



Seal428

V2.0

User's Manual

Vol. 2

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Warnings, Cautions, Important Notices, and Notes

Warnings, Cautions, and Important notices throughout this manual guide you to avoid injury, prevent equipment damage, and determine equipment use when varying components or configurations exist. Notes provide tips or additional information.

SERCEL is not responsible for damages or injuries that result from failure to observe the information provided.

Warnings and Cautions



When a Warning or Caution appears with a lightning-bolt icon, as shown in this example, this is to indicate a potential hazard that may lead to bodily injury or even death.

CAUTION



When a Warning or Caution appears with an exclamation-point icon, as shown in this example, this is to indicate possible equipment damage or potential risk of misuse and incorrect operation.

Important Notices



IMPORTANT

Important notices appear in the manual to highlight information that does not affect the risk of bodily injury, death, or equipment damage, but is nevertheless important. These notices appear with a stop-sign icon, as shown in this example.

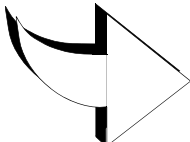
Notes



Note Notes provide tips or peripheral facts and may guide you to other sources of information.

Revision history

Date of revision	Manual Version	Chapters or pages affected	Description of revision or reason for change
Nov. 2016	AA		V2.0 original release.



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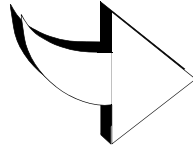
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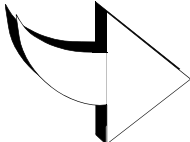
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Introduction

The documentation coming with the Seal428 system consists of the following manuals:

- **Installation Manual** (Manual # 10015725): contains an introduction to the Seal428 system, some basic instructions for getting started with the system, and system deployment information that will help get a Seal428 System operating.
- **User's Manual Volume 1** (Manual # 10015749): describes the parameters displayed on the system's Graphical User Interface (GUI) and how to use each window.
- **User's Manual Volume 2** (Manual # 10015750): this manual, containing information on logged data and on interfaces (description of Input/Output formats, including the SEGD format).
- **User's Manual Volume 3** (Manual # 10015752): contains reference information (filter charts, theory of tests, technical data, release notes, specifications).
- **Technical Manual** (Manual # 10015754): contains maintenance and repair information, including operating instructions for using the system's testers.

Seal428 manuals are automatically loaded from the Seal428 DVD-ROM to your computer's disk (in the "doc" folder) as you load the Seal428 software package. To open this manual in a PDF file reader (Adobe Acrobat Reader) on a computer, search for the "doc" folder.



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Chapter

1

SEGD format

This chapter describes the SEG D format for the Seal428 system. It includes the following sections:

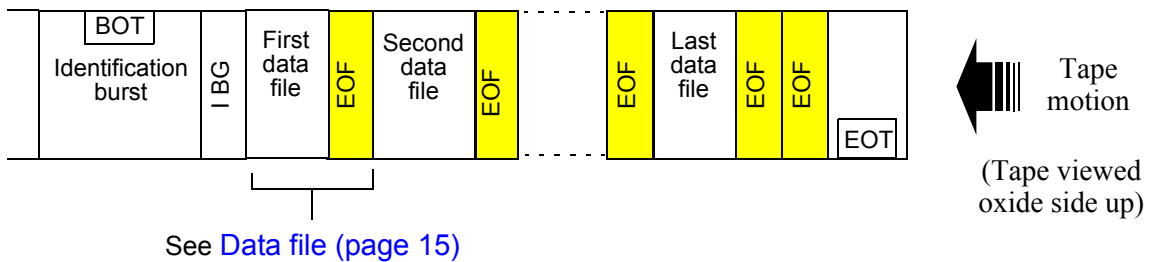
- [Overview \(page 14\)](#)
- [File Header block \(page 17\)](#)
- [Trace Data block for SERCEL channels \(page 28\)](#)

Overview

Seal428 Revision	Changes
1.0	Original release

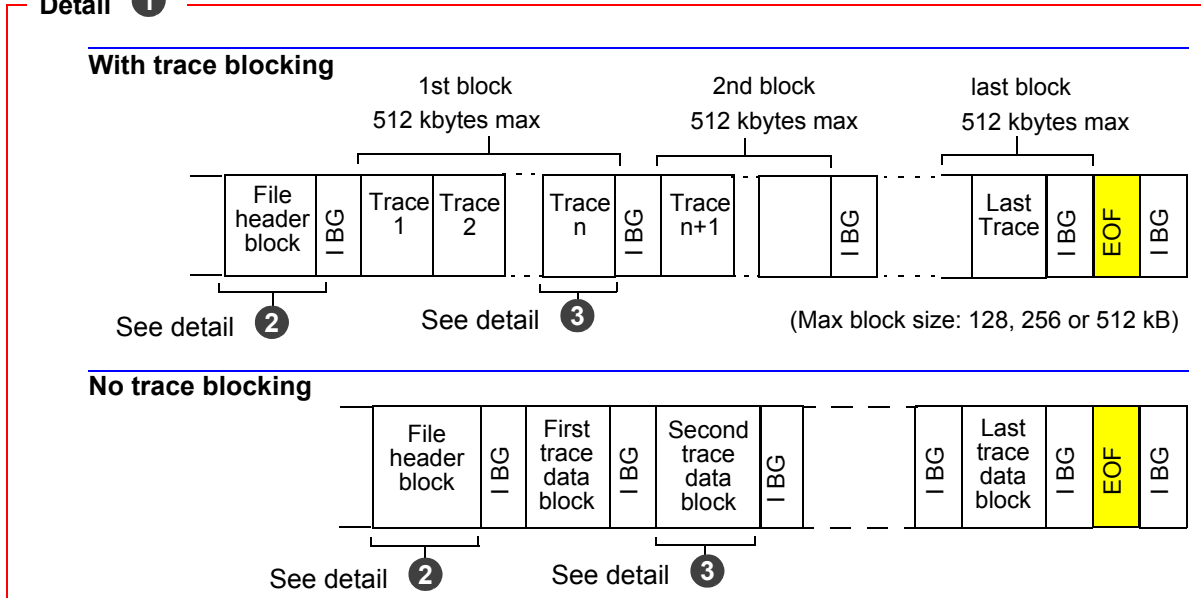
See also [SEGD header edits \(page 47\)](#) for the changes introduced by the “SEGD Edition” process.

SEGD Rev 1

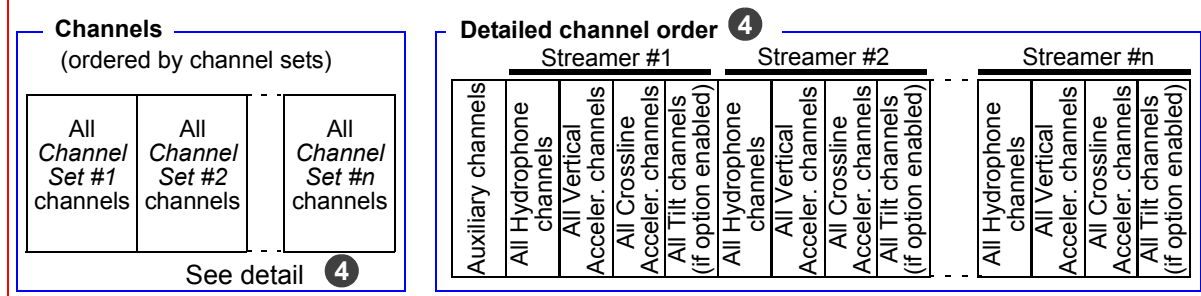


Data file

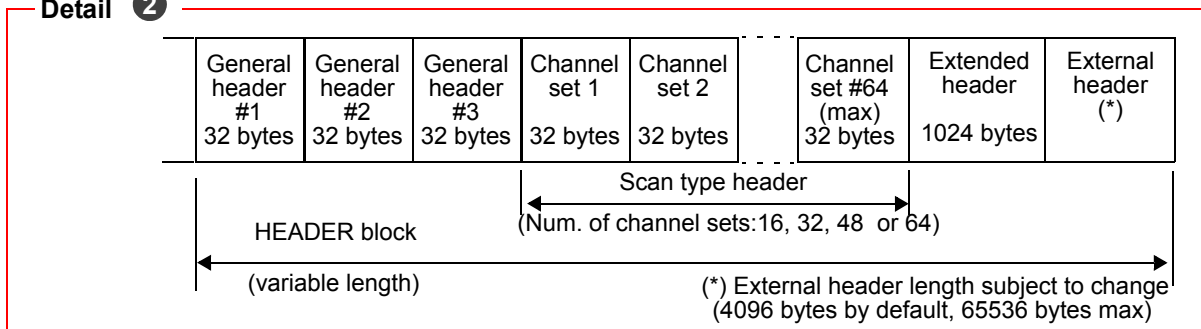
Detail 1



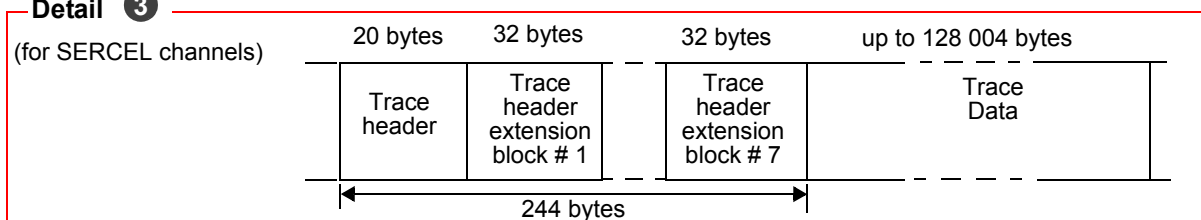
Channel order in case of multi-component receiver points



Detail 2



Detail 3



Conventions used in this chapter

1

In the format description tables that follow, 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

File Header block

General Header Block #1	General Header Block #2	General Header Block #3	Channel Set #1	Channel Set #64 or 16, 32, 48	Extended Header	External Header	
32 bytes	32 bytes	32 bytes	32 bytes		32 bytes	1024 bytes	Variable length	

General header block #1

Byte No.	Value	Fmt	Description	Notes
1 - 2	XXXX	bcd	Four-digit File number (1-9999)	If file nb > 9999, set to FFFF and <i>Extended File Nb</i> is used.
3 - 4	8058	bcd	Format code (32 IEEE demultiplexed)	
5 -10	X		General constants	4 for Seal428
11	XX	bcd	Last two digits of Year (0-99)	See SEGD header edits (page 47) .
12H	2	bcd	Number of additional blocks in general header	
12L-13	XXX	bcd	Julian day, 3 digits (1-366)	See SEGD header edits (page 47) .
14	XX	bcd	Hour of day (0-23)	
15	XX	bcd	Minute of hour (0-59)	
16	XX	bcd	Second of minute (0-59)	
17	13	bcd	Manufacturer's code	
18-19	0	bcd	Manufacturer's serial nb	

Byte No.	Value	Fmt	Description	Notes
20-22	XXXXXX		Bytes per scan	000000 non blocked record 100000 blocked record
23	XX	bcd	Base scan interval: 0.25 ms = 4 0.5 ms = 8 1 ms = 10 2 ms = 20 4 ms = 40	See SEGD header edits (page 47) .
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	Variable.
30	00		Number of sample skew 32 byte extensions	
31	32	bcd	Extended header length	
32	XX	bcd	External header length	FF.

General Header block # 2

Byte No.	Value	Fmt	Description	Notes
1 - 3	XXXXXX	bin	Expanded file number.	1-16777215. See SEGD header edits (page 47) .
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.	Variable.
10	0		Not used.	
11 - 12	x.x	bin	SEG-D Revision Number.	1.0
13 - 14	0		Number of Blocks of General Trailer.	
15 - 17	XXXXXX	bin	Extended Record Length (0-128000 ms).	See SEGD header edits (page 47) .
18	0		Not used.	
19	2	bin	General Header Block Number.	
20			Not used.	
21 - 22	XXXX	bin	Sequence Number.	Defaults to GUI setup or updated by navigation system.
23 - 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 (0-9)	
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

Byte No.	Value	Fmt	Description	Notes						
1	01	bcd	Scan Type Header	See SEGD header edits (page 47) .						
2	XX	bcd	Channel Set Number	See SEGD header edits (page 47) .						
3-4	XXXX	bin	Channel Set Starting Time	0 for Auxes. Refraction Delay for Seis. Units: 2 ms. See SEGD header edits (page 47) .						
5-6	XXXX	bin	Channel Set End Time	Record length for Auxes. Refraction Delay + Record Length for Seis. Units: 2 ms. See SEGD header edits (page 47) .						
7-8	XXXX	±bin	Descal Multiplier <table border="1"> <tr> <td>mV</td> <td>1600</td> <td>400</td> </tr> <tr> <td>FDU</td> <td>AF6D</td> <td>B76D</td> </tr> </table>	mV	1600	400	FDU	AF6D	B76D	
mV	1600	400								
FDU	AF6D	B76D								
9-10	XXXX	bcd	Number of channels in this channel set							
11H	X	bcd	Channel Type Identification: 1 = Seis 9 = Aux 7 = Tilt (Other)	All the auxiliary channels described in the Streamer window are recorded, even those at fault or not connected, if any. See also SEGD header edits (page 47) .						
11L	0		Not used							
12H	0		Number of subscans exponent	See SEGD header edits (page 47) .						
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 <table border="1" style="margin-left: 20px;"> <tr> <td></td> <td>0.25</td> <td>0.5</td> <td>1</td> <td>0.5</td> <td>1</td> </tr> <tr> <td>FDU</td> <td>1600</td> <td>800</td> <td>400</td> <td>200</td> <td>100</td> </tr> </table>		0.25	0.5	1	0.5	1	FDU	1600	800	400	200	100	(if Hydrophone or Accelerometer channel).																																								
				0.25	0.5	1	0.5	1																																																
FDU	1600	800	400	200	100																																																			
			Tilt: 1 Hz.	(if Tilt channel).																																																				
15-16	XXX	bcd	Alias filter slope	- FDU channel: 370. - Tilt channel: 31																																																				
17-18	XX	bcd	Low-cut filter frequency <table border="1" style="margin-left: 20px;"> <thead> <tr> <th rowspan="2">Chan</th> <th rowspan="2">Operation / Test type</th> <th colspan="2">Digital filter</th> </tr> <tr> <th>Off</th> <th>On</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Aux.</td> <td>Instrument tests (except Pulse)</td> <td>0</td> <td>0</td> </tr> <tr> <td>Operation or Instrument Pulse</td> <td>0</td> <td>Fc₂</td> </tr> <tr> <td rowspan="4">Hydro</td> <td>Operation or Sensor Noise</td> <td>Fc₁</td> <td>Fc</td> </tr> <tr> <td>Other Sensor tests</td> <td>Fc₁</td> <td>Fc₁</td> </tr> <tr> <td>Instrument Pulse</td> <td>0</td> <td>Fc₂</td> </tr> <tr> <td>Other Instrument tests</td> <td>0</td> <td>0</td> </tr> <tr> <td rowspan="4">Acc.</td> <td>Operation or Sensor Noise</td> <td></td> <td>Fc</td> </tr> <tr> <td>Other Sensor tests</td> <td></td> <td>Fc₁</td> </tr> <tr> <td>Instrument Pulse</td> <td></td> <td>Fc₂</td> </tr> <tr> <td>Other Instrument tests</td> <td></td> <td>0</td> </tr> <tr> <td>Tilt</td> <td>All</td> <td>0</td> <td>0</td> </tr> </tbody> </table>	Chan	Operation / Test type	Digital filter		Off	On	Aux.	Instrument tests (except Pulse)	0	0	Operation or Instrument Pulse	0	Fc ₂	Hydro	Operation or Sensor Noise	Fc ₁	Fc	Other Sensor tests	Fc ₁	Fc ₁	Instrument Pulse	0	Fc ₂	Other Instrument tests	0	0	Acc.	Operation or Sensor Noise		Fc	Other Sensor tests		Fc ₁	Instrument Pulse		Fc ₂	Other Instrument tests		0	Tilt	All	0	0	<p>See “Seal428 acquisition filters” in User’s Manual Vol. 3.</p> <ul style="list-style-type: none"> • Fc₁ selected in Crew Setup (Section Analog Freq.) • Fc₂ = Digital filter freq. • $Fc = \sqrt{Fc_1 \times Fc_2}$ <table border="1" style="margin-left: 20px;"> <thead> <tr> <th></th> <th>Hydro</th> <th>Accelerometer</th> </tr> </thead> <tbody> <tr> <td>Fc₁</td> <td>2 or 3 Hz</td> <td>6,1 Hz</td> </tr> <tr> <td>Fc₂</td> <td>2 to 15 Hz</td> <td>2 Hz</td> </tr> </tbody> </table>		Hydro	Accelerometer	Fc ₁	2 or 3 Hz	6,1 Hz	Fc ₂	2 to 15 Hz	2 Hz
			Chan			Operation / Test type	Digital filter																																																	
				Off	On																																																			
			Aux.	Instrument tests (except Pulse)	0	0																																																		
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			Hydro	Operation or Sensor Noise	Fc ₁	Fc																																																		
				Other Sensor tests	Fc ₁	Fc ₁																																																		
				Instrument Pulse	0	Fc ₂																																																		
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			Acc.	Operation or Sensor Noise		Fc																																																		
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Other Instrument tests		0																																																						
Tilt	All	0	0																																																					
	Hydro	Accelerometer																																																						
Fc ₁	2 or 3 Hz	6,1 Hz																																																						
Fc ₂	2 to 15 Hz	2 Hz																																																						
19-20	XX	bcd	Low-cut filter slope <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Low-cut filter frequency</th> <th>0</th> <th>Fc₁ or Fc₂</th> <th>Fc</th> </tr> </thead> <tbody> <tr> <td>Low-cut filter slope value</td> <td>0</td> <td>6</td> <td>12</td> </tr> </tbody> </table>	Low-cut filter frequency	0	Fc ₁ or Fc ₂	Fc	Low-cut filter slope value	0	6	12	See Reference in User’s Manual Vol. 3.																																												
			Low-cut filter frequency	0	Fc ₁ or Fc ₂	Fc																																																		
Low-cut filter slope value	0	6	12																																																					
21-22	0		First Notch Frequency																																																					
23-24	0		Second Notch Frequency																																																					

Byte No.	Value	Fmt	Description	Notes
25-26	0		Third Notch Frequency	
27-28	0		Extended channel set number	
29H	0		Extended header flag	
29L	X	bin	Trace Header Extensions	7 for SERCEL channels. See SEGD header edits (page 47) .
30	XX	bin	Vertical Stack	
31	XX	bin	Streamer cable number	
32	X	bin	Array forming: 0x01: No array forming	

Extended Header

Byte No.	Value	Fmt	Description	Notes
1 - 4	XXXX	bin	Acquisition length (for seismic traces)	1000 to 128000 ms. See SEGD header edits (page 47) .
5-8	XXXX	bin	Sample rate (for seismic traces)	250, 500, 1000, 2000, 4000 μ s
9-12	XXXX	bin	Total number of traces	See SEGD header edits (page 47) .
13-16	XXXX	bin	Number of Auxes (including AXC channels)	1 to n. All the auxiliary channels described in the Streamer window are recorded, even those at fault or not connected, if any. See SEGD header edits (page 47) .
17-20	XXXX	bin	Number of Seis traces	
21-24	XXXX	bin	Number of dead Seis traces	
25-28	XXXX	bin	Number of live Seis traces	
29-32	XXXX	bin	Type of source	0 = no source 1 = Impulsive
33-36	XXXX	bin	Number of samples in trace (for seismic traces)	1 to 128000
37-40	XXXX	bin	Shot number	≥ 0 . See SEGD header edits (page 47) .
41-44	XXXX	bin	File Type	Bit 0: TB-triggered Bit 1: Raw Bit 3: Navigation See SEGD header edits (page 47) .

Byte No.	Value	Fmt	Description	Notes
45-48	XXXX	bin	Test record type	0 N/A 1 Sensor Noise 3 Sensor Crosstalk 6 Sensor Leakage 7 Instr Noise 8 Instr Distortion 9 Instr Pulse 10 Instr Gain/Phase 11 Instr Crosstalk 12 Instr Common Mode 13 Synthetic
49-56	XXXX XXXX		GPS shot time.	Ref: January 6th, 1980.
57-60	XXXX	bin	Spread number	0.
61-64	XXXX	bin	Spread type	2 = Absolute.
65-68	XXXX	bin	Timebreak	0 to 9999 microseconds.
69-72	XXXX	bin	μ s UTC shot time.	Microseconds part, completes General Header #1 time (UTC).
73-76	XXXX	bin	Blaster id	0 to 15.
77-80	XXXX	bin	Blaster status	Depends on blaster type.
81-84	XXXX	bin	Refraction delay	ms (Water Delay).
85-88	XXXX	\pm bin	Tb to T0 time	Microseconds.
89-92	XXXX	bin	Number of Tilt channels	
93-140				Not used.
141-144	XXXX	bin	Type of process	1 = No operation (raw data).
145-524				Not used.
525-540	XXXX	asc	Tape label	ASCII text, 16 characters.
541-544	XXXX	bin	Tape number	1 to 9999, 0 if tape not used.
545-560	XXXX	asc	Software version	ASCII text, 16 characters.
561-572	XXXX	asc	Date	ASCII text, 12 characters (dd mmm yyyy).

Byte No.	Value	Fmt	Description	Notes
573-580	XXXX	dbl	Source easting	Default to GUI setup, or updated by navigation system. See SEGD header edits (page 47) .
581-588	XXXX	dbl	Source northing	
589-592	XXXX	flt	Source elevation	
593-596				Not used.
597-600	XXXX	bin	Files per tape	1 to 9999, 0 if tape not used.
601-604	XXXX	bin	File count	1 to 9999, 0 if tape not used.
605-764	XXXX	asc	Acquisition error description	ASCII text, 160 characters.
765-768	XXXX	bin	Filter type	0 No filter. 2 0.8 Lin.
769-780				Not used.
781-784	XXXX	bin	T0 mode	1 Internal closure. 2 External closure. 3 Noise file. See SEGD header edits (page 47) .
785-800	X ... X	asc	Source Line Name	See SEGD header edits (page 47) .
801-804	XXXX	bin	Sequence Number	See SEGD header edits (page 47) .
805-816				Not used.
817-820			Total num. of editions	Sum of trace headers' num. of editions.
821-824	XXXX	flt	Aux digital low-cut filter	0 = OFF.
825-828	XXXX	flt	Seis hydrophone digital low-cut filter	0 = OFF. NaN: variable according to streamer. Depends on crew Setup 'Digital Filter' option setting.

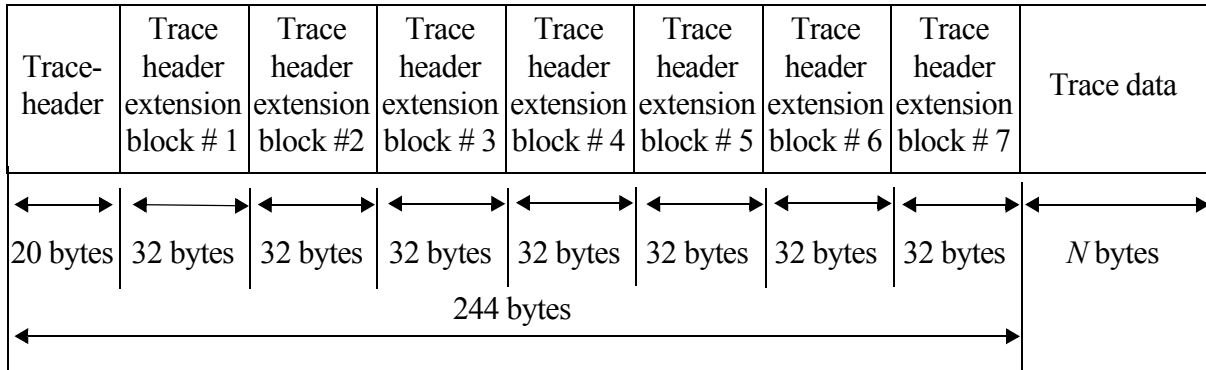
Byte No.	Value	Fmt	Description	Notes
829-832	XXXX	flt	Seis hydrophone compound low-cut filter	Depends on Crew Setup “Section Analog Frequency” option setting. See User’s Manual Vol. 3: “Seal428 acquisition filters”.
833-836	XXXX	bin	Number of characters in External Header	See SEGD header edits (page 47) .
837-840				Reserved.
841-844				Not used.
845-848	XXXX	bin		Reserved.
849-1024	0		not used	

External Header

Byte No.	Value	Fmt	Description	Notes
1 - n	XXXX	asc	Concatenation of information from navigation system.	Up to 65535. See SEGD header edits (page 47) .

Trace Data block for SERCEL channels

1



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

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

“+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 number > 9999, set to FFFF and <i>Extended File Number</i> is used.
3	01	bcd	Scan Type Number	
4	XX	bcd	Channel Set Number	
5-6	XXXX	bcd	Trace Number	If trace number > 9999, set to FFFF and <i>Extended Trace Number</i> is used.
7-9	XXXX	bin	First Timing Word	See SEGD header edits (page 47) .
10	7	bin	Trace Header Extension	See SEGD header edits (page 47) .
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.	See SEGD header edits (page 47) . Traces (seismic or aux) at fault or not connected are recorded as dead. Acquisition error or noise edited.
13-15	XXXX.XX	bin	Time break window	0.
16-17	0		Extended channel set number	See SEGD header edits (page 47) .
18-20	XXXXXXX		Extended file number	1-16777215. See SEGD header edits (page 47) .

Trace Header Extensions

Trace Header Extension Block # 1

Byte No.	Value	Fmt	Description	Notes
1-3	XXXXXX	bin	Receiver line number	Streamer identification number.
4-6	XXXXXX	bin	Receiver point number	Physical channel number within streamer.
7	XX	bin	Receiver point index	Always 1.
8-10	XXXXXX	bin	Number of samples per trace	See SEGD header edits (page 47) .
11-15	0		Extended receiver line number	
16-20	0		Extended receiver point number	
21	XX	bin	Sensor type	0 Tilt channel (not defined). 1 Hydrophone. 6 Accelerometer, vertical. 8 Accelerometer, horizontal, crossline.
22-32	0		Not used	

Trace Header Extension block # 2

Byte No.	Value	Fmt	Description	Notes
1-8	XXXXXXXX	dbl	Receiver point easting	Defaults to GUI setup, or updated by navigation system
9-16	XXXXXXXX	dbl	Receiver point northing	Defaults to GUI setup, or updated by navigation system
17-20	XXXX	flt	Receiver point elevation	Defaults to GUI setup, or updated by navigation system
21	XX	bin	Sensor type nb	
22-28	0		Not used	
29-32	XXXX	bin	Extended Trace Number	

Trace Header Extension block # 3

Byte No.	Value	Fmt	Description	Notes
1-4	XXXX	flt	DC Offset.	Only recorded if offset is removed. See Trace Header Extension block # 7 (page 34) . (byte 14 = 1). See also SEGD header edits (page 47) .
5-32				Empty.

Trace Header Extension block # 4

Byte No.	Value	Fmt	Description	Notes
1-4	XXXX	flt	Capacitance low limit	For hydrophones and accelerometers 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 and accelerometers 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	For hydrophones and accelerometers only.
5-8	XXXX	flt	Leakage value	megohms
9-24	0		Not used	
25	X	bin	Leakage error	0 = No 1 = Yes
26-32	0		Not used	

Non-significant fields are set to FFFFFFFF.

Trace Header Extension block # 6

Byte No.	Value	Fmt	Description	Notes
1	X	bin	Unit type 00 Not identified 01 FDU	See below for details.
2-4	XXXXXX	bin	Unit serial number	If unit serial number greater than 16777214, value is set to 0xFFF. In that case, check extended unit serial number (byte 25-28 in this Trace Header Extension).
5	X	bin	Channel number	1 Hydrophone. 2 Accelerometer, vertical. 3 Accelerometer, horizontal, crossline. 4 Tilt.
6-8		0	Spare	
9	X	bin	FDU assembly type 0x01 to string of n FDUs 0x10 0x20 ALS 0x28 ALS428 0x29 SSAS428 0x38 SSAS 0xE6 Sentinel® MS	Significant only for FDU channels.
10-12	XXXXXX	bin	FDU assembly serial number	If assembly serial number greater than 16777214, value is set to 0xFFF. In that case, check extended assembly serial number (byte 29-32 in this Trace Header Extension).
13	X	bin	FDU assembly location	
14-16		0	Spare	

Byte No.	Value	Fmt	Description	Notes
17	XX	bin	FDU unit type 0x04 FDU2M 0x08 FDU2F 0x1A FDU2M-428 0x1B FDU2F-428 0x29 FDU3F-428	
18				Not used.
19-20		0	Spare	
21-24	XXXX	flt	Sensor sensitivity	- Hydrophone: Volt/bar. - Accelerometer: V/m/s ² . - Tilt channel: Radian.
25-28	XXXXXXXX	bin	Extended unit serial number	
29-32	XXXXXXXX	bin	Extended FDU assembly serial number	

Trace Header Extension block # 7

Byte No.	Value	Fmt	Description	Notes	
1	X	bin	Control unit type 49 LCI-428 50 LAUM-428 51 TAPU-428 52 DCXU-428 54 LAUM-428-70 55 TAPU-428-HVS		
2-4	XXXXXX	bin	Control unit serial number		
5	X	bin	Channel gain scale		
				FDU	
			1	1600 mV	0 dB
2	400 mV	12 dB			
6	X	bin	Channel filter 0 N/A. 2 0.8FN Linear phase.		

Byte No.	Value	Fmt	Description	Notes
7	X	bin	Channel data error: overscaling	
8	X	bin	Channel edit status. 0 No edition. 1 Dead. 2 Acquisition/retrieve error.	Traces (seismic or aux) at fault or not connected are recorded as dead. See SEGD header edits (page 47) .
9-12	XXXX	flt	Channel sample to mV conversion factor.	0 for Auxes (not computed).
13				Not used.
14	XX	bin	Removed offset	0 = No. 1 = Yes, recorded in Trace Header Extension block # 3 (page 31) . See also SEGD header edits (page 47) .
15	XX	bin	Channel type Id: 1 = Seis. 7 = Tilt (other). 9 = Aux.	All the auxiliary channels described in the Streamer window are recorded, even those at fault or not connected, if any.
16	XX	bin	Channel process. 01 Raw data. 07 Tilt rotated. 08 Filtered.	Tilt rotation concerns accelerometer channels (MS section). Tilt rotation is not performed in the following cases: - At least one dead accelerometer at receiver location - Dead tilt channel at receiver location - Data error on tilt measurement for this receiver location (pitch, missing samples).
17-20	XXXX	flt	Analog low-cut filter.	Channel's actual low-cut filter frequency.
21-24	XXXX	flt	Digital low-cut filter.	
25-28	XXXX	bin	Number of editions.	See Reference in User's Manual Vol. 3.

Byte No.	Value	Fmt	Description	Notes
29-32	XXXX	flt	Compound low-cut filter.	Computed from channel's actual low-cut filter frequency. See "Seal428 acquisition filters" in User's Manual Vol. 3.

1

Trace data

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

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	Last byte
	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	

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 = $(-1)^s \times 2^{e-127} \times 1.f$ (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

2

SEG-D format Rev 2.1

This chapter describes how the SEG-D Rev. 2.1 standard is implemented in the Seal428 system. It includes the following sections

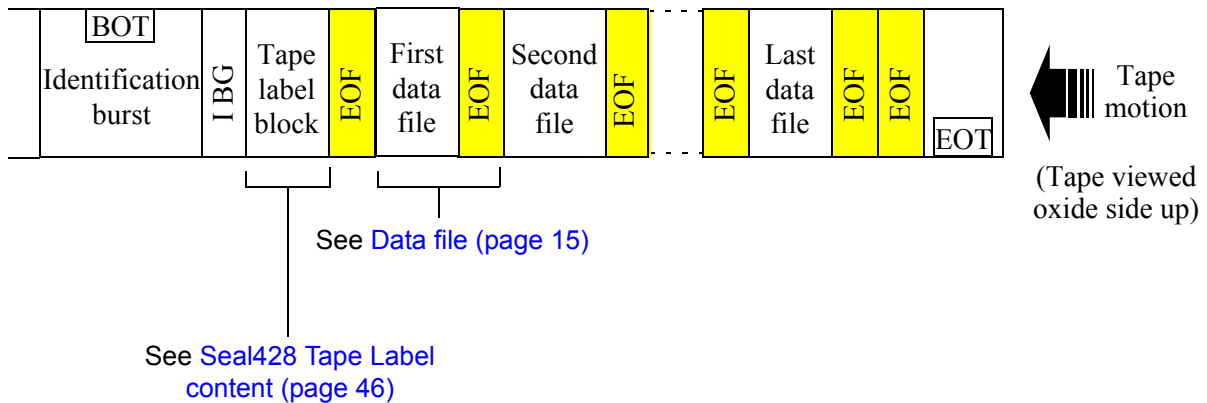
- *Changes introduced in Revision 2.1 (page 40)*
- *SEG-D Rev 2.1 Tape Label (page 41)*
- *Seal428 Tape Label content (page 46)*

Changes introduced in Revision 2.1

SEGD standard Revision 2.1 supports “RECORD” (variable-length) and “FIXREC” (fixed-length) storage unit structures. SEG-D Rev. 2.1 files from the Seal428 system are recorded with the “RECORD” structure.

SEGD standard Revision 2.1 requires a 128-kbyte label to be recorded at the beginning of each tape. That label is not recorded in the SEG-D 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 2-1 SEG-D Rev. 2.1 file content

Changes	SEG-D Rev 2.1 standard	Content generated by Seal428
Tape Label block	See SEG-D Rev 2.1 Tape Label (page 41)	See Seal428 Tape Label content (page 46)
General Header Block # 2 Bytes 11 and 12	SEG-D Revision Number	2.1
General Header Block # 2 Bytes 21 and 22	Sequence Number	Sequence Number parameter from Operation window
Extended Header		Same as SEG-D Rev. 1

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.

Table 2-2

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 if 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**. The characters in this field are right justified with leading blank characters if required. 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 be 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. The characters in this field are right justified with leading blank characters if required.

Max Number of shot records per field record. Field Records are data between File Marks (10 bytes). The characters in this field are right justified with leading blank characters if required.

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.

Seal428 Tape Label content

2

Table 2-3 Tape label content

Field	Start - End byte	Description	Content generated by Seal428
1	1 - 4	Storage Unit sequence number	Tape Number field from "Tape" setup (in Export window).
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 Config 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 plus Tape Number field from Export window's Tape Setup.
9	63 - 68	Reserved	" "
10		Storage set identifier	
	69 - 80	· External label name	External Label field from "Tape" setup (in Export window).
	81 - 104	· Recording entity name	"Recording Entity Name" field from "Tape" setup (in Export window).
	105 - 118	· User defined	"User Defined" field from "Tape" setup (in Export window).
	119 - 128	· Max number of shots record per field record	1

All the fields are filled with ASCII characters, with padding blanks rather than string terminators.

Chapter

3

SEGD header edits

This chapter describes how SEG D Header record fields are modified by the SEG D Edition process. It includes the following sections:

- [File Header \(page 48\)](#)
- [Trace Header \(page 50\)](#)

File Header

General Header block #1

SEGD field	Modification caused by SEG D Edition process
Date	Updated if "Continuous acquisition" mode. The shot time (T0) from the navigation header data is used.

General Header block #2

SEGD field	Modification caused by SEG D Edition process
File Number	In "Continuous acquisition" mode, the original File Number is updated with a sequentially generated number.
Extended Record Length	Updated if "Continuous acquisition" mode.

General Header block #3

Not modified.

Extended Header

SEGD field	Modification caused by SEG D Edition process
Acquisition length	Recomputed if "Continuous acquisition" mode.
Shot number	Updated if "Continuous acquisition" mode.
File Type	Updated.
Source easting, northing, elevation	Updated with information from navigation header file (if any), if "Continuous acquisition" mode.
T0 mode	Set to "External" if "Continuous acquisition" mode (except for "Noise files").
Source Line Name	Updated with information from navigation header file (if any), if "Continuous acquisition" mode.

SEGD field	Modification caused by SEG D Edition process
Sequence Number	Updated with information from navigation header file (if any), if “Continuous acquisition” mode.
Number of characters in External Header	Updated with navigation header length (if “Continuous acquisition” mode).

External Header

The External Header is updated with information from the navigation header file if the “Continuous acquisition” mode is used.

Trace Header

Demultiplexed Trace Header

The Demultiplexed Trace Header is updated if the “Continuous acquisition” mode is used.

SEGD field	Modification caused by SEG D Edition process
First Timing Word	Updated if “Continuous acquisition” mode (delay between T0 and first sample).
Trace edit	Updated if “Continuous acquisition” mode. See Trace status in Continuous-acquisition mode (page 173) in Seal428 User’s Manual Vol. 3.
Extended file number	Updated if “Continuous acquisition” mode.

Trace Header Extension block #1

SEGD field	Modification caused by SEG D Edition process
Number of samples per trace	Updated.

Trace Header Extension block #2

Not modified.

Trace Header Extension block #3

SEGD field	Modification caused by SEG D Edition process
DC offset	If the “Continuous acquisition” mode is used, the DC offset is removed by the Edition process, and the offset value is recorded in this field. Otherwise, the DC offset is removed earlier, and already recorded in this field (in the raw SEG D file).

Trace Header Extension block #4

Not modified.

Trace Header Extension block #5

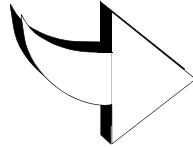
Not modified.

Trace Header Extension block #6

Not modified.

Trace Header Extension block #7

SEGD field	Modification caused by SEG D Edition process
Channel edited status	Updated if "Continuous acquisition" mode. See Trace status in Continuous-acquisition mode (page 173) in Seal428 User's Manual Vol. 3.
Removed offset	Updated (set to "1") if "Continuous acquisition" mode.



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Chapter

4

Navigation formats

In this chapter:

- *Seal428 interfacing capabilities (page 54)*
- *Navigation templates (page 55)*
- *ECOS navigation system (page 61)*
- *Spectra / SPN navigation system (page 63)*
- *Orca / SPN navigation message (page 67)*
- *Spectra / Orca Rev 0007 / SPN (page 71)*
- *ORCA Rev11 / SPN (page 73)*

Seal428 interfacing capabilities

The Seal428 can receive ASCII information (line name, shot time, shot number, etc.) from a navigation system during data acquisition. That information is extracted from the header in the messages from the navigation system. To choose the way of connecting the navigation system to the Seal428, see the Config window's [Navigation setup \(page 93\)](#) in Seal428 User's Manual Vol. 1.

XML template files are provided in the Log window that allow extracting standard fields from navigation headers. You can use those templates to create new ones that will allow you to build reports with more fields, from different navigation headers. To create new templates, see [Creating and using navigation templates \(page 296\)](#) in Seal428 User's Manual Vol. 1. See also [Navigation templates \(page 55\)](#) in this manual.

Custom changes to the decoding templates do not affect the SEGD file. None of the additional fields in a customized template is recorded into the SEGD file.

The message from the navigation system can be up to 64 kbytes long. It is processed by the Seal428 as follows:

- The entire ASCII message is copied to the **External Header** in the SEGD file header.
- Significant information is copied to the relevant fields in the SEGD file header.

Navigation templates

In this section:

- [Overview \(page 55\)](#)
- [Element of information \(page 56\)](#)
- [Constraints on elements \(page 58\)](#)
- [Annotation \(page 59\)](#)
- [Optional Block \(page 59\)](#)

Overview

Template files describing navigation protocols are XML-format. It is assumed that the user is familiar with that format.

To save/export navigation templates, see the Log window in Seal428 User's Manual Vol. 1.

The basic idea in defining a navigation template consists in specifying the location and size of each data field to extract from the navigation header. A complete description of each navigation data field is not necessary. Only the fields required for Seal428 SEG D files need to be described.

The general frame of the file is as follows:

```
<?xml version="1.0" encoding="UTF-8"?>
<navMessageFormat format="RAW ">
  <annotation> .....</annotation>
  <element .../>
  <element .../>
  <element .../>
  <element .../>
  <element .../>
</navMessageFormat>
```

Element of information

The <element> tag describes how to retrieve a single element of information from a navigation message.

All the elements needed by the Seal428 are defined as:

```
<element name="..." type="..." offset="..." size="..."  
headerLength="..." >  
</element>
```

4

name

This field is mandatory.

One of the following predefined “names” can be used:

- lineName
- shotNumber
- timeReference
- sourceId
- shotTimeHour
- shotTimeMinute
- shotTimeSecond
- shotTimeMicrosecond
- shotTimeYear
- shotTimeMonth
- shotTimeDay
- shotTimeJulianDay
- sourceEasting
- sourceNorthing
- sourceElevation
- lineStatus
- sequenceNumber

- length

These predefined “names” have special meaning for the Seal428 software: if any of them is present in the template and appears in the navigation header, then it is copied to the relevant SEGD field. End-users can add their own custom “names” to be displayed in different logs (Operation, Edit, Log windows).

Special note about cases where **name=**”length””: the “length” field can have two different meanings:

- it can specify the total size of the navigation message,
- or it can just indicate the length of the data appearing after a possible header.

To make it possible to compute the size of the navigation message in all situations, an optional **headerLength** can be specified to indicate the size of the header.

type

This field is mandatory for ASCII/BIN messages, not used for XML messages.

type can be:

- string
- integer
- float
- bin
- gunMicrosecondInteger

offset and size

These fields are mandatory for ASCII/BIN messages, not used for XML messages.

As all navigation messages are formed with fixed-length variables, an **offset** tag and a **size** tag are all what is needed to specify the exact position of information within the message:

- **offset** is a non-negative integer specifying the position of the data in the buffer from the beginning of the buffer.
- **size** is a positive integer specifying the number of bytes that must be read to retrieve the data.

Constraints on elements

To make it possible to check the validity of the retrieved data to some extent, constraints can be defined (but are not mandatory):

```
<element ...>  
  <restriction type="..." value="...">  
  <restriction type="..." value="...">  
</element>
```

type and value

These fields are mandatory.

Depending of the data types, one or more restrictions can be applied to the data. `<type>` can be:

- **minInclusive**: $\text{value} \leq \text{data}$
- **maxInclusive**: $\text{data} \leq \text{value}$
- **minExclusive**: $\text{value} < \text{data}$
- **maxExclusive**: $\text{data} < \text{value}$
- **enumeration**: $\text{data} = \text{value}$. If several enumerations are specified, data must be one of the possible values.

A field in a navigation message is valid if all “inclusive/exclusive” constraints are satisfied or if at least one of “enumeration” constraints is satisfied.

Annotation

The purpose of the `<annotation>` field is to briefly describe the navigation model using “human” words.

Data is written between the opening and closing tag. No property exists for the `<annotation>` tag.

A typical example of `<annotation>` can be:

```
<?xml version="1.0" encoding="UTF-8"?>  
<navMessageFormat>
```

Optional Block

If you want to add any fields that are not absolutely necessary for decoding the navigation header (e.g. gun or bird data fields), you must use an “*Optional Block*” to describe them so they will not give rise to any error if any is missing in the incoming navigation header. The Optional block can contain any number of `<element>` tags.

Specific features of the Optional block

- A single Optional block is allowed. It must be located after the mandatory fields.
- Those `<element>` tags which are described in the Optional block are not regarded as mandatory (the navigation header will decode properly even if any of them or the whole optional block is missing).
- No *predefined* field is allowed in the Optional block (see predefined [name – page 56](#) — list). Using any predefined name to describe the Optional block will give rise to an error when you save the new custom navigation template in jLog.
- At decoding time, the entire Optional block is ignored if any of its specified elements is missing or does not decode properly (for instance if it does not comply with the *restrictions* described in the template).

Example

```
...  
<element name="lineName" offset="42" type="string" size="16"/>  
<element name="customField1" offset="166" type="string" size="10"/>  
<optionalBlock>  
<element name="optionalField1" offset="176" type="string" size="10"/>  
<element name="optionalField2" offset="186" type="string" size="5">  
    <restriction type="enumeration" value="uvwxyz"/>  
  </element>  
</optionalBlock>  
</navMessageFormat>
```

In the above example, the Optional block is composed of two string-type fields, whose respective sizes are 10 and 5. *CustomField1* is a 10-byte custom field but is not optional.

ECOS navigation system

A default template for the format described below is provided by SERCEL. The message from the ECOS navigation system is a standard SPS message followed by any number of characters.

The SPS message consists of a header with four characters (SPS<space>) followed by 80 characters starting with <S>:

SPS <80 characters ><LF>

The 80 characters are described in the table below:

Table 4-4

Item	Definition of field	Cols.	Format	Min to Max	Default	Units
1	Record identification	1-1	A1	"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		
5	Point code (*)	27-28	A2	see below	None	
6	Static correction	29-32	I4	-999 - 999	Blank	ms
7	Point Depth	33-36	F4.1	0 -99.9	None	Metre
8	Seismic datum	37-40	I4	-999 - 999	None	Metre
9	Uphole time	41-42	I2	0 99	Blank	ms
10	Water depth (#)	43-46	F4.1#	0 to 99.9/9999	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	I 3	1 - 999	None	
15	Time hhmmss	75-80	3 I 2	000000-235959	None	

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

(*) Example Point codes:

"PM" - permanent marker, "KL" - kill or omit point

"E1".."E9" "A1".."A9".."W1".."W9", "S1".."S9". - source codes

The table below shows how Header fields in the SEG D file are updated after interpreting messages from the ECOS navigation system with the default SERCEL template.

Table 4-5

SEG D Header Field	ECOS field copied to SEG D Header (if valid ECOS message)	Default (if invalid ECOS message)
Line Name (Extended Header block)	Line Name	Line Name from Seal428 system
Source point number (General Header block #3)	Point number	Shot Point from Seal428 system.
Source point index (General Header block #3)	Point index	1
Source easting (Extended Header)	Map grid easting	0
Source northing (Extended Header)	Map grid northing	0
Source elevation (Extended Header)	Surface elevation	0
Julian Day, Hour, Minute, Second	Time	Day and Time from Seal428 system



Note Because the SEG D "Line Name" (Extended Header) field is imported from the ECOS navigation message, receiving an erroneous message may cause a spurious directory to be created on the hard disk (/var/dump partition), containing the corresponding shots.

Spectra / SPN navigation system

A default template for the format described below is provided by SERCEL. The message from the Spectra/SPN navigation system consists of a header followed by a message from the gun controller system.

The format of the header is as follows:

Table 4-6 Revision 1, or 2, or 3

Definition	Format	Description
Header ID	aa	'\$1' or '\$2'. '\$1' is default. If "-rstdiff <name>" command line argument is supplied, this field is changed to "\$2".
Length	nnnn	Length of header excluding this field and the 'Header ID' field
Program Revision	aaaa	'0001' or '0002' or '0003'
Line Status	nn	01=Offline, 02=Approach, 03=Online, 04=Runout
Shot Time:	nn nn nn .nnnnnn nnnn nn nn	Hours Minutes Seconds Microseconds (optional) Year Month Day
Time Ref	aaa	'UTC'
Shot Number	nnnnnn	6 characters
Line Name	aaaaaaaaaaaaaaaa a	16 characters
Master Latitude	nnnn.nnnnnn	In degrees
Master Longitude	nnnn.nnnnnn	In degrees
Water Depth	nnnn.n	In metres
Source Latitude	nnnn.nnnnnn	In degrees
Source Longitude	nnnn.nnnnnn	In degrees

Table 4-6 Revision 1, or 2, or 3 (Continued)

Master Gyro	nnn.n	In degrees
Master CMG	nnn.n	In degrees
Master Speed	nn.n	In knots
Vessel ID	nnn	(if Rev. 3)
Master Easting	eeeeeeee.e	metres (11.1f)
Master Northing	nnnnnnnn.n	metres (11.1f)
Source Delta East	eeee.e	metres (7.1f)
Source Delta Nrth	nnnn.n	metres (7.1f)
Line Bearing	bbb.b	degrees (5.1f)
Julian Day	ddd	
TB-Trigger Time	nnnn	Optional. If the "-rstdiff <name>" command line argument is supplied, this field contains the time difference between the Timebreak and the specified trigger time. i.e. diff = (Trigger Time – Timebreak Time). The units are in integer millisecs.

Table 4-7 Revision 5

Definition	Format	Description
Header ID	aa	'\$1' or '\$2'. '\$1' is default. If "-rstdiff <name>" command line argument is supplied, this field is changed to "\$2".
Length	nnnn	Length of header excluding this field and the 'Header ID' field
Program Revision	aaaa	'0005'
Line Status	nn	01=Offline, 02=Approach, 03=Online, 04=Runout

Table 4-7 Revision 5 (Continued)

Shot Time:	nn nn nn .nnnnnn nnnn nn nn	Hours Minutes Seconds Microseconds (optional) Year Month Day
Time Ref	aaa	'UTC'
Shot Number	nnnnnn	6 characters
Line Name	aaaaaaaaaaaaaaaa	16 characters
Master Latitude	nnnn.nnnnnn	In degrees
Master Longitude	nnnn.nnnnnn	In degrees
Water Depth	nnnn.n	In metres
Source Latitude	nnnn.nnnnnn	In degrees
Source Longitude	nnnn.nnnnnn	In degrees
Master Gyro	nnn.n	In degrees
Master CMG	nnn.n	In degrees
Master Speed	nn.n	In knots
Sequence number	nnnn	4 characters
Master Easting	eeeeeeee.e	metres (11.1f)
Master Northing	nnnnnnnnn.n	metres (11.1f)
Source Delta East	eeee.e	metres (7.1f)
Source Delta Nrth	nnnnn.n	metres (7.1f)
Line Bearing	bbb.b	degrees (5.1f)
Julian Day	ddd	
TB-Trigger Time	nnnnn	Optional. If the "-rstdiff <name>" command line argument is supplied, this field contains the time difference between the Timebreak and the specified trigger time. i.e. diff = (Trigger Time – Timebreak Time). The units are in integer millisecs.

The table below shows how Header fields in the SEG-D file are updated after interpreting messages from the Spectra/SPN navigation system with the default SERCEL template.

Table 4-8

SEG-D Header Field	Spectra/SPN field copied to SEG-D Header (if valid Spectra/SPN message)	Default (if invalid Spectra/SPN message)
Line Name (Extended Header block)	Line Name	Line Name from Seal428 system
Sequence Number (General header block # 2 and Extended Header block)	Sequence Number (only if Spectra/SPN header Revision 5)	Sequence Number from Seal428 system
Source point number (General header block #3 and Extended Header block)	Shot number	Shot Point from Seal428 system.
Year julian day, hour, minute, seconds (General header block #1)	Shot time	Day and time from Seal428 system.



Note Because the SEG-D "Line Name" (Extended Header) field is imported from the Spectra/SPN navigation message, receiving an erroneous message may cause a spurious directory to be created on the hard disk (/var/dump partition), containing the corresponding shots.

Orca / SPN navigation message

Table 4-9 ORCA LABO Rev 2 / SPN

Definition	Bytes	Example
\$	2	\$2
Length	4	3945
Revision	4	0002
Line status	2	03
Time	6	055817
Microsecond	7	.999822
Year and date	8	20090915
Time Ref	3	UTC
Shot Point	6	000125
Line name	16	B62709-TEST9016
Master Lat.	11	9.517893
Master Lon.	11	100.146617
Water depth	6	5.9
Source Lat.	11	9.518023
Source Lon.	11	100.133522
Master gyro	5	239.8
Master CMG	5	346.9
Master speed	4	0.0
Master Easting	11	000625852.9
Master Northing	11	001052318.1
Source Delta Easting	7	-1437.6
Source Delta Northing	7	00009.6
Line bearing	5	021.0
Julian day	3	258
-rstdiff option	5	-50

Table 4-10 ORCA LABO Rev 3 / SPN

Definition	Bytes	Example
\$	2	\$2
Length	4	3945
Revision	4	0003
Line status	2	03
Time	6	055817
Microsecond	7	.999822
Year and date	8	20090915
Time Ref	3	UTC
Shot Point	6	000125
Line name	16	B62709-TEST9016
Master Lat.	11	9.517893
Master Lon.	11	100.146617
Water depth	6	5.9
Source Lat.	11	9.518023
Source Lon.	11	100.133522
Master gyro	5	239.8
Master CMG	5	346.9
Master speed	4	0.0
Vessel ID	3	001
Master Easting	11	000625852.9
Master Northing	11	001052318.1
Source Delta Easting	7	-1437.6
Source Delta Northing	7	00009.6
Line bearing	5	021.0
Julian day	3	258
-rstdiff option	5	-50

Table 4-11 ORCA LABO Rev 4 / SPN

Definition	Bytes	Example
\$	2	\$2
Length	4	3953
Revision	4	0004
Line status	2	03
Time	6	06075
Microsecond	7	.999822
Year and date	8	20090915
Time Ref	3	UTC
Shot Point	6	000112
Line name	16	B62709-TEST9018
Sequence number	5	09018
Master Lat.	11	9.516422
Master Lon.	11	100.365608
Water depth	6	5.8
Source Lat.	11	9.516093
Source Lon.	11	100.340177
Master gyro	5	238.9
Master CMG	5	143.9
Master speed	4	0.0
Vessel ID	3	001
Master Easting	11	000649893.9
Master Northing	11	001052242.5
Source Delta Easting	7	-2791.7
Source Delta Northing	7	-0047.3
Line bearing	5	021.0
Julian day	3	258
-rstdiff option	5	-50



Note Because the SEGD "Line Name" (Extended Header) field is imported from the Orca/SPN navigation message, receiving an erroneous message may cause a spurious directory to be created on the hard disk (/var/dump partition), containing the corresponding shots.

The table below shows how Header fields in the SEGD file are updated after interpreting the Orca/SPN navigation messages:

Table 4-12

SEGD Header Field	Orca/SPN field copied to SEGD Header (if valid Orca/SPN message)	Default (if invalid Orca/SPN message)
Line Name (Extended Header block)	Line Name	Line Name from Seal428 system
Sequence Number (Extended Header block)	Sequence Number (only if Rev. 4)	Sequence Number from Seal428 system
Source point number (general header block #3)	Shot Point	Shot Point from Seal428 system.
Year julian day, hour, minute, seconds (general header block #1)	Time	Day and time from Seal428 system.

Spectra / Orca Rev 0007 / SPN

Table 4-13

Byte	Format	Number of Bytes	Description	
1	AA	2	Header ID: "\$2 ".	
3	NNNN	4	Length of header, excluding this field and the 'Header ID' field.	
7	AAAA	4	Program Revision: 0007.	
11	NN	2	Line Status. 01 = Offline 02 = Approach 03 = Online 04 = Runout.	
13	NN	2	Shot Time:	Hours.
15	NN	2		Minutes.
17	NN	2		Seconds.
19	.	1		Decimal Point.
20	NNNNNN	6		Microseconds.
26	NNNN	4	Date:	Year.
30	NN	2		Month.
32	NN	2		Day.
34	AAA	3	Time Ref. 'UTC' (or 'GPS' depending on RTNU reference).	
37	NNNNNN	6	Shot Number.	
43	AAAAAAAAAAAAAAAAAAAA	16	Line Name.	
59	NNNN.NNNNNN	11	Master Latitude in degrees.	
70	NNNN.NNNNNN	11	Master Longitude in degrees.	
81	NNNN.N	6	Water Depth in metres.	
87	NNNN.NNNNNN	11	Source Latitude in degrees.	
98	NNNN.NNNNNN	11	Source Longitude in degrees.	

Table 4-13 (Continued)

Byte	Format	Number of Bytes	Description
109	NNN.N	5	Master Gyro in degrees.
114	NNN.N	5	Master CMG in degrees.
119	NN.N	4	Master Speed in knots.
123	NNNN	4	Sequence number.
127	NNN	3	ID of the shooting vessel.
130	NNNNNNNNN.N	11	Master Easting in metres.
141	NNNNNNNNN.N	11	Master Northing in metres.
152	NNNNN.N	7	Source Delta Easting in metres.
159	NNNNN.N	7	Source Delta Northing in metres.
166	NNN.N	5	Line Bearing in degrees.
171	NNN	3	Julian Day.
174	NNNNN	5	TB-Trigger time. Time difference between the Time Break and the specified trigger time, i.e. diff = (Trigger Time – Time Break). The units are in integer millisecs.

4

Vessel ID must be written whenever the software allows it.

Total Block Size = 178 bytes.

ORCA Rev11 / SPN

Table 4-14

Byte	Format	Number of Bytes	Name	Description
1	string	2	header	'\$1' or '\$2'.
3	integer	4	length	(headerLength = 6)
7	integer	4	revision	"0011".
11	integer	2	lineStatus	
13	integer	2	shotTimeHour	
15	integer	2	shotTimeMinute	
17	integer	2	shotTimeSecond	
20	integer	6	shotTimeMicrosecond	
26	integer	4	shotTimeYear	
30	integer	2	shotTimeMonth	
32	integer	2	shotTimeDay	
34	string	3	timeReference	
37	float	6	shotNumber	
43	string	16	lineName	
59	float	11	masterLatitude	
70	float	11	masterLongitude	
81	float	6	waterDepth	
87	float	11	sourceLatitude	
98	float	11	sourceLongitude	
109	float	5	masterGyro	
114	float	5	masterCMG	
119	float	4	masterSpeed	
123	integer	4	seqNumber	

Table 4-14 (Continued)

Byte	Format	Number of Bytes	Name	Description
127	integer	3	vesselId	
130	float	11	masterEasting	
141	float	11	masterNorthing	
152	float	7	sourceDeltaEasting	
159	float	7	sourceDeltaNorthing	
166	float	5	lineBearing	
171	integer	3	shotTimeJulianDay	
174	string	5	recTriggerDelay	
179	string	3	vesselPrefix	
182	string	5	rstdiffOption	

Chapter 5

Real-time log examples

In this chapter:

- *Basic log (page 76)*
- *Detailed log (page 78)*

Basic log

Below is the XML schema for a “**basic log**”, only including a summary of erroneous or edited traces in each streamer.

```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<SERCEL>
  <SEAL>
    <ACQ_LOG>
      <Line_Name>test</Line_Name>
      <Sequence_Number>0</Sequence_Number>
      <Shot_Point_Number>9021</Shot_Point_Number>
      <File_Number>9021</File_Number>
      <T0_Date>21 JUL 2009</T0_Date>
      <T0_Time>09:15:56</T0_Time>
      <Julian_Day>202</Julian_Day>
      <T0_Mode>Internal</T0_Mode>
      <Record_Type>Test</Record_Type>
      <File_Type>Tb Triggered</File_Type>
      <Type_of_Test>INSTR_NOISE</Type_of_Test>
      <Water_Delay>0</Water_Delay>
      <Navigation_Message_Length>0</Navigation_Message_Length>
      <Total_Number_of_Traces>2</Total_Number_of_Traces>
      <Number_of_Aux_Traces>1</Number_of_Aux_Traces>
      <Number_of_Seis_Traces>1</Number_of_Seis_Traces>
      <Number_of_Dead_Seis_Channels>1</
Number_of_Dead_Seis_Channels>
      <Seal_Seis_Record_Length>2050</Seal_Seis_Record_Length>
      <Seal_Seis_Sample_Rate>2000</Seal_Seis_Sample_Rate>
      <Seal_Seis_Number_of_Samples>1026</
Seal_Seis_Number_of_Samples>
      <Seal_Aux_Record_Length>2050</Seal_Aux_Record_Length>
      <Seal_Aux_Sample_Rate>2000</Seal_Aux_Sample_Rate>
      <Seal_Aux_Number_of_Samples>1026</
Seal_Aux_Number_of_Samples>
      <Aux_Digital_Low_Cut_Filter>0</Aux_Digital_Low_Cut_Filter>
      <Seis_Digital_Low_Cut_Filter>0</
Seis_Digital_Low_Cut_Filter>
      <Seis3dB_Compound_Low_Cut_Filter>4.7</
Seis3dB_Compound_Low_Cut_Filter>
```

```

        <Nb_Of_Recorded_Channel_Set>16</
Nb_Of_Recorded_Channel_Set>

<External_Header>$1128300010413481220070115UTC000158abcdefghij-
000010010.0000000020.0000000499.60010.0000000020.000000004.5009.915.
0000010000.0000001000.120000.002000.0200.0349*GCS900552LineName20
9E06/11/
15:09:27:231520100500020001006000.000.00001000100010010010101020103
0104000AP1NB000000
00000000001AP1NB00200300400500602AP1NB00400600801001203AP1NB00600901
201501804AP1NB00801201602002405AP1NB01001502002503006AP1NB0201802403
003607AP1NB01402102803504208AP1NB01602403204004809AP1NB0180270360450
5410AP1NB02003004005006011AP1NB02203304405506612APNB0240360480600721
3AP1NB02603905206507814AP1NB02804205607008415AP1NB03004506007509016A
P1NB03204806408009617AP1NB0340510680851028AP1NB03605407209010819AP1N
B038057076095114/
nabcdefghijklmnopqrstuvwxyabcdefghijklmnopqrstuvwxyabcdefghijklmnopghijklmno
pqrstuvwxyabcdefghijklmnopqrstuv[
a]abcdefghijklmnopqrstuvwxyabcdefghijklmnopqrstuvwxyabcdefghijklmnopghijk
lmnopqrstuvwxyabcdefghijklmnopqr[
a]tuvwxyzabcdefghijklmnopqrstuvwxyabcdefghijklmnopqrstuvwxyabcdefghijklmnop
ghijklmnopqrstuvwxyabcdefghijklmnop[
a]pqrstuvwxyabcdefghijklmnopqrstuvwxyabcdefghijklmnopqrstuvwxyabcdefghijklmnop
defghijklmnopqrstuvwxyabcdefghijklmnopghij[
a]lmnopqrstuvwxyabcdefghijklmnopqrstuvwxyabcdefghijklmnopqrstuvwxy
zabcdefghijklmnopqrstuvwxyabcdefghijklmnop[
a]hijklmnopqrstuvwxyabcdefghijklmnopqrstuvwxyabcdefghijklmnopqrstuvwxy
vwxyzabcd[0x12]

        </External_Header>
        <External_Header_Size> 4096</External_Header_Size>
        <SEGD_Disk_Write_Error>No</SEGD_Disk_Write_Error>
        <List_Of_Error_Traces>
            <Error_Traces>
                <Seis_Error_Traces>1:1(1)</Seis_Error_Traces>
            </Error_Traces>
        </List_Of_Error_Traces>
    </ACQ_LOG>
</SEAL>
</SERCEL>

```

Detailed log

Below is the XML schema for a “**detailed log**”, only including the type of error or edition for each erroneous or edited trace.

```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<SERCEL>
  <SEAL>
    <ACQ_LOG>
      <Line_Name>test</Line_Name>
      <Sequence_Number>0</Sequence_Number>
      <Shot_Point_Number>9021</Shot_Point_Number>
      <File_Number>9021</File_Number>
      <T0_Date>21 JUL 2009</T0_Date>
      <T0_Time>09:15:56</T0_Time>
      <Julian_Day>202</Julian_Day>
      <T0_Mode>Internal</T0_Mode>
      <Record_Type>Test</Record_Type>
      <File_Type>Tb Triggered</File_Type>
      <Type_of_Test>INSTR_NOISE</Type_of_Test>
      <Water_Delay>0</Water_Delay>
      <Navigation_Message_Length>0</Navigation_Message_Length>
      <Total_Number_of_Traces>2</Total_Number_of_Traces>
      <Number_of_Aux_Traces>1</Number_of_Aux_Traces>
      <Number_of_Seis_Traces>1</Number_of_Seis_Traces>
      <Number_of_Dead_Seis_Channels>1</
Number_of_Dead_Seis_Channels>
      <Seal_Seis_Record_Length>2050</Seal_Seis_Record_Length>
      <Seal_Seis_Sample_Rate>2000</Seal_Seis_Sample_Rate>
      <Seal_Seis_Number_of_Samples>1026</
Seal_Seis_Number_of_Samples>
      <Seal_Aux_Record_Length>2050</Seal_Aux_Record_Length>
      <Seal_Aux_Sample_Rate>2000</Seal_Aux_Sample_Rate>
      <Seal_Aux_Number_of_Samples>1026</
Seal_Aux_Number_of_Samples>
      <Aux_Digital_Low_Cut_Filter>0</Aux_Digital_Low_Cut_Filter>
      <Seis_Digital_Low_Cut_Filter>0</
Seis_Digital_Low_Cut_Filter>
      <Seis3dB_Compound_Low_Cut_Filter>4.7</
Seis3dB_Compound_Low_Cut_Filter>
```

```

        <Nb_Of_Recorded_Channel_Set>16</
Nb_Of_Recorded_Channel_Set>

<External_Header>$1128300010413481220070115UTC000158abcdefghij-
000010010.0000000020.0000000499.60010.0000000020.000000004.5009.915.
0000010000.0000001000.120000.002000.0200.0349*GCS900552LineName20
9E06/11/
15:09:27:231520100500020001006000.000.00001000100010010010101020103
0104000AP1NB000000
00000000001AP1NB00200300400500602AP1NB00400600801001203AP1NB00600901
201501804AP1NB00801201602002405AP1NB01001502002503006AP1NB0201802403
003607AP1NB01402102803504208AP1NB01602403204004809AP1NB0180270360450
5410AP1NB02003004005006011AP1NB02203304405506612APNB0240360480600721
3AP1NB02603905206507814AP1NB02804205607008415AP1NB03004506007509016A
P1NB03204806408009617AP1NB0340510680851028AP1NB03605407209010819AP1N
B038057076095114/
nabcdefghijklmnopqrstuvwxyabcdefghijklmnopqrstuvwxyabcdefghijklmnopghijklmno
pqrstuvwxyabcdefghijklmnopqrstuv[
a]abcdefghijklmnopqrstuvwxyabcdefghijklmnopqrstuvwxyabcdefghijklmnopghijk
lmnopqrstuvwxyabcdefghijklmnopqr[
a]tuvwxyzabcdefghijklmnopqrstuvwxyabcdefghijklmnopqrstuvwxyabcdefghijklmnop
ghijklmnopqrstuvwxyabcdefghijklmnop[
a]pqrstuvwxyabcdefghijklmnopqrstuvwxyabcdefghijklmnopqrstuvwxyabcdefghijklmnop
defghijklmnopqrstuvwxyabcdefghijklmnopghij[
a]lmnopqrstuvwxyabcdefghijklmnopqrstuvwxyabcdefghijklmnopqrstuvwxy
zabcdefghijklmnopqrstuvwxyabcdefghijklmnop[
a]hijklmnopqrstuvwxyabcdefghijklmnopqrstuvwxyabcdefghijklmnopqrstuvwxy
vwxyzabcd[0x12]

        </External_Header>
        <External_Header_Size> 4096</External_Header_Size>
        <SEGD_Disk_Write_Error>No</SEGD_Disk_Write_Error>
        <List_Of_Error_Traces>

<Error_Trace>
<Streamer_Nb> 0 </Streamer_Nb>
<Channel_Nb> 1 </Channel_Nb>
<Anomaly> Dead </Anomaly>
</Error_Trace>
<Error_Trace>
<Streamer_Nb> 1 </Streamer_Nb>
<Channel_Nb> 1 </Channel_Nb>
<Anomaly> Dead </Anomaly>
</Error_Trace>
<Error_Trace>
<Streamer_Nb> 1 </Streamer_Nb>
<Channel_Nb> 2 </Channel_Nb>

```

```
<Anomaly> Dead </Anomaly>
</Error_Trace>
  </List_Of_Error_Traces>
    </ACQ_LOG>
  </SEAL>
</SERCEL>
```


Chapter

6

Instrument test limit file format

This chapter describes the format of the files containing Instrument test limits. For default limit values, see User's Manual Vol. 3, Appendix 1 (Specifications). It includes the following sections:

- [FDU2x instrument tests \(page 82\)](#)

For default limit values, see User's Manual Vol. 3, Appendix 1 (Specifications)

FDU2x instrument tests

All the files containing the instrument test limits for FDU channels are located in the following directory:

```
/home/userseal/sercel/Seal428v._._/eHCI/
```

Below is the `Fdu_Instr_Test_Limit.land.fdu.2ms` file containing the limits for instrument tests with a 2-ms sample rate:

```
Fdu_Instr_Test_Limit : [  
# =====  
  
    Distorsion_Limit      : -100 # (dB)  
    Com_Mode_Rej_Limit   : 100 # (dB)  
    Gain_Limit            : 1.0 # (%)  
    Phase_Limit           : 20 # (us)  
    Noise_Limit_G1600     : 1.6 # (uv)  
    Noise_Limit_G400      : 0.4 # (uv)  
    Crosstalk_Limit      : 100.00  
  
]
```

6

The suffix of the file name depends on the Sample Rate (.4ms .2ms .1ms .0.5ms .0.25ms).

For other sample rates, the file structure is the same but limit values may be different, in compliance with Seal428 Specifications (see User's Manual Vol. 3 Appendix A).

Appendix

A

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

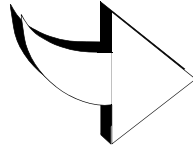
info@posc.org

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
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

Code	Organization
170	Electronic Logging Company
180	Elgen
190	El Toro
200	Empire
205	Encom Technology, Ltd.
206	Ensign 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
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

Code	Organization
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
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

Code	Organization
510	Western
520	Westronics
525	Winters Wireline
530	Wireline Electronics
540	Worth Well
560	Z & S Consultants Limited
999	Reserved for local schemas
1000	POSC



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