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Annex A ERS SAR.RAW CCT and EXABYTE FORMAT SPECIFICATIONS.

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TABLE OF CONTENTS

- [1. INTRODUCTION](#)
 - [1.1 General Structure](#)
 - [1.2 Files Description](#)
 - [1.2.1 Volume Directory File](#)
 - [1.2.2 Leader File](#)
 - [1.2.3 Data Set File](#)
 - [1.2.4 Volume Directory File \(update of CCT1\)](#)
 - [1.2.5 Data Set File](#)
 - [1.2.6 Null Volume File](#)
 - [1.2.7 Notation conventions](#)
 - [1.2.8 File Class](#)
 - [1.2.9 Data Interpretation](#)
 - [1.2.10 Records in products](#)
 - [1.3 Note](#)
- [2. VOLUME DIRECTORY FILE FORMAT DEFINITION](#)
- [3. LEADER FILE FORMAT DEFINITION](#)
- [4. DATA SET FILE FORMAT DEFINITION](#)
- [5. NULL VOLUME FORMAT DEFINITION](#)

LIST OF TABLES

- [Table 1 VOLUME DESCRIPTOR RECORD](#)
- [Table 2 LEADER FILE POINTER RECORD](#)
- [Table 3 DATA FILE POINTER RECORD](#)
- [Table 4 TEXT RECORD](#)
- [Table 5 SAR - LEADER FILE, FILE DESCRIPTOR RECORD](#)
- [Table 6 RAW DATA SET SUMMARY RECORD](#)
- [Table 7 RAW PLATFORM POSITION DATA RECORD](#)
- [Table 8 RAW FACILITY RELATED DATA RECORD \[GENERAL TYPE\]](#)
- [Table 9 RAW FACILITY RELATED DATA RECORD PCS TYPE](#)
- [Table 10 SAR DATA FILE , FILE DESCRIPTOR RECORD \(FIXED SEGMENT\)](#)
- [Table 11 IMAGERY OPTIONS FILE - SIGNAL DATA RECORD DEFINITION](#)
- [Table 12 NULL VOLUME DESCRIPTOR RECORD](#)

1. INTRODUCTION

Sar Raw Data

Acronym: **SAR.RAW**

Decommutated Raw Sar echos data suitable for input to a processor.

The ESA SAR.RAW format is based on the general definition of the SAR CEOS format (ref. ER-IS-EPO-GS-5902).

The product is stored on two CCTs or one exabyte.

1.1 General Structure

In the case of CCT, the first tape (CCT 1) contains the following three files :

Volume Directory File

Leader File

Data Set File

1.2 Files Description

1.2.1 Volume Directory File:

Volume Descriptor Record	360 bytes
Leader File Pointer Record	360 bytes
Data Set File Pointer Record	360 bytes
Text Record	360 bytes

1.2.2 Leader File:

File Descriptor Record	720 bytes
Data Set Summary Record	1886 bytes
Platform Position Data Record bytes

Facility Related Data Record General Type	12288 bytes
Facility Related Data Record PCS Quality Type	12288 bytes

1.2.3 Data Set File:

File Descriptor Record	11644 bytes
13600 signal data record	11644 bytes

CCT2 contains the following three files:

Volume Directory File

Data Set File

Null Volume File

1.2.4 Volume Directory File (update of CCT1):

Volume descriptor record	360 bytes
Leader file pointer record	360 bytes
Data set file pointer record	360 bytes
Text record	360 bytes

1.2.5 Data Set File:

..... signal data records	11644 bytes
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1.2.6 Null Volume File:

Volume Descriptor Record	360 bytes
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1.2.7 Notation conventions :

\$. - the use of the "\$" (dollar sign) in the documentation denotes a requirement for the blank character (ie. the ASCII pt EBCDIC space character).

(n) - this expression is used to denote the contents of an integer binary field which will vary depending on the product type or data origin and will have to be supplied by facility generating the tape.

<.....> i i i - this expression is used to denote the contents of an alphanumeric field, which will vary depending on the product type or data origin and will have to be supplied by the facility generating the tape.

<\$...\$> - this expression is used to denote a blank field.

1.2.8 File Class

	Class Code	Data Type
"8\$BIT\$ASCII\$ONLY\$\$\$\$\$\$\$\$\$\$\$\$"	"ASCO"	ASCII only data
"EBCDIC\$ONLY\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$"	"EBCO"	EBCDIC only
"BCD\$ONLY\$"	"BCDO"	BCD only
"BINARY\$ONLY\$"	"BINO"	binary only data
"MIXED\$BINARY\$AND\$ASCII\$\$\$\$\$\$\$\$"	"MBAA"	binary & ASCII
"MIXED\$BINARY\$AND\$EBCDIC\$\$\$\$\$\$\$\$"	"MBAE"	binary & EBCDIC
"MIXED\$BINARY\$AND\$BCD\$\$\$\$\$\$\$\$\$\$\$\$"	"MBAB"	binary & BCD
"UNDEFINED,\$ETC.\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$"	"UNDF"	undefined
"COMPLEX\$"	"COMP"	complex
"REAL\$"	"REAL"	floating point

1.2.9 Data Interpretation

	Format	Length
"INTEGER*1\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$"	"I*1\$"	1 byte wide
"INTEGER*2\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$"	"I*2\$"	2 byte wide
"INTEGER*4\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$"	"I*4\$"	4 byte wide

- one, two and four byte two's complement integer representation

"SIGNED\$INTEGER*1\$\$\$\$\$\$\$\$\$\$\$\$"	"IS1\$"	1 byte wide
"SIGNED\$INTEGER*2\$\$\$\$\$\$\$\$\$\$\$\$"	"IS2\$"	2 byte wide
"SIGNED\$INTEGER*4\$\$\$\$\$\$\$\$\$\$\$\$"	"IS4\$"	4 byte wide

- one, two and four byte signed integer with the most significant bit used to denote sign

"UNSIGNED\$INTEGER*1\$\$\$\$\$\$\$\$\$\$\$\$"	"IU1\$"	1 byte wide
"UNSIGNED\$INTEGER*2\$\$\$\$\$\$\$\$\$\$\$\$"	"IU2\$"	2 byte wide
"UNSIGNED\$INTEGER*4\$\$\$\$\$\$\$\$\$\$\$\$"	"IU4\$"	4 byte wide

- one, two and four byte unsigned integer with the most significant bit used as part of the pixel value, the pixel is always positive.

"REAL*2\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$"	"R*2\$"	2 byte wide
"REAL*4\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$"	"R*4\$"	4 byte wide
"REAL*8\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$"	"R*8\$"	8 byte wide

- two, four and eight byte two's complement floating point representation with the exponent denoted in two's complement binary. (note that the REAL*8 representation is the same as double precision.)

"REAL*2\$HEXADECEMAL\$\$\$\$\$\$\$\$\$\$\$\$"	"R*2H"	2 byte wide
"REAL*4\$HEXADECEMAL\$\$\$\$\$\$\$\$\$\$\$\$"	"R*4H"	4 byte wide
"REAL*8\$HEXADECEMAL\$\$\$\$\$\$\$\$\$\$\$\$"	"R*8H"	8 byte wide

- two, four eight byte hexadecimal floating point representation with the exponent denoted as a hexadecimal exponent. (note that the REAL*8.representation is the same as double precision.)

"COMPLEX*4\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$"	"C*4\$"	4 byte wide
"COMPLEX*8\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$"	"C*8\$"	8 byte wide

- four byte field with the first half (two bytes) containing the two's complement floating point representation value of the real component and the second half containing the imaginary component. Similarly for the eight byte type, with each half of the field containing the real and imaginary pairs.

"COMPLEX\$INTEGER*2\$\$\$\$\$\$\$\$\$\$\$\$"	"CI*2"	2 byte wide
"COMPLEX\$INTEGER*4\$\$\$\$\$\$\$\$\$\$\$\$"	"CI*4"	4 byte wide
"COMPLEX\$INTEGER*8\$\$\$\$\$\$\$\$\$\$\$\$"	"CI*8"	8 byte wide

- similar to the complex floating point representation above except that each component is stored as a two's complement integer.

"COMPLEX\$SIGNED\$INTEGER*2\$\$\$\$"	"CIS2"	2 byte wide
"COMPLEX\$SIGNED\$INTEGER*4\$\$\$\$"	"CIS4"	4 byte wide

"COMPLEX\$SIGNED\$INTEGER*8\$\$\$\$"	"CIS8"	8 byte wide
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- similar to the complex floating point representation above except that each component is stored as a signed integer.

"COMPLEX*4\$HEXADECEMIAL\$\$\$\$\$\$"	"C*4H"	4 byte wide
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"COMPLEX*8\$HEXADECEMIAL\$\$\$\$\$\$"	"C*8H"	8 byte wide
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- same as the floating point complex notation above except that the representation follows the hexadecimal conventions.

1.2.10 Records in products

Volume Directory File

	CEOS Codes
VOLUME DESCRIPTOR RECORD	192,192,18,18
FILE POINTER RECORD	219,192,18,18
TEXT RECORD	18,63,18,18

Leader File

FILE DESCRIPTOR RECORD	63,192,18,18
DATA SET SUMMARY RECORD	10,10,31,20
PLATFORM POSITION DATA RECORD	10,30,31,20
FACILITY RELATED DATA RECORD GENERAL TYPE	10,200,31,50
FACILITY RELATED DATA RECORD PCS QUALITY TYPE	10,200,31,50

SAR Data File

FILE DESCRIPTOR RECORD	63,192,18,18
RAW SIGNAL DATA RECORD	50,10,31,20

Null Volume

NULL VOLUME DESCRIPTOR RECORD	192,192,63,18
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1.3 Note:

Fields not provided are treated as follows: (for a case of a field 8 bytes long)

Field type	Format	Filler
alphanumeric	A8	8 blanks
numeric integer	Iw	-9999999
numeric floating point	F8.2	-9999.99
numeric exponential	E8.2	-9999.99E-99

WARNING: Please be aware that the field "Example with RAW product" in the following tables, contains only an EXAMPLE of what can be found in a product

2. VOLUME DIRECTORY FILE FORMAT DEFINITION

Table 1: VOLUME DESCRIPTOR RECORD

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with RAW product	UNITS
1	1-4	B4	Record Sequence Number	1	
2	5-5	B1	1st record sub-type code	192	
3	6-6	B1	Record type code	192	
4	7-7	B1	2nd record sub-type code	18	
5	8-8	B1	3rd record sub-type code	18	
6	9-12	B4	Length of this record	360	
7	13-14	A2	ASCII/EBCDIC Flag	A	
8	15-16	A2	Blanks		
9	17-28	A12	Format control document	CCB-CCT-0002	
10	29-30	A2	Superstructure format control document	E	
11	31-32	A2	Superstructure record format revision	A	
12	33-44	A12	Logical volume generating facility software release and revision level	ERS2-RAW-6.2	
13	45-60	A16	ID of physical volume containing this volume descriptor	1	
14	61-76	A16	Logical volume identifier	0003792600087854	
15	77-92	A16	Volume set identifier	199712 2 451 828	
16	93-94	I2	Total number of physical volumes in the logical volume	1	
17	95-96	I2	Physical volume sequence number of the first tape within the logical volume	1	
18	97-98	I2	Physical volume sequence number of the last tape within the logical volume	1	
19	99-100	I2	Physical volume sequence number of current tape within the logical volume	1	
20	101-104	I4	First referenced file number in this physical volume within the logical volume.	1	
21	105-108	I4	Logical volume number within volume set	1	
22	109-112	I4	Logical volume number within physical volume	1	
23	113-120	A8	Logical volume creation date (YYYYMMDD)	19980508	
24	121-128	A8	Logical volume creation time (HHMMSSDD, DD=deci-seconds) (DD not provided)	08383523	
25	129-140	A12	Logical volume generation country(GERMANY, ENGLAND, ITALY)	GERMANY	
26	141-148	A8	Logical volume generating agency	ESA	
27	149-160	A12	Logical volume generating facility(D-PAF,UK-PAF, IPAF(ASI), ES, ,MS, KS, FS)	D-PAF	

28	161-164	I4	Number of pointer records in volume directory	2	
29	165-168	I4	Number of records in volume directory	4	
30	169-172	I4	Total number of logical volumes in the set	1	
31	173-260	A88	Volume descriptor spare segment		
32	261-360	A100	Local use segment		

Table 2: LEADER FILE POINTER RECORD

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with RAW product	UNITS
1	1-4	B4	Record sequence number	2	
2	5-5	B1	1st record sub-type code	219	
3	6-6	B1	Record type code	192	
4	7-7	B1	2nd record sub-type code	18	
5	8-8	B1	3rd record sub-type code	18	
6	9-12	B4	Length of this record	360	
7	13-14	A2	ASCII/EBCDIC Flag	A	
8	15-16	A2	Blanks		
9	17-20	I4	Referenced file number	1	
10	21-36	A16	Referenced file name	ERS2.SAR.RAWLEAD	
11	37-64	A28	Referenced file class	SARLEADER FILE	
12	65-68	A4	Referenced file class code	SARL	
13	69-96	A28	Referenced file data type	MIXED BINARY AND ASCII	
14	97-100	A4	Referenced file data type code	MBAA	
15	101-108	I8	Number of records in referenced file	5	
16	109-116	I8	Referenced file - descriptor record length	720	
17	117-124	I8	Referenced file maximum record length	12288	
18	125-136	A12	Referenced file record length type	VARIABLE LEN	
19	137-140	A4	Referenced file record length type code	VARE	
20	141-142	I2	Referenced file physical volume start number	1	
21	143-144	I2	Referenced file physical volume end number	1	
22	145-152	I8	Referenced file portion start, 1st record number for this physical volume	1	

23	153-160	I8	Referenced file portion end, last record number for this physical volume	5	
24	161-260	A100	File pointer spare segment		
25	261-360	A100	Local use segment		

Table 3: DATA FILE POINTER RECORD

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with RAW product	UNITS
1	1-4	B4	Record number	3	
2	5	BI	1-st record subtype code	219	
3	6	BI	record type code	192	
4	7	BI	2-nd subtype code	18	
5	8	B1	3-rd subtype code	18	
6	9-12	B4	Length of this record	360	
7	13-14	A2	ASCII/EBCDIC flag for referenced file	A	
8	15-16	A2	Blank		
9	17-20	I4	Referenced file number	2	
10	21-36	A16	Referenced file name	ERS2.SAR.RAWIMGY	
11	37-64	A28	Referenced file class	IMAGERY OPTIONS FILE	
12	65-68	A4	Referenced file class code	IMOP	
13	69-96	A28	Referenced file data type	MIXED BINARY AND ASCII	
14	97-100	A4	Referenced file data type code	MBAA	
15	101-108	I8	Number of records in referenced file (variable)	28001	
16	109-116	I8	Referenced file 1-st record length	11644	
17	117-124	I8	Referenced file maximum record length	11644	
18	125-136	A12	Referenced file record length type	FIXED LENGTH	
19	137-140	A4	Referenced file record length type code	FIXD	
20	141-142	I2	Referenced file physical volume start number	1	
21	143-144	I2	Referenced file physical volume end number	1	
22	145-152	I8	Referenced file portion start, 1-st record number for this physical volume	1	
23	153-160	I8	Referenced file portion end, last record number for this physical volume (variable)	28001	

24	161-260	A100	File pointer spare segment		
25	261-360	A100	Local use segment		

Table 4: TEXT RECORD

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with RAW product	UNITS
1	1-4	B4	Record sequence number	4	
2	5-5	B1	1st record sub-type code	18	
3	6-6	B1	Record type code	63	
4	7-7	B1	2nd record sub-type code	18	
5	8-8	B1	3rd record sub-type code	18	
6	9-12	B4	Length of this record	360	
7	13-14	A2	ASCII/EBCDIC Flag	A	
8	15-16	A2	Continuation flag (*)		
9	17-56	A40	Product type specifier	PRODUCT:ERS-2.SAR.RAW	
10	57-116	A60	Location and date/time of product creation#	GENERATED AT D-PAF 8-MAY-1998 10:17:13.580	
11	117-156	A40	Physical volume identification#	Tape 1/1 VOL-ID 176	
12	157-196	A40	Scene identification#	ORBIT 13686 DATE 2-DEC-1997 4:51: 8	
13	197-236	A40	Scene location#	FRAME 2840 LAT: 537.93 LON: 87.85	
14	237-256	A20	<i>Spares</i>		
15	257-360	A104	<i>Spares</i>		

(*) this field is set to "C\$" if information is continued on the next text record (if any).

3. LEADER FILE FORMAT DEFINITION

Table 5: SAR - LEADER FILE, FILE DESCRIPTOR RECORD

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with RAW product	UNITS
1	1-4	B4	Record Sequence Number	1	
2	5	B1	1st record sub-type code	63	
3	6	B1	Record type code	192	

4	7	B1	2nd record sub-type code	18	
5	8	B1	3rd record sub-type code	18	
6	9-12	B4	Length of this record	720	
7	13-14	A2	ASCII/EBCDIC Flag	A	
8	15-16	A2	Blanks		
9	17-28	A12	Format control document ID for this data file format	CEOS-SAR-CCT	
10	29-30	A2	Format control document revision level	B	
11	31-32	A2	File design descriptor revision letter	B	
12	33-44	A12	Generating software release and revision level	ERS2-RAW-6.2	
13	45-48	I4	File number	1	
14	49-64	A16	File name	ERS2.SAR.RAWLEAD	
15	65-68	A4	Record sequence and location type flag	FSEQ	
16	69-76	I8	Sequence number location	1	
17	77-80	I4	Sequence number field length	4	
18	81-84	A4	Record Code and location type flag	FTYP	
19	85-92	I8	Record code location	5	
20	93-96	I4	Record code field length	4	
21	97-100	A4	Record length and location type flag	FLGT	
22	101-108	I8	Record length location	9	
23	109-112	I4	Record length field length	4	
24-27	113-116	A1	<i>Reserved</i>		
28	117-180	A64	Reserved segment		
29	181-186	I6	Number of data set summary records	1	
30	187-192	I6	Data set summary record length	1886	
31	193-198	I6	Number of map projection data records	0	
32	199-204	I6	Map projection record length	0	
33	205-210	I6	Number of platform pos. data records	1	
34	211-216	I6	Platform position record length	1046	
35	217-222	I6	Number of attitude data records	0	
36	223-228	I6	Attitude data record length	0	
37	229-234	I6	Number of radiometric data records	0	

38	235-240	I6	Radiometric record length	0	
39	241-246	I6	Number of rad. compensation records	0	
40	247-252	I6	Radiometric compensation rec. length	0	
41	253-258	I6	Number of data quality summary records	0	
42	259-264	I6	Data quality summary record length	0	
43	265-270	I6	Number of data histograms records	0	
44	271-276	I6	Data histogram record length	0	
45	277-282	I6	Number of range spectra records	0	
46	283-288	I6	Range spectra record length	0	
47	289-294	I6	Number of DEM descriptor records	0	
48	295-300	I6	DEM descriptor record length	0	
49	301-306	I6	Number of radar par. update records	0	
50	307-312	I6	Radar par. update record length	0	
51	313-318	I6	Number of annotation data records	0	
52	319-324	I6	Annotation data record length	0	
53	325-330	I6	Number of det.processing records	0	
54	331-336	I6	Det.processing record length	0	
55	337-342	I6	Number of calibration records	0	
56	343-348	I6	Calibration record length	0	
57	349-354	I6	Number of GCP records	0	
58	355-360	I6	GCP record length	0	
59-68	361-420	I6	<i>Spare(60 blanks)</i>		
69	421-426	I6	Number of facility data records	2	
70	427-432	I6	Facility data record maximum length	12288	
71	433-720	A2	Blanks		

Table 6: RAW DATA SET SUMMARY RECORD

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with RAW product	UNITS
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1	1 - 4	B4	Record sequence number	2	
2	5	B1	1-st record sub-type code	10	
3	6	B1	Record-type code	10	

4	7	B1	2 nd record sub-type code	31	
5	8	B1	3 rd record sub-type code	20	
6	9-12	B4	Length of this record	1886	
7	13-16	I4	Data Set Summary Record sequence number (starts at 1)	1	
SCENE PARAMETERS					
8	17-20	I4	SAR channel indicator	1	
9	21-36	A16	<i>Reserved</i>		
10	37-68	A32	Scene reference number (e.g. orbit - frame number)	ORBIT=13686- FRAME=2840	
11	69-100	A32	Scene centre time (UTC) <YYYYMMDDhhmsstt\$\$\$\$\$\$\$\$>	19971202045116622	
12	101-116	A16	<i>Spare</i>		
13	117-132	F16.7	Processed scene centre geodetic latitude (positive for North latitude, negative for South latitude)	37.926	
14	133-148	F16.7	Processed scene centre longitude	87.854	degrees
15	149-164	F16.7	Processed scene centre true heading (Not provided by the VMP)	-9999999.9999999	degrees
16	165-180	A16	Ellipsoid designator	GEM6	
17	181-196	F16.7	Ellipsoid semimajor axis	6378.144	km
18	197-212	F16.7	Ellipsoid semiminor axis	6356.759	km
19	213-228	F16.7	Earth mass times gravitational constant (M . G)	3.9860044	kg.m/s2
20	229-244	A16	<i>Spare</i>		
21	245-260	F16.7	Ellipsoid J2 parameter	1082.28	
22	261-276	F16.7	Ellipsoid J3 parameter	-2.30	
23	277-292	F16.7	Ellipsoid J4 parameter	-0.20	
24	293-308	A16	<i>Spare</i>		
25	309-324	F16.7	<i>Reserved</i>		m
26	325-332	I8	Scene centre line number (the line number at the scene centre including zero fill)	00014000	
27	333-340	I8	Scene centre pixel number (the pixel number at the scene centre including zero fill)	0002808	
28	341-356	F16.7	Processed scene length including zero fill	111.440	km
29	357-372	F16.7	Scene width including zero fill	44.3888640	km
30	373-388	A16	<i>Spare</i>		
GENERAL MISSION / SENSOR PARAMETERS					
31	389-392	I4	Number of SAR channels	0001	

32	393-396	A4	Spare		
33	397-412	A16	Sensor platform mission identifier	ERS2	
34	413-444	A32	Sensor ID and mode of operation for this channel <AAAAAA-BB-CC-DD-EF> where : AAAAAA = sensor identifier; BB = SAR band; CC = resolution mode code; DD = imaging mode code; E = transmit polarisation; F = receiver polarisation	SAR- C-HR-IM-VV	
35	445-452	A8	Orbit number	13686	
36	453-460	F8.3	Sensor platform geodetic latitude at nadir corresponding to scene centre (positive for North latitude)	37.186	degrees
37	461-468	F8.3	Sensor platform longitude at nadir corresponding to scene centre (negative for West longitude)	91.230	degrees
38	469-476	F8.3	Sensor platform heading at nadir corresponding to scene centre (clockwise positive from North)	193.840	degrees
39	477-484	F8.3	Sensor clock angle as measured relative to sensor platform flight direction	90	degrees
40	485-492	F8.3	Incidence angle at scene centre	23.720	degrees
41	493-500	F8.3	Radar frequency	5.3	GHz
42	501-516	F16.7	Radar wavelength	0.056666	metres
43	517-518	A2	Motion compensation indicator "00" = no compensation, "01" = on board compensation, "10" = in processor compensation, "11" = both on board and in processor	00	
44	519-534	A16	Range pulse code specifier	LINEAR FM CHIRP	
45	535-550	E16.7	Nominal range pulse (chirp) amplitude coefficient, Constant term	1.0E+00	
46	551-566	E16.7	Nominal range pulse (chirp) amplitude coefficient, Linear term	0.0E+00	sec-1
47	567-582	E16.7	Nominal range pulse (chirp) amplitude coefficient, Quadratic term	0.0E+00	sec-2
48	583-598	E16.7	Nominal range pulse (chirp) amplitude coefficient, Cubic term	0.0E+00	sec-3
49	599-614	E16.7	Nominal range pulse (chirp) amplitude coefficient, Quartic term	0.0E+00	sec-4
50	615-630	E16.7	Nominal range pulse (chirp) phase coefficient, Constant term	0.0E+00	cycles
51	631-646	E16.7	Nominal range pulse (chirp) phase coefficient, Linear term	0.0E+00	Hz
52	647-662	E16.7	Nominal range pulse (chirp) phase coefficient, Quadratic term	2.0889E+11	Hz/sec
53	663-678	E16.7	Nominal range pulse (chirp) phase coefficient, Cubic term	0.0E+00	Hz/sec2
54	679-694	E16.7	Nominal range pulse (chirp) phase coefficient, Quartic term	0.0E+00	Hz/sec3
55	695-702	I8	Down linked chirp extraction index	29	samples
56	703-710	A8	Spare		
57	711-726	F16.7	Range sampling rate	18.9624680	MHz

58	727-742	F16.7	Range gate delay at early edge (in time) at the start of the image		msec
59	743-758	F16.7	Range pulse length	37.12	m sec
60	759-762	A4	<i>Reserved</i>		
61	763-766	A4	Range compressed flag (YES = range compressed data)	NO	
62-63	767-798	2 F16.7	<i>Reserved</i>		
64	799-806	I8	Quantization per channel I & Q	00000005	bits
65	807-818	A12	Quantizer descriptor	UNIFORM I Q	
66	819-834	F16.7	DC Bias for I-component (actual value)	-0.02	
67	835-850	F16.7	DC Bias for Q-component (actual value)	0.02	
68	851-866	F16.7	Gain imbalance for I & Q (actual value) (Not provided by the VMP)	-9999999.9999999	
69-70	867-898	A32	<i>Spare</i>		
71	899-914	F16.7	<i>Reserved</i>		
72	915-930	F16.7	Antenna mechanical boresight angle relative to platform vertical axis	20.355	degrees
73	931-934	A4	<i>Reserved</i>		
74	935-950	F16.7	Pulse Repetition Frequency (PRF) (actual value)	1679.902	Hz
75-76	951-982	F16.7	<i>Reserved</i>		
SENSOR SPECIFIC PARAMETERS					
77	983-998	I16	Satellite encoded binary time code	3976440323	
78	999-1030	A32	Satellite clock time (UTC) <YYYYMMDDhhmmsssttt\$\$\$\$...\$>	19971202061758632	
79	1031-1038	I8	Satellite clock step length	3906250	nanosec
80	1039-1046	A8	<i>Spare</i>		
GENERAL PROCESSING PARAMETERS					
81	1047-1062	A16	Processing facility identifier (D-PAF, UK-PAF, ES)	D-PAF	
82	1063-1070	A8	Processing system identifier (VMP for D-PAF, UK-PAF and ES)	VMP	
83	1071-1078	A8	Processing version identifier	6.2	
84-85	1079-1110	A16	<i>Reserved</i>		
86	1111-1142	A32	Product type specifier	SAR RAW SIGNAL DATA	
87	1143-1174	A32	Processing algorithm identifier (Not relevant for the RAW product)		
88	1175-1190	F16.7	Nominal number of looks processed in azimuth (Not relevant for the RAW product)	-9999999.9999999	looks
89	1191-1206	F16.7	Nominal number of looks processed in range (Not relevant for the RAW product)	-9999999.9999999	looks

90	1207-1222	F16.7	Bandwidth per look in azimuth (null-to-null) (Not relevant for the RAW product)	-9999999.9999999	Hz
91	1223-1238	F16.7	Bandwidth per look in range (Not relevant for the RAW product)	-9999999.9999999	MHz
92	1239-1254	F16.7	Total processor bandwidth in azimuth (Not relevant for the RAW product)	-9999999.9999999	Hz
93	1255-1270	F16.7	Total processor bandwidth in range (Not relevant for the RAW product)	-9999999.9999999	MHz
94	1271-1302	A32	Weighting function designator in azimuth (Not relevant for the RAW product)		
95	1303-1334	A32	Weighting function designator in range (Not relevant for the RAW product)		
96	1335-1350	A16	Data input source	HDDT	
97	1351-1366	F16.7	Nominal resolution in range (3-dB width) (Not relevant for the RAW product)	-9999999.9999999	m
98	1367-1382	F16.7	Nominal resolution in azimuth (3-dB width) (Not relevant for the RAW product)	-9999999.9999999	m
99	1383-1398	A32	<i>Reserved</i>		
100	1399-1414	A32	<i>Reserved</i>		
101	1415-1430	F16.7	Along track Doppler frequency centroid at early edge of image, Constant term (Not provided for the RAW product)	-9999999.9999999	Hz
102	1431-1446	F16.7	Along track Doppler frequency centroid at early edge of image, Linear term (Not provided for the RAW product)	-9999999.9999999	Hz/sec
103	1447-1462	F16.7	Along track Doppler frequency centroid at early edge of image, Quadratic term (Not provided for the RAW product)	-9999999.9999999	Hz/sec ²
104	1463-1478	A16	<i>Spare</i>		
105	1479-1494	F16.7	Cross track Doppler frequency centroid at early edge of image, Constant term (Not provided for the RAW product)	-9999999.9999999	Hz
106	1495-1510	F16.7	Cross track Doppler frequency centroid at early edge of image, Linear term (Not provided for the RAW product)	-9999999.9999999	Hz/sec
107	1511-1526	F16.7	Cross track Doppler frequency centroid at early edge of image, Quadratic term (Not provided for the RAW product)	-9999999.9999999	Hz/sec ²
108	1527-1534	A8	Time direction indicator along pixel direction	INCREASE	
109	1535-1542	A8	Time direction indicator along line direction	INCREASE	
110	1543-1558	F16.7	Along track Doppler frequency rate at early edge of image, Constant term (Not provided for the RAW product)	-9999999.9999999	Hz/sec
111	1559-1574	F16.7	Along track Doppler frequency rate at early edge of image, Linear term (Not provided for the RAW product)	-9999999.9999999	Hz/sec ²
112	1575-1590	F16.7	Along track Doppler frequency rate at early edge of image, Quadratic term (Not provided for the RAW product)	-9999999.9999999	Hz/sec ³
113	1591-1606	A16	<i>Spare</i>		
114	1607-1622	F16.7	Cross track Doppler frequency rate at early edge of image, Constant term (Not provided for the RAW product)	-9999999.9999999	Hz/sec

115	1623-1638	F16.7	Cross track Doppler frequency rate at early edge of image, Linear term (Not provided for the RAW product)	-9999999.9999999	Hz/sec2
116	1639-1654	F16.7	Cross track Doppler frequency rate at early edge of image, Quadratic term (Not provided for the RAW product)	-9999999.9999999	Hz/sec3
117	1655-1670	A16	<i>Spare</i>		
118	1671-1678	A8	Line content indicator	RANGE	
119	1679-1682	A4	Clutterlock applied flag	NOT	
120	1683-1686	A4	Autofocussing applied flag	NOT	
121	1687-1702	F16.7	Line spacing	3.980	m
122	1703-1718	F16.7	Pixel spacing	7.904	m
123	1719-1734	A16	Processor range compression designator (Not provided for the RAW product)		
124	1735-1750	A16	<i>Spare</i>		
125	1751-1766	A16	<i>Spare</i>		

SENSOR SPECIFIC LOCAL USE SEGMENT

126/1	1767-1782	F16.7	Zero-doppler range time (two-way) of first range pixel	5.5410340	millisec
126/2	1783-1798	F16.7	Zero-doppler range time (two-way) of centre range pixel	5.6891160	millisec
126/3	1799-1814	F16.7	Zero-doppler range time (two-way) of last range pixel	5.8371980	millisec
126/4	1815-1838	A24	Zero-doppler azimuth time of first azimuth pixel (UTC) <dd-MMM-yyyy hh:mm:ss.ttt>	02-DEC-1997 04:51:08.289	
126/5	1839-1862	A24	Zero-doppler azimuth time of centre azimuth pixel (UTC) <dd-MMM-yyyy hh:mm:ss.ttt>	02-DEC-1997 04:51:16.622	
126/6	1863-1886	A24	Zero-doppler azimuth time of last azimuth pixel (UTC) <dd-MMM-yyyy hh:mm:ss.ttt>	02-DEC-1997 04:51:24.956	

Table 7: RAW PLATFORM POSITION DATA RECORD

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with RAW product	UNITS
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1	1 - 4	B4	Record sequence number	3	
2	5	B1	1-st record sub-type code	10	
3	6	B1	Record-type code	30	
4	7	B1	2 nd record sub-type code	31	
5	8	B1	3 rd record sub-type code	20	
6	9-12	B4	Length of this record (not fixed length)	1046	
7	13-44	A32	<i>Reserved</i>		

8 to 13	45-140	6 F16.7	Reserved		
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POSITIONAL DATA POINTS

14	141-144	I4	Number of data points (always 5 for the VMP)	5	
15	145-148	I4	Year of data point <YYYY>	1997	
16	149-152	I4	Month of data point <\$\$MM>	0012	
17	153-156	I4	Day of data point <\$\$DD>	02	
18	157-160	I4	Day in the year <GMT> (1st January = Day 1)	0336	
19	161-182	E22.15	Seconds of day of data	7.805732E+04	sec
20	183-204	E22.15	Time interval between data points	4.018E+00	sec
21	205-268	A64	Reference coordinate system	Earth Centred Rotating	
22	269-290	E22.15	Greenwich mean hour angle (Not provided by the VMP)	-99999..99E-99	degrees
23	291-306	F16.7	Along track position error (Not provided by the VMP)	-9999999.9999999	metres
24	307-322	F16.7	Across track position error (Not provided by the VMP)	-9999999.9999999	metres
25	323-338	F16.7	Radial position error (Not provided by the VMP)	-9999999.9999999	metres
26-28	339-386	F16.7	Reserved		

FIRST POSITIONAL DATA POINT

29	387-408	D22.15	1st data point - Position vector X	4.4599626E+06	m
	409-430	D22.15	1st data point - Position vector Y	1.093685E+05	m
	431-452	D22.15	1st data point - Position vector Z	5.59626963E+06	m
30	453-474	D22.15	1st data point - Velocity vector X'	-5.61894961E+03	m/s
	475-496	D22.15	1st data point - Velocity vector Y'	-2.2451222E+03	m/s
	497-518	D22.15	1st data point - Velocity vector Z'	4.5109856E+03	m/s

SECOND POSITIONAL DATA POINT

31	519-540	D22.15	2nd data point - Position vector X	4.43734455E+06	m
	541-562	D22.15	2nd data point - Position vector Y	1.0035342E+05	m
	563-584	D22.15	2nd data point - Position vector Z	5.61434529E+06	m
32	585-606	D22.15	2nd data point - Velocity vector X'	-5.639553E+03	m/s
	607-628	D22.15	2nd data point - Velocity vector Y'	-2.24227818E+03	m/s
	629-650	D22.15	2nd data point - Velocity vector Z'	4.48649896E+03	m/s
33-	EOR		Blanks		

Repetition of fields 29-30 as specified by the number of points in field 14 (usually 5 or 6 data points)

Table 8: RAW FACILITY RELATED DATA RECORD [GENERAL TYPE]

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with	UNITS
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				RAW product	
1	1 - 4	B4	Record sequence number	4	
2	5	B1	1-st record sub-type code	10	
3	6	B1	Record-type code	200	
4	7	B1	2 nd record sub-type code	31	
5	8	B1	3 rd record sub-type code	50	
6	9-12	B4	Length of this record	12288	
7	13-76	A64	Name of this facility related data record	FACILITY RELATED DATA RECORD [ESA GENERAL TYPE]	
SIGNAL DATA QUALITY					
8	77-82	A6	Date of last release of QC software (Not relevant for the RAW product)		
9	83-84	A2	<i>Spare</i>		
10	85-90	A6	Date of the last calibration update <YYMMDD> (Not relevant for the RAW product)		
11	91-94	I4	Overall QA summary flag (Sum of the next 9 following flags)	0	
12	95-98	I4	PRF code change flag (0 = PRF constant in scene)	0	
13	99-102	I4	Sampling window start time change flag (0 = SWST constant)	0	
14	103-106	I4	Cal. system & receiver gain change flag (0 = Cal/Rx gain constant)	0	
15	107-110	I4	Chirp replica quality flag (0 = Replica XCF in limits)	0	
16	111-114	I4	Input data statistics flag (0 = Raw data mean & sd in limits)	0	
17	115-118	I4	Doppler centroid confidence measure flag (0 = in limits)	0	
18	119-122	I4	Doppler centroid value (0 = Dopp-centroid less than PRF/2)	0	
19	123-126	I4	Doppler ambiguity confidence measure flag (0 = in limits)	0	
20	127-130	I4	Output data Mean flag (0 = Image mean or sd in limits)	0	
21	131-134	I4	On ground / on board range compressed flag (0 = OGRC,1=OBRC)	0	
22	135-138	I4	Number of PRF code changes	0	
23	139-142	I4	Number of sampling window time changes	0	
24	143-146	I4	Number of calibration subsystems gain changes	0	
25	147-150	I4	Number of missing lines (i.e. raw data input lines)	0	
26	151-154	I4	Number of receiver gain changes	0	
27	155-170	F16.7	3-dB width of Cross Correlation Function (CCF) between first extracted chirp and nominal chirp [for Bangkok processor this is the CCF between best extracted chirp and nominal chirp]	1.142	samples

28	171-186	F16.7	First side lobe level of chirp CCF	-9.639	dB
29	187-202	F16.7	ISLR of chirp CCF	-6.922	dB
30	203-218	F16.7	Doppler centroid confidence measure (value normalized such that it takes a value of zero for the best case and a value of one for the worst case)	0.0	
31	219-234	F16.7	Doppler ambiguity confidence measure (value normalized such that it takes a value of one for the best case and a value of zero for the worst case)	0.0	
32	235-250	F16.7	Estimated mean of I input data (once the nominal bias of 15.5 has been applied)	-0.020	
33	251-266	F16.7	Estimated mean of Q input data (once the nominal bias of 15.5 has been applied)	0.020	
34	267-282	F16.7	Estimated standard deviation of I input data	3.302	
35	283-298	F16.7	Estimated standard deviation of Q input data	3.305	
36	299-314	F16.7	Calibration system gain of first processed line (telemetry value)	7	
37	315-330	F16.7	Receiver gain of first processed line (telemetry value)	19	
38	331-346	F16.7	Doppler ambiguity number	0	
39	347-362	A16	<i>Spare</i>		

CALIBRATION INFORMATION

40	363-378	F16.7	Bias correction applied to I channel (to be added to the nominal bias)	0.02	
41	379-394	F16.7	Bias correction applied to Q channel (to be added to the nominal bias)	-0.02	
42	395-410	F16.7	I/Q gain imbalance correction (applied to I channel)	1.0	
43	411-426	F16.7	I/Q gain imbalance correction (applied to Q channel)	0.998	
44	427-442	F16.7	I/Q non-orthogonality correction (applied to Q channel)	0.348	
45	443-458	A16	<i>Spare</i>		
46	459-474	F16.7	Noise power per sample (Not provided by the VMP)	-9999999.9999999	
47	475-490	I16	Calibration pulse time delay (Not provided by the VMP)	-9999999.9999999	nanosec
48	491-494	I4	Number of valid calibration pulses (0 for the VMP)	0	pulses
49	495-498	I4	Number of valid noise pulses (0 for the VMP)	0	pulses
50	499-502	I4	Number of valid replica pulses	1	pulses
51	503-518	F16.7	First sample in replica (Chirp extraction index)	30	samples
52	519-534	F16.7	Mean calibration pulse power (Not provided by the VMP)	-9999999.9999999	
53	535-550	F16.7	Mean noise pulse power (Not provided by the VMP)	-9999999.9999999	
54	551-566	F16.7	Range compression normalisation factor	12055352.0	
55	567-582	F16.7	Replica pulse power	111403.0	

56	583-598	F16.7	Incidence angle at first range pixel (at mid-azimuth)	19.335	degrees
57	599-614	F16.7	Incidence angle at centre range pixel (at mid-azimuth)	23.720	degrees
58	615-630	F16.7	Incidence angle at last range pixel (at mid-azimuth)	27.249	degrees
59	631-646	F16.7	Slant range reference (for range spreading loss compensation)	847.0	km
60	647-658	A12	<i>Spare</i>		
61	659-662	I4	Antenna pattern correction flag (0 = no correction)	0	
62	663-678	F16.7	Absolute calibration constant K (scalar) (Not provided for the RAW product)	-9999999.9999999	
63	679-694	F16.7	Upper bound calibration constant K (+ 0.75 dB) (Not provided for the RAW product)	-9999999.9999999	
64	695-710	F16.7	Lower bound calibration constant K (- 0.75 dB) (Not provided for the RAW product)	-9999999.9999999	
65	711-726	F16.7	Estimated noise equivalent σ_0 (Not provided for the RAW product)	-9999999.9999999	dB
66	727-732	A6	Date on which K was generated as YYMMDD (Not provided for the RAW product)		
67	733-736	A4	K version number as XXYY, where XX refers to a K update implemented across the ground segment and YY refers to an upgrade only at the source facility (as may arise in case of local software updates) (Not provided for the RAW product)		

VARIOUS PARAMETERS (from SPH fields)

68	737-740	I4	Number of duplicated input lines (Not provided by the VMP)	-999	
69	741-756	F16.7	Estimated bit error rate (Not provided by the VMP)	-9999999.9999999	
70	757-768	A12	<i>Spare</i>		
71	769-784	F16.7	Output image mean (Not provided for the RAW product)	-9999999.9999999	
72	785-800	F16.7	Output image standard deviation (Not provided for the RAW product)	-9999999.9999999	
73	801-816	F16.7	Output image maximum value (Not provided for the RAW product)	-9999999.9999999	
74	817-840	A24	Time of raw data first input range line (UTC) <dd-MMM-yyyy hh:mm:ss.ttt>	2-DEC-1997 4:51: 8.289	
75	841-864	A24	Time of ascending node state vector (UTC)		
76 to 81	865-996	6 D22.15	Ascending node state vectors (X,Y,Z,X',Y',Z')	0,0,0,0,0,0	m & m/s
82	997-1000	I4	Output pixel bit length	0016	bits
83	1001-1016	F16.7	Processor gain #1	0.0	
84	1017-1032	F16.7	Processor gain #2	0.0	
85	1033-1048	F16.7	Processor gain #3	0.0	
86	1049-1052	I4	Peak location of Cross Correlation Function (CCF) between first extracted chirp and nominal chirp[for Bangkok processor, CCF between best extracted chirp and nominal chirp]	0030	samples

87	1053-1068	F16.7	3-dB width of Cross Correlation Function (CCF) between last extracted chirp and nominal chirp	1.141	samples
88	1069-1084	F16.7	First side lobe level of chirp CCF between last extracted chirp and nominal chirp	-9.612	dB
89	1085-1100	F16.7	ISLR of chirp CCF between last extracted chirp and nominal chirp	-6.881	DB
90	1101-1104	I4	Peak location of Cross Correlation Function (CCF) between last extracted chirp and nominal chirp	0030	Samples
91	1105-1108	I4	Roll tilt mode flag (0 = not in roll tilt mode)	0000	
92	1109-1112	I4	Raw data correction flag (0 = correction with defaults parameters)	0001	
93	1113-1116	I4	Look detection flag (1 = power detected and summed) (Not provided)	-999	
94	1117-1120	I4	Doppler ambiguity estimation flag (0 = no estimation done) (Not provided)	-999	
95	1121-1124	I4	Azimuth baseband conversion flag (0 = no conversion done) (Not provided)	-999	
96	1125-1128	I4	Samples per line used for the raw data analysis	1000	samples
97	1129-1132	I4	Range lines skip factor for raw data analysis	0010	lines
98	1133-1156	A24	Time of input state vector (UTC) used to processed the image <dd-MMM-yyyy hh:mm:ss.ttt>	02-DEC-1997 04:51:00.000	
99	1157-1178	D22.15	Input state vector - Position vector X	4.33291511E+06	m
100	1179-1200	D22.15	Input state vector - Position vector Y	6.832440E+05	m
101	1201-1222	D22.15	Input state vector - Position vector Z	5.68776213E+06	m
102	1223-1244	D22.15	Input state vector - Velocity vector X'	-5.72938895E+03	m/s
103	1245-1266	D22.15	Input state vector - Velocity vector Y'	-2.23133119E+03	m/s
104	1267-1288	D22.15	Input state vector - Velocity vector Z'	4.38098297E+03	m/s
105	1289-1292	I4	Input state vector type flag (0 = ascending node state vectors, i.e predicted orbit, 1 = preliminary or precise	0001	
106	1293-1308	F16.7	Window coefficient for range-matched filter	0.0	
107	1309-1324	F16.7	Window coefficient for azimuth-matched filter	0.0	
108	1325-1328	I4	Update period of range-matched filter	0000	chirps
109	1329-1456	8 F16.7	Look scalar gains (up to 8 looks)	0,0,0,0,0,0,0	
110	1457-1460	I4	Sampling window start time bias	6265	nanosec
111	1461-1482	E22.15	Doppler centroid cubic coefficient	0.0	
112	1483-1486	I4	PRF code of first range line (telemetry value)	2820	
113	1487-1490	I4	PRF code of last range line (telemetry value)	2820	

114	1491-1494	I4	Sampl. wind. start time code of first range line (telemetry value)	0900	
115	1495-1498	I4	Sampl. wind. start time code of last range line (telemetry value)	0900	
116	1499-1502	I4	Calibration system gain of last processed line (telemetry value)	0007	
117	1503-1506	I4	Receiver gain of last processed line (telemetry value)	0019	
118	1507-1510	I4	First processed range sample	0001	
119	1511-1514	I4	Azimuth FFT/IFFT ratio (Not relevant for the RAW product)	-999	
120	1515-1518	I4	Number of azimuth blocks processed (0000 for the RAW product)	0000	
121	1519-1526	I8	Number of input raw data lines (variable)	00028000	lines
122	1527-1530	I4	Initial Doppler ambiguity number	0000	
123	1531-1578	3F16.7	Chirp quality thresholds - Pulse width of the chirp CCF - First sidelobe of the chirp CCF - ISLR of the chirp CCF	1.5 -10.0 -6.0	pixels dB dB
	1579-1642	4F16.7	Input data statistic thresholds - Mean of input I data in fraction of maximum absolute of input data - Mean of input Q data in fraction of maximum absolute of input data - Standard deviation of input I data in fraction of maximum absolute of input data - Standard deviation of input Q data in fraction of maximum absolute of input data	0.1 0.1 0.2 0.2	
	1643-1674	2F16.7	Doppler ambiguity confidence thresholds	0.0, 0.0	
	1675-1706	2F16.7	Output data statistic thresholds - Mean of output data - Standard deviation of output data	0.0 0.0	
124	1707-1722	I16	Satellite binary time of first range line (telemetry value) (Not provided by the VMP)	-9999999.9999999	
125	1723-1726	I4	Number of valid pixels per range line (the remaining pixels are zero padded)	5616	pixels
126	1727-1730	I4	Number of range samples discarded during processing interpolations	0000	samples
127	1731-1746	F16.7	I/ gain imbalance - Lower bound	0.998	
128	1747-1762	F16.7	I/ gain imbalance - Upper bound	1.001	
129	1763-1778	F16.7	I/Q quadrature departure - Lower bound	-1.660	degrees
130	1779-1794	F16.7	I/Q quadrature departure - Upper bound	2.364	degrees
131	1795-1810	F16.7	3-dB look bandwidth (Not relevant for the RAW product)	-9999999.9999999	Hz
132	1811-1826	F16.7	3-dB processed Doppler bandwidth (Not relevant for the RAW product)	-9999999.9999999	Hz
133	1827-1830	I4	Range sprading loss compensation flag (0 = no compensation)	0000	
134	1831-1832	I1	Datation flag (1 = azimuth timing improved based on timing)	1	

			information of range line specified in field 136)		
135	1833-1838	I7	Maximum error of range line timing	334613	nanosec
136	1839-1844	I7	Format number of range line used to synchronize the azimuth timing	0177204	
137	1845-1846	I1	Automatic look scalar gain flag (1= automatically calculated)	0	
138	1847-1850	I4	Maximum value of look scalar gain before the look scalar gains are normalised (Not provided)	-999	
139	1851-1854	I4	Replica normalisation method flag (0 = normalised by replica power, i.e. $Z' = Z \cdot c/Ar$ where Ar is the replica power and c is specified in field 54, 1 = normalised by the square root of replica power, i.e. $Z' = Z / Ar$)	0000	
140	1855-1934	4 E20.10	4 coefficients of the ground range to slant range conversion polynomial (Not provided)	1.4693679385e-39	
141	1935-2034	5 E20.10	5 coefficients of the antenna elevation pattern polynomial (Not provided)	-9999...99E-99	
142	2035-2050	E16.7	Range time of origin of antenna pattern polynomial (Not provided)	-9999999.9999999	sec
143	2051-12288	A10238	Spare		

Table 9: RAW FACILITY RELATED DATA RECORD PCS TYPE

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with RAW product	UNITS
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1	1 - 4	B4	Record sequence number	5	
2	5	B1	1-st record sub-type code	10	
3	6	B1	Record-type code	200	
4	7	B1	2 nd record sub-type code	31	
5	8	B1	3 rd record sub-type code	50	
6	9-12	B4	Length of this record	12288	
7	13-76	A64	Name of this facility related data record	FACILITY RELATED DATA RECORD [ESA PCS QUALITY TYPE]	
8	77-12288	B	ESA reserved		

4. DATA SET FILE FORMAT DEFINITION

Table 10: SAR DATA FILE , FILE DESCRIPTOR RECORD (FIXED SEGMENT)

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with RAW product	UNITS
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1	1-4	B4	Record sequence number	1	
2	5	B1	1st record sub-type code	63	
3	6	B1	Record sub-type code	192	

4	7	B1	2nd record sub-type code	18	
5	8	B1	3rd record sub-type code	18	
6	9-12	B4	Length of this record	11644	
7	13-14	A2	ASCII/EBCDIC flag	A	
8	15-16	A2	Blanks		
9	17-28	A12	Format control document ID for this data file format	CEOS-SAR-CCT	
10	29-30	A2	Format control document revision level	B	
11	31-32	A2	File design descriptor revision letter	B	
12	33-44	A12	Generating software release and revision level	ERS2-RAW-6.2	
13	45-48	I4	File number	2	
14	49-64	A16	File name	ERS2.SAR.RAWIMGY	
15	65-68	A4	Record sequence and location type flag	FSEQ	
16	69-76	I8	Sequence number location	1	
17	77-80	I4	Sequence number field length	4	
18	81-84	A4	Record code and location type flag	FTYP	
19	85-92	I8	Record code location	5	
20	93-96	I4	Record code field length	4	
21	97-100	A4	Record length and location type flag	FLGT	
22	101-108	I8	Record length location	9	
23	109-112	I4	Record length field length	4	
24-27	113-116	A1	<i>Reserved</i>		
28	117-180	A64	Reserved segment		
SAR DATA IMAGERY OPTIONS FILE, FILE DESCRIPTOR RECORD (VARIABLE SEGMENT)					
29	181-186	I6	Number of SAR DATA records (variable)	028000	
30	187-192	I6	SAR DATA record length	011644	bytes
31	193-216	A24	<i>Reserved</i>		
SAMPLE GROUP DATA					
32	217-220	I4	Number of bits per sample	16	
33	221-224	I4	Number of samples per data group (or pixels)	1	
34	225-228	I4	Number of bytes per data group(or pixels)	2	
35	229-232	A4	Justification and order of samples within data group		
SAR RELATED DATA IN THE RECORD					
36	233-236	I4	Number of SAR channels in this file	1	

37	237-244	I8	Number of lines per data set (variable)	00028000	
38	245-248	I4	Number of left border pixels per line	0	
39	249-256	I8	Total number of data groups per line per SAR channel	00005616	
40	257-260	I4	Number of right border pixels per line	0000	
41	261-264	I4	Number of topborder lines	0	
42	265-268	I4	Number of bottom border lines	0	
43	269-272	A4	Interleaving indicator	BSQ	
RECORD DATA IN THE FILE					
44	273-274	I2	Number of physical records per line	1	
45	275-276	I2	Number of physical records per multi-channel line	1	
46	277-280	I4	Number of bytes of prefix data per record	400	
47	281-288	I8	Number of bytes of SAR data(or pixel data) per record (nominal)	00011232	
48	289-292	I4	Number of bytes of suffix data per record	0	
49-55	293-340	A48	<i>Reserved</i>		
56	341-368	A28	Blanks		
57-60	369-400	A32	<i>Reserved</i>		
61	401-428	A28	SAR Data format type identifier	COMPLEX UNSIGNED INTEGER	
62	429-432	A4	SAR Data format type code	CI*2	
63	433-436	I4	Number of left fill bits within pixel	0	
64	437-440	I4	Number of right fill bits within pixel	0	
65	441-448	I8	Maximum data range of pixel	255	
66	449-11644	A10196	<i>Spare</i>		

Table 11: IMAGERY OPTIONS FILE - SIGNAL DATA RECORD DEFINITION

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with RAW product	UNITS
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1	1-4	B4	Record sequence number	2	
2	5	B1	1-st record sub-type code	50	
3	6	B1	Record type code	10	
4	7	B1	2-nd record sub-type code	31	
5	8	B1	3-rd record sub-type code	20	

6	9-12	B4	Length of this record	11644	
PREFIX DATA - GENERAL INFORMATION					
7	13-16	B4	SAR image data line number	1	
8	17-20	B4	SAR image data record index (indicates the record sequence number of the image line)	1	
9	21-24	B4	Actual count of left-fill pixels	0	
10	25-28	B4	Actual count of data pixels (samples)	5616	
11	29-32	B4	Actual count of right-fill pixels	0	
PREFIX DATA-SENSOR PARAMETERS					
12-27	33-84	B52	<i>Reserved</i>		
28	85-88	B4	<i>Spare</i>		
29	89-92	B4	<i>Spare</i>		
30-37	93-124	B32	<i>Reserved</i>		
38	125-128	B4	<i>Spare</i>		
PREFIX DATA PLATFORM REFERENCE INFORMATION					
39-50	129-192	B64	<i>Spare</i>		
PREFIX DATA - SENSOR/FACILITY SPECIFIC, AUXILIARY DATA					
51 51	193-412	B220	Sensor/Facility specific auxiliary information such as down linked auxiliary data (i.e. pulse replicas, etc.) and data quality information		
			Breakdown of field 51		
	193-202	B10	IDHT General Header		
			Breakdown of IDHT General Header(field 193-202)		
	193	B1	Packet counter	23	
	194	B1	Subcommutation counter	10	
	195-202	B8	IDHT General Header source packet		
	203-203	A1	Fixed code = AA in Hexadecimal notation	AA	
	204-204	B1	OGRC/OBRC flag (1 or 0) Orbit ID code(1=OBRC,0=OGRC,value 0 to 15 corresponds to orbit number 1 to 16, bit 4=LSB of code)	40	
	205-208	B4	ICU on board time	1442850363	
	209-210	B2	Activity task	48064	
	211-214	B4	Image format counter	101389	
	215-216	B2	Sampling window start time	1032	
	217-218	B2	Pulse repetition interval	2820	
	219-219	B1	Calibration attenuation setting	44	
	220-220	B1	Receiver gain attenuation setting	30	

	221-340	120B1	Spare		
	341-412	36B2	36 replica pulses as (4bit spare 6bit Q 6bit I from MSB down to LSB)		
SAR RAW SIGNAL DATA					
52	413-414	B2	First sample I and Q values		
53	415-416	B2	Second sample I and Q values		
..	B2 sample I and Q values		
5667	11643-11644	B2	Last sample I and Q values		

5. NULL VOLUME FORMAT DEFINITION

Table 12: NULL VOLUME DESCRIPTOR RECORD

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with RAW product	UNITS
1	1-4	B4	Record sequence number	1	
2	5	B1	1st record sub-type code	192	
3	6	B1	Record sub-type code	192	
4	7	B1	2nd record sub-type code	63	
5	8	B1	3rd record sub-type code	18	
6	9-12	B4	Length of this record	360	
7	13-14	A2	ASCII/EBCDIC flag	A	
8	15-16	A2	Blanks		
9	17-28	A12	Format control document	CCB-CCT-0002	
10	29-30	A2	Superstructure document	E	
11	31-32	A2	Superstructure record format revision	A	
12	33-44	A12	Logical volume generating facility software release and revision level	ERS2-RAW-6.2	
13	45-60	A16	ID of physical volume containing this volume descriptor	1	
14	61-76	A16	Logical volume identifier	0003792600087854	
15	77-92	A16	Volume set identifier	199712 2 451 828	
16	93-94	I2	Total number of physical volumes in the logical volume	1	
17	95-96	I2	Physical volume sequence number of the first tape within the logical volume	1	
18	97-98	I2	Physical volume sequence number of the last tape in the logical volume	1	
19	99-100	I2	Physical volume sequence number of the current tape within the logical volume	1	
20	101	I4	First referenced file number in this physical volume within the logical	1	

			volume		
21	105-108	I4	Logical volume within a volume set	1	
22	109-112	I4	Logical volume number within physical volume	1	
23	113-120	A8	Logical volume creation date (YYYYMMDD)	19980508	
24	121-128	A8	Logical volume creation time (hhmmssdd, dd-deci-seconds) (dd not provided)	100155	
25	129-140	A12	Logical volume generation country(GERMANY, ENGLAND, ITALY)	GERMANY	
26	141-148	A8	Logical volume agency	ESA	
27	149-160	A12	Logical volume generating facility(D-PAF,UK-PAF, IPAF(ASI), ES, MS, KS, FS)	D-PAF	
28	161-164	I4	Number of file pointer records in volume directory	0	
29	165-168	I4	Number of records in volume directory	1	
30	169-260	A92	Volume descriptor spare segment(always blank filled)		
31	261-360	A100	Local use segment		

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