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TOPEX/POSEIDON Project

TOPEX Ground System
Software Interface Specification,
Volume 2: Design (SIS-2)

Altimeter Sensor Data Record (SDR)—
Alt SDR Data

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B	1992-05-15	4.4.n all renumbered (now sorted in dictionary order) 1.6.4, 4.4.129, 4.4.131 event times changed from "local time" to "VAX clock time", as TGS VAX clocks were changed to UTC. p. 16 Memory_Dump changed from 34 to 32 occurrences per MCR 095; also 4.4.108 p. 17 Alt_Eng_Status, Alt_Eng_ Frame added per MCR 125; also added 4.4.59 and 4.4.67 4.4.3, 4.4.6 clarifications 4.4.11, 4.4.17 update limits 4.4.48-51, 4.4.53-55 change units and limits per MCR 118 4.4.57, 4.4.64-65, 4.4.72-73, 4.4.88, 4.4.101 clarifications 4.4.113 change sign per MCR124 4.4.120, 4.4.166, 4.4.178, 4.4.180-182, 4.4.191 clarifications
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1. INTRODUCTION

1.1. Identification

SIS 633-751-23-001 Alt SDR Data Volume 2, Design, is a deliverable product of the TOPEX Ground System (TGS) Science Data Subsystem (SDS).

1.2. Content Overview

The Alt SDR Data product is a pass file of time-tagged, earth-located, decommutated altimeter data.

1.3. Scope

This document specifies the content and structure of the Alt SDR Data. This Software Interface Specification contains the current state of format details for this interface.

This document supersedes the corresponding SIS Volume 1, Requirements, which will no longer be maintained.

1.4. Related Interfaces

Alt SDR SIS, PD 633-752-23-021, describes the packaging of Alt SDR Data pass files into Alt SDR products.

1.5. Applicable Documents

SDS Functional Design Document, PD 633-752, Dec. 1990

SDPS Software Requirements Document, PD 633-751-21, June 1991

Alt SDR Software Interface Specification, PD 633-752-23-021, June 1991

Altimeter Flight Software User's Guide, FSC 968-ER1000 (Draft), Jan. 1990

TOPEX Ground System Science Algorithm Specification, PD 633-708, Rev. A, Change 1, April 1991, as amended

CCSDS 301.0-B-2 Blue Book Issue 2, Apr 1990, Recommendation For Space System Data Standards: Time Code Formats

TOPEX NASA Altimeter Operations Handbook, WFF - TPX-005

Information processing--ISO 7-bit coded character set for information interchange, ISO 646-1983

1.6. Conventions

1.6.1. Data Representation

All file headers are ASCII. All other data are binary unless noted otherwise.

Bit and byte ordering follow VAX/VMS conventions as defined in Appendix C. The term "byte" is synonymous with "octet" as used by ISO.

All text fields in headers are free-form, with variable spaces.

1.6.2. File Structure

The record format is fixed-length. The VMS record attributes are "none". For block size see the Alt SDR SIS, PD 633-752-23-021.

1.6.3. Notation

1.6.3.1. Traceability

Some data element descriptions may contain a trace code that indicates the data product in which it appears and the priority assigned to it. The code has the following format:

```
{[ppp:n]}
```

where: ppp... = data product acronym (e.g. GDR)
 n = 1 - mandatory or pre-launch
 2 - important or as soon as possible
 3 - desirable or post-launch

1.6.3.2. Hexadecimal Values

X'nn' is a representation of a numeric value in hexadecimal.

1.6.3.3. Keyword/Value Conventions

Data in header records follow a "keyword=value" convention as shown here:

```
KEYWORD Assignment_symbol VALUE Stmt_Terminator
```

where:

KEYWORD is the leftmost component term and consists of a character string that describes the corresponding keyword. Assignment_symbol is the ASCII equal sign character "=".

VALUE is the rightmost component term and consists of a character string containing the value of the data object described by the corresponding keyword.

Stmt_Terminator is a semicolon (;).

Unless otherwise noted in the appropriate record description, the Stmt_Terminator (;) is followed by a carriage return - line feed pair (<CR><LF>) and padded with blanks to the record length specified for the file in which the keyword=value pair is located.

1.6.4. Data Definition Terminology

File A collection of information stored as records and terminated with an EOF marker.

Group A conceptually useful aggregate of records or elements.

Record An organized and identifiable aggregate of related data elements transcribed on a storage medium.

Element A discrete, non-decomposable unit of information. An element has the following attributes:

Element Type Conceptual data type. Values are:

bitfield	Contiguous sequence of bits, often used as flags.
integer	Whole number.
real	Number that can include a decimal fraction.
string	Contiguous sequence of characters.
utc	Universal Coordinated Time
time	VAX clock time

Storage Type Format in which an element is represented on a storage medium. Values are:

signed	Signed integer, twos-complement.
unsigned	Unsigned integer.
bit	Contiguous sequence of bits.
character	Contiguous sequence of ASCII characters.
time_ascii	Time represented by ASCII characters in format yyyy-dddThh:mm:ss.fff...
utc_binary	UTC in CCSDS day segmented binary format.

Bytes Size of element in 8-bit bytes.

Units Unit of measure including scale factor, "counts", or "N/A".

<u>Minimum</u>	Typical or approximate minimum element value.
<u>Nominal</u>	Typical or approximate nominal element value.
<u>Maximum</u>	Typical or approximate maximum element value.

2. ENVIRONMENT

2.1. Hardware Characteristics

This product will be created in a VAX/VMS environment.

2.2. Interface Medium and Characteristics

See Transfer Medium.

2.3. Input/Output Protocols

2.3.1. Device Addressing

See Transfer Method.

2.3.2. Operating System Protocols

Records are fixed-length, unformatted. Blocking is performed by the operating system.

2.3.3. Deformatting

See Conventions and individual file, record, or data element definitions for formatting or translation requirements.

2.3.4. Calling Sequence

Not applicable.

2.4. Failure Protection and Recovery

Not Applicable.

3. DATA FLOW CHARACTERISTICS

3.1. Data Volume Estimates

Minimum Size: <.1 MB

Nominal Size: 5.6 MB

Maximum Size: 5.6 MB

3.2. Generation Frequency

The generation frequency for the Alt SDR Data is one pass file per data pass (approximately 56 minutes).

3.3. Transfer Medium

The transfer medium within TGS is shared disk storage.

See the Alt SDR SIS, 633-752-23-021, and appropriate Interface Control Document for details on transfers to external organizations.

3.4. Transfer Method

At time of generation, this data product shall be written to the TGS common storage area, SDS_ALTSDRDATA:.

See the Alt SDR SIS, 633-752-23-021, and appropriate Interface Control Document for details on transfers to external organizations.

3.5. Labeling

Alt SDR Data files conform to the following naming convention:

SDP_ALTSDR_ccc_ppp.DAT

where ccc = the TOPEX cycle number for the 10-day period in which this data was acquired and ppp = the pass number within the cycle. For file naming conventions within Alt SDR products, see the Alt SDR SIS.

4. DATA PRODUCT DEFINITION

4.1. Summary Data Product Structure

This section describes the overall structure of this product and defines its major components.

File: Alt SDR Data			
Record Group (optional)	Record Name	Size	Occurs
Alt SDR Data Header	SFDU_Pass_File_Header	1472	1
SDS_Header	Producer_Agency_Name Producer_Institution_Name Source_Name Sensor_Name SIS_Id Product_Create_Start_Time Product_Create_End_Time Generating_Software_Name Build_Id Operator_Note	1472 1472 1472 1472 1472 1472 1472 1472 1472	1 1 1 1 1 1 1 1 1 1
SDP_Header	Cycle_Number Pass_Number Rev_Number Equator_Long Equator_Time Time_First_Pt Time_Last_Pt Time_Epoch	1472 1472 1472 1472 1472 1472 1472 1472	1 1 1 1 1 1 1 1
Alt SDR specific Header	Alt_SDR_SW_Ped	1472	1
Alt_SDR_Processing_Summary	Alt_SDR_Gap_Count Alt_Sci_Frames_Received Alt_Eng_Frames_Received STR_Frames_Received Alt_Sci_Frames_Processed Alt_Eng_Frames_Processed	1472 1472 1472 1472 1472 1472	1 1 1 1 1 1
	End_of_Header	1472	1

File: Alt SDR Data (Cont.)

Record Group (optional)	Record Name	Size	Occurs
	Alt SDR Data Record * =[Alt Sci SDR Record Alt Eng SDR Record]	1472 1472 1472	3798 1 1

* An occurrence of the Alt SDR Data Record is either an Alt Sci SDR Record or Alt Eng SDR Record. See record description for more details.

4.2. File, Record and Group Descriptions

This section provides a description of each file, record, and record group.

4.2.1. Alt SDR Data

A nominal pass file contains slightly less than one hour of data covering a ground track from min/max latitude to max/min latitude. It contains header records followed by data records and is delimited by a VMS end-of-file indication.

4.2.2. Alt SDR Data Header

This group of fixed-length records identifies the source of the data, the span of data contained in the pass file, and the pedigree of all software and supporting data used to generate the pass file. All header entries are in ASCII and follow a "keyword=value" convention. Records are padded with ASCII spaces to maintain a fixed length equal to the length of the data record (1472 bytes).

4.2.3. Alt SDR Data Record

This is either an Alt Sci SDR Record or an Alt Eng SDR Record. Each record corresponds to one altimeter frame (science or engineering). Record types are interleaved in time-order and occur at the nominal rate of eight science to one engineering (same as the rate of the corresponding altimeter frames). The record ordering is determined by the minor frame times (MF UTC and Time_Past_Epoch_AltEng). Since the science data time tag, Time_Past_Epoch_AltSci, is modified by several processing algorithms, the interleaving between science and engineering will appear out of order if Time_Past_Epoch_AltSci is compared with Time_Past_Epoch_AltEng. A pass file typically contains approximately 3798 Alt SDR Data records, of which 3376 are Alt Sci SDR Records and the remaining 422 records are Alt Eng SDR Records.

The data coverage normally begins a few seconds before the beginning of the pass and ends a few seconds after the end of the pass, to accommodate downstream processing which requires averaging more than one frame.

4.2.4. Alt Sci SDR Record

This fixed-length record contains data from the altimeter science and satellite engineering streams. A pass file contains a maximum of about 3376 occurrences of this record.

4.2.5. Alt Eng SDR Record

This fixed-length record contains data from the altimeter engineering stream. A pass file contains a maximum of about 422 occurrences of this record.

4.3. Detailed Data Product Structure

This section describes every data element included in this product.

Record Name	Element Group (optional)	Element Name	Type	Storage	Offset	Size	Occurs
SFPU_Pass_File_Header		SFPU_Classz_Format_Id	string	char	0	12	1
		SFPU_Classz_Length_Value	integer	char	12	8	1
		SFPU_Class1_Format_Id	string	char	20	12	1
		SFPU_Class1_Length_Value	integer	char	32	8	1
Producer_Agency_Name		Producer_Agency_Name_Keywd	string	char	**	**	1
		Producer_Agency_Name_Value	string	char	**	**	1
Producer_Institution_Name		Producer_Institution_Name_Keywd	string	char	**	**	1
		Producer_Institution_Name_Value	string	char	**	**	1
Source_Name		Source_Name_Keywd	string	char	**	**	1
		Source_Name_Value	string	char	**	**	1
Sensor_Name		Sensor_Name_Keywd	string	char	**	**	1
		Sensor_Name_Value	string	char	**	**	1
SIS_Id		SIS_Id_Keywd	string	char	**	**	1
		SIS_Id_Value	string	char	**	**	1
Product_Create_Start_Time		Product_Create_Start_Time_Keywd	string	char	**	**	1
		Product_Create_Start_Time_Value	time	time_asc	**	**	1
Product_Create_End_Time		Product_Create_End_Time_Keywd	string	char	**	**	1
		Product_Create_End_Time_Value	time	time_asc	**	**	1
Generating_Software_Name		Generating_Software_Name_Keywd	string	char	**	**	1
		Generating_Software_Name_Value	string	char	**	**	1
Build_Id		Build_Id_Keywd	string	char	**	**	1
		Build_Id_Value	string	char	**	**	1
Operator_Note		Operator_Note_Keywd	string	char	**	**	1
		Operator_Note_Value	string	char	**	**	1
Cycle_Number		Cycle_Number_Keywd	string	char	**	**	1
		Cycle_Number_Value	integer	char	**	**	1
Pass_Number		Pass_Number_Keywd	string	char	**	**	1
		Pass_Number_Value	integer	char	**	**	1
Rev_Number		Rev_Number_Keywd	string	char	**	**	1
		Rev_Number_Value	integer	char	**	**	1

** 'Keyword=Value' element - see text for parsing information.

Record Name	Element Group (optional)	Element Name	Type	Storage	Offset	Size	Occurs
Equator_Long		Equator_Long_Keywd Equator_Long_Value	string real	char char	** **	** **	1 1
Equator_Time		Equator_Time_Keywd Equator_Time_Value	string utc	char time_asc	** **	** **	1 1
Time_First_Pt		Time_First_Pt_Keywd Time_First_Pt_Value	string utc	char time_asc	** **	** **	1 1
Time_Last_Pt		Time_Last_Pt_Keywd Time_Last_Pt_Value	string utc	char time_asc	** **	** **	1 1
Time_Epoch		Time_Epoch_Keywd Time_Epoch_Value	string utc	char time_asc	** **	** **	1 1
Alt_SDR_SW_Ped		Alt_SDR_SW_Ped_Keywd Alt_SDR_SW_Ped_Value	string string	char char	** **	** **	1 1
Alt_SDR_Gap_Count		Alt_SDR_Gap_Count_Keywd Alt_SDR_Gap_Count_Value	string integer	char char	** **	** **	1 1
Alt_Sci_Frames_Received		Alt_Sci_Frames_Received_Keywd Alt_Sci_Frames_Received_Value	string integer	char char	** **	** **	1 1
Alt_Eng_Frames_Received		Alt_Eng_Frames_Received_Keywd Alt_Eng_Frames_Received_Value	string integer	char char	** **	** **	1 1
STR_Frames_Received		STR_Frames_Received_Keywd STR_Frames_Received_Value	string integer	char char	** **	** **	1 1
Alt_Sci_Frames_Processed		Alt_Sci_Frames_Processed_Keywd Alt_Sci_Frames_Processed_Value	string integer	char char	** **	** **	1 1
Alt_Eng_Frames_Processed		Alt_Eng_Frames_Processed_Keywd Alt_Eng_Frames_Processed_Value	string integer	char char	** **	** **	1 1
End_of_Header		End_of_Header_Keywd	string	char	**	**	1
Alt SDR Data Record							
Alt Sci SDR Record		AltSci_Record_Type_Code AltSci_Raw_Clock_Counts Time_Post_Epoch_AltSci MF_UTC	bitfield integer utc utc	bit unsigned utc_bin utc_bin	0 2 8 16	2 6 8 8	1 1 1 1

** 'Keyword=Value' element - see text for parsing information.

Record Name	Element Group (optional)	Element Name	Type	Storage	Offset Size	Occurs
		Latitude_AltSDR	Integer	signed	24	1
		Longitude_AltSDR	Integer	signed	28	1
		Sat_Alt_AltSDR	Integer	unsigned	32	1
		Time_shift_Midframe	Integer	signed	36	1
		Height_1011	Integer	unsigned	40	1
		Range_K	Integer	unsigned	44	20
		Range_C	Integer	unsigned	124	20
		Time_Corr_Rate_Coarse	Integer	unsigned	204	1
		Time_Corr_Rate_Fine	Integer	unsigned	208	1
		Net_Time_Tag_Corr	Integer	signed	212	1
		Synchronizer_Mode_Bits	bitfield	bit	214	1
		Smoothed_V_Att_K	Integer	signed	216	1
		Smoothed_V_Att_C	Integer	signed	218	1
		Last_ICA_Command	bitfield	bit	220	1
		Sat_Alt_Hi_Rate_AltSDR	bitfield	bit	222	1
		Range_Rate	Integer	signed	224	2
		AGC_AltSDR_K	Integer	signed	244	2
		AGC_AltSDR_C	Integer	unsigned	204	2
		Off_Madir_Angle_SC	Integer	unsigned	324	2
		Roll_STR	Integer	unsigned	364	1
		Pitch_STR	Integer	signed	366	1
		Yaw_STR	Integer	signed	368	1
		Solar_Array_Pitch_Angle_STR	Integer	signed	370	1
		Sparc2	Integer	unsigned	372	2
		VSMH_AltSDR_K	Integer	signed	374	2
		VSMH_AltSDR_C	Integer	signed	390	10
		Calib_Atten_K	Integer	unsigned	400	10
		Calib_Atten_C	Integer	unsigned	410	1
		Range_Blunder_Flags_Limit_K	Integer	unsigned	411	1
		Range_Blunder_Flags_Limit_C	bitfield	bit	412	3
		Range_Blunder_Flags_Fit_K	bitfield	bit	415	1
		Range_Blunder_Flags_Fit_C	bitfield	bit	418	3
		Alt_Sci_Quality_Flags	bitfield	bit	421	1
		Alt_Eng_Quality_Flags	bitfield	bit	424	1
		Land_Water_Alt	bitfield	bit	425	1
		Gate_Index	bitfield	bit	426	1
		Current_Mode	bitfield	bit	427	1
		Mode_Change	bitfield	bit	428	2
		Test_Mode	bitfield	bit	430	1
		Operation_Mode_Byte	bitfield	bit	432	1
		Waveform_Scale_Hi	bitfield	bit	433	1
		Waveform_Scale_Lo	Integer	unsigned	434	10
			Integer	unsigned	444	1

** 'keyword=Value' element - see text for parsing information.

Record Name	Element Group (optional)	Element Name	Type	Storage	Offset	Size	Occurs		
Alt Eng SDR Record		Waveform_Samps_Hi	integer	unsigned	449	64	10		
		Waveform_Samps.Lo	integer	unsigned	1089	64	5		
		Waveform_Flags_Hi	bitfield	bit	1409	1	10		
		Waveform_Flags.Lo	bitfield	bit	1419	1	5		
		UTC_Conv_Flag_AltSci	bitfield	bit	1424	1	1		
		Alt_Sci_Prelim_Flags	bitfield	bit	1425	1	1		
		Smoothed_V_Att_Flag_K	bitfield	bit	1426	1	1		
		Smoothed_V_Att_Flag_C	bitfield	bit	1427	1	1		
		Mode_Flags	bitfield	bit	1428	1	1		
		OOE_Flag	bitfield	bit	1429	1	1		
		Limit_Byte	bitfield	bit	1430	1	1		
		Altimeter_State	bitfield	bit	1431	1	1		
		Order_Flag	bitfield	bit	1432	1	1		
		Bad_HF_Count_AltSci	integer	unsigned	1433	1	1		
		Bad_CRC_Count_AltSci	integer	unsigned	1434	1	1		
		Solar_Array_Temp_Diff	integer	signed	1435	1	1		
		Interp_Qual_Flags	bitfield	bit	1436	1	1		
		Spare	integer	signed	1437	1	35		
		AltEng_Record_Type_Code		AltEng_Record_Type_Code	bitfield	bit	0	2	1
		AltEng_Raw_Clock_Counts		AltEng_Raw_Clock_Counts	integer	unsigned	2	6	1
		Time_Past_Epoch_AltEng		Time_Past_Epoch_AltEng	utc	utc_bin	8	8	1
		Spare		Spare	integer	signed	16	1	10
		Time_Last_Reset_Row		Time_Last_Reset_Row	integer	unsigned	26	6	1
		Time_Last_Reset		Time_Last_Reset	utc	utc_bin	32	8	1
		Alt_ENG_01		Alt_ENG_01	integer	signed	40	2	1
		Alt_ENG_02		Alt_ENG_02	integer	signed	42	2	1
		Alt_ENG_03		Alt_ENG_03	integer	signed	44	2	1
		Alt_ENG_04		Alt_ENG_04	integer	signed	46	2	1
		Alt_ENG_05		Alt_ENG_05	integer	signed	48	2	1
		Alt_ENG_06		Alt_ENG_06	integer	signed	50	2	1
		Alt_ENG_07		Alt_ENG_07	integer	signed	52	2	1
		Alt_ENG_08		Alt_ENG_08	integer	signed	54	2	1
		Alt_ENG_09		Alt_ENG_09	integer	signed	56	2	1
		Alt_ENG_10		Alt_ENG_10	integer	signed	58	2	1
		Alt_ENG_11		Alt_ENG_11	integer	signed	60	2	1
Alt_ENG_12		Alt_ENG_12	integer	signed	62	2	1		
Alt_ENG_13		Alt_ENG_13	integer	signed	64	2	1		
Alt_ENG_14		Alt_ENG_14	integer	signed	66	2	1		
Alt_ENG_15		Alt_ENG_15	integer	signed	68	2	1		
Alt_ENG_16		Alt_ENG_16	integer	signed	70	2	1		
Alt_ENG_17		Alt_ENG_17	integer	signed	72	2	1		
Alt_ENG_18		Alt_ENG_18	integer	signed	74	2	1		
Alt_ENG_19		Alt_ENG_19	integer	signed	76	2	1		

** 'Keyword=Value' element - see text for parsing information.

Record Name	Element Group (optional)	Element Name	Type	Storage	Offset	Size	Occurs
		ALT_ENG_20	Integer	signed	78	2	1
		ALT_ENG_21	Integer	signed	80	2	1
		ALT_ENG_22	Integer	signed	82	2	1
		ALT_ENG_23	Integer	signed	84	2	1
		ALT_ENG_24	Integer	signed	86	2	1
		ALT_ENG_25	Integer	signed	88	2	1
		ALT_ENG_26	Integer	signed	90	2	1
		ALT_ENG_27	Integer	signed	92	2	1
		ALT_ENG_28	Integer	signed	94	2	1
		ALT_ENG_29	Integer	signed	96	2	1
		ALT_ENG_30	Integer	signed	98	2	1
		ALT_ENG_31	Integer	signed	100	2	1
		ALT_ENG_32	Integer	signed	102	2	1
		ALT_ENG_33	Integer	signed	104	2	1
		ALT_ENG_34	Integer	signed	106	2	1
		ALT_ENG_35	Integer	signed	108	2	1
		ALT_ENG_36	Integer	signed	110	2	1
		ALT_ENG_37	Integer	signed	112	2	1
		ALT_ENG_38	Integer	signed	114	2	1
		ALT_ENG_39	Integer	signed	116	2	1
		ALT_ENG_40	Integer	signed	118	2	1
		ALT_ENG_41	Integer	signed	120	2	1
		ALT_ENG_42	Integer	signed	122	2	1
		ALT_ENG_43	Integer	signed	124	2	1
		ALT_ENG_44	Integer	signed	126	2	1
		ALT_ENG_45	Integer	signed	128	2	1
		ALT_ENG_46	Integer	signed	130	2	1
		ALT_ENG_47	Integer	signed	132	2	1
		ALT_ENG_48	Integer	signed	134	2	1
		ALT_ENG_49	Integer	signed	136	1	1
		ALT_ENG_50	Integer	signed	137	1	1
		Memory Dump Address	Integer	unsigned	138	2	1
		Memory Dump	bitfield	bit	140	1	32
		Spare_AltEng	Integer	unsigned	172	1	2
		Alt_Eng_Checksum	Integer	unsigned	174	1	1
		Checksum_Hi	Integer	unsigned	175	1	1
		Checksum_Lo	Integer	unsigned	176	1	1
		Last Command	bitfield	bit	177	3	8
		Alt_Eng_Spare	Integer	unsigned	201	1	1
		UTC_Conv_Flag_AltEng	bitfield	bit	202	1	1
		Alt_Eng_Prelim_Flags	bitfield	bit	203	1	1
		Sum_Count	Integer	unsigned	204	1	1
		Pass_Count_Alt	Integer	unsigned	205	1	1
		Order_Flag	bitfield	bit	206	1	1

** 'Keyword=Value' element - see text for parsing information.

Record Name	Element Group (optional)	Element Name	Type	Storage	Offset	Size	Occurs
		Bad_HF_Count_AltEng	integer	unsigned	207	1	1
		Bad_CRC_Count_AltEng	integer	unsigned	208	1	1
		Alt_Eng_Status	bitfield	bit	209	1	1
		Alt_Eng_Frame	bitfield	bit	210	128	1
		Spare_AltEng	integer	unsigned	338	1	1136

** 'Keyword=Value' element - see text for parsing information.

4.4. Element Definitions

This section provides a definition for each data element.

4.4.1. AGC_AltSDR_C

Engineering value for 20/frame Automatic Gain Control for the C band.

Element Type: integer
Storage Type: unsigned
Number of Bytes: 2
Units: .01 dB
Minimum Val: 0
Nominal Val: N/A
Maximum Val: 6600

4.4.2. AGC_AltSDR_K

Engineering value for 20/frame Automatic Gain Control for the K band.

Element Type: integer
Storage Type: unsigned
Number of Bytes: 2
Units: .01 dB
Minimum Val: 0
Nominal Val: N/A
Maximum Val: 6600

4.4.3. AltEng_Raw_Clock_Counts

Raw counts of the satellite clock value for the altimeter engineering frame, from the TCCS frame header.

Element Type: integer
Storage Type: unsigned
Number of Bytes: 6
Units: counts
Minimum Val: 0
Nominal Val: N/A
Maximum Val: X'FFFFFFFFFFFF'

4.4.4. AltEng_Record_Type_Code

Flag indicating this is an engineering record.

Element Type: bitfield
Storage Type: bit
Number of Bytes: 2

Units: N/A
 Minimum Val: X'0101'
 Nominal Val: X'0101'
 Maximum Val: X'0101'

4.4.5. Altimeter_State

A set of flags extracted from other status channels representing altimeter state information used by many processing algorithms. This channel is redundant with other information, and is for the convenience of the ground system. Bits are defined as follows:

Bit	Definition
---	-----
0-1	CON 0 - C band off 1 - C on, 100 MHz 2 - C on, 320 MHz
2	KUON 0 - Ku band off 1 - Ku band on
3	Altimeter Operating 0 - Side A on 1 - Side B on
4	High WF Freq 0 - Ku is high rate 1 - C is high rate
5-7	Spares.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: X'00'
 Nominal Val: N/A
 Maximum Val: X'1F'

4.4.6. AltSci_Raw_Clock_Counts

Telemetry raw counts of the satellite clock value for the altimeter science frame time, as reported by the altimeter in the science frame.

Element Type: integer
 Storage Type: unsigned
 Number of Bytes: 6
 Units: counts
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: X'FFFFFFFFFFFF'

4.4.7. AltSci_Record_Type_Code

Flag indicating this is a science record.

Element Type: bitfield
Storage Type: bit
Number of Bytes: 2
Units: N/A
Minimum Val: 0
Nominal Val: 0
Maximum Val: 0

4.4.8. Alt_ENG_01

Spare.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: N/A
Minimum Val: -32768
Nominal Val: N/A
Maximum Val: 32767

4.4.9. Alt_ENG_02

Spare.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: N/A
Minimum Val: -32768
Nominal Val: N/A
Maximum Val: 32767

4.4.10. Alt_ENG_03

Spare.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: N/A
Minimum Val: -32768
Nominal Val: N/A
Maximum Val: 32767

4.4.11. Alt_ENG_04

Spare temp monitor.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2721
Nominal Val: 0
Maximum Val: 10200

4.4.12. Alt_ENG_05

Engineering value for the Receiver Automatic Gain Control Section temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 2700
Maximum Val: 9999

4.4.13. Alt_ENG_06

Engineering value for the SSU temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 2600
Maximum Val: 9999

4.4.14. Alt_ENG_07

Engineering value for the Ku band Microwave Transmission Unit IF Preamplifier temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 2900
Maximum Val: 9999

4.4.15. Alt_ENG_08

Engineering value for the Receiver IQ Video Section temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 3100
Maximum Val: 9999

4.4.16. Alt_ENG_09

Engineering value for the Traveling Wave Tube Assembly EPC temperature #1.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 2900
Maximum Val: 9999

4.4.17. Alt_ENG_10

Engineering value for the temperature monitor spare.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2721
Nominal Val: -2721
Maximum Val: 10200

4.4.18. Alt_ENG_11

Engineering value for the C band Microwave Temperature Unit Calibration Attenuator temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 2800
Maximum Val: 9999

4.4.19. Alt_ENG_12

Engineering value for the C band Microwave Transmission Unit RF Preamplifier temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 2600
Maximum Val: 9999

4.4.20. Alt_ENG_13

Engineering value for the C band Microwave Transmission Unit IF Preamplifier temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 2700
Maximum Val: 9999

4.4.21. Alt_ENG_14

Engineering value for the C band Microwave Transmission Unit Power Monitor temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 2600
Maximum Val: 9999

4.4.22. Alt_ENG_15

Engineering value for the C-SSA Gallium Arsenide Field Effect Transistor temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 3100
Maximum Val: 9999

4.4.23. Alt_ENG_16

Engineering value for the C-SSA Power Converter temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 4100
Maximum Val: 9999

4.4.24. Alt_ENG_17

Engineering value for the Ku band Microwave Transmission Unit Calibration Attenuator temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 3000
Maximum Val: 9999

4.4.25. Alt_ENG_18

Engineering value for the Ku band Microwave Transmission Unit Power Monitor temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 2800
Maximum Val: 9999

4.4.26. Alt_ENG_19

Engineering value for the UCFM temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 3100
Maximum Val: 9999

4.4.27. Alt_ENG_20

Engineering value for the Ku band Microwave Transmission Unit RF Preamplifier temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 2900
Maximum Val: 9999

4.4.28. Alt_ENG_21

Engineering value for the Downconverter temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 2900
Maximum Val: 9999

4.4.29. Alt_ENG_22

Engineering value for the Signal Processor DFB Butterfly Board temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 4400
Maximum Val: 9999

4.4.30. Alt_ENG_23

Engineering value for the Signal Processor DFB Memory temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 4500
Maximum Val: 9999

4.4.31. Alt_ENG_24

Engineering value for the Signal Processor ICA Conditioning Amplifiers temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 3600
Maximum Val: 9999

4.4.32. Alt_ENG_25

Engineering value for the Signal Processor A/D Converter temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 3900
Maximum Val: 9999

4.4.33. Alt_ENG_26

Engineering value for the Signal Processor Synchronizer temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 4400
Maximum Val: 9999

4.4.34. Alt_ENG_27

Engineering value for the Signal Processor ATA temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 4500
Maximum Val: 9999

4.4.35. Alt_ENG_28

Engineering value for the Signal Processor Housing Wall temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 3100
Maximum Val: 9999

4.4.36. Alt_ENG_29

Engineering value for the Digital Chirp Generator Gate Array temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 3600
Maximum Val: 9999

4.4.37. Alt_ENG_30

Engineering value for the Low Voltage Power Supply mounting plate temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 3500
Maximum Val: 9999

4.4.38. Alt_ENG_31

Engineering value for the Low Voltage Power Supply Boost Regulator Assembly temperature.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg C
Minimum Val: -2000
Nominal Val: 3900
Maximum Val: 9999

4.4.39. Alt_ENG_32

Engineering value for the +12 volt output of the Low Voltage Power Supply.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: millivolts
Minimum Val: 10000
Nominal Val: 12000
Maximum Val: 14000

4.4.40. Alt_ENG_33

Engineering value for the +28 volt output from the Low Voltage Power Supply.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: millivolts
Minimum Val: 24000
Nominal Val: 28000
Maximum Val: 32000

4.4.41. Alt_ENG_34

Engineering value for the +15 volt output of the Low Voltage Power Supply.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: millivolts
Minimum Val: 14000
Nominal Val: 15000
Maximum Val: 16000

4.4.42. Alt_ENG_35

Engineering value for the -15 volt output of the Low Voltage Power Supply.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: millivolts
Minimum Val: -16000
Nominal Val: -15000
Maximum Val: -14000

4.4.43. Alt_ENG_36

Engineering value for the +5 volt (5%) output of the Low Voltage Power Supply.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: millivolts
Minimum Val: 4750
Nominal Val: 5000
Maximum Val: 5250

4.4.44. Alt_ENG_37

Engineering value for the +5 volt (1%) output of the Low Voltage Power Supply.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: millivolts
Minimum Val: 4750
Nominal Val: 5000
Maximum Val: 5250

4.4.45. Alt_ENG_38

Engineering value for the -5.2 volt output of the Low Voltage Power Supply.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: millivolts
Minimum Val: -5700
Nominal Val: -5200
Maximum Val: -4700

4.4.46. Alt_ENG_39

Engineering value for the -6 volt output of the Low Voltage Power Supply.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: millivolts
Minimum Val: -6500
Nominal Val: -6000
Maximum Val: -5500

4.4.47. Alt_ENG_40

Engineering value for the Ku band transmitter power.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: milliwatts
Minimum Val: 18000
Nominal Val: 20000
Maximum Val: 22000

4.4.48. Alt_ENG_41

Engineering value for the Travelling Wave Tube Assembly cathode voltage.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: volts
Minimum Val: 0
Nominal Val: 4200
Maximum Val: 9000

4.4.49. Alt_ENG_42

Engineering value for the Travelling Wave Tube Assembly cathode current.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .00001 amps
Minimum Val: 0
Nominal Val: 3000
Maximum Val: 9000

4.4.50. Alt_ENG_43

Engineering value for the Traveling Wave Tube Assembly helix current.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: microamperes
Minimum Val: 0
Nominal Val: 2800
Maximum Val: 15000

4.4.51. Alt_ENG_44

Engineering value for the Traveling Wave Tube Assembly bus current.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: milliamperes
Minimum Val: 0
Nominal Val: 2300
Maximum Val: 9500

4.4.52. Alt_ENG_45

Engineering value for the C band transmitter power.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: milliwatts
Minimum Val: 18000
Nominal Val: 20000
Maximum Val: 22000

4.4.53. Alt_ENG_46

Engineering value for the C-SSA Input RF power.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .001 dBm
Minimum Val: -3500
Nominal Val: 200
Maximum Val: 3500

4.4.54. Alt_ENG_47

Engineering value for the C-SSA bus current.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: milliamperes
Minimum Val: 0
Nominal Val: 950
Maximum Val: 1200

4.4.55. Alt_ENG_48

Engineering value for the Low Voltage Power Supply bus current.

Element Type: integer
 Storage Type: signed
 Number of Bytes: 2
 Units: milliamperes
 Minimum Val: 0
 Nominal Val: 4000
 Maximum Val: 8000

4.4.56. Alt_ENG_49

Engineering measurement Telltale Byte #1, where bits are defined as follows:

Bit	Definition	0	1
0	Ku MTU T/R Switch	Transmit	Recv
1	Ku MTU Noise Suppression Switch	ON	OFF
2	Ku MTU Xmit Side A/B	B	A
3	Ku MTU Receive Side A/B	A	B
4	C MTU T/R Switch	Transmit	Recv
5	C MTU Noise Suppression Switch	ON	OFF
6	C MTU Xmit Side A/B	A	B
7	C MTU Receive Side A/B.	A	B.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: X'FF'

4.4.57. Alt_ENG_50

Engineering measurement Telltale Byte #2, where bits are defined as follows:

Bit	Definition	0	1
0	Ku TWTA Command Status	Correct	Incorrect
1	C-SSA Command Status	Correct	Incorrect
2	Spare	-	-
3	Altimeter Side A/B	A	B
4-7	Spares (set to 1)	-	-

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1

Units: N/A
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: X'FF'

4.4.58. Alt_Eng_Checksum

A number derived by the summation, in the flight software, of the first 125 bytes of the engineering frame. This number is compared to the results of a similar calculation in algorithm t4108. The result of this comparison determines the state of the Altimeter Engineering frame checksum exception flag.

Element Type: integer
 Storage Type: unsigned
 Number of Bytes: 1
 Units: counts
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: 255

4.4.59. Alt_Eng_Frame

An exact copy of the 128-byte altimeter engineering frame as assembled by TCCS.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 128
 Units: N/A
 Minimum Val: {X'00'} 128
 Nominal Val: N/A
 Maximum Val: {X'FF'} 128

4.4.60. Alt_Eng_Frames_Processed_Keywd

The Alt_Eng_Frames_Processed_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Alt_Eng_Frames_Processed_Value.

Element Type: string
 Storage Type: character
 Number of Bytes: 24
 Units: N/A
 Minimum Val: N/A
 Nominal Val: Alt_Eng_Frames_Processed
 Maximum Val: N/A

4.4.61. Alt_Eng_Frames_Processed_Value

Number of altimeter engineering frames processed to the Alt SDR Data records for the current pass.

Element Type: integer
 Storage Type: character
 Number of Bytes: 4
 Units: counts
 Minimum Val: 1
 Nominal Val: 422
 Maximum Val: 440

4.4.62. Alt_Eng_Frames_Received_Keywd

The Alt_Eng_Frames_Received_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Alt_Eng_Frames_Received_Value.

Element Type: string
 Storage Type: character
 Number of Bytes: 23
 Units: N/A
 Minimum Val: N/A
 Nominal Val: Alt_Eng_Frames_Received
 Maximum Val: N/A

4.4.63. Alt_Eng_Frames_Received_Value

Number of altimeter engineering telemetry frames received by the Alt SDR processor from the Alt Eng Frames file for the current pass.

Element Type: integer
 Storage Type: character
 Number of Bytes: 3
 Units: counts
 Minimum Val: 1
 Nominal Val: 422
 Maximum Val: 440

4.4.64. Alt_Eng_Prelim_Flags

Bit flags set by algorithms t4108e and t4109e to indicate altimeter engineering data status at the frame level. Zero bits indicate good data. Bits are defined as follows:

Bit	Definition
0	Engineering Frame PFLAG_FATAL (t4109e)
1	Engineering Frame Checksum Exception (Flag_EC)

- 2 Engineering Frame Reset Detected (Flag_ER)
- 3 Engineering Frame Spare Exception (Flag_ES)
- 4 Spare
- 5 "OR" of Engineering Prelim Flags (1, 2 and 3 above)
- 6-7 Spares.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: 0
 Nominal Val: 0
 Maximum Val: X'2F'

4.4.65. Alt_Eng_Quality_Flags

Bit flags set by algorithm t1016e (E6 and E7) and by the algorithm executive (E5) based on specified quality indicators for the altimeter engineering frame. Zero bits indicate good data. Bits are defined as follows:

Bit	Definition
0	Out-of-limit Attitude Angle (Flag_E5)
1	Out-of-limit Low Temperature (Flag_E6)
2	Out-of-limit High Temperature (Flag_E7)
3-7	Spares.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: 0
 Nominal Val: 0
 Maximum Val: X'07'

4.4.66. Alt_Eng_Spare

Spare byte inserted by on-board altimeter computer and telemetered down (MF 125).

Element Type: integer
 Storage Type: unsigned
 Number of Bytes: 1
 Units: N/A
 Minimum Val: X'00'
 Nominal Val: X'0A'
 Maximum Val: X'FF'

4.4.67. Alt_Eng_Status

Status byte from telemetry (MF 9). See Altimeter Flight Software User's Guide for definition.

Element Type: bitfield
Storage Type: bit
Number of Bytes: 1
Units: N/A
Minimum Val: X'00'
Nominal Val: N/A
Maximum Val: X'FF'

4.4.68. Alt_Sci_Frames_Processed_Keywd

The Alt_Sci_Frames_Processed_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Alt_Sci_Frames_Processed_Value.

Element Type: string
Storage Type: character
Number of Bytes: 24
Units: N/A
Minimum Val: N/A
Nominal Val: Alt_Sci_Frames_Processed
Maximum Val: N/A

4.4.69. Alt_Sci_Frames_Processed_Value

Number of altimeter science frames processed to the Alt SDR Data records for the current pass.

Element Type: integer
Storage Type: character
Number of Bytes: 4
Units: counts
Minimum Val: 1
Nominal Val: 3376
Maximum Val: 3600

4.4.70. Alt_Sci_Frames_Received_Keywd

The Alt_Sci_Frames_Received_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Alt_Sci_Frames_Received_Value.

Element Type: string
Storage Type: character
Number of Bytes: 23
Units: N/A
Minimum Val: N/A

Nominal Val: Alt_Sci_Frames_Received
 Maximum Val: N/A

4.4.71 Alt_Sci_Frames_Received_Value

Number of altimeter science telemetry frames received by the Alt SDR processor in the Alt Sci Frames file for the current pass.

Element Type: integer
 Storage Type: character
 Number of Bytes: 4
 Units: counts
 Minimum Val: 1
 Nominal Val: 3376
 Maximum Val: 3600

4.4.72 Alt_Sci_Prelim_Flags

Bit flags set by algorithm t4108s and t4109s to indicate altimeter science data status at the frame level. Zero bits indicate good data. Bits are defined as follows:

Bit	Definition
----	-----
0	Science Data Frame PFLAG_FATAL (t4109s)
1	Science Data Frame Checksum Exception (Flag_SC)
2	Science Data Frame Invalid Mode (Flag_SM)
3	Science Data Frame Spare Exception (Flag_SS)
4	Midframe Time Shift set to value from the previous frame (t1165)
5	"OR" of Science Prelim Flags (1, 2 and 3 above)
6-7	Spares.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: 0
 Nominal Val: 0
 Maximum Val: X'3F'

4.4.73 Alt_Sci_Quality_Flags

Bit flags set by algorithm t1016s based on specified quality indicators for the altimeter science frame. Zero bits indicate good data. Bits are defined as follows:

Bit	Definition
----	-----
0	Out-of-limit Height RMS for Ku Band (Flag_E1)
1	Out-of-limit Height RMS for C Band (Flag_E1)

2	Out-of-limit AGC RMS for Ku Band (Flag_E2)
3	Out-of-limit AGC RMS for C Band (Flag_E2)
4	Out-of-limit SWH RMS for Ku Band (Flag_E3)
5	Out-of-limit SWH RMS for C Band (Flag_E3)
6	Out-of-limit Height Rate RMS (Flag_E4)
7	Spare.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: 0
 Nominal Val: 0
 Maximum Val: X'7F'

4.4.74 Alt_SDR_Gap_Count_Keywd

The Alt_SDR_Gap_Count_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Alt_SDR_Gap_Count_Value.

Element Type: string
 Storage Type: character
 Number of Bytes: 17
 Units: N/A
 Minimum Val: N/A
 Nominal Val: Alt_SDR_Gap_Count
 Maximum Val: N/A

4.4.75 Alt_SDR_Gap_Count_Value

Number of gaps identified during generation of the Alt SDR Data file. A gap is defined as missing science data in the Alt SDR Data file for a period of at least 5 seconds.

Element Type: integer
 Storage Type: character
 Number of Bytes: 3
 Units: counts
 Minimum Val: 0
 Nominal Val: 0
 Maximum Val: 999

4.4.76 Alt_SDR_SW_Ped_Keywd

The Alt_SDR_SW_Ped_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Alt_SDR_SW_Ped_Value.

Element Type: string
 Storage Type: character

Number of Bytes: 14
Units: N/A
Minimum Val: N/A
Nominal Val: Alt_SDR_SW_Ped
Maximum Val: N/A

4.4.77 Alt_SDR_SW_Ped_Value

Information on the version of the Alt SDR processing software used to generate these data.

Element Type: string
Storage Type: character
Number of Bytes: 18
Units: N/A
Minimum Val: 633-755/1991-01-01
Nominal Val: N/A
Maximum Val: 633-755/9999-12-31

4.4.78 Bad_CRC_Count_AltEng

The number of satellite minor frames, corresponding to the altimeter engineering frame, which failed the CRC test.

Element Type: integer
Storage Type: unsigned
Number of Bytes: 1
Units: counts
Minimum Val: 0
Nominal Val: 0
Maximum Val: 128

4.4.79 Bad_CRC_Count_AltSci

The number of satellite minor frames, corresponding to the altimeter science frame, which failed the CRC test.

Element Type: integer
Storage Type: unsigned
Number of Bytes: 1
Units: counts
Minimum Val: 0
Nominal Val: 0
Maximum Val: 17

4.4.80 Bad_MF_Count_AltEng

The number of satellite minor frames, corresponding to the altimeter engineering frame, which were missing.

Element Type: integer
Storage Type: unsigned
Number of Bytes: 1
Units: counts
Minimum Val: 0
Nominal Val: 0
Maximum Val: 128

4.4.81. Bad_MF_Count_AltSci

The number of satellite minor frames, corresponding to the altimeter science frame, which were missing.

Element Type: integer
Storage Type: unsigned
Number of Bytes: 1
Units: counts
Minimum Val: 0
Nominal Val: 0
Maximum Val: 17

4.4.82. Build_Id_Keywd

The Build_Id_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Build_Id_Value.

Element Type: string
Storage Type: character
Number of Bytes: 8
Units: N/A
Minimum Val: N/A
Nominal Val: Build_Id
Maximum Val: N/A

4.4.83. Build_Id_Value

The Build_Id_Value provides the identifier of the Release Description Document (RDD) that corresponds to the software build used to create this product.

Element Type: string
Storage Type: character
Number of Bytes: 18
Units: N/A
Minimum Val: 633-755/1991-01-01
Nominal Val: N/A
Maximum Val: 633-755/9999-12-31

4.4.84. Calib_Atten_C

Data number indicating the setting of the altimeter C band attenuator.

Element Type: integer
Storage Type: unsigned
Number of Bytes: 1
Units: counts
Minimum Val: 0
Nominal Val: N/A
Maximum Val: 16

4.4.85. Calib_Atten_K

Data number indicating the setting of the altimeter K band attenuator.

Element Type: integer
Storage Type: unsigned
Number of Bytes: 1
Units: counts
Minimum Val: 0
Nominal Val: N/A
Maximum Val: 16

4.4.86. Checksum_Hi

PROM and write-protected altimeter computer memory checksum bits 8-15.

Element Type: integer
Storage Type: unsigned
Number of Bytes: 1
Units: counts
Minimum Val: 0
Nominal Val: N/A
Maximum Val: 255

4.4.87. Checksum_Lo

PROM and write-protected altimeter computer memory checksum bits 0-7.

Element Type: integer
Storage Type: unsigned
Number of Bytes: 1
Units: counts
Minimum Val: 0
Nominal Val: N/A
Maximum Val: 255

4.4.88. Current_Mode

Byte indicating the altimeter current mode for the first or second half frame. This byte is a direct pass-thru from telemetry. Bits are defined as follows:

Bit	Definition
---	-----
0-3	Mode: 0011 - Standby 0110 - Cal-I 1100 - Cal-II 1001 - Coarse Acquisition 1010 - Coarse Track 0101 - Fine Acquisition 1111 - Fine Track
4	0 - EML Track 1 - Threshold Track
5	0 - AGC Gate 1 - Primary Max/3
6	High Variability Flag 0 - False 1 - True
7	Hi/Lo Rate Waveform Assignment 0 - Ku/C 1 - C/Ku.

{{GDR:1}}

Element Type: bitfield
Storage Type: bit
Number of Bytes: 1
Units: N/A
Minimum Val: 0
Nominal Val: X'0F'
Maximum Val: X'FF'

4.4.89. Cycle_Number_Keywd

The Cycle_Number_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Cycle_Number_Value.

Element Type: string
Storage Type: character
Number of Bytes: 12
Units: N/A
Minimum Val: N/A

Nominal Val: Cycle_Number
 Maximum Val: N/A

4.4.90. Cycle_Number_Value

The number of the repeat cycle in which this Pass_Number occurs. The Cycle_Number and Pass_Number together uniquely identify a segment of data.

Element Type: integer
 Storage Type: character
 Number of Bytes: 3
 Units: counts
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: 999

4.4.91. End_of_Header_Keywd

A string indicating the end of the header.

Element Type: string
 Storage Type: character
 Number of Bytes: 13
 Units: N/A
 Minimum Val: N/A
 Nominal Val: End_of_Header
 Maximum Val: N/A

4.4.92. Equator_Long_Keywd

The Equator_Long_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Equator_Long_Value.

Element Type: string
 Storage Type: character
 Number of Bytes: 17
 Units: N/A
 Minimum Val: N/A
 Nominal Val: Equator_Longitude
 Maximum Val: N/A

4.4.93. Equator_Long_Value

East longitude at which this pass crosses the Equator. (Information may not be valid to the full indicated precision, since it is calculated from a predicted orbit.)

Element Type: real
 Storage Type: character
 Number of Bytes: 10
 Units: degrees
 Minimum Val: 0.000000
 Nominal Val: N/A
 Maximum Val: 359.999999

4.4.94. Equator_Time_Keywd

The Equator_Time_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Equator_Time_Value.

Element Type: string
 Storage Type: character
 Number of Bytes: 12
 Units: N/A
 Minimum Val: N/A
 Nominal Val: Equator_Time
 Maximum Val: N/A

4.4.95. Equator_Time_Value

UTC date and time at which this pass crosses the Equator. Given in standard format YYYY-DDDTHH:MM:SS[.FFFFFF], where the number of digits of fractional seconds may be different for different data products (information may only be valid to the nearest second, since it is calculated from a predicted orbit).

Element Type: utc
 Storage Type: time_ascii
 Number of Bytes: 24
 Units: UTC
 Minimum Val: 1991-001T00:00:00[.000000]
 Nominal Val: N/A
 Maximum Val: 9999-366T23:59:60[.999999]

4.4.96. Gate_Index

Byte indicating the gate index for both primary and secondary altimeter channels. The value for each gate index ranges from 1 to 5 (modified by SDS from the range 0-4 in the telemetry). Bits 0-3 are a binary representation of the gate index for the primary channel. Bits 4-7 represent the gate index for the secondary channel. These values are output by algorithm t3117. {[GDR:1]}

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A

Minimum Val: X'11'
 Nominal Val: N/A
 Maximum Val: X'55'

4.4.97. Generating_Software_Name_Keywd

The Generating_Software_Name_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Generating_Software_Name_Keywd.

Element Type: string
 Storage Type: character
 Number of Bytes: 24
 Units: N/A
 Minimum Val: N/A
 Nominal Val: Generating_Software_Name
 Maximum Val: N/A

4.4.98. Generating_Software_Name_Value

The Generating_Software_Name_Value specifies the name of the program generating the data product. The format for this element is:

sss_XXXXXXXXXXXXXXXXXXXXX.EXE

where sss = is a 3-character Id for the generating program set (SDP) and xxx...x = 3-20 character name of program.

Element Type: string
 Storage Type: character
 Number of Bytes: 28
 Units: N/A
 Minimum Val: N/A
 Nominal Val: SDP_XXXXXXXXXXXXXXXXXXXXXGEN.EXE
 Maximum Val: N/A

4.4.99. Height_1011

Average of height (range) samples 10 and 11 at the altimeter frame mid-point, from algorithm t1165.

Element Type: integer
 Storage Type: unsigned
 Number of Bytes: 4
 Units: millimeters
 Minimum Val: 1000000000
 Nominal Val: 1336000000
 Maximum Val: 1400000000

4.4.100. Interp_Qual_Flags

Flags set by algorithm t1310 indicating quality of interpolated values. 0 = good data, 1 = only 1 data point available, 2 = no data available. Bits are defined as follows:

Bit	Definition
---	-----
0-1	Roll/Pitch/Yaw interpolation flag
2-3	Off-Nadir Angle interpolation flag
4-5	Solar Array Pitch Angle interpolation flag
6-7	Solar Array Temp difference interpolation flag.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: X'00'
 Nominal Val: X'00'
 Maximum Val: X'FF'

4.4.101. Land_Water_Alt

A flag to indicate whether there is land or shallow water within a predefined radius (5 km) of the measurement point based on a world land/ocean map and a deep-water map. 0 = Deep Water, 1 = Water (not deep), 2 = Land. This flag is set by algorithm t7110.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: X'00'
 Nominal Val: X'00'
 Maximum Val: X'02'

4.4.102. Last_ATA_Command

The last Adaptive Tracker Assembly command executed by the altimeter command processor. See the Altimeter Flight Software User's Guide for bit definitions. The two bytes are stored in the same order as received in the telemetry.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 2
 Units: N/A
 Minimum Val: X'0000'
 Nominal Val: N/A
 Maximum Val: X'FFFF'

4.4.103. Last_Command

Three bytes representing the last command to the altimeter. The first byte identifies the command. The two remaining bytes contain the command bit configuration.

Element Type: bitfield
Storage Type: bit
Number of Bytes: 3
Units: N/A
Minimum Val: 0
Nominal Val: N/A
Maximum Val: X'FFFFFF'

4.4.104. Last_ICA_Command

The last Interface Control Assembly command received by the altimeter command processor. See the Altimeter Flight Software User's Guide for bit definitions. The two bytes are stored in the same order as received in the telemetry.

Element Type: bitfield
Storage Type: bit
Number of Bytes: 2
Units: N/A
Minimum Val: X'0000'
Nominal Val: N/A
Maximum Val: X'FFFF'

4.4.105. Latitude_AltSDR

Geodetic latitude of the satellite at the time tag based on the OOE.

Element Type: integer
Storage Type: signed
Number of Bytes: 4
Units: microdegrees
Minimum Val: -90000000
Nominal Val: N/A
Maximum Val: 90000000

4.4.106. Limit_Byte

This byte indicates if the height rate, height difference, or AGC values have been limited in the tracker, or if they reflect the actual tracked values. 0 = False, 1 = True. Bits are defined as follows:

Bit	Definition
----	-----
0-3	Spares
4	Secondary AGC Limited
5	Height Difference Limited
6	Primary AGC Limited
7	Height Rate Limited.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: X'00'
 Nominal Val: N/A
 Maximum Val: X'F0'

4.4.107. Longitude_AltSDR

East longitude of the satellite at the time tag based on the OOE.

Element Type: integer
 Storage Type: signed
 Number of Bytes: 4
 Units: microdegrees
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: 359999999

4.4.108. Memory_Dump

One of thirty-two bytes of the on-board computer dump contained in the engineering frame.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: X'FF'

4.4.109. Memory_Dump_Address

Memory address, in the altimeter on-board computer, of the first memory dump byte stored in the altimeter engineering frame. The two bytes are stored in telemetry order rather than VAX order.

Element Type: integer
 Storage Type: unsigned
 Number of Bytes: 2
 Units: counts

Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: 65535

4.4.110. MF.UTC

Time tag of satellite minor frame containing first byte of associated instrument frame. Representation is CCSDS day segmented binary. See Appendix D for more details.

Element Type: utc
 Storage Type: utc_binary
 Number of Bytes: 8
 Units: UTC
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: N/A

4.4.111. Mode_Change

Byte indicating various tracker conditions in the first or second half frame. See the Altimeter Flight Software User's Guide for bit definitions.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: X'FF'

4.4.112. Mode_Flags

Two flags set by algorithm t1068 indicating altimeter tracker status. Bits are defined as follows:

Bit	Definition	0	1
0	MFLAG	Normal	Other
1	TFLAG	Normal	Other
2-7	Spares	-	-

[Note: See algorithm t1068 for state definitions.]

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: X'00'

Nominal Val: X'00'
 Maximum Val: X'03'

4.4.113 Net_Time_Tag_Corr

Net time tag correction = Alt internal delay (-50 microseconds, from t1155) + height delay (pulse travel time) (-4.45 milliseconds, from t1145). Alt internal delay is the difference between the Alt frame time tag and the time at which the reported Alt measurement is valid. This is NOT just the electronic delay. This value is output by algorithm t1120. {[GDR:1]}

Element Type: integer
 Storage Type: signed
 Number of Bytes: 2
 Units: microseconds
 Minimum Val: -5000
 Nominal Val: -4500
 Maximum Val: -4000

4.4.114 Off_Nadir_Angle_SC

Engineering value for the altimeter off-nadir pointing angle calculated from the quaternion elements relating the satellite body-fixed axis, the orbit-reference axis, and the commanded bias, and interpolated to altimeter time.

Element Type: integer
 Storage Type: unsigned
 Number of Bytes: 2
 Units: millidegrees
 Minimum Val: 0
 Nominal Val: 0
 Maximum Val: 1000

4.4.115 OOE_Flag

A bit flag set by algorithm t6009 to indicate the quality of the Operational Orbit Ephemeris data used to earth-locate the current frame. Zero bit indicates good data.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: 0
 Nominal Val: 0
 Maximum Val: 1

4.4.116. Operation_Mode_Byte

One byte that identifies the primary channel, the parameter set, the type of last reset, the current resolution, and the first frame of the science after a reset. See the Altimeter Flight Software User's Guide for bit definitions.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: X'FF'

4.4.117. Operator_Note_Keywd

The Operator_Note_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Operator_Note_Value.

Element Type: string
 Storage Type: character
 Number of Bytes: 13
 Units: N/A
 Minimum Val: N/A
 Nominal Val: Operator_Note
 Maximum Val: N/A

4.4.118. Operator_Note_Value

The Operator_Note_Value is a text field which provides miscellaneous notes or comments. {[GDR:3]}

Element Type: string
 Storage Type: character
 Number of Bytes: 60
 Units: N/A
 Minimum Val: N/A
 Nominal Val: N/A
 Maximum Val: N/A

4.4.119. Order_Flag

Flag indicating inconsistency between minor frame UTC and UTC converted from Altimeter science TMR frame clock. Zero indicates good data. Always set to zero for TMR SDR records.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1

Units: N/A
Minimum Val: 0
Nominal Val: 0
Maximum Val: 1

4.4.120. Pass_Count_Alt

Telemetry byte from minor frame 124. See the Altimeter Flight Software User's Guide for definition.

Element Type: integer
Storage Type: unsigned
Number of Bytes: 1
Units: counts
Minimum Val: 0
Nominal Val: N/A
Maximum Val: 255

4.4.121. Pass_Number_Keywd

The Pass_Number_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Pass_Number_Value.

Element Type: string
Storage Type: character
Number of Bytes: 11
Units: N/A
Minimum Val: N/A
Nominal Val: Pass_Number
Maximum Val: N/A

4.4.122. Pass_Number_Value

Each half rev of the repeating orbit, from max/min to min/max latitude, is assigned a unique number. The numbers run from 1 to twice the number of revs in a repeat cycle. This number is used to facilitate the sorting of data for science applications.

Element Type: integer
Storage Type: character
Number of Bytes: 3
Units: counts
Minimum Val: 1
Nominal Val: N/A
Maximum Val: 254

4.4.123. Pitch_STR

Satellite pitch attitude derived from satellite telemetry interpolated to altimeter time.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: millidegrees
Minimum Val: -2000
Nominal Val: N/A
Maximum Val: 2000

4.4.124. Producer_Agency_Name_Keywd

The Producer_Agency_Name_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Producer_Agency_Name_Value.

Element Type: string
Storage Type: character
Number of Bytes: 20
Units: N/A
Minimum Val: N/A
Nominal Val: Producer_Agency_Name
Maximum Val: N/A

4.4.125. Producer_Agency_Name_Value

The Producer_Agency_Name_Value provides the name of the government agency producing the data product.

Element Type: string
Storage Type: character
Number of Bytes: 4
Units: N/A
Minimum Val: CNES
Nominal Val: <depends on data product>
Maximum Val: NASA

4.4.126. Producer_Institution_Name_Keywd

The Producer_Institution_Name_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Producer_Institution_Name_Value.

Element Type: string
Storage Type: character
Number of Bytes: 25
Units: N/A
Minimum Val: N/A

Nominal Val: Producer_Institution_Name
Maximum Val: N/A

4.4.127. Producer_Institution_Name_Value

The Producer_Institution_Name_Value identifies a university, research center, NASA or CNES center or other institution associated with the production of a data set.

Element Type: string
Storage Type: character
Number of Bytes: 3
Units: N/A
Minimum Val: CLS
Nominal Val: N/A
Maximum Val: JPL

4.4.128. Product_Create_End_Time_Keywd

The Product_Create_End_Time_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Product_Create_End_Time_Value.

Element Type: string
Storage Type: character
Number of Bytes: 23
Units: N/A
Minimum Val: N/A
Nominal Val: Product_Create_End_Time
Maximum Val: N/A

4.4.129. Product_Create_End_Time_Value

The Product_Create_End_Time_Value specifies the data product generation end time in CCSDS ASCII time format.

Element Type: time
Storage Type: time_ascii
Number of Bytes: 17
Units: VAX clock time
Minimum Val: 1990-001T00:00:00
Nominal Val: N/A
Maximum Val: 9999-366T23:59:60

4.4.130. Product_Create_Start_Time_Keywd

The Product_Create_Start_Time_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Product_Create_Start_Time_Value.

Element Type: string
 Storage Type: character
 Number of Bytes: 25
 Units: N/A
 Minimum Val: N/A
 Nominal Val: Product_Create_Start_Time
 Maximum Val: N/A

4.4.131. Product_Create_Start_Time_Value

The Product_Create_Start_Time_Value specifies the data product generation start time in CCSDS ASCII time format.

Element Type: time
 Storage Type: time_ascii
 Number of Bytes: 17
 Units: VAX clock time
 Minimum Val: 1990-001T00:00:00
 Nominal Val: N/A
 Maximum Val: 9999-366T23:59:60

4.4.132. Range_Blunder_Flags_Fit_C

Bit flags set by algorithm t1016 for C band range values. Each range value is checked for deviation from the best-fit straight line. If the deviation exceeds a prescribed limit then the corresponding flag is set to one. Zero bits indicate good data. Bits are defined as follows:

Bit	Definition
----	-----
0-19	Flags Corresponding to C Band Range Values 1-20
20-23	Spares.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 3
 Units: N/A
 Minimum Val: X'000000'
 Nominal Val: N/A
 Maximum Val: X'0FFFFFF'

4.4.133. Range_Blunder_Flags_Fit_K

Bit flags set by algorithm t1016 for the Ku band range values. Each range value is checked for deviation from the best-fit straight line. If the deviation exceeds a prescribed limit then the corresponding flag is set to one. Zero bits indicate good data. Bits are defined as follows:

Bit	Definition
---	-----
0-19	Flags Corresponding to Ku Band Range Values 1-20
20-23	Spares.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 3
 Units: N/A
 Minimum Val: X'000000'
 Nominal Val: N/A
 Maximum Val: X'FFFFFF'

4.4.134. Range_Blunder_Flags_Limit_C

Bit flags set by algorithm t1016 for the C band range values. Each range value is checked against a nominal range. If the difference exceeds a prescribed limit then the corresponding flag is set to one. Zero bits indicate good data. Bits are defined as follows:

Bit	Definition
---	-----
0-19	Flags Corresponding to C Band Range Values 1-20
20-23	Spares.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 3
 Units: N/A
 Minimum Val: X'000000'
 Nominal Val: N/A
 Maximum Val: X'FFFFFF'

4.4.135. Range_Blunder_Flags_Limit_K

Bit flags set by algorithm t1016 for the Ku band range values. Each range value is checked against a nominal range. If the difference exceeds a prescribed limit then the corresponding flag is set to one. Zero bits indicate good data. Bits are defined as follows:

Bit	Definition
---	-----
0-19	Flags Corresponding to Ku Band Range Values 1-20
20-23	Spares.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 3
 Units: N/A
 Minimum Val: X'000000'

Nominal Val: N/A
Maximum Val: X'0FFFFFF'

4.4.136 Range_C

Engineering value for 20/frame altimeter range measurements for the C band.

Element Type: integer
Storage Type: unsigned
Number of Bytes: 4
Units: millimeters
Minimum Val: 1323000000
Nominal Val: 1343000000
Maximum Val: 1363000000

4.4.137 Range_K

Engineering value for 20/frame altimeter range measurements for the K band.

Element Type: integer
Storage Type: unsigned
Number of Bytes: 4
Units: millimeters
Minimum Val: 1323000000
Nominal Val: 1343000000
Maximum Val: 1363000000

4.4.138 Range_Rate

Engineering value for 20/frame altimeter range rates for the primary channel. Note: The altimeter can track to ± 50 m/s (50000 mm/s); extreme values are truncated in the SDR.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: millimeters/sec
Minimum Val: -32768
Nominal Val: N/A
Maximum Val: 32767

4.4.139 Rev_Number_Keywd

The Rev_Number_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Rev_Number_Value.

Element Type: string
Storage Type: character
Number of Bytes: 10
Units: N/A
Minimum Val: N/A
Nominal Val: Rev_Number
Maximum Val: N/A

4.4.140 Rev_Number_Value

Revolution (orbit) number counted from launch (into rev 0), incremented at the ascending node, during which this pass begins.

Element Type: integer
Storage Type: character
Number of Bytes: 5
Units: counts
Minimum Val: 0
Nominal Val: N/A
Maximum Val: 99999

4.4.141 Roll_STR

Satellite roll attitude derived from satellite telemetry interpolated to altimeter time.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: millidegrees
Minimum Val: -2000
Nominal Val: N/A
Maximum Val: 2000

4.4.142 Sat_Alt_AltSDR

Altitude of satellite center of mass above the reference ellipsoid measured along the normal to the ellipsoid at the time tag and based on the OOE.

Element Type: integer
Storage Type: unsigned
Number of Bytes: 4
Units: millimeters
Minimum Val: 1323000000
Nominal Val: 1343000000
Maximum Val: 1363000000

4.4.143 Sat_Alt_Hi_Rate_AltSDR

The difference of the satellite altitude at each of the high rate height points from Sat_Alt_AltSDR, which is at the frame time (Time_Past_Epoch_AltSDR). These values are needed to do orbit replacement without having the original orbit and software.

Element Type: integer
 Storage Type: signed
 Number of Bytes: 2
 Units: millimeters
 Minimum Val: -32768
 Nominal Val: N/A
 Maximum Val: 32767

4.4.144 Sensor_Name_Keywd

The Sensor_Name_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Sensor_Name_Value.

Element Type: string
 Storage Type: character
 Number of Bytes: 11
 Units: N/A
 Minimum Val: N/A
 Nominal Val: Sensor_Name
 Maximum Val: N/A

4.4.145 Sensor_Name_Value

The Sensor_Name_Value provides the name of the instrument or hardware used to acquire the data.

Element Type: string
 Storage Type: character
 Number of Bytes: 30
 Units: N/A
 Minimum Val: ALT>Altimeter
 Nominal Val: <depends on data product>
 Maximum Val: TMR>TOPEX Microwave Radiometer

4.4.146 SFDU_ClassI_Format_Id

The SFDU_ClassI_Format_Id is the TYPE identifier which is part of the fundamental structure used to build SFDUs, comprising a TYPE, a LENGTH, and a VALUE field, and referred to as a TYPE-LENGTH-VALUE Object (TLVO). The TYPE and LENGTH fields together make up a fixed-length "label" followed by a variable length VALUE field.

The TYPE field has four subfields:

The first subfield (octets 0-3) identifies the agency with registration responsibility for the data description information contained in octets 8-11, in this instance NJPL.

The second subfield (octet 4) contains the Version ID which identifies the structure and coding of the label. In this case, Version=1, which indicates that the LENGTH field is a decimal number 8 octets in length with leading zeros as necessary.

The third subfield (octet 5) is used to classify the type of data contained within the VALUE field. Class=I indicates that the VALUE field contains application data.

The last subfield of the TYPE field (octets 8-11) contains an ID of the data description information which includes the definition of the format and parsing rules, as well as the semantic meaning of the value field. This value is assigned by the JPL SFDU Control Authority, and is a mechanism by which the format specified in this specification is registered as an SFDU. This subfield has been assigned the value T001 for the Alt SDR Data SIS, T002 for the TMR SDR Data SIS and T003 for the GDR Data SIS.

Element Type:	string
Storage Type:	character
Number of Bytes:	12
Units:	N/A
Minimum Val:	N/A
Nominal Val:	NJPL1I00XXXX
Maximum Val:	N/A

4.4.147 SFDU_ClassI_Length_Value

Length in bytes of header and data following the SFDU I label in a pass file. The nominal value is approximately 0552448 for Alt SDR Data, 00513400 for (I)GDR Data and 00062872 for TMR SDR Data.

Element Type:	integer
Storage Type:	character
Number of Bytes:	8
Units:	counts
Minimum Val:	00001900
Nominal Val:	N/A
Maximum Val:	05600000

4.4.148 SFDU_ClassZ_Format_Id

The SFDU_ClassZ_Format_Id is the TYPE identifier which is part of the fundamental structure used to build SFDUs, comprising a TYPE, a LENGTH, and a VALUE field, and referred to as a TYPE-LENGTH-VALUE Object (TLVO). The TYPE and LENGTH fields together make up a fixed-length "label" followed by a variable length VALUE field.

The TYPE field has four subfields:

The first subfield (octets 0-3) identifies the agency with registration responsibility for the data description information contained in octets 8-11, in this instance CCSDS.

The second subfield (octet 4) contains the Version ID which identifies the structure and coding of the label. In this case, Version=1, which indicates that the LENGTH field is a decimal number 8 octets in length with leading zeros as necessary.

The third subfield (octet 5) is used to classify the type of data contained within the VALUE field. Class=Z indicates the start of a data unit that is composed of one or more TLVOs.

The last subfield of the TYPE field (octets 8-11) contains an ID of the data description information which includes the definition of the format and parsing rules, as well as the semantic meaning of the value field.

Element Type:	string
Storage Type:	character
Number of Bytes:	12
Units:	N/A
Minimum Val:	N/A
Nominal Val:	CCSD1Z000001
Maximum Val:	N/A

4.4.149 SFDU_ClassZ_Length_Value

The SFDU_ClassZ_Length_Value specifies the length of SFDU Class Z data description.

Element Type:	integer
Storage Type:	character
Number of Bytes:	8
Units:	counts
Minimum Val:	00001900
Nominal Val:	N/A
Maximum Val:	05500000

4.4.150 SIS_Id_Keywd

The SIS_Id_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object SIS_Id_Value.

Element Type:	string
Storage Type:	character
Number of Bytes:	6
Units:	N/A
Minimum Val:	N/A

Nominal Val: SIS_Id
 Maximum Val: N/A

4.4.151 SIS_Id_Value

The SIS_Id_Value provides the document and version date of the Software Interface Specification that describes this data product. The format for this element is:

XXX-XXX-XX-XXX/YYYY-MM-DD

where the value to the left of the diagonal is the project document number of the SIS describing the data product and the right value is the document date, e.g., 633-751-23-004/1990-10-01.

Element Type: string
 Storage Type: character
 Number of Bytes: 25
 Units: N/A
 Minimum Val: 633-751-23-001/1990-10-01
 Nominal Val: N/A
 Maximum Val: 633-752-23-021/9999-12-31

4.4.152 Smoothed_V_Att_C

This value is an indicator of the amplitude of the later plateau portion of the C band waveform relative to the amplitude of the waveform in the vicinity of the track point (the AGC gate). It is a function of the attitude angle and thus can be used as an input to procedures for attitude estimation and for estimating corrections for attitude effects. This value is calculated in algorithm t5135.

Element Type: integer
 Storage Type: signed
 Number of Bytes: 2
 Units: .001 ratio
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: 32767

4.4.153 Smoothed_V_Att_Flag_C

Flag which indicates if the corresponding Smoothed_V_Att_C computed by t5135 was out of range and set to zero. Zero value of this flag indicates good data.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A

Minimum Val: 0
 Nominal Val: 0
 Maximum Val: 1

4.4.154 Smoothed_V_Att_Flag_R

Flag which indicates if the corresponding Smoothed_V_Att_K computed by t5135 was out of range and set to zero. Zero value of this flag indicates good data.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: 0
 Nominal Val: 0
 Maximum Val: 1

4.4.155 Smoothed_V_Att_K

This value is an indicator of the amplitude of the later plateau portion of the Ku band waveform relative to the amplitude of the waveform in the vicinity of the track point (the AGC gate). It is a function of the attitude angle and thus can be used as an input to procedures for attitude estimation and for estimating corrections for attitude effects. This value is calculated in algorithm t5135.

Element Type: integer
 Storage Type: signed
 Number of Bytes: 2
 Units: .001 ratio
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: 32767

4.4.156 Solar_Array_Pitch_Angle_STR

Engineering value for the solar array pitch angle derived from satellite telemetry and interpolated to altimeter time.

Element Type: integer
 Storage Type: unsigned
 Number of Bytes: 2
 Units: 0.1 degrees
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: 3599

4.4.157 Solar_Array_Temp_Diff

Solar array temperature difference computed by t1308 and interpolated to altimeter time.

Element Type: integer
 Storage Type: signed
 Number of Bytes: 1
 Units: deg C
 Minimum Val: -128
 Nominal Val: N/A
 Maximum Val: 127

4.4.158 Source_Name_Keywd

The Source_Name_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Source_Name_Value.

Element Type: string
 Storage Type: character
 Number of Bytes: 11
 Units: N/A
 Minimum Val: N/A
 Nominal Val: Source_Name
 Maximum Val: N/A

4.4.159 Source_Name_Value

The Source_Name_Value refers to the spacecraft, instrument, etc. which contains the sensors.

Element Type: string
 Storage Type: character
 Number of Bytes: 14
 Units: N/A
 Minimum Val: N/A
 Nominal Val: TOPEX/POSEIDON
 Maximum Val: multiple

4.4.160 Spare

Spare.

Element Type: integer
 Storage Type: signed
 Number of Bytes: 1
 Units: N/A
 Minimum Val: -128
 Nominal Val: N/A
 Maximum Val: 127

4.4.161 Spare2

Two-byte spare.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: N/A
Minimum Val: -32768
Nominal Val: N/A
Maximum Val: 32767

4.4.162 Spare_AltEng

Spare bytes to pad the engineering record to the same size as the science record.

Element Type: integer
Storage Type: unsigned
Number of Bytes: 1
Units: N/A
Minimum Val: 0
Nominal Val: 0
Maximum Val: 0

4.4.163 STR_Frames_Received_Keywd

The STR_Frames_Received_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object STR_Frames_Received_Value.

Element Type: string
Storage Type: character
Number of Bytes: 19
Units: N/A
Minimum Val: N/A
Nominal Val: STR_Frames_Received
Maximum Val: N/A

4.4.164 STR_Frames_Received_Value

Number of satellite engineering telemetry frames received in the SDS STR file for the current pass.

Element Type: integer
Storage Type: character
Number of Bytes: 2
Units: counts
Minimum Val: 0
Nominal Val: 55
Maximum Val: 60

4.4.165. Sum_Count

See the Altimeter Flight Software User's Guide for definition.

Element Type: integer
 Storage Type: unsigned
 Number of Bytes: 1
 Units: counts
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: 255

4.4.166. Synchronizer_Mode_Bits

Two bytes (16 bits) as they are sent to the altimeter synchronizer to control its operation. Bits are defined as follows:

Bit	Definition
0	Ku PRF Select 0 - 4 Khz 1 - 1 Khz
1	Burst Start Bandwidth 0 - C Starts Burst 1 - Ku Starts Burst
2	CAMPIN Enable 0 - C-Band Off 1 - C-Band On
3	Ku TWTIN Enable 0 - Ku-Band Off 1 - Ku-Band On
4	CAMPOUT Enable 1 to 0 --> High Attenuation; C Transmit Inhibit 0 to 1 --> Normal C Transmission
5	Ku TWTOUT Enable 0 to 1 --> High Attenuation; Ku Transmit Inhibit 1 to 0 --> Normal Ku Transmission
6	Mode 0 - CW Mode 1 - Chirp Mode
7	Cal/Operate Select 0 - Operate 1 - Calibrate
8	Cal Attenuator Select 0 - C Attenuator 1 - Ku Attenuator
9	C Bandwidth Select 0 - 320 MHz 1 - 100 Mhz
10	T/R Switch Select 0 - Normal State 1 - High Attenuate
11-15	Spares.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 2
 Units: N/A
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: X'FFFF'

4.4.167. Test_Mode

Byte indicating if a test mode has been commanded. See the Altimeter Flight Software User's Guide for bit definitions.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: X'FF'

4.4.168. Time_Corr_Rate_Coarse

The high-order part of the time correlation rate, defined so that

$$\text{Rate (picoseconds/count)} = \text{Time_Corr_Rate_Coarse} + 1.E-6 * \text{Time_Corr_Rate_Fine}.$$

Element Type: integer
 Storage Type: unsigned
 Number of Bytes: 4
 Units: picoseconds/count
 Minimum Val: 0
 Nominal Val: 976562
 Maximum Val: 99999999

4.4.169. Time_Corr_Rate_Fine

The low-order part of the time correlation rate, defined so that

$$\text{Rate (picoseconds/count)} = \text{Time_Corr_Rate_Coarse} + 1.E-6 * \text{Time_Corr_Rate_Fine}.$$

Element Type: integer
 Storage Type: unsigned
 Number of Bytes: 4
 Units: attoseconds/count
 Minimum Val: 0
 Nominal Val: 500000
 Maximum Val: 999999

4.4.170. Time_Epoch_Keywd

The Time_Epoch_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Time_Epoch_Value.

Element Type: string
 Storage Type: character
 Number of Bytes: 10
 Units: N/A
 Minimum Val: N/A
 Nominal Val: Time_Epoch
 Maximum Val: N/A

4.4.171. Time_Epoch_Value

Zero point of time from which data times are measured. Given in standard format YYYY-DDDTHH:MM:SS.FFFFFFFF to the nearest microsecond. Preferred zero point is January 1, 1958 00:00:00.000000 (CCSDS standard).

Element Type: utc
 Storage Type: time_ascii
 Number of Bytes: 24
 Units: UTC
 Minimum Val: 1958-001T00:00:00.000000
 Nominal Val: 1958-001T00:00:00.000000
 Maximum Val: 1992-001T00:00:00.000000

4.4.172. Time_First_Pt_Keywd

The Time_First_Pt_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Time_First_Pt_Value.

Element Type: string
 Storage Type: character
 Number of Bytes: 13
 Units: N/A
 Minimum Val: N/A
 Nominal Val: Time_First_Pt
 Maximum Val: N/A

4.4.173. Time_First_Pt_Value

UTC time of first data point in the current pass. Given in standard format YYYY-DDDTHH:MM:SS[.FFFFFF].

Element Type: utc
 Storage Type: time_ascii
 Number of Bytes: 24

Units: UTC
 Minimum Val: 1991-001T00:00:00[.000000]
 Nominal Val: N/A
 Maximum Val: 9999-366T23:59:60[.999999]

4.4.174. Time_Last_Pt_Keywd

The Time_Last_Pt_Keywd is the leftmost string in a "Keyword=Value" statement that describes the corresponding data object Time_Last_Pt_Value.

Element Type: string
 Storage Type: character
 Number of Bytes: 12
 Units: N/A
 Minimum Val: N/A
 Nominal Val: Time_Last_Pt
 Maximum Val: N/A

4.4.175. Time_Last_Pt_Value

UTC time of the last data point in the current pass. Given in standard format YYYY-DDDTHH:MM:SS[.FFFFFF].

Element Type: utc
 Storage Type: time_ascii
 Number of Bytes: 24
 Units: UTC
 Minimum Val: 1991-001T00:00:00[.000000]
 Nominal Val: N/A
 Maximum Val: 9999-366T23:59:60[.999999]

4.4.176. Time_Last_Reset

Time elapsed between the Time_Epoch_Value and the time of the last reset of altimeter on-board computer. Representation is CCSDS day segmented binary. See Appendix D for more details. Note: This value is not meaningful, as it is not calculated by SDS processing. Use Time_Last_Reset_Raw to detect resets.

Element Type: utc
 Storage Type: utc_binary
 Number of Bytes: 8
 Units: UTC
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: N/A

4.4.177. Time_Last_Reset_Raw

Telemetry raw counts of the time of the last reset of the altimeter on-board computer. The bytes are stored in telemetry order.

Element Type: integer
 Storage Type: unsigned
 Number of Bytes: 6
 Units: counts
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: X'FFFFFFFFFFFF'

4.4.178. Time_Past_Epoch_AltEng

Time elapsed between the Time_Epoch_Value and the altimeter engineering frame time tag of the first minor frame. Representation is CCSDS day segmented binary. See Appendix D for more details.

Element Type: utc
 Storage Type: utc_binary
 Number of Bytes: 8
 Units: UTC
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: N/A

4.4.179. Time_Past_Epoch_AltSci

Time elapsed between the Time_Epoch_Value and the altimeter science midframe time. This is the time that corresponds to the fitted 1/frame data point. Representation is CCSDS day segmented binary. See Appendix D for more details.

Element Type: utc
 Storage Type: utc_binary
 Number of Bytes: 8
 Units: UTC
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: N/A

4.4.180. Time_Shift_Midframe

The frame time shift from the first height in a science data frame to the middle of the frame, added to the corrected altimeter science frame time tag to produce Time_Past_Epoch_AltSci. This value is output by algorithm t1165. If the number of valid range measurements is insufficient to calculate the shift, the value is

set to the value from the previous frame and bit 4 of Alt_Sci_Prelim_Flags is set to 1. {[GDR:1]}

Element Type: integer
 Storage Type: signed
 Number of Bytes: 4
 Units: microseconds
 Minimum Val: 500000
 Nominal Val: 508000
 Maximum Val: 520000

4.4.181 UTC_Conv_Flag_AltEng

Bit flags indicating an error in the UTC time of the altimeter engineering frame or in the UTC conversion of the altimeter last reset time. Zero bits indicate good data. Bits are defined as follows:

Bit	Definition
0	Altimeter Engineering Time Flag
1	Altimeter Last Reset Time Flag (always set)
2-7	Spares.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: 0
 Nominal Val: X'02'
 Maximum Val: X'03'

4.4.182 UTC_Conv_Flag_AltSci

Flag set by algorithm t1007 to indicate an error converting the clock to UTC. Zero bits indicate good data.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: 0
 Nominal Val: 0
 Maximum Val: 1

4.4.183 VSWH_AltSDR_C

10/Frame Significant Wave Height-related voltage (data number) for the C band.

Element Type: integer
 Storage Type: unsigned
 Number of Bytes: 1
 Units: counts
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: 255

4.4.184. VSWE_AltSDR_K

10/Frame Significant Wave Height-related voltage (data number) for the K band.

Element Type: integer
 Storage Type: unsigned
 Number of Bytes: 1
 Units: counts
 Minimum Val: 0
 Nominal Val: N/A
 Maximum Val: 255

4.4.185. Waveform_Flags_Hi

Bit flags set by algorithm t5110 indicating the usability of the altimeter high rate waveforms for further processing. Zero bits indicate good data. Bits are defined as follows:

Bit	Definition
---	-----
0	R1_REF Threshold Test
1	R2_REF Threshold Test
2	R3_REF Threshold Test
3	R4_REF Threshold Test
4	Frequency Test
5	Track Type and Current Mode Test
6-7	Spares.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: 0
 Nominal Val: 0
 Maximum Val: X'3F'

4.4.186. Waveform_Flags_Lo

Bit flags set by algorithm t5110 indicating the usability of the altimeter low rate waveforms for further processing. Zero bits indicate good data. Bits are defined as follows:

Bit	Definition
----	-----
0	R1_REF Threshold Test
1	R2_REF Threshold Test
2	R3_REF Threshold Test
3	R4_REF Threshold Test
4	Frequency Test
5	Track Type and Current Mode Test
6-7	Spares.

Element Type: bitfield
 Storage Type: bit
 Number of Bytes: 1
 Units: N/A
 Minimum Val: 0
 Nominal Val: 0
 Maximum Val: X'3F'

4.4.187. Waveform_Samps_Hi

One of 10 sets of 64 raw high rate waveform samples.

Element Type: integer
 Storage Type: unsigned
 Number of Bytes: 64
 Units: counts
 Minimum Val: {0} 64
 Nominal Val: N/A
 Maximum Val: {255} 64

4.4.188. Waveform_Samps_Lo

One of 5 sets of 64 raw low rate waveform samples.

Element Type: integer
 Storage Type: unsigned
 Number of Bytes: 64
 Units: counts
 Minimum Val: {0} 64
 Nominal Val: N/A
 Maximum Val: {255} 64

4.4.189. Waveform_Scale_Hi

This byte contains an index to allow the extraction of the scaling factor used to restore the high rate waveform samples to original values.

Element Type: integer
 Storage Type: unsigned
 Number of Bytes: 1

Units: counts
Minimum Val: 0
Nominal Val: N/A
Maximum Val: 15

4.4.190. Waveform_Scale_Lo

This byte contains an index to allow the extraction of the scaling factor used to restore the low rate waveform samples to original values.

Element Type: integer
Storage Type: unsigned
Number of Bytes: 1
Units: counts
Minimum Val: 0
Nominal Val: N/A
Maximum Val: 15

4.4.191. Yaw_STR

Reserved for satellite yaw attitude derived from satellite telemetry interpolated to altimeter time. Value will always be zero, unless yaw computation is added to processing.

Element Type: integer
Storage Type: signed
Number of Bytes: 2
Units: .01 deg
Minimum Val: -18000
Nominal Val: N/A
Maximum Val: 18000

APPENDIX A - ACRONYMS

AGC	Automatic Gain Control
Alt	NASA Altimeter
ANSI	American National Standards Institute
ASCII	American Standard Code for Information Interchange (restricted to International Use positions of ISO 646)
CCSDS	Consultative Committee on Space Data Systems
CRC	Cyclic Redundancy Check
DEC	Digital Equipment Corporation
FDD	Functional Design Document
FRD	Functional Requirements Document
GDR	Geophysical Data Record
ICD	Interface Control Document
IGDR	Interim Geophysical Data Record
ISO	International Organization for Standardization
JPL	Jet Propulsion Laboratory
N/A	Not applicable
NASA	National Aeronautics and Space Administration
NODS	NASA Ocean Data System
OOE	Operational Orbit Ephemeris (predicted)
PD	Project Document
POD	Precision Orbit Determination
POE	Precision Orbit Ephemeris
RDD	Release Description Document
RMS	Root Mean Square
SDDS	Science Data Distribution Subsystem
SDM	Science Data Management program set
SDMS	Science Data Management Subsystem
SDP	Science Data Processing program set
SDPS	Science Data Processing Subsystem
SDR	Sensor Data Record
SDS	Science Data Subsystem
SDT	Science Data Team
SFDU	Standard Formatted Data Unit
SIS	Software Interface Specification
SRD	Software Requirements Document
SSH	Sea Surface Height
STR	Selected Telemetry Record
SWH	Significant Wave Height
TBD	To Be Determined
TBS	To Be Supplied
TCCS	Telemetry, Command, and Communications Subsystem
TGS	TOPEX Ground System
TLVO	Type-Length-Value Object (SFDU)
TMR	TOPEX Microwave Radiometer
UTC	Coordinated Universal Time
VAX	trademark for DEC line of 32-bit computers
VMS	trademark for VAX Virtual Memory operating System

APPENDIX B - PRODUCT EXAMPLE

```

CCSD1Z000001nnnnnnnnnNJPL1I00T001mmmmmmmmmm      ;<CR><LF>
Producer_Agency_Name      = NASA                    ;<CR><LF>
Producer_Institution Name = JPL                     ;<CR><LF>
Source_Name = TOPEX/POSEIDON                       ;<CR><LF>
Sensor_Name = ALT>Altimeter                        ;<CR><LF>
SIS_Id = 633-751-23-001/1991-06-12                 ;<CR><LF>
Product_Create_Start Time = 1992-123T12:34:56      ;<CR><LF>
Product_Create_End Time   = 1992-123T13:54:32      ;<CR><LF>
Generating_Software_Name  = SDP_ALTSDRGEN.EXE      ;<CR><LF>
Build_Id      = 633-755/1993-01-15                 ;<CR><LF>
Operator_Note =                                     ;
Cycle_Number  = 12                                  ;<CR><LF>
Pass_Number   = 123                                 ;<CR><LF>
Rev_Number    = 1647                                ;<CR><LF>
Equator_Longitude = 123.456789                     ;<CR><LF>
Equator_Time   = 1992-012T21:02:53.230000          ;<CR><LF>
Time_First_Pt  = 1992-012T20:34:12.345678          ;<CR><LF>
Time_Last_Pt   = 1992-012T21:30:21.876543          ;<CR><LF>
Time_Epoch     = 1958-001T00:00:00.000000          ;<CR><LF>
Alt_SDR_SW_Ped= 633-755/1992-10-10                 ;<CR><LF>
Alt_SDR_Gap_Count =                                5 ;<CR><LF>
Alt_Sci_Frames_Received =                          3350 ;<CR><LF>
Alt_Eng_Frames_Received =                          418 ;<CR><LF>
STR_Frames_Received   =                            50 ;<CR><LF>
Alt_Sci_Frames_Processed =                        3340 ;<CR><LF>
Alt_Eng_Frames_Processed =                        418 ;<CR><LF>
End_of_Header                                               ;<CR><LF>
[Alt SDR Data record - 1472 data bytes]
[Alt SDR Data record - 1472 data bytes]

[Alt SDR Data record - 1472 data bytes]
<EOF>

```

Note: There are always the same number of header records (26 in this example). Each record (plus the 40 byte SFDU label pair) is padded on the right with ASCII spaces to fill out the record to 1472 bytes. mmmmmmmmm is the total number of bytes in the file, following the initial 40 byte SFDU labels. nnnnnnnn = mmmmmmmmm+20. Thus, the total number of bytes in the file is mmmmmmmmm+40 = (Alt_Sci_Frames_Processed + Alt_Eng_Frames_Processed + 26 + 1) * 1472.

APPENDIX C - VAX DATA FORMATS

All SDS files are generated on Digital Equipment Corporation (DEC) VAX/VMS computers, and hence contain data which are organized according to the VAX data formats. This appendix summarizes those data formats which are relevant to SDS files.

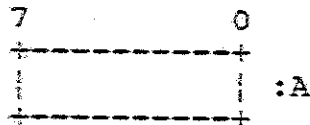
C.1 VAX Addressing

The basic addressable unit is the 8-bit byte. Multi-byte quantities are addressed by the least significant byte, and hence bytes are stored in order of increasing significance.

C.2 VAX Data Types

C.2.1 Byte

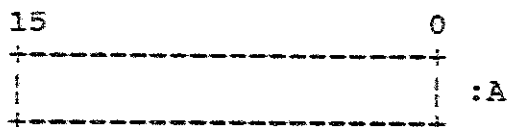
A byte is eight contiguous bits starting on an addressable byte boundary. The bits are numbered from right to left 0 through 7.



A byte is specified by its address A. When interpreted as a signed integer, a byte is a twos' complement integer with bits of increasing significance ranging from bit 0 through bit 6, with bit 7 the sign bit. The value of the integer is in the range -128 through +127. For the purpose of addition, subtraction, and comparison, VAX instructions also provide direct support for the interpretation of a byte as an unsigned integer with bits of increasing significance ranging from bit 0 through bit 7. The value of the unsigned integer is in the range 0 through 255.

C.2.2 Word

A word is two contiguous bytes starting on an arbitrary byte boundary. The 16 bits are numbered from right to left 0 through 15.



A word is specified by its address, A, which is the address of the byte containing bit 0. When interpreted as a signed integer, a word is a twos' complement integer with bits of increasing significance ranging from bit 0 through bit 14, with bit 15 the

sign bit. The value of the integer is in the range -32768 through +32767. For the purpose of addition, subtraction, and comparison, VAX instructions also provide direct support for the interpretation of a word as an unsigned integer with bits of increasing significance ranging from bit 0 through bit 15. The value of the unsigned integer is in the range 0 through 65535.

C.2.3 Longword

A longword is four contiguous bytes starting on an arbitrary byte boundary. The 32 bits are numbered from right to left 0 through 31.



A longword is specified by its address, A, which is the address of the byte containing bit 0. When interpreted as a signed integer, a longword is a twos' complement integer with bits of increasing significance ranging from bit 0 through bit 30, with bit 31 the sign bit. The value of the integer is in the range -2147483648 through +2147483647. For the purpose of addition, subtraction, and comparison, VAX instructions also provide direct support for the interpretation of a word as an unsigned integer with bits of increasing significance ranging from bit 0 through bit 31. The value of the unsigned integer is in the range 0 through 4294967295.

APPENDIX D - CCSDS DAY SEGMENTED TIME CODE

D.1 T-Field

For the segmented binary time code described herein, the T-Field consists of a selected number of contiguous time segments. Each segment represents the state of a binary counter, cascaded with the adjacent counters, which rolls over at a modulo specified for each counter.

The segmented binary day count code Recommendation is as follows:

Segment Width (bits)	OPTIONAL		
	day	millisec	microsec
	16 or 24	32	16

Each segment above is a right-adjusted binary counter. The CCSDS recommended day segment is a continuous counter of days from 1958 January 1 starting with 0, but other Agency-defined epochs may be accommodated as a level 2 code.

The microseconds segment is optional. Since this code is UTC-based, the leap second correction must be made.

D.2 P-Field

Bit 0 = 0

Bits 1-3 = time code identification = 100

Bit 4 = epoch identification:

0 -- 1958 Jan 1 epoch (Level 1) (used by SDS)
1 -- Agency-defined epoch (Level 2)

Bit 5 = length of day segment:

0 -- 16-bit day segment (used by SDS)
1 -- 24-bit day segment

Bits 6-7 = resolution (number of optional subsecond segments):

00 -- millisecond
01 -- microsecond
10 -- reserved for future use
11 -- reserved for future use

For all SDS data products, the P-Field is:

Bit 0	=	0
Bits 1-3	=	100
Bit 4	=	0
Bit 5	=	0
Bits 6-7	=	01

Since the P-Field is specified in this document, it is omitted from the time codes in the data product.

D.3 SDS Version of Time Format

Thus the form of day segmented binary time codes used by SDS is:

