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Annex D
ERS SAR.PRI
CCT and EXABYTE

Document: ER-IS-EPO-GS-5902.4
Issue: 3.0
Date: August 1, 1998
Prepared by: Ola Gråbak
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1. INTRODUCTION

Sar Precision Image

Acronym: **SAR.PRI**

The product SAR.PRI is a digital image generated from raw SAR data using up-to-date auxiliary parameters, corrected for antenna elevation gain and range spreading loss.The image, projected on ground range, covers an area 100 km wide and at least 102.5 km long.

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

1.1 General Structure

The tape contains the following four files :

Volume Directory File Leader File Data Set File Null Volume 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
Map Projection Record	1620 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	16012 bytes
Image Data Records	16012 bytes

1.2.4 Null Volume File:

Volume Descriptor Record	360 bytes

1.2.5 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 the facility generating the tape.

<.....> - 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.

1.2.6 File Class

	Class Code	Data Type
"8BITASCII$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

1.2.7 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$HEXADECIMAL$$$$$$$$$$"	"R*2H"	2 byte wide
"REAL*4$HEXADECIMAL$$$$$$$$$$"	"R*4H"	4 byte wide
"REAL*8$HEXADECIMAL$$$$$$$$$$"	"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

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

- similar to the complex floating point representation above except that each component is stored as a signed integer.

"COMPLEX*4$HEXADECIMAL$$$$$$$"	"C*4H"	4 byte wide
"COMPLEX*8$HEXADECIMAL$$$$$$$"	"C*8H"	8 byte wide

- same as the floating point complex notation above except that the representation follows the hexadecimal conventions.

1.2.8 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
MAP PROJECTION DATA RECORD	10,20,31,20
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
PROCESSED DATA RECORD	50,11,31,20

Null Volume

NULL VOLUME DESCRIPTOR RECORD	192,192,63,18

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 PRI product" in the following tables, contains only an EXAMPLE of what can be found in a product.

Be aware that for products produced at I-PAF with the ESAR processor, the annotation might differ for some fields. All products produced with the VMP processor since January 1997 should be according to this document.

2. VOLUME DIRECTORY FILE FORMAT DEFINITION

Table 1 *VOLUME DESCRIPTOR RECORD*

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI 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-PRI-6.2	
13	45-60	A16	ID of physical volume containing this volume descriptor	ES001459	
14	61-76	A16	Logical volume identifier(for the VMP the lat-lon is given here)	0001151200285210	
15	77-92	A16	Volume set identifier	199710 515251427	
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)	19980511	
24	121-128	A8	Logical volume creation time (HHMMSSDD, DD=deci-seconds)(DD not provided)	210737	
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 file 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 volume set	1	
31	173-260	A88	Volume descriptor spare segment (always blanks filled)		
32	261-360	A100	Local use segment		

Table 2 ***LEADER FILE POINTER RECORD***

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI 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.PRILEAD	
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	6	
16	109-116	I8	Referenced file - 1st 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	6	
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 PRI product	UNITS
1	1-4	B4	Record number	3	
2	5	Bl	1-st record subtype code	219	
3	6	Bl	Record type code	192	
4	7	Bl	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.PRIIMGY	
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)	8125	
16	109-116	I8	Referenced file 1-st record length	16012	
17	117-124	I8	Referenced file maximum record length	16012	
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)	8125	
24	161-260	Al00	File pointer spare segment		
25	261-360	Al00	Local use segment	PRI	

Table 4 ***TEXT RECORD***

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI 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.PRI	
10	57-116	A60	Location and date/time of product creation	GENERATED AT D-PAF 11-MAY-1998 23:05:29.040	
11	117-156	A40	Physical volume identification	Tape 1/1 VOL-ID 1	
12	157-196	A40	Scene identification	ORBIT 12862 DATE 05-OCT-1997 15:25:14	
13	197-236	A40	Scene location	FRAME 3375 LAT: 11.51 LON: 285.21	
14	237-256	A20	*Spares*		
15	257-360	A104	*Spares*		

(*) 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 PRI 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-PRI-6.2	
13	45-48	I4	File number	1	
14	49-64	A16	File name	ERS2.SAR.PRILEAD	
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	*Reserved*		
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	1	
32	199-204	I6	Map projection record length	1620	
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	*Spare*		
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 ***PRI DATA SET SUMMARY RECORD***

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI product	UNITS
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	*Reserved*		
10	37-68	A32	Scene reference number (e.g. orbit - frame number)	ORBIT=12862- FRAME=3375	
11	69-100	A32	Scene centre time (UTC) <YYYYMMDDhhmmssttt>	19971005152522018	
12	101-116	A16	*Spare*		
13	117-132	F16.7	Processed scene centre geodetic latitude (positive for North latitude, negative for South latitude)	11.512	degrees
14	133-148	F16.7	Processed scene centre geodetic longitude (negative for West longitude)	285.210	degrees
15	149-164	F16.7	Processed scene centre true heading as calculated relative to North	195.2961097	
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	$kg.m/s^2$
20	229-244	A16	*Spare*		
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	*Spare*		
25	309-324	F16.7	*Reserved*		
26	325-332	I8	Scene centre line number (the line number at the scene centre including zero fill) (variable)	4133	

27	333-340	I8	Scene centre pixel number (the pixel number at the scene centre including zero fill) (nominal)	4000	
28	341-356	F16.7	Processed scene length including zero fill (nominal)	103.325	km
29	357-372	F16.7	Processed scene width including zero fill (nominal)	100	km
30	373-388	A16	*Spare*		

GENERAL MISSION / SENSOR PARAMETERS

31	389-392	I4	Number of SAR channels	1	
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	12862	
36	453-460	F8.3	Sensor platform geodetic latitude at nadir corresponding to scene centre (positive for North latitude)	10.867	degrees
37	461-468	F8.3	Sensor platform longitude at nadir corresponding to scene centre (negative for West longitude)	-72.166	degrees
38	469-476	F8.3	Sensor platform heading at nadir corresponding to scene centre (clockwise positive from North)	192.547	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 as derived from sensor platform orientation	22.972	degrees
41	493-500	F8.3	Radar frequency	5.3	GHz
42	501-516	F16.7	Radar wavelength	0.05666	meters
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/sec^2
54	679-694	E16.7	Nominal range pulse (chirp) phase coefficient quartic term	0.0E+00	Hz/sec^3
55	695-702	I8	Down linked data 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 (Not provided by the VMP)	5453.706	microsec
59	743-758	F16.7	Range pulse length	37.12	microsec
60	759-762	A4	*Reserved*		
61	763-766	A4	Range compressed flag (YES = range compressed data)	YES	
62-63	767-798	2 F16.7	*Reserved*		
64	799-806	I8	Quantization per channel I & Q (5I 5Q/6I 6Q for OGRC/OBRC	5	bits
65	807-818	A12	Quantizer descriptor	UNIFORM I Q	
66	819-834	F16.7	DC Bias for I-component (actual value)	0.151	
67	835-850	F16.7	DC Bias for Q-component (actual value)	0.117	
68	851-866	F16.7	Gain imbalance for I & Q (actual value)	1.005	
69-70	867-898	F16.7	*Spare*		
71	899-914	F16.7	*Reserved*		
72	915-930	F16.7	Antenna mechanical boresight angle relative to platform vertical axis at the start of the image positive to the right, negative to the left	20.355	degrees
73	931-934	A4	*Reserved*		
74	935-950	F16.7	Pulse Repetition Frequency (PRF) (actual value)	1679.902	Hz
75-76	951-966	F16.7	*Reserved*		

SENSOR SPECIFIC PARAMETERS

77	983-998	I16	Satellite encoded binary time code	2027258159	
78	999-1030	A32	Satellite clock time (UTC) <YYYYMMDDhhmmssttt>	19971005145658234	
79	1031-1038	I8	Satellite clock step length	3906249	nanosec
80	1039-1046	A8	*Spare*		

GENERAL PROCESSING PARAMETERS

81	1047-1062	A16	Processing facility identifier (KS, FS, MS, D-PAF, IP, ES, UK-PAF)	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	1079-1094	A16	*Reserved*		
85	1095-1110	A16	*Reserved*		
86	1111-1142	A32	Product type specifier	SAR PRECISION IMAGE	

87	1143-1174	A32	Processing algorithm identifier	RANGE DOPPLER	
88	1175-1190	F16.7	Nominal number of looks processed in azimuth	3	looks
89	1191-1206	F16.7	Nominal number of looks processed in range	1	looks
90	1207-1222	F16.7	Bandwidth per look in azimuth (null-to-null)	320	Hz
91	1223-1238	F16.7	Bandwidth per look in range	15.55	MHz
92	1239-1254	F16.7	Total processor bandwidth in azimuth	960	Hz
93	1255-1270	F16.7	Total processor bandwidth in range	15.55	MHz
94	1271-1302	A32	Weighting function designator in azimuth	HAMMING	
95	1303-1334	A32	Weighting function designator in range	HAMMING	
96	1335-1350	A16	Data input source	HDDT	
97	1351-1366	F16.7	Nominal resolution in range (3-dB width)	25	m
98	1367-1382	F16.7	Nominal resolution in azimuth (3-dB width)	22	m
99	1383-1398	F16.7	*Reserved*		
100	1399-1414	F16.7	*Reserved*		
101	1415-1430	F16.7	Along track Doppler frequency centroid at early edge of image constant term (Not provided by the VMP)	-9999999.9999999	Hz
102	1431-1446	F16.7	Along track Doppler frequency centroid at early edge of image linear term (Not provided by the VMP)	-9999999.9999999	Hz/sec
103	1447-1462	F16.7	Along track Doppler frequency centroid at early edge of image quadratic term (Not provided by the VMP)	-9999999.9999999	Hz/sec/sec
104	1463-1478	A16	*Spare*		
105	1479-1494	F16.7	Cross track Doppler frequency centroid at early edge of image constant term (Doppler centroid)	-417.947	Hz
106	1495-1510	F16.7	Cross track Doppler frequency centroid at early edge of image linear term (Slope of Doppler centroid)	2111156.0	Hz/sec
107	1511-1526	F16.7	Cross track Doppler frequency centroid at early edge of image quadratic term	-23225000000.0	Hz/sec/sec
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 by the VMP)	-9999999.9999999	Hz/sec
111	1559-1574	F16.7	Along track Doppler frequency rate at early edge of image linear term (Not provided by the VMP)	-9999999.9999999	Hz/sec/sec
112	1575-1590	F16.7	Along track Doppler frequency rate at early edge of image quadratic term (Not provided by the VMP)	-9999999.9999999	Hz/sec/sec/sec
113	1591-1606	A16	*Spare*		
114	1607-1622	F16.7	Cross track Doppler frequency rate at early edge of image constant term(Azimuth FM rate)	-2156.498	Hz/sec
115	1623-1638	F16.7	Cross track Doppler frequency rate at early edge of image linear term(Slope of Az. FM rate)	391931.99	Hz/sec/sec
116	1639-1654	F16.7	Cross track Doppler frequency rate at early edge of image quadratic term (Not provided by the VMP)	-9999999.9999999	Hz/sec/sec/sec
117	1655-1670	A16	*Spare*		

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	12.5	m
122	1703-1718	F16.7	Pixel spacing	12.5	m
123	1719-1734	A16	Processor range compression designator	EXTRACTED CHIRP	
124	1735-1750	A16	*Spare*		
125	1751-1766	A16	*Spare*		

SENSOR SPECIFIC LOCAL USE SEGMENT

126/1	1767-1782	F16.7	Zero-doppler range time (two-way) of first range pixel	5.522630	millisec
126/2	1783-1798	F16.7	Zero-doppler range time (two-way) of centre range pixel	5.6413780	millisec
126/3	1799-1814	F16.7	Zero-doppler range time (two-way) of last valid range pixel	5.7786810	millisec
126/4	1815-1838	A24	Zero-doppler azimuth time of first azimuth pixel (UTC) <dd-MMM-yyyy$hh:mm:ss.ttt>	05-OCT-1997 15:25:14.321	
126/5	1839-1862	A24	Zero-doppler azimuth time of centre azimuth pixel (UTC) <dd-MMM-yyyy$hh:mm:ss.ttt>	05-OCT-1997 15:25:22.018	
126/6	1863-1886	A24	Zero-doppler azimuth time of last azimuth pixel (UTC) <dd-MMM-yyyy$hh:mm:ss.ttt>	05-OCT-1997 15:25:29.715	

Table 7 **MAP PROJECTION DATA RECORD**

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI product	UNITS
1	1 - 4	B4	Record sequence number	3	
2	5	B1	1-st record sub-type code	10	
3	6	B1	Record-type code	20	
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	1620	
7	13-28	A16	*Spare*		

MAP PROJECTION GENERAL INFORMATION

8	29-60	A32	Map projection descriptor	Ground range	
9	61-76	I16	Number of pixels per line of image	8000	pixels
10	77-92	I16	Number of lines (variable)	8266	lines
11	93-108	F16.7	Nominal inter-pixel distance in output scene	12.5	m
12	109-124	F16.7	Nominal inter-line distance in output scene	12.5	m
13	125-140	F16.7	Orientation at output scene centre [for geocoded products this is simply the convergence of the meridians, ie: the angle between geographic north and map grid north (Angle of projection axis from true North)]	195.2961	degrees
14	141-156	F16.7	Nominal platform orbital inclination (168days=98.491, 35days=98.516, 3days=98.542)	98.542	degrees
15	157-172	F16.7	Actual ascending node (longitude at Equator) (not filled by the vmp)	-9999999.9999999	degrees
16	173-188	F16.7	Geocentre to platform distance at input scene centre (Not provided)	-9999999.9999999	km
17	189-204	F16.7	Platform geodetic altitude over the ellipsoid (Not provided)	-9999999.9999999	km
18	205-220	F16.7	Ground speed at nadir at input scene centre time (Not provided)	-9999999.9999999	km/s
19	221-236	F16.7	Platform heading at nadir corresponding to scene centre	192.547	degrees
20	237-268	A32	Name of reference ellipsoid	GEM6	
21	269-284	F16.7	Semimajor axis of ref.ellipsoid	6378.144	km
22	285-300	F16.7	Semiminor axis of ref.ellipsoid	6356.759	km
23 to 55	301-880	A580	*Reserved*		
56 to 59	881-944	4 A16	*Spares*		

COORDINATES OF FOUR CORNER POINTS

60 to 67	945-1072	A128	*Reserved*		
68	1073-1088	F16.7	1st line 1st pixel geodetic latitude (positive for North latitude)	11.876	degrees

69	1089-1104	F16.7	1st line 1st pixel longitude (negative for West longitude)	285.750	degrees
70	1105-1120	F16.7	1st line last valid pixel geodetic latitude	12.061	degrees
71	1121-1136	F16.7	1st line last valid pixel longitude	284.866	degrees
72	1137-1152	F16.7	Last line last valid pixel geodetic latitude	11.148	degrees
73	1153-1168	F16.7	Last line last valid pixel longitude	284.670	degrees
74	1169-1184	F16.7	Last line 1st pixel geodetic latitude	10.962	degrees
75	1185-1200	F16.7	Last line 1st pixel longitude	285.551	degrees
76 to 96	1201-1620	A420	*Reserved & spares*		

Table 8 ***PRI PLATFORM POSITION DATA RECORD***

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI product	UNITS
1	1 - 4	B4	Record sequence number	4	
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)	1620	
7	13-44	A32	*Reserved*		
8 to 13	45-140	6 F16.7	*Reserved*		

POSITIONAL DATA POINTS

14	141-144	I4	Number of data points (always equal to 5 for the VMP)	5	
15	145-148	I4	Year of data point <YYYY>	1997	
16	149-152	I4	Month of data point <$$MM>	10	
17	153-156	I4	Day of data point <$$DD>	05	
18	157-160	I4	Day in the year <GMT> (1st January = Day 1)	278	
19	161-182	D22.15	Seconds of day of data	5.5514273E+04	sec
20	183-204	D22.15	Time interval between data points	4.018E+00	sec
21	205-268	A64	Reference coordinate system	Earth Centred Rotating	
22	269-290	D22.15	Greenwich mean hour angle (Not provided by the VMP)	-9.99E+03	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	.....				

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

Table 9 ***PRI FACILITY RELATED DATA RECORD [GENERAL TYPE]***

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI product	UNITS
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 GENERAL TYPE]	

SIGNAL DATA QUALITY

8	77-82	A6	Date of last release of QC software < YYMMDD>		
9	83-84	A2	*Spare*		
10	85-90	A6	Date of the last calibration update <YYMMDD>	950713	
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 pulse width of (first) Chirp Replica Cross Correlation Function (CCF)	1.109	samples
28	171-186	F16.7	First side lobe level of chirp CCF	-10.413	dB
29	187-202	F16.7	ISLR of chirp CCF function	-7.154	dB

30	203-218	F16.7	Doppler centroid confidence measure (processor specific) (value normalized such that it takes a value of zero for the best case and a value of one for the worst case)	0.019	
31	219-234	F16.7	Doppler ambiguity confidence measure (processor specific) (value normalized such that it takes a value of one for the best case and a value of zero for the worst case)	0.954	
32	235-250	F16.7	Estimated mean of I input data (once the nominal bias of 15.5 has been applied)	-0.151	
33	251-266	F16.7	Estimated mean of Q input data (once the nominal bias of 15.5 has been applied)	-0.117	
34	267-282	F16.7	Estimated standard deviation of I input data	6.506	
35	283-298	F16.7	Estimated standard deviation of Q input data	6.473	
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	*Spare*		

CALIBRATION INFORMATION

40	363-378	F16.7	Bias correction applied to I channel (to be added to the nominal bias)	0.151	
41	379-394	F16.7	Bias correction applied to Q channel (to be added to the nominal bias)	0.117	
42	395-410	F16.7	I/Q gain imbalance correction (applied to I channel)	1	
43	411-426	F16.7	I/Q gain imbalance correction (applied to Q channel)	1.005	
44	427-442	F16.7	I/Q non-orthogonality correction (applied to Q channel)	1.003	
45	443-458	A16	*Spare*		
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	194215.0	
56	583-598	F16.7	Incidence angle at first range pixel (at mid-azimuth)	19.390	degrees
57	599-614	F16.7	Incidence angle at centre range pixel (at mid-azimuth)	22.972	degrees
58	615-630	F16.7	Incidence angle at last valid range pixel (at mid-azimuth)	26.409	degrees
59	631-646	F16.7	Slant range reference (for range spreading loss compensation)	847.0	km
60	647-658	A12	*Spare*		
61	659-662	I4	Antenna pattern correction flag (0 = no correction)	1	
62	663-678	F16.7	Absolute calibration constant K (scalar)	944061	
63	679-694	F16.7	Upper bound calibration constant K (+ 0.75 dB)	1035140	

64	695-710	F16.7	Lower bound calibration constant K (- 0.75 dB)	860993	
65	711-726	F16.7	Estimated noise equivalent s^0 (ERS-1 : -25.0, ERS-2 : -24.0)	-24.0	dB
66	727-732	A6	Date on which K was generated as YYMMDD	950713	
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)	0100	

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	*Spare*		
71	769-784	F16.7	Output image mean	305.568	
72	785-800	F16.7	Output image standard deviation	155.078	
73	801-816	F16.7	Output image maximum value (Not provided by the VMP)	-9999999.9999999	
74	817-840	A24	Time of raw data first input range line (UTC) <dd-MMM-yyyy$hh:mm:ss.ttt>	5-OCT-1997 15:25:14.273	
75	841-864	A24	Time of ascending node state vector (UTC) <dd-MMM-yyyy$hh:mm:ss.ttt>		
76 to 81	865-996	6 D22.15	Ascending node state vectors (X,Y,Z,X',Y',Z')		m & m/s
82	997-1000	I4	Output pixel bit length	16	bits
83	1001-1016	F16.7	Processor gain #1	1.682	
84	1017-1032	F16.7	Processor gain #2	1.000	
85	1033-1048	F16.7	Processor gain #3	1.000	
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]	30	samples
87	1053-1068	F16.7	3-dB width of Cross Correlation Function (CCF) between last extracted chirp and nominal chirp	1.109	samples
88	1069-1084	F16.7	First side lobe level of chirp (CCF) between last extracted chirp and nominal chirp	-10.323	dB
89	1085-1100	F16.7	ISLR of chirp CCF between last extracted chirp and nominal chirp	-7.118	dB
90	1101-1104	I4	Peak location of Cross Correlation Function (CCF) between last extracted chirp and nominal chirp	30	samples
91	1105-1108	I4	Roll tilt mode flag (0 = not in roll tilt mode)	0	
92	1109-1112	I4	Raw data correction flag (0 = correction with defaults parameters)	1	
93	1113-1116	I4	Look detection flag (1 = power detected and summed)	1	
94	1117-1120	I4	Doppler ambiguity estimation flag (0 = no estimation done)	1	
95	1121-1124	I4	Azimuth baseband conversion flag (0 = no conversion done)	1	
96	1125-1128	I4	Samples per line used for the raw data analysis (nominal)	1000	samples
97	1129-1132	I4	Range lines skip factor for raw data analysis	10	lines

98	1133-1156	A24	Time of input state vector (UTC) used to processed the image <dd-MMM-yyyy$hh:mm:ss.ttt>	05-OCT-1997 15:25:00.000	
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 = near scene state vectors, i.e. restituted, preliminary or precise orbit)	1	
106	1293-1308	F16.7	Window coefficient for range-matched filter	0.75	
107	1309-1324	F16.7	Window coefficient for azimuth-matched filter	0.75	
108	1325-1328	I4	Update period of range-matched filter	2000	chirps
109	1329-1456	8 F16.7	Look scalar gains (up to 8 looks)	1,1,1,0,0,0,0,0	
110	1457-1460	I4	Sampling window start time bias	6265	nanosec
111	1461-1482	D22.15	Doppler centroid cubic coefficient	-5.0 E+12	Hz/sec^3
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)	799	
115	1495-1498	I4	Sampl. wind. start time code of last range line (telemetry value)	799	
116	1499-1502	I4	Calibration system gain of last processed line (telemetry value)	7	
117	1503-1506	I4	Receiver gain of last processed line (telemetry value)	19	
118	1507-1510	I4	First processed range sample	1	
119	1511-1514	I4	Azimuth FFT/IFFT ratio	4	
120	1515-1518	I4	Number of azimuth blocks processed	15	
121	1519-1526	I8	Number of input raw data lines (variable)	26632	lines
122	1527-1530	I4	Initial Doppler ambiguity number	0	
123	1531-1578	3 F16.7	Chirp quality thresholds - Pulse width of the chirp CCF - First sidelobe of the chirp CCF - ISLR of the chirp CCF	 1.2 -11.0 -8.0	 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	0.05,0.95	

	1675-1706	2F16.7	Output data statistic thresholds - Mean of output data - Standard deviation of output data	 200 100	
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)	7876	pixels
126	1727-1730	I4	Number of range samples discarded during processing interpolations	9	samples
127	1731-1746	F16.7	I/Q gain imbalance - Lower bound	0.997	
128	1747-1762	F16.7	I/Q gain imbalance - Upper bound	1.002	
129	1763-1778	F16.7	I/Q quadrature departure - Lower bound	0.972	degrees
130	1779-1794	F16.7	I/Q quadrature departure - Upper bound	0.972	degrees
131	1795-1810	F16.7	3-dB look bandwidth	177.5	Hz
132	1811-1826	F16.7	3-dB processed Doppler bandwidth	817.5	Hz
133	1827-1830	I4	Range spreading loss compensation flag (0 = no compensation)	1	
134	1831-1832	I1	Datation flag (1 = azimuth timing improved based on timing information of range line specified in field 136)	1	
135	1833-1838	I7	Maximum error of range line timing	332082	nanosec
136	1839-1844	I7	Format number of range line used to synchronize the azimuth timing	342264	
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 by the VMP)	-999	
139	1851-1854	I4	Replica normalisation method flag (0 = normalised by replica power, i.e. $Z' = Z \cdot {}^{c}/A_r$ where A_r 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)	0	
140	1855-1934	4 E20.10	4 coefficients of the ground range to slant range conversion polynomial . • For the VMP, the coefficients can be used to calculate the range time of the output range sample as follows : $Tn = (C0 + C1.Gn + C2.Gn^2 + C3.Gn^3) / Fr + T0$ where : Gn is ground range of sample n from first range sample in metres Fr is the range sampling rate in Hz (field DSS 57) T0 is the range time of the first output range sample (field DSS 126/1) • For the Bangkok processor, the coefficients can be used to calculate the slant range sample corresponding to the output range sample as follows : $Sn = C0 + C1.Gn + C2.Gn^2 + C3.Gn^3$ where : Gn is ground range sample number n Sn is the corresponding slant range sample n	4.54....e-13 4.19....e-02 7.76....e-08 -3.37....e-14	

141	1935-2034	5 E20.10	5 coefficients of the antenna elevation pattern polynomial. • For the VMP, the coefficients can be used to calculate the antenna elevation pattern as a function of range time as follows : $At = C0 + C1.T + C2.T^2 + C3.T^3 + C4.T^4$ where : At is expressed in dB T is the range time relative to the polynomial origin in seconds (field 142) • For the Bangkok processor, the coefficients can be used to calculate the antenna elevation pattern as a function of range pixel look angle as follows : $At = C0 + C1.T + C2.T^2 + C3.T^3 + C4.T^4$ where : At is expressed in natural value (not in dB) from 1 to 0 T is the range pixel look angle in degrees **This field is not relevant for the VMP version 6.0 and above, for which there is a linear interpolation of the antenna pattern.**	-7.1206316E+02 1.4109934E+02 -1.0455099E+01 3.4380848E-01 -4.2333874E-03	
142	2035-2050	E16.7	Range time of origin of antenna pattern polynomial **This field is not relevant for the VMP version 6.0 and above, for which there is a linear interpolation of the antenna pattern.**	5.6293510E+06	sec
143	2051-12288	A10238	*Spare*		

Table 10 ***PRI FACILITY RELATED DATA RECORD PCS TYPE***

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI product	UNITS
1	1 - 4	B4	Record sequence number	6	
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 11 *SAR DATA FILE , FILE DESCRIPTOR RECORD (FIXED SEGMENT)*

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI product	UNITS
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	16012	
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-PRI-6.2	
13	45-48	I4	File number	2	
14	49-64	A16	File name	ERS.SAR.PRIIMGY	
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	*Reserved*		
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 (nominal)	8200	
30	187-192	I6	SAR DATA record length	16012	bytes
31	193-216	A24	*Reserved*		

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 (nominal)	8200	
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 (variable)	8000	
40	257-260	I4	Number of right border pixels per line (variable)	301	
41	261-264	I4	Number of top border 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	0	
47	281-288	I8	Number of bytes of SAR data(or pixel data) per record(nominal)	16000	
48	289-292	I4	Number of bytes of suffix data per record	0	
49-55	293-340	A48	*Reserved*		
56	341-368	A28	Blanks		
57-60	369-400	A32	*Reserved*		
61	401-428	A28	SAR Data format type identifier	UNSIGNED INTEGER	
62	429-432	A4	SAR Data format type code	U12	
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	32767	
66	449-EOR	A15564	*Spare*		

Table 12 ***IMAGERY OPTIONS FILE, PROCESSED DATA RECORD***

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI product	UNITS
1	1-4	B4	Record sequence number	2	
2	5	B1	1st record sub-type code	50	
3	6	B1	Record sub-type code	11	
4	7	B1	2nd record sub-type code	31	
5	8	B1	3rd record sub-type code	20	
6	9-12	B4	Length of this record (nominal)	16012	
7	13-14	B2	First sample of image line		
8	15-16	B2	Second sample of image line		
...	...	...	....		
5006	16011-16012	B2	Last sample of image line		

5. NULL VOLUME FORMAT DEFINITION

Table 13 *NULL VOLUME DESCRIPTOR RECORD*

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI 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-PRI-6.2	
13	45-60	A16	ID of physical volume containing this volume descriptor	1	
14	61-76	A16	Logical volume identifier	0008105400016659	
15	77-92	A16	Volume set identifier	199710 515251427	
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 volume	1	
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)	19980511	
24	121-128	A8	Logical volume creation time (hhmmssdd, dd-deci-seconds) (dd not provided)	210737	
25	129-140	A12	Logical volume generation country(GERMANY, UK, 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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Annex D
ERS SAR.PRI
CCT and EXABYTE

Document: ER-IS-EPO-GS-5902.4
Issue: 3.0
Date: August 1, 1998
Prepared by: Ola Grråbak
Checked by: H. Laur

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1. INTRODUCTION

Sar Precision Image

Acronym: **SAR.PRI**

The product SAR.PRI is a digital image generated from raw SAR data using up-to-date auxiliary parameters, corrected for antenna elevation gain and range spreading loss.The image, projected on ground range, covers an area 100 km wide and at least 102.5 km long.

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

1.1 General Structure

The tape contains the following four files :

Volume Directory File Leader File Data Set File Null Volume 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
Map Projection Record	1620 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	16012 bytes
Image Data Records	16012 bytes

1.2.4 Null Volume File:

Volume Descriptor Record	360 bytes

1.2.5 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 the facility generating the tape.

<.....> - 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.

1.2.6 File Class

	Class Code	Data Type
"8BITASCII$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

1.2.7 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$HEXADECIMAL$$$$$$$$$$"	"R*2H"	2 byte wide
"REAL*4$HEXADECIMAL$$$$$$$$$$"	"R*4H"	4 byte wide
"REAL*8$HEXADECIMAL$$$$$$$$$$"	"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

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

- similar to the complex floating point representation above except that each component is stored as a signed integer.

"COMPLEX*4$HEXADECIMAL$$$$$$$"	"C*4H"	4 byte wide
"COMPLEX*8$HEXADECIMAL$$$$$$$"	"C*8H"	8 byte wide

- same as the floating point complex notation above except that the representation follows the hexadecimal conventions.

1.2.8 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
MAP PROJECTION DATA RECORD	10,20,31,20
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
PROCESSED DATA RECORD	50,11,31,20

Null Volume

NULL VOLUME DESCRIPTOR RECORD	192,192,63,18

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 PRI product" in the following tables, contains only an EXAMPLE of what can be found in a product.

Be aware that for products produced at I-PAF with the ESAR processor, the annotation might differ for some fields. All products produced with the VMP processor since January 1997 should be according to this document.

2. VOLUME DIRECTORY FILE FORMAT DEFINITION

Table 1 *VOLUME DESCRIPTOR RECORD*

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI 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-PRI-6.2	
13	45-60	A16	ID of physical volume containing this volume descriptor	ES001459	
14	61-76	A16	Logical volume identifier(for the VMP the lat-lon is given here)	0001151200285210	
15	77-92	A16	Volume set identifier	199710 515251427	
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)	19980511	
24	121-128	A8	Logical volume creation time (HHMMSSDD, DD=deci-seconds)(DD not provided)	210737	
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 file 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 volume set	1	
31	173-260	A88	Volume descriptor spare segment (always blanks filled)		
32	261-360	A100	Local use segment		

Table 2 *LEADER FILE POINTER RECORD*

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI 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.PRILEAD	
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	6	
16	109-116	I8	Referenced file - 1st 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	6	
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 PRI 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.PRIIMGY	
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)	8125	
16	109-116	I8	Referenced file 1-st record length	16012	
17	117-124	I8	Referenced file maximum record length	16012	
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)	8125	
24	161-260	A100	File pointer spare segment		
25	261-360	A100	Local use segment	PRI	

Table 4 *TEXT RECORD*

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI 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.PRI	
10	57-116	A60	Location and date/time of product creation	GENERATED AT D-PAF 11-MAY-1998 23:05:29.040	
11	117-156	A40	Physical volume identification	Tape 1/1 VOL-ID 1	
12	157-196	A40	Scene identification	ORBIT 12862 DATE 05-OCT-1997 15:25:14	
13	197-236	A40	Scene location	FRAME 3375 LAT: 11.51 LON: 285.21	
14	237-256	A20	*Spares*		
15	257-360	A104	*Spares*		

(*) 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 PRI 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-PRI-6.2	
13	45-48	I4	File number	1	
14	49-64	A16	File name	ERS2.SAR.PRILEAD	
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	*Reserved*		
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	1	
32	199-204	I6	Map projection record length	1620	
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	*Spare*		
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 *PRI DATA SET SUMMARY RECORD*

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI product	UNITS
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	*Reserved*		
10	37-68	A32	Scene reference number (e.g. orbit - frame number)	ORBIT=12862- FRAME=3375	
11	69-100	A32	Scene centre time (UTC) <YYYYMMDDhhmmssttt>	19971005152522018	
12	101-116	A16	*Spare*		
13	117-132	F16.7	Processed scene centre geodetic latitude (positive for North latitude, negative for South latitude)	11.512	degrees
14	133-148	F16.7	Processed scene centre geodetic longitude (negative for West longitude)	285.210	degrees
15	149-164	F16.7	Processed scene centre true heading as calculated relative to North	195.2961097	
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	$kg.m/s^2$
20	229-244	A16	*Spare*		
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	*Spare*		
25	309-324	F16.7	*Reserved*		
26	325-332	I8	Scene centre line number (the line number at the scene centre including zero fill) (variable)	4133	

27	333-340	I8	Scene centre pixel number (the pixel number at the scene centre including zero fill) (nominal)	4000	
28	341-356	F16.7	Processed scene length including zero fill (nominal)	103.325	km
29	357-372	F16.7	Processed scene width including zero fill (nominal)	100	km
30	373-388	A16	*Spare*		

GENERAL MISSION / SENSOR PARAMETERS

31	389-392	I4	Number of SAR channels	1	
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	12862	
36	453-460	F8.3	Sensor platform geodetic latitude at nadir corresponding to scene centre (positive for North latitude)	10.867	degrees
37	461-468	F8.3	Sensor platform longitude at nadir corresponding to scene centre (negative for West longitude)	-72.166	degrees
38	469-476	F8.3	Sensor platform heading at nadir corresponding to scene centre (clockwise positive from North)	192.547	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 as derived from sensor platform orientation	22.972	degrees
41	493-500	F8.3	Radar frequency	5.3	GHz
42	501-516	F16.7	Radar wavelength	0.05666	meters
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/sec^2
54	679-694	E16.7	Nominal range pulse (chirp) phase coefficient quartic term	0.0E+00	Hz/sec^3
55	695-702	I8	Down linked data 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 (Not provided by the VMP)	5453.706	microsec
59	743-758	F16.7	Range pulse length	37.12	microsec
60	759-762	A4	*Reserved*		
61	763-766	A4	Range compressed flag (YES = range compressed data)	YES	
62-63	767-798	2 F16.7	*Reserved*		
64	799-806	I8	Quantization per channel I & Q (5I 5Q/6I 6Q for OGRC/OBRC	5	bits
65	807-818	A12	Quantizer descriptor	UNIFORM I Q	
66	819-834	F16.7	DC Bias for I-component (actual value)	0.151	
67	835-850	F16.7	DC Bias for Q-component (actual value)	0.117	
68	851-866	F16.7	Gain imbalance for I & Q (actual value)	1.005	
69-70	867-898	F16.7	*Spare*		
71	899-914	F16.7	*Reserved*		
72	915-930	F16.7	Antenna mechanical boresight angle relative to platform vertical axis at the start of the image positive to the right, negative to the left	20.355	degrees
73	931-934	A4	*Reserved*		
74	935-950	F16.7	Pulse Repetition Frequency (PRF) (actual value)	1679.902	Hz
75-76	951-966	F16.7	*Reserved*		

SENSOR SPECIFIC PARAMETERS

77	983-998	I16	Satellite encoded binary time code	2027258159	
78	999-1030	A32	Satellite clock time (UTC) <YYYYMMDDhhmmssttt>	19971005145658234	
79	1031-1038	I8	Satellite clock step length	3906249	nanosec
80	1039-1046	A8	*Spare*		

GENERAL PROCESSING PARAMETERS

81	1047-1062	A16	Processing facility identifier (KS, FS, MS, D-PAF, IP, ES, UK-PAF)	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	1079-1094	A16	*Reserved*		
85	1095-1110	A16	*Reserved*		
86	1111-1142	A32	Product type specifier	SAR PRECISION IMAGE	

87	1143-1174	A32	Processing algorithm identifier	RANGE DOPPLER	
88	1175-1190	F16.7	Nominal number of looks processed in azimuth	3	looks
89	1191-1206	F16.7	Nominal number of looks processed in range	1	looks
90	1207-1222	F16.7	Bandwidth per look in azimuth (null-to-null)	320	Hz
91	1223-1238	F16.7	Bandwidth per look in range	15.55	MHz
92	1239-1254	F16.7	Total processor bandwidth in azimuth	960	Hz
93	1255-1270	F16.7	Total processor bandwidth in range	15.55	MHz
94	1271-1302	A32	Weighting function designator in azimuth	HAMMING	
95	1303-1334	A32	Weighting function designator in range	HAMMING	
96	1335-1350	A16	Data input source	HDDT	
97	1351-1366	F16.7	Nominal resolution in range (3-dB width)	25	m
98	1367-1382	F16.7	Nominal resolution in azimuth (3-dB width)	22	m
99	1383-1398	F16.7	*Reserved*		
100	1399-1414	F16.7	*Reserved*		
101	1415-1430	F16.7	Along track Doppler frequency centroid at early edge of image constant term (Not provided by the VMP)	-9999999.9999999	Hz
102	1431-1446	F16.7	Along track Doppler frequency centroid at early edge of image linear term (Not provided by the VMP)	-9999999.9999999	Hz/sec
103	1447-1462	F16.7	Along track Doppler frequency centroid at early edge of image quadratic term (Not provided by the VMP)	-9999999.9999999	Hz/sec/sec
104	1463-1478	A16	*Spare*		
105	1479-1494	F16.7	Cross track Doppler frequency centroid at early edge of image constant term (Doppler centroid)	-417.947	Hz
106	1495-1510	F16.7	Cross track Doppler frequency centroid at early edge of image linear term (Slope of Doppler centroid)	2111156.0	Hz/sec
107	1511-1526	F16.7	Cross track Doppler frequency centroid at early edge of image quadratic term	-23225000000.0	Hz/sec/sec
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 by the VMP)	-9999999.9999999	Hz/sec
111	1559-1574	F16.7	Along track Doppler frequency rate at early edge of image linear term (Not provided by the VMP)	-9999999.9999999	Hz/sec/sec
112	1575-1590	F16.7	Along track Doppler frequency rate at early edge of image quadratic term (Not provided by the VMP)	-9999999.9999999	Hz/sec/sec/sec
113	1591-1606	A16	*Spare*		
114	1607-1622	F16.7	Cross track Doppler frequency rate at early edge of image constant term(Azimuth FM rate)	-2156.498	Hz/sec
115	1623-1638	F16.7	Cross track Doppler frequency rate at early edge of image linear term(Slope of Az. FM rate)	391931.99	Hz/sec/sec
116	1639-1654	F16.7	Cross track Doppler frequency rate at early edge of image quadratic term (Not provided by the VMP)	-9999999.9999999	Hz/sec/sec/sec
117	1655-1670	A16	*Spare*		

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	12.5	m
122	1703-1718	F16.7	Pixel spacing	12.5	m
123	1719-1734	A16	Processor range compression designator	EXTRACTED CHIRP	
124	1735-1750	A16	*Spare*		
125	1751-1766	A16	*Spare*		

SENSOR SPECIFIC LOCAL USE SEGMENT

126/1	1767-1782	F16.7	Zero-doppler range time (two-way) of first range pixel	5.522630	millisec
126/2	1783-1798	F16.7	Zero-doppler range time (two-way) of centre range pixel	5.6413780	millisec
126/3	1799-1814	F16.7	Zero-doppler range time (two-way) of last valid range pixel	5.7786810	millisec
126/4	1815-1838	A24	Zero-doppler azimuth time of first azimuth pixel (UTC) <dd-MMM-yyyy$hh:mm:ss.ttt>	05-OCT-1997 15:25:14.321	
126/5	1839-1862	A24	Zero-doppler azimuth time of centre azimuth pixel (UTC) <dd-MMM-yyyy$hh:mm:ss.ttt>	05-OCT-1997 15:25:22.018	
126/6	1863-1886	A24	Zero-doppler azimuth time of last azimuth pixel (UTC) <dd-MMM-yyyy$hh:mm:ss.ttt>	05-OCT-1997 15:25:29.715	

Table 7 *MAP PROJECTION DATA RECORD*

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI product	UNITS
1	1 - 4	B4	Record sequence number	3	
2	5	B1	1-st record sub-type code	10	
3	6	B1	Record-type code	20	
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	1620	
7	13-28	A16	*Spare*		

MAP PROJECTION GENERAL INFORMATION

8	29-60	A32	Map projection descriptor	Ground range	
9	61-76	I16	Number of pixels per line of image	8000	pixels
10	77-92	I16	Number of lines (variable)	8266	lines
11	93-108	F16.7	Nominal inter-pixel distance in output scene	12.5	m
12	109-124	F16.7	Nominal inter-line distance in output scene	12.5	m
13	125-140	F16.7	Orientation at output scene centre [for geocoded products this is simply the convergence of the meridians, ie: the angle between geographic north and map grid north (Angle of projection axis from true North)]	195.2961	degrees
14	141-156	F16.7	Nominal platform orbital inclination (168days=98.491, 35days=98.516, 3days=98.542)	98.542	degrees
15	157-172	F16.7	Actual ascending node (longitude at Equator) (not filled by the vmp)	-9999999.9999999	degrees
16	173-188	F16.7	Geocentre to platform distance at input scene centre (Not provided)	-9999999.9999999	km
17	189-204	F16.7	Platform geodetic altitude over the ellipsoid (Not provided)	-9999999.9999999	km
18	205-220	F16.7	Ground speed at nadir at input scene centre time (Not provided)	-9999999.9999999	km/s
19	221-236	F16.7	Platform heading at nadir corresponding to scene centre	192.547	degrees
20	237-268	A32	Name of reference ellipsoid	GEM6	
21	269-284	F16.7	Semimajor axis of ref.ellipsoid	6378.144	km
22	285-300	F16.7	Semiminor axis of ref.ellipsoid	6356.759	km
23 to 55	301-880	A580	*Reserved*		
56 to 59	881-944	4 A16	*Spares*		

COORDINATES OF FOUR CORNER POINTS

60 to 67	945-1072	A128	*Reserved*		
68	1073-1088	F16.7	1st line 1st pixel geodetic latitude (positive for North latitude)	11.876	degrees

69	1089-1104	F16.7	1st line 1st pixel longitude (negative for West longitude)	285.750	degrees
70	1105-1120	F16.7	1st line last valid pixel geodetic latitude	12.061	degrees
71	1121-1136	F16.7	1st line last valid pixel longitude	284.866	degrees
72	1137-1152	F16.7	Last line last valid pixel geodetic latitude	11.148	degrees
73	1153-1168	F16.7	Last line last valid pixel longitude	284.670	degrees
74	1169-1184	F16.7	Last line 1st pixel geodetic latitude	10.962	degrees
75	1185-1200	F16.7	Last line 1st pixel longitude	285.551	degrees
76 to 96	1201-1620	A420	*Reserved & spares*		

Table 8 *PRI PLATFORM POSITION DATA RECORD*

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI product	UNITS
1	1 - 4	B4	Record sequence number	4	
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)	1620	
7	13-44	A32	*Reserved*		
8 to 13	45-140	6 F16.7	*Reserved*		

POSITIONAL DATA POINTS

14	141-144	I4	Number of data points (always equal to 5 for the VMP)	5	
15	145-148	I4	Year of data point <YYYY>	1997	
16	149-152	I4	Month of data point <$$MM>	10	
17	153-156	I4	Day of data point <$$DD>	05	
18	157-160	I4	Day in the year <GMT> (1st January = Day 1)	278	
19	161-182	D22.15	Seconds of day of data	5.5514273E+04	sec
20	183-204	D22.15	Time interval between data points	4.018E+00	sec
21	205-268	A64	Reference coordinate system	Earth Centred Rotating	
22	269-290	D22.15	Greenwich mean hour angle (Not provided by the VMP)	-9.99E+03	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	.....				

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

Table 9 *PRI FACILITY RELATED DATA RECORD [GENERAL TYPE]*

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI product	UNITS
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 GENERAL TYPE]	

SIGNAL DATA QUALITY

8	77-82	A6	Date of last release of QC software < YYMMDD>		
9	83-84	A2	*Spare*		
10	85-90	A6	Date of the last calibration update <YYMMDD>	950713	
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 pulse width of (first) Chirp Replica Cross Correlation Function (CCF)	1.109	samples
28	171-186	F16.7	First side lobe level of chirp CCF	-10.413	dB
29	187-202	F16.7	ISLR of chirp CCF function	-7.154	dB

30	203-218	F16.7	Doppler centroid confidence measure (processor specific) (value normalized such that it takes a value of zero for the best case and a value of one for the worst case)	0.019	
31	219-234	F16.7	Doppler ambiguity confidence measure (processor specific) (value normalized such that it takes a value of one for the best case and a value of zero for the worst case)	0.954	
32	235-250	F16.7	Estimated mean of I input data (once the nominal bias of 15.5 has been applied)	-0.151	
33	251-266	F16.7	Estimated mean of Q input data (once the nominal bias of 15.5 has been applied)	-0.117	
34	267-282	F16.7	Estimated standard deviation of I input data	6.506	
35	283-298	F16.7	Estimated standard deviation of Q input data	6.473	
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	*Spare*		

CALIBRATION INFORMATION

40	363-378	F16.7	Bias correction applied to I channel (to be added to the nominal bias)	0.151	
41	379-394	F16.7	Bias correction applied to Q channel (to be added to the nominal bias)	0.117	
42	395-410	F16.7	I/Q gain imbalance correction (applied to I channel)	1	
43	411-426	F16.7	I/Q gain imbalance correction (applied to Q channel)	1.005	
44	427-442	F16.7	I/Q non-orthogonality correction (applied to Q channel)	1.003	
45	443-458	A16	*Spare*		
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	194215.0	
56	583-598	F16.7	Incidence angle at first range pixel (at mid-azimuth)	19.390	degrees
57	599-614	F16.7	Incidence angle at centre range pixel (at mid-azimuth)	22.972	degrees
58	615-630	F16.7	Incidence angle at last valid range pixel (at mid-azimuth)	26.409	degrees
59	631-646	F16.7	Slant range reference (for range spreading loss compensation)	847.0	km
60	647-658	A12	*Spare*		
61	659-662	I4	Antenna pattern correction flag (0 = no correction)	1	
62	663-678	F16.7	Absolute calibration constant K (scalar)	944061	
63	679-694	F16.7	Upper bound calibration constant K (+ 0.75 dB)	1035140	

64	695-710	F16.7	Lower bound calibration constant K (- 0.75 dB)	860993	
65	711-726	F16.7	Estimated noise equivalent s ^{0} (ERS-1 : -25.0, ERS-2 : -24.0)	-24.0	dB
66	727-732	A6	Date on which K was generated as YYMMDD	950713	
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)	0100	

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	*Spare*		
71	769-784	F16.7	Output image mean	305.568	
72	785-800	F16.7	Output image standard deviation	155.078	
73	801-816	F16.7	Output image maximum value (Not provided by the VMP)	-9999999.9999999	
74	817-840	A24	Time of raw data first input range line (UTC) <dd-MMM-yyyy$hh:mm:ss.ttt>	5-OCT-1997 15:25:14.273	
75	841-864	A24	Time of ascending node state vector (UTC) <dd-MMM-yyyy$hh:mm:ss.ttt>		
76 to 81	865-996	6 D22.15	Ascending node state vectors (X,Y,Z,X',Y',Z')		m & m/s
82	997-1000	I4	Output pixel bit length	16	bits
83	1001-1016	F16.7	Processor gain #1	1.682	
84	1017-1032	F16.7	Processor gain #2	1.000	
85	1033-1048	F16.7	Processor gain #3	1.000	
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]	30	samples
87	1053-1068	F16.7	3-dB width of Cross Correlation Function (CCF) between last extracted chirp and nominal chirp	1.109	samples
88	1069-1084	F16.7	First side lobe level of chirp (CCF) between last extracted chirp and nominal chirp	-10.323	dB
89	1085-1100	F16.7	ISLR of chirp CCF between last extracted chirp and nominal chirp	-7.118	dB
90	1101-1104	I4	Peak location of Cross Correlation Function (CCF) between last extracted chirp and nominal chirp	30	samples
91	1105-1108	I4	Roll tilt mode flag (0 = not in roll tilt mode)	0	
92	1109-1112	I4	Raw data correction flag (0 = correction with defaults parameters)	1	
93	1113-1116	I4	Look detection flag (1 = power detected and summed)	1	
94	1117-1120	I4	Doppler ambiguity estimation flag (0 = no estimation done)	1	
95	1121-1124	I4	Azimuth baseband conversion flag (0 = no conversion done)	1	
96	1125-1128	I4	Samples per line used for the raw data analysis (nominal)	1000	samples
97	1129-1132	I4	Range lines skip factor for raw data analysis	10	lines

98	1133-1156	A24	Time of input state vector (UTC) used to processed the image <dd-MMM-yyyy$hh:mm:ss.ttt>	05-OCT-1997 15:25:00.000	
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 = near scene state vectors, i.e. restituted, preliminary or precise orbit)	1	
106	1293-1308	F16.7	Window coefficient for range-matched filter	0.75	
107	1309-1324	F16.7	Window coefficient for azimuth-matched filter	0.75	
108	1325-1328	I4	Update period of range-matched filter	2000	chirps
109	1329-1456	8 F16.7	Look scalar gains (up to 8 looks)	1,1,1,0,0,0,0,0	
110	1457-1460	I4	Sampling window start time bias	6265	nanosec
111	1461-1482	D22.15	Doppler centroid cubic coefficient	-5.0 E+12	Hz/sec^3
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)	799	
115	1495-1498	I4	Sampl. wind. start time code of last range line (telemetry value)	799	
116	1499-1502	I4	Calibration system gain of last processed line (telemetry value)	7	
117	1503-1506	I4	Receiver gain of last processed line (telemetry value)	19	
118	1507-1510	I4	First processed range sample	1	
119	1511-1514	I4	Azimuth FFT/IFFT ratio	4	
120	1515-1518	I4	Number of azimuth blocks processed	15	
121	1519-1526	I8	Number of input raw data lines (variable)	26632	lines
122	1527-1530	I4	Initial Doppler ambiguity number	0	
123	1531-1578	3 F16.7	Chirp quality thresholds - Pulse width of the chirp CCF - First sidelobe of the chirp CCF - ISLR of the chirp CCF	 1.2 -11.0 -8.0	 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	0.05,0.95	

	1675-1706	2F16.7	Output data statistic thresholds - Mean of output data - Standard deviation of output data	 200 100	
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)	7876	pixels
126	1727-1730	I4	Number of range samples discarded during processing interpolations	9	samples
127	1731-1746	F16.7	I/Q gain imbalance - Lower bound	0.997	
128	1747-1762	F16.7	I/Q gain imbalance - Upper bound	1.002	
129	1763-1778	F16.7	I/Q quadrature departure - Lower bound	0.972	degrees
130	1779-1794	F16.7	I/Q quadrature departure - Upper bound	0.972	degrees
131	1795-1810	F16.7	3-dB look bandwidth	177.5	Hz
132	1811-1826	F16.7	3-dB processed Doppler bandwidth	817.5	Hz
133	1827-1830	I4	Range spreading loss compensation flag (0 = no compensation)	1	
134	1831-1832	I1	Datation flag (1 = azimuth timing improved based on timing information of range line specified in field 136)	1	
135	1833-1838	I7	Maximum error of range line timing	332082	nanosec
136	1839-1844	I7	Format number of range line used to synchronize the azimuth timing	342264	
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 by the VMP)	-999	
139	1851-1854	I4	Replica normalisation method flag (0 = normalised by replica power, i.e. $Z' = Z \cdot {}^{c}/A_r$ where A_r is the replica power and c is specified in field 54, 1 = normalised by the square root of replica power, i.e. $Z' = Z / Ar$)	0	
140	1855-1934	4 E20.10	4 coefficients of the ground range to slant range conversion polynomial . • For the VMP, the coefficients can be used to calculate the range time of the output range sample as follows : $Tn = (C0 + C1.Gn + C2.Gn^2 + C3.Gn^3) / Fr + T0$ where : Gn is ground range of sample n from first range sample in metres Fr is the range sampling rate in Hz (field DSS 57) T0 is the range time of the first output range sample (field DSS 126/1) • For the Bangkok processor, the coefficients can be used to calculate the slant range sample corresponding to the output range sample as follows : $Sn = C0 + C1.Gn + C2.Gn^2 + C3.Gn^3$ where : Gn is ground range sample number n Sn is the corresponding slant range sample n	4.54....e-13 4.19....e-02 7.76....e-08 -3.37....e-14	

141	1935-2034	5 E20.10	5 coefficients of the antenna elevation pattern polynomial. • For the VMP, the coefficients can be used to calculate the antenna elevation pattern as a function of range time as follows : $At = C0 + C1.T + C2.T^2 + C3.T^3 + C4.T^4$ where : At is expressed in dB T is the range time relative to the polynomial origin in seconds (field 142) • For the Bangkok processor, the coefficients can be used to calculate the antenna elevation pattern as a function of range pixel look angle as follows : $At = C0 + C1.T + C2.T^2 + C3.T^3 + C4.T^4$ where : At is expressed in natural value (not in dB) from 1 to 0 T is the range pixel look angle in degrees **This field is not relevant for the VMP version 6.0 and above, for which there is a linear interpolation of the antenna pattern.**	-7.1206316E+02 1.4109934E+02 -1.0455099E+01 3.4380848E-01 -4.2333874E-03	
142	2035-2050	E16.7	Range time of origin of antenna pattern polynomial **This field is not relevant for the VMP version 6.0 and above, for which there is a linear interpolation of the antenna pattern.**	5.6293510E+06	sec
143	2051-12288	A10238	*Spare*		

Table 10 *PRI FACILITY RELATED DATA RECORD PCS TYPE*

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI product	UNITS
1	1 - 4	B4	Record sequence number	6	
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 11 *SAR DATA FILE , FILE DESCRIPTOR RECORD (FIXED SEGMENT)*

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI product	UNITS
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	16012	
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-PRI-6.2	
13	45-48	I4	File number	2	
14	49-64	A16	File name	ERS.SAR.PRIIMGY	
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	*Reserved*		
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 (nominal)	8200	
30	187-192	I6	SAR DATA record length	16012	bytes
31	193-216	A24	*Reserved*		

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 (nominal)	8200	
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 (variable)	8000	
40	257-260	I4	Number of right border pixels per line (variable)	301	
41	261-264	I4	Number of top border 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	0	
47	281-288	I8	Number of bytes of SAR data(or pixel data) per record(nominal)	16000	
48	289-292	I4	Number of bytes of suffix data per record	0	
49-55	293-340	A48	*Reserved*		
56	341-368	A28	Blanks		
57-60	369-400	A32	*Reserved*		
61	401-428	A28	SAR Data format type identifier	UNSIGNED INTEGER	
62	429-432	A4	SAR Data format type code	U12	
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	32767	
66	449-EOR	A15564	*Spare*		

Table 12 *IMAGERY OPTIONS FILE, PROCESSED DATA RECORD*

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI product	UNITS
1	1-4	B4	Record sequence number	2	
2	5	B1	1st record sub-type code	50	
3	6	B1	Record sub-type code	11	
4	7	B1	2nd record sub-type code	31	
5	8	B1	3rd record sub-type code	20	
6	9-12	B4	Length of this record (nominal)	16012	
7	13-14	B2	First sample of image line		
8	15-16	B2	Second sample of image line		
...	...	...	....		
5006	16011-16012	B2	Last sample of image line		

5. NULL VOLUME FORMAT DEFINITION

Table 13 *NULL VOLUME DESCRIPTOR RECORD*

FIELD	BYTES	FORMAT	DESCRIPTION	EXAMPLE with PRI 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-PRI-6.2	
13	45-60	A16	ID of physical volume containing this volume descriptor	1	
14	61-76	A16	Logical volume identifier	0008105400016659	
15	77-92	A16	Volume set identifier	199710 515251427	
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 volume	1	
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)	19980511	
24	121-128	A8	Logical volume creation time (hhmmssdd, dd-deci-seconds) (dd not provided)	210737	
25	129-140	A12	Logical volume generation country(GERMANY, UK, 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		