storage set must have a FIXREC structure, the maximum record length may be different in different storage units. When the FIXREC option is used, then the maximum record length field shall not be 0 (zero).

Field 4

Binding edition is the character B in byte 16 of the label followed by a positive integer in the range 1 to 999 (no leading zeros), left justified with trailing blanks if needed to fill out the field. The integer value corresponds to the edition of the Part 3 of the API, RP66 standard used to describe the physical binding of the logical format to the storage unit. *This field is required.*

Field 5

Maximum Block Size is an integer in the range of 0 to 4,294,967,295 ($2^{32}-1$), indicating the maximum block length for the storage unit, or 0 (zero) if undeclared. This number is represented using the characters 0 to 9, right justified, with leading blanks if necessary to fill out the field (no leading zeros). The rightmost character is byte 29 of the label. A valid value or 0 (zero) must be recorded. A value of 1 means byte stream device (e.g. disk). *It is highly recommended to indicate the maximum block length where possible, as this will determine the size buffer needed to read the data, and will enable reading the data at a more optimal speed (using multi-block read).*

Field 6

Producer organization code is an integer in the range of 0 to 4,294,967,295 ($2^{32}-1$) indicating the organization code of the storage unit producer. This number is represented using the characters 0 to 9, right justified, with leading blanks if necessary to fill out the field

(NO leading zeros). The rightmost character is byte 39 of the label. *This field may be empty, i.e. may contain all blanks, in which case no storage unit producer is specified (i.e. same as RP-66 V2).*

Organization codes are assigned by Energistics, formerly the Petrotechnical Open Standards Consortium (POSC), which maintains the current list of codes. To request a new organization code, contact:

Energistics
24 E. Greenway Plaza
Suite 1315
Houston, TX 77046-2414 USA
+1 713 784-1880 telephone
+1 713 784-9219 fax
info@energistics.org

Field 7

Creation date is the earliest date that any current information was recorded on the storage unit. The date is represented in the form dd-MMM-yyyy, where yyyy is the year (e.g. 1996), MMM is one of (JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC), and dd is the day of the month in the range 1 to 31. Days 1 to 9 may have one leading blank. The separator is a hyphen (code 4510). *This field is required.*

Field 8

Serial number is an ID used to distinguish the storage unit from other storage units in an archive of an enterprise. The specification and management of serial numbers is delegated to organizations using this standard. If an external label is used the name/number must be a subset of the serial number or the External Label Name in Field 10, and must occupy the rightmost characters in the serial number (or External Label Name). *This field is required.*

Field 9

This field is reserved and should be recorded as all blanks (code 3210).

Filed 10 - 12

The **Storage set identifier** is a descriptive name for the storage set. Every storage unit in the same storage set shall have the same value for the **user defined portion** of the storage set identifier in its storage unit label. Included in the **Storage Set Identifier** is the **External Label Name**. The characters in this field are right justified with leading blank characters as required. If the tape does not have a physical label, then this field must be blank. A physical label is optional, but if it exists, then this field is required only if the external label is different from the lower 6 characters of the Serial Number in Field 8. The next field in the Storage set identifier is the **Recording Entity Name**. This must contain the crew number or name, or some other unique identifier which will differentiate the recording entity which recorded this data from any other recording entity within the organization (as included in field 6). The 24 bytes may by any alphanumeric characters. If multiple recording systems are used on a vessel or crew, then data recorded on each system must be clearly distinguished. For example, an ABC Geophysical crew (party 13), on the M/V Gopher, recording data on two Zip 6000 recording systems might have a Recording Entity Name on tapes recording on the first recording system of:

ABC, Gopher, P13, Zip#1

On the second system, the Recording Entity Name might be:

ABC, Gopher, P13, Zip#2

The Recording Entity Name field is required.

Field 13

User Defined

The next 14 bytes in this field may contain any other user input information. The only restriction is that the data must be in ASCII.

Field 14

Max Number of shot records per field record. Field Records are data between File Marks (10 bytes).

It is not acceptable to use an ANSI label (or any other label or data) prior to the Storage Unit Label.

An external, physical label is not required.

Sercel Tape Label content

Table 10-39

Field	Location	Description	Start - end byte
1	1-4	Storage unit sequence number	Tape Number from input filter setup
2	5-9	SEG-D Revision	SD3.0
3	10-15	Storage unit structure (fixed or variable)	RECORD
4	16-19	Binding edition	B2
5	20-29	Maximum block size	0
6	30-39	API Producer organization code	469 (Sercel)
7	40-50	Creation date	Recording date of the tape label

Table 10-39

Field	Location	Description	Start - end byte
8	51-62	Serial number	Tape Label field from input filter setup
9	63-68	Reserved	""
11	69-80	External Label Name	External Tape Label field from input filter setup
12	81-104	Recording Entity Name	Crew Name from crew setup
13	105-118	User defined	User Defined Tape Label field from input filter setup
14	119-128	Max shot records per field record	1

Chapter

11

Observer Report Format (Wireless)

This chapter includes the following sections:

Observer Report JSON Format

Introduction to the JSON format

JSON (JavaScript Object Notation) is an open data-interchange format based on a subset of the JavaScript Programming Language. The JSON filename extension is .json.

JSON is a text format that is completely language independent but uses conventions that are familiar to programmers of the C-family of languages, including C, C++, C#, Java, JavaScript, Perl, Python, and many others. These properties make JSON an ideal data-interchange language.

ECMA-404 and RCF 7159 standards defined the JSON format: The ECMA standard describes only the allowed syntax, whereas the RFC also provides some semantic and security considerations.

References:

JSON Website: http://json.org/

RFC 7159 Standard: https://tools.ietf.org/html/rfc7159

ECMA-404 Standard: http://www.ecma-international.org/publications/files/ECMA-ST/ECMA-404.pdf

Observer Report JSON Output Rules

RAW Observer Report JSON output format follows the hereafter structure:

Example of JSON Observer Report

"Line Report":

- "Total number of traces":
- "Number of Auxes":
- "Number of Seis traces":
- "Number of dead Seis traces":
- "Number of live Seis traces":
- "Spread first line":
- "Spread first number":
- "Spread number":
- "Spread type":
- "Internal time break":
- "Acquisition error description":
- "Filter type":
- "Dead Seis":
- "Live Seis": "

"Shot Report":

- "Sample rate":
- "Source line number":
- "Source point number":
- "Source point index":
- "Source Set Number":
- "Source Easting":
- "Source Northing":
- "Source Elevation":
- "COG Easting":
- "COG Northing":
- "COG Elevation":
- "Acquisition length":
- "Number of samples" :
- "Type of source":
- "Shot number":
- "TB window":
- "Shot date time":
- "Uphole time":
- "Blaster id":
- "Blaster status":
- "Record length":
- "Pilot length":
- "Sweep length":
- "Swath name":
- "Operating mode":
- "Swath Id":
- "Observer Comments":

"Noise Report":

- "Noise elimination type":
- "Low trace percentage":
- "Low trace value":
- "Number of windows":

"Process Report":

- "Type of process":
- "Autocorrelation peak time":
- "Correlation Pilot No.":
- "Acquisition number":
- "Max of max Aux":
- "Max of max Seis":
- "Dump stacking fold":
- "GPS time of acquisition TB":
- "Max time values":

"Record Report":

- "File number":
- "Record type":
- "Test record type":
- "Type of dump":
- "Processing time":

"Others":

- "Software version":
- "User text":

```
"Obs_Report_Result": {

"Observer_Report": {

"Line Report": {

"Total number of traces": "44",
"Number of Auxes": "0",
"Number of Seis traces": "44",
"Number of dead Seis traces": "0",
"Number of live Seis traces": "44",
"Spread first line": "N\/A",
"Spread first number": "N\/A",
"Spread number": "N\/A",
"Spread type": "N\/A",
"Internal time break": "0",
"Acquisition error description": "N\/A",
"Filter type": "0.8FN Lin Phase",
"Dead Seis": "",
"Live Seis": "1:3-1 (1-2)\n1:2-4 (3-4)\n1:5-44 (5-44)"
},

"Shot Report": {

"Sample rate": "2000",
"Source line number": "1.00",
"Source point number": "7831.00",
"Source point index": "1",
"Source Set Number": "0",
"Source Easting": "0.00",
"Source Northing": "0.00",
"Source Elevation": "0.00",
"COG Easting": "N\/A",
"COG Northing": "N\/A",
```

```
"COG Elevation": "N\/A",
"Acquisition length": "60002",
"Number of samples": "30001",
"Type of source": "impulsive",
"Shot number": "1864552994",
"TB window": "0",
"Shot date time": "20160727 16:00:00",
"Uphole time": "0",
"Blaster id": "0",
"Blaster status": "0",
"Record length": "60002",
"Pilot length": "0",
"Sweep length": "0",
"Swath name": "sw1",
"Operating mode": "normal",
"Swath Id": "1",
"Observer comments": ""



"Noise Report": {

"Noise elimination type": "none",
"Low trace percentage": "N\/A",
"Low trace value": "N\/A",
"Number of windows": "0"
},

"Process Report": {

"Type of process": "Raw Data",
"Autocorrelation peak time": "N\/A",
"Correlation Pilot No.": "0",
"Acquisition number": "N\/A",
```

```
"Max of max Aux": "N\/A",
"Max of max Seis": "N\/A",
"Dump stacking fold": "1",
"GPS time of acquisition TB": "1153670417000000",
"Max time values": "N\/A"
},

"Record Report": {

"File number": "8831",
"Record type": "normal",
"Test record type": "normal",
"Type of dump": "normal",
"Processing time": "1156768624497000"
},

"Others": {

"Software version": "3.1.0.0              ",
"User text": ""
}

}
```

Observer Report XML Format

Introduction to XML format

XML (eXtensible Markup Language) is a markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable. The XML filename extension is .xml.

It is a textual data format with strong support via Unicode for different human languages. Although the design of XML focuses on documents, the language is widely used for the representation of arbitrary data structures such as those used in web services.

The W3C's XML 1.0 (Fifth Edition) specification and several other related specifications, - all of them free open standards- define XML.

References:

XML Website: http://www.w3.org/XML/
W3C's XML 1.0 Specifications: http://www.w3.org/TR/rec-xml

Observer Report XML Output Rules

Observer report format corresponds to an XML file Microsoft office schema like:

```
<?xml version="1.0" encoding="UTF-8"?>
<?mso-application progid="Excel.Sheet"?>
<Workbook xmlns="urn:schemas-microsoft-
com:office:spreadsheet">
<Worksheet ss:Name="OBS_REPORT">
<Table>
<Row>
<Cell><Data ss:Type="String">Id</Data></Cell>
 <Cell><Data ss:Type="String">Name</Data></Cell>
</Row>
<Row>
<Cell><Data ss:Type="Number">1</Data></Cell>
<Cell><Data ss:Type="String">Test 1</Data></Cell>
</Row>
<Row>
<Cell><Data ss:Type="Number">2</Data></Cell>
<Cell><Data ss:Type="String">Test 2</Data></Cell>
</Row>
</Table>
</Worksheet>
</Workbook>
```

Observer report data structure:

1. File Number	32. Blaster status
2. Sample Rate	33. Internal time break
3. Record Type	34. Noise elimination type
4. Source Line Nb	35. Low trace percentage
5. Source Point Nb	36. Low trace value
6. Source Point Index	37. Number of windows
7. Source Set Number	38. Type of process
8. Source Easting	39. Record length
9. Source Northing	40. Autocorrelation peak time
10. Source Elevation	41. Correlation Pilot No.
11. COG Easting	42. Pilot length
12. COG Northing	43. Sweep length
13. COG Elevation	44. Acquisition number
14. Acquisition Length	45. Max of max Aux
15. Number of samples	46. Max of max Seis
16. Total number of traces	47. Dump stacking fold
17. Number of Auxes	48. Software version
18. Number of Seis traces	49. Acquisition error description
19. Number of dead Seis traces	50. Filter type
20. Number of live Seis traces	51. Swath name
21. Type of source	52. Operating mode
22. Shot number	53. Type of dump
23. TB Window	54. Swath Id
24. Shot date time	55. GPS time of acquisition TB
25. Test record type	56. User text
26. Spread first line	57. Max time values
27. Spread first number	58. Dead Seis
28. Spread number	59. Live Seis
29. Spread type	60. Processing time
30. Uphole time	61. Observer comments
31. Blaster id	

Example of XML Observer Report

XML files can be opened with Microsoft Office Excel and compatible spreadsheet editors. One record contains 61 data fields so the hereafter example only represents a part of the complete report.

File number	Sample rate	Record type	Source line number	Source point number	Source point index	Source Set Number
524	1000	normal	1036.00	1589.00	1	0
525	1000	normal	1036.00	1589.00	1	0
526	1000	normal	1036.00	1589.00	1	0
527	1000	normal	1036.00	1589.00	1	0

Source Easting	Source Northing	Source Elevation	COG Easting	COG Northing	COG Elevation	Acquisitio n length
368982.70	6833574.5 0	299.80	368982.70	6833574.5 0	299.80	9999
368982.70	6833574.5 0	299.80	368982.70	6833574.5 0	299.80	9999
368982.70	6833574.5 0	299.80	368982.70	6833574.5 0	299.80	9999
368982.70	6833574.5 0	299.80	368982.70	6833574.5 0	299.80	9999

Number of samples	Total number of traces	Number of Auxes	Number of Seis traces	Number of dead Seis traces	Number of live Seis traces	Type of source
10000	562	1	561	1	560	impulsive

10000	562	1	561	4	557	impulsive
10000	562	1	561	6	555	impulsive
10000	562	1	561	10	551	impulsive

Shot number	TB window	Shot date time	Test record type	Spread first line	Spread first number	Spread number
1629905388	0	20151219 14:25:29	normal	1036	1309	0
263662769	0	20151219 14:28:25	normal	1036	1309	0
1858682677	0	20151219 14:46:50	normal	1036	1309	0
1223825221	0	20151219 14:48:46	normal	1036	1309	0

Chapter 12 Organization Codes

Organization codes are assigned by the Petroleum Open Standards Consortium (POSC).

To request a new organization code, contact:

POSC

24 Greenway Plaza

Suite 1000-B

Houston, TX 77046 USA

+1 713 784-1880 telephone

+1 713 784-9219 fax

info@posc.org

Code	Organization
0	Subcommittee On Recommended Format For Digital Well Data, Basic Schema
1	Operator
2	Driller
3	Mud Logger
9	Amerada Hess
10	Analysts, The
15	Baker Hughes Inteq
20	Baroid
30	Birdwell
40	Reeves (1 Jan 99; formerly BPB)
50	Brett Exploration
60	Cardinal
65	Center Line Data
66	Subcommittee On Recommended Format For Digital Well Data, DLIS Schema
70	Century Geophysical
77	CGG Logging, Massey France
80	Charlene Well Surveying
90	Compagnie de Services Numerique
95	Comprobe
100	Computer Data Processors
110	Computrex
115	COPGO Wood Group
120	Core Laboratories
125	CRC Wireline, Inc.
126	Crocker Data Processing Pty Ltd

Code	Organization
127	Tucker Wireline Services (formerly Davis Great Guns Logging, Wichita, KS)
130	Digigraph
137	Tucker Technologies (formerly Digital Logging Inc.), Tulsa, OK.
140	Digitech
145	Deines Perforating
148	Drillog Petro-Dynamics Limited
150	Baker Atlas (formerly Dresser Atlas)
160	Earthworm Drilling
170	Electronic Logging Company
180	Elgen
190	El Toro
200	Empire
205	Encom Technology, Ltd.
206	Ensigh Geophysics, Ltd.
210	Frontier
215	Geolog
217	Geoshare
218	GEO·X Systems Ltd.
220	G O International
230	Gravilog
240	Great Guns Servicing
250	Great Lakes Petroleum Services
260	GTS
268	Guardian Data Seismic Pty. Ltd.
270	Guns
280	Halliburton Logging
285	Horizon Production Logging

Code	Organization
290	Husky
300	Jetwell
305	Landmark Graphics
310	Lane Wells
315	Logicom Computer Services (UK) Ltd
320	Magnolia
330	McCullough Tool
332	Mitchell Energy Corporation
335	Paradigm Geophysical (formerly Mincom Pty Ltd)
337	MR-DPTS Limited
338	NRI On-Line Inc
339	Oilware, Inc.
340	Pan Geo Atlas
342	Pathfinder Energy Services
345	Perfco
350	Perfojet Services
360	Perforating Guns of Canada
361	Petcom, Inc.
362	Petroleum Exploration Computer Consultants, Ltd.
363	Petrologic Limited
366	Phillips Petroleum Company
368	Petroleum Geo-Services (PGS)
370	Petroleum Information
380	Petrophysics
390	Pioneer
392	The Practical Well Log Standards Group

Code	Organization
395	IHS Energy Log Services (formerly Q. C. Data Collectors)
400	Ram Guns
410	Riley's Datashare
418	RODE
420	Roke
430	Sand Surveys
440	Schlumberger
450	Scientific Software
460	Seismograph Service
462	SEGDEF
463	SEG Technical Standards High Density Media Format Subcommittee
464	Shell Services Company
465	Stratigraphic Systems, Inc.
467	Sperry-Sun Drilling Services
468	SEPTCO
469	Sercel, Inc.
470	Triangle
475	Troika International
480	Welex
490	Well Reconnaissance
495	Wellsite Information Transfer Specification (WITS)
500	Well Surveys
510	Western
520	Westronics
525	Winters Wireline
530	Wireline Electronics
540	Worth Well

Code	Organization
560	Z & S Consultants Limited
999	Reserved for local schemas
1000	POSC

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508^{XT} manuals

IM = Installation Manual

FM1 = Functional Manual Vol. 1

FM2 = Functional Manual Vol. 2

DFM = Data Format Manual

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