RE-ENGINEERING OF MISSION ANALYSIS SOFTWARE FOR ENVISAT-1

Mission File Formats

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1 SCOPE

This document describes the formats for the files used by the ENVISAT-1 Mission CFI Software.

2 ACRONYMS AND NOMENCLATURE

2.1 Acronyms

AOCS	Attitude and Orbit Control System
ANX	Ascending Node Crossing
CFI	Customer Furnished Item
CS	Coordinate System
DRS	Data Relay Satellite
ESA	European Space Agency
ESTEC	European Space Technology and Research Centre
FOS	Flight Operation Segment
GS	Ground Station
H/W	Hardware
I/F	Interface
K-V	Keyword-Value
LOS	Line Of Sight
PPF	Polar Platform
RAM	Random Access Memory
SBT	Satellite Binary Time
SOBM	Sun Occultation By Moon
SUM	Software User Manual
S/W	Software
SZA	Sun Zenith Angle
UTC	Universal Time Coordinated
UT1	Universal Time UT1
SSP	Sub Satellite Point

2.2 Nomenclature

CFI	A group of CFI functions, and related software and documentation, that will be distributed by ESA to the users as an independent unit
CFI function	A single function within a CFI that can be called by the user
Library	A software library containing all the CFI functions included within a CFI plus the supporting functions used by those CFI functions (transparently to the user)

3 APPLICABLE AND REFERENCE DOCUMENTS

3.1 Applicable documents

AD 1 ESA Software Engineering Standards. ESA PSS-05-0. ESA. Issue 2. February 1991

3.2 Reference documents

RD 1 Envisat-1 Mission CFI Software Description and Interface Definition Document. PO-ID-ESA-SY-00412

RD 2 Envisat-1 Mission CFI Software. Mission Conventions Document. PO-IS-GMV-GS-0561

RD 3 Envisat-1 Mission CFI Software General Software User Manual. PO-IS-DMS-GS-0556

4 FILES FORMAT SPECIFICATION

This section presents the formats for all the files used by the ENVISAT CFI software.

The files used by the CFI can be:

- External: Files generated and/or used for the CFI software and other external facilities.
- Internal: Files used only in the CFI as data.

All internal files are written in ASCII with Keyword-Value format. Following the usual format for the ENVISAT Files, the file can contain:

- A fixed header: The format for the fixed header is common to all ENVISAT Files and always contain the same data (see section 4.1).
- Optonally it can contain a variable header.
- A data block containing the input/output data for the functions.

The following sections describe the format for all ENVISAT mission files, but in general, the structrure of a file will be:

```
FILE ; ENVISAT file
;---------------------------------------------------
RECORD fhr ; Fixed Header

FILENAME="an_envisat_file.txt"

DESTINATION="PDS,FOS  "
PHASE_START=+000
CYCLE_START=+000
REL_START_ORBIT=+00000
ABS_START_ORBIT=+00000

ENDRECORD fhr
;---------------------------------------------------
RECORD xxx_vhr ; Variable Header

[...]

ENDRECORD xxx_vhr

;---------------------------------------------------

[ data block ]

;---------------------------------------------------

ENDFILE
```

4.1 Fixed Header

4.1.1 Format

The Fixed Header is a K-V record. Many of its fields are redundant with the File Name elements, but are present in more readable form in the Fixed Header, whereas in File Name they are more compact for obvious reasons. Its format is described in the followig table:

Table 1: Fixed header format

N	Description	units	Byte Length	Data Type	C Format
1	**FILENAME=**	keyword	9	string	%4s
	filename			string	%s
	newline character	terminator	1	string	\n
2	**DESTINATION=**	keyword	12	string	%4s
	destination			string	%s
	newline character	terminator	1	string	\n
3	**PHASE_START=**	keyword	12	string	%4s
	phase start		4	+xxx	%+04ld
	newline character	terminator	1	string	\n
4	**CYCLE_START=**	keyword	12	string	%4s
	cycle start		4	+xxx	%+04ld
	newline character	terminator	1	string	\n
5	**REL_START_ORBIT=**	keyword	16	string	%4s
	relative start orbit		6	+xxxxx	%+06ld
	newline character	terminator	1	string	\n
6	**ABS_START_ORBIT=**	keyword	16	string	%4s
	absolute start orbit		6	+xxxxx	%+06ld
	newline character	terminator	1	string	\n

4.1.2 Example

```
RECORD fhr ; Fixed Header

FILENAME="MPL_GND_DBTRGT19970515_120000_00000000_00000000_19950101_000000_20100101_000000.N1"
DESTINATION="PDS,FOS  "
PHASE_START=+000
CYCLE_START=+000
REL_START_ORBIT=+00000
ABS_START_ORBIT=+00000

ENDRECORD fhr
```

4.2 FOS Predicted orbit file

Table 2: FOS Predicted orbit file

N	Description	units	Byte Length	Data Type	C Format
1	**FILE**	keyword	4	string	%4s
	; FOS Predicted Orbit file	comment		string	%s
	newline character	terminator	1	string	\n
2	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	fhr	keyword	3	string	%3s
	blank space		1	string	%1s
	; Fixed Header	comment		string	%s
	newline character	terminator	1	string	\n
3	**Fixed header record (see section 4.1)**				
4	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	fhr	keyword	3	string	%3s
	newline character	terminator	1	string	\n
5	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	fos_vhr	keyword	7	string	%7s
	blank space		1	string	%1s
	; Variable Header	comment		string	%s
	newline character	terminator	1	string	\n
6	**fos_vhr (see section 4.2.1)**				
7	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	fos_vhr	keyword	7	string	%7s
	newline character	terminator	1	string	\n
	; Variable Header	comment		string	%s
8	**Data block (see section 4.2.2)**				

4.2.1 FOS Predicted Orbit File. Variable Header

Table 3: FOS Predicted Orbit File. Variable Header.

N	Description	units	Byte Length	Data Type	C Format
1	**START_TIME=**	keyword	11	string	%11s
	quotation mark	-	1	string	\"
	start_time		27	string	%27s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
2	**STOP_TIME=**	keyword	10	string	%10s
	quotation mark	-	1	string	\"
	stop_time		27	string	%27s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
4	newline character	terminator	1	string	\n
4	**LEAP_UTC=**	keyword	10	string	%10s
	quotation mark	-	1	string	\"
	leap_utc		27	string	%27s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
5	**LEAP_SIGN=**	keyword	10	string	%10s
	leap_sign		6	+xxxxx	%d
	newline character	terminator	1	string	\n
6	newline character	terminator	1	string	\n
7	**RECORD_SIZE=**	keyword	11	string	%11s
	record_size		6	+xxxxx	%d
	newline character	terminator	1	string	\n
8	**NUM_REC=**	keyword	7	string	%7s
	num_rec		6	+xxxxx	%d
	newline character	terminator	1	string	\n
9	newline character	terminator	1	string	\n

4.2.2 FOS Predicted Orbit File Data Block

The data block does not follow the keyword value structure. It is formed by a list of state vectors arranged in lines. Each line contains the data with the following format:

Table 4: FOS Predicted file. Data Block

N	Description	units	Byte Length	Data Type	C Format
1	UTC date		27	string	%27s
2	blank space		1	string	%1s
3	Delta UT1		8	+.xxxxxx	%f
4	blank space		1	string	%1s
5	Absolute orbit		6	+xxxxx	%d
6	blank space		1	string	%1s
7	Position X		12	+xxxxxx.xxx	%+12.3f
8	blank space		1	string	%1s
9	Position Y		12	+xxxxxx.xxx	%+12.3f
10	blank space		1	string	%1s
11	Position Z		12	+xxxxxx.xxx	%+12.3f
12	blank space		1	string	%1s
13	Velocity X		12	+xxxx.xxxxxx	%+12.6f
14	blank space		1	string	%1s
15	Velocity Y		12	+xxxx.xxxxxx	%+12.6f
16	blank space		1	string	%1s
17	Velocity Z		12	+xxxx.xxxxxx	%+12.6f
18	blank space		1	string	%1s
19	Quality		6	string	%6s
20	newline character	terminator	1	string	\n

4.2.3 Example

```
FILE ;FOS Predicted Orbit File
;---------------------------------------------------
RECORD fhr ; Fixed Header

FILENAME="AUX_FPO_AXTFOS19980820_071856_00000000_00000001_19990320_194232_19990327_105531.N1"

DESTINATION="........."
PHASE_START=+001
```

```
CYCLE_START=+001
REL_START_ORBIT=+00001
ABS_START_ORBIT=+00000

ENDRECORD fhr
;-------------------------------------------------
RECORD fos_vhr ; Variable Header

START_TIME="21-MAR-1999 22:00:05.193000"
STOP_TIME="26-MAR-1999 19:21:09.901000"

LEAP_UTC="00-JAN-2000 00:00:00.000000"
LEAP_SIGN=+00000

RECORD_SIZE=+00129  ; includes newline character
NUM_REC=+00071

ENDRECORD fos_vhr
;-------------------------------------------------
21-MAR-1999 22:00:05.193000 +.500000 +00000 +7165345.243 +0000559.365 +0000004.193 -0008.567013
-1631.450004 +7377.279119 QQQQQQ
21-MAR-1999 23:40:41.184000 +.500000 +00001 +6486309.722 -3044730.157 +0000487.568 -0701.614621
-1472.889214 +7377.241591 QQQQQQ
[...]
26-MAR-1999 19:21:09.901000 +.500000 +00070 +5509926.155 +4580015.134 -0001332.446 +1037.033011
-1258.676060 +7377.187678 QQQQQQ
```

4.3 FOS Restituted Orbit File

Table 5: FOS Restituted Orbit File

N	Description	units	Byte Length	Data Type	C Format
1	**PRODUCT=**	keyword	8	string	%8s
	quotation mark	-	1	string	\"
	filename	keyword		string	%s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
2	**PROC_STAGE=**	keyword	11	string	%11s
	procedure		1	string	%1s
	newline character	terminator	1	string	\n
4	**REF_DOC=**	keyword	8	string	%8s
	quotation mark	-	1	string	\"
	reference document		7	string	%7s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
5	newline character	terminator	1	string	\n
6	**ACQUISITION_STATION=**	keyword	20	string	%20s
	quotation mark	-	1	string	\"
	reference document		20	string	%20s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
7	**PROC_CENTER=**	keyword	12	string	%12s
	quotation mark	-	1	string	\"
	processing center		6	string	%6s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
8	**SOFTWARE_VER=**	keyword	10	string	%10s
	quotation mark	-	1	string	\"
	software version		27	string	%27s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
9	newline character	terminator	1	string	\n

Table 5: FOS Restituted Orbit File

N	Description	units	Byte Length	Data Type	C Format
10	**SENSING_START=**	keyword	14	string	%14s
	quotation mark	-	1	string	\"
	sensing start		27	string	%27s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
11	**SENSING_STOP=**	keyword	13	string	%13s
	quotation mark	-	1	string	\"
	sensing stop		27	string	%27s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
12	newline character	terminator	1	string	\n
13	**PHASE=**	keyword	6	string	%6s
	phase		1	string	%1s
	newline character	terminator	1	string	\n
14	**CYCLE=**	keyword	6	string	%6s
	cycle number		4	+xxx	%+03
	newline character	terminator	1	string	\n
15	**REL_ORBIT=**	keyword	10	string	%10s
	relative orbit		6	+xxxxx	%d
	newline character	terminator	1	string	\n
16	**ABS_ORBIT=**	keyword	10	string	%10s
	absolute orbit		6	+xxxxx	%d
	newline character	terminator	1	string	\n
17	**STATE_VECTOR_TIME=**	keyword	18	string	%18s
	quotation mark	-	1	string	\"
	state vector time		27	string	%27s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n

Table 5: FOS Restituted Orbit File

N	Description	units	Byte Length	Data Type	C Format
18	**DELTA_UT1=**	keyword	10	string	%10s
	delta UT1		8	+.xxxxxx	%+8.6f
	<s>	units	3	string	%3s
	newline character	terminator	1	string	\n
19	**X_POSITION=**	keyword	6	string	%6s
	positon (x coordinate)		12	+xxxxxxx.xxx	%12.3f
	<m>	units	3	string	%3s
	newline character	terminator	1	string	\n
20	**Y_POSITION=**	keyword	6	string	%6s
	positon (y coordinate)		12	+xxxxxxx.xxx	%12.3f
	<m>	units	3	string	%3s
	newline character	terminator	1	string	\n
21	**Z_POSITION=**	keyword	6	string	%6s
	positon (z coordinate)		12	+xxxxxxx.xxx	%12.3f
	<m>	units	3	string	%3s
	newline character	terminator	1	string	\n
22	**X_VELOCITY=**	keyword	6	string	%6s
	velocity (x coordinate)		12	+xxxxxxx.xxx	%12.6f
	<m/s>	units	5	string	%5s
	newline character	terminator	1	string	\n
23	**Y_VELOCITY=**	keyword	6	string	%6s
	velocity (y coordinate)		12	+xxxxxxx.xxx	%12.6f
	<m/s>	units	5	string	%5s
	newline character	terminator	1	string	\n
14	**Z_VELOCITY=**	keyword	6	string	%6s
	velocity (z coordinate)		12	+xxxxxxx.xxx	%12.6f
	<m/s>	units	5	string	%5s
	newline character	terminator	1	string	\n

Table 5: FOS Restituted Orbit File

N	Description	units	Byte Length	Data Type	C Format
15	**VECTOR_SOURCE=**	keyword	14	string	%14s
	quotation mark	-	1	string	\"
	vector source		2	string	%2s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
16	newline character	terminator	1	string	\n
17	**UTC_SBT_TIME=**	keyword	13	string	%13s
	quotation mark	-	1	string	\"
	UTC satellite binary time		27	string	%27s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
18	**SAT_BINARY_TIME=**	keyword	16	string	%16s
	satellite binary time		11	+xxxxxxxxxx	%+11f
	newline character	terminator	1	string	\n
19	**CLOCK_STEP=**	keyword	6	string	%6s
	clock step		11	+xxxxxxxxx	%11f
	<ps>		4	string	%4s
	newline character	terminator	1	string	\n
20	newline character	terminator	1	string	\n
21	**LEAP_UTC=**	keyword	9	string	%9s
	quotation mark	-	1	string	\"
	UTC time before the leap second		27	string	%27s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
22	**LEAP_SIGN=**	keyword	10	string	%10s
	leap second sign		4	+xxx	%4d
	newline character	terminator	1	string	\n
23	**LEAP_ERR=**	keyword	9	string	%9s
	leap error		1	string	%1s
	newline character	terminator	1	string	\n
24	newline character	terminator	1	string	\n

Table 5: FOS Restituted Orbit File

N	Description	units	Byte Length	Data Type	C Format
25	**PRODUCT_ERR=**	keyword	12	string	%12s
	product error		1	string	%1s
	<ps>		4	string	%4s
	newline character	terminator	1	string	\n
26	**TOT_SIZE=**	keyword	6	string	%6s
	total size		20	+x (*20)	%20d
	<bytes>		4	string	%4s
	newline character	terminator	1	string	\n
27	**SPH_SIZE=**	keyword	6	string	%6s
	SPH size		11	+xxxxxxxxx	%11f
	<bytes>		4	string	%4s
	newline character	terminator	1	string	\n
28	**NUM_DSD=**	keyword	6	string	%6s
	Number of DSD		11	+xxxxxxxxx	%11f
	newline character	terminator	1	string	\n
29	**DSD_SIZE=**	keyword	6	string	%6s
	DSD size		11	+xxxxxxxxx	%11f
	<bytes>		4	string	%4s
	newline character	terminator	1	string	\n
30	**NUM_DATA_SETS=**	keyword	6	string	%6s
	Number of data sets		11	+xxxxxxxxx	%11f
	newline character	terminator	1	string	\n
31	newline character	terminator	1	string	\n
32	**SPH_DESCRIPTOR=**	keyword	15	string	%15s
	quotation mark	-	1	string	\"
	SPH Descriptor		28	string	%28s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
33	newline character	terminator	1	string	\n

Table 5: FOS Restituted Orbit File

N	Description	units	Byte Length	Data Type	C Format
34	**DS_NAME=**	keyword	8	string	%8s
	quotation mark	-	1	string	\"
	DS name		28	string	%28s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
35	**DS_TYPE=**	keyword	8	string	%8s
	DS type		1	string	%1s
	newline character	terminator	1	string	\n
36	**FILENAME=**	keyword	9	string	%9s
	quotation mark	-	1	string	\"
	filename		62	string	%62s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
37	**DS_OFFSET=**	keyword	10	string	%10s
	quotation mark	-	1	string	\"
	DS offset		20	string	%20s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
38	**DS_SIZE=**	keyword	8	string	%8s
	quotation mark	-	1	string	\"
	DS size		20	string	%20s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
39	**NUM_DSR=**	keyword	8	string	%8s
	quotation mark	-	1	string	\"
	Number of DSR		10	string	%10s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n

Table 5: FOS Restituted Orbit File

N	Description	units	Byte Length	Data Type	C Format
40	**DSR_SIZE=**	keyword	9	string	%9s
	quotation mark	-	1	string	\"
	DSR size		10	string	%10s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
41	newline character	terminator	1	string	\n
42	**Data block (see section 4.3.1)**				

4.3.1 FOS Restituted File Data Block

The data block does not follow the keyword value structure. It is formed by a list of state vectors arranged in lines. Each line contains the data with the following format:

Table 6: FOS Restituted file. Data Block

N	Description	units	Byte Length	Data Type	C Format
1	UTC date		27	string	%27s
2	blank space		1	string	%1s
3	Delta UT1		8	+.xxxxxx	%f
4	blank space		1	string	%1s
5	Absolute orbit		6	+xxxxx	%d
6	blank space		1	string	%1s
7	Position X		12	+xxxxxx.xxx	%+12.3f
8	blank space		1	string	%1s
9	Position Y		12	+xxxxxx.xxx	%+12.3f
10	blank space		1	string	%1s
11	Position Z		12	+xxxxxx.xxx	%+12.3f
12	blank space		1	string	%1s
13	Velocity X		12	+xxxx.xxxxxx	%+12.6f
14	blank space		1	string	%1s
15	Velocity Y		12	+xxxx.xxxxxx	%+12.6f
16	blank space		1	string	%1s

Table 6: FOS Restituted file. Data Block

N	Description	units	Byte Length	Data Type	C Format
17	Velocity Z		12	+xxxx.xxxxxx	%+12.6f
18	blank space		1	string	%1s
19	Quality		6	string	%6s
20	newline character	terminator	1	string	\n

4.3.2 Example

```
PRODUCT="FOS_RESTITUTED_FILE.N1"
PROC_STAGE=T
REF_DOC="PO-RS-MDA-GS-2009_3/A  "

ACQUISITION_STATION="FOS-ES              "
PROC_CENTER="FOS-ES"
PROC_TIME="12-APR-1993 21:55:00.000000"
SOFTWARE_VER="--------------"

SENSING_START="11-APR-1993 01:05:00.000000"
SENSING_STOP="11-APR-1993 22:51:00.000000"

PHASE=A
CYCLE=+018
REL_ORBIT=+00062
ABS_ORBIT=+09080
STATE_VECTOR_TIME="11-APR-1993 01:05:00.000000"
DELTA_UT1=-.300000<s>
X_POSITION=+4791268.310<m>
Y_POSITION=-5314177.402<m>
Z_POSITION=+0377784.560<m>
X_VELOCITY=-1477.354005<m/s>
Y_VELOCITY=-0796.173445<m/s>
Z_VELOCITY=+7366.695184<m/s>
VECTOR_SOURCE="FR"

UTC_SBT_TIME="DD-MMM-YYYY HH:MM:SS.mmmmmm"
SAT_BINARY_TIME=+xxxxxxxxxx
CLOCK_STEP=+xxxxxxxxxx<ps>

LEAP_UTC="DD-MMM-YYYY 00:00:00.000000"
LEAP_SIGN=+001
LEAP_ERR=0

PRODUCT_ERR=0
TOT_SIZE=+00000000000000170228<bytes>
SPH_SIZE=+0000000378<bytes>
```

```
NUM_DSD=+0000000001
DSD_SIZE=+0000000280<bytes>
NUM_DATA_SETS=+0000000001

SPH_DESCRIPTOR="FOS Restituted Orbit        "

DS_NAME="FOS Restituted Orbit        "
DS_TYPE=G
FILENAME="------------------------------------------------------------------"
DS_OFFSET=+0000000000000001625<bytes>
DS_SIZE=+0000000000000168603<bytes>
NUM_DSR=+0000001307
DSR_SIZE=+0000000129<bytes>

11-APR-1993 01:05:00.000000 -.300000 +09080 +4791268.310 -5314177.402 +0377784.560 -1477.354005
-0796.173445 +7366.695184 QQQQQQ
[...]
11-APR-1993 22:49:00.000000 -.300000 +09092 +6897673.881 -1457761.954 -1289087.563 +0951.403910
-1876.626075 +7253.870468 QQQQQQ
11-APR-1993 22:50:00.000000 -.300000 +09092 +6940847.237 -1567666.016 -0851617.979 +0487.352580
-1784.975099 +7323.697464 QQQQQQ
11-APR-1993 22:51:00.000000 -.300000 +09092 +6956132.713 -1671738.380 -0410816.656 +0022.127435
-1682.297302 +7364.889082 QQQQQQ
```

4.4 Orbit Scenario File

Table 7: Orbit Scenario file

N	Description	units	Byte Length	Data Type	C Format
1	**FILE**	keyword	4	string	%4s
	; Orbit Scenario file	comment		string	%s
	newline character	terminator	1	string	\n
2	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	fhr	keyword	3	string	%3s
	blank space		1	string	%1s
	; Fixed Header	comment		string	%s
	newline character	terminator	1	string	\n
3	**Fixed header record (see section 4.1)**				
4	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	fhr	keyword	3	string	%3s
	newline character	terminator	1	string	\n
5	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	osf_vhr	keyword	7	string	%7s
	blank space		1	string	%1s
	; Variable Header	comment		string	%s
	newline character	terminator	1	string	\n
6	**Fixed header record (see section 4.4.1)**				
7	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	osf_vhr	keyword	7	string	%7s
	newline character	terminator	1	string	\n
8	**; Variable Header**	comment		string	%s
9	**Data block (see section 4.4.2)**				
10	**ENDFILE**	keyword	7	string	%7s

4.4.1 OSF Variable header

Table 8: Orbit Scenario file. Variable header

N	Description	units	Byte Length	Data Type	C Format
1	**PHASE_STOP=**	keyword	6	string	%6s
	phase stop		4	+xxx	%0+4d
	newline character	terminator	1	string	\n
2	**CYCLE_STOP=**	keyword	11	string	%11s
	cycle stop		4	+xxx	%0+4d
	newline character	terminator	1	string	\n
3	**REL_STOP_ORBIT=**	keyword	16	string	%16s
	relative stop orbit		6	+xxxxx	%0+6d
	newline character	terminator	1	string	\n
4	**ABS_STOP_ORBIT=**	keyword	11	string	%11s
	absolute stop orbit		6	+xxxxx	%0+6d
	newline character	terminator	1	string	\n
5	newline character	terminator	1	string	\n
6	**NUM_SZA=**	keyword	8	string	%8s
	number of SZA		4	+xxx	%0+4d
	newline character	terminator	1	string	\n
7	**NUM_ORBIT_CHANGES=**	keyword	18	string	%18s
	number of orbit changes		4	+xxx	%0+4d
	newline character	terminator	1	string	\n
8	newline character	terminator	1	string	\n
9	**OSF_VERSION=**	keyword	12	string	%12s
	quotation mark	-	1	string	\”
	version number of OSF type		3	xx	%02d
	quotation mark	-	1	string	\”
	newline character	terminator	1	string	\n
10	newline character	terminator	1	string	\n

4.4.2 Data Block

Table 9: Orbit Scenario file. Data Block

N	Description	units	Byte Length	Data Type	C Format
1	**LIST**	keyword	4	string	%4s
	blank space		1	string	%1s
	num_sza=	keyword	8	string	%8s
	number of Sun zenith angles		3	xxx	%03d
	blank space		1	string	%1s
	; Sun Zenith Angles	comment		string	%s
	newline character	terminator	1	string	\n
2	list of SZA (see format below) all separatedby empty lines				
3	newline character	terminator	1	string	\n
4	**ENDLIST**	keyword	7	string	%7s
	blank space		1	string	%1s
	num_sza	keyword	7	string	%7s
	newline character	terminator	1	string	\n
5	**LIST**	keyword	4	string	%4s
	blank space		1	string	%1s
	num_osf_rec=	keyword	11	string	%11s
	number of orbit changes		3	xxx	%3d
	blank space		1	string	%1s
	; orbit changes	comment		string	%s
	newline character	terminator	1	string	\n
6	list of orbit changes(see table 11) all separatedby empty lines				
7	newline character	terminator	1	string	\n
8	**ENDLIST**	keyword	7	string	%7s
	blank space		1	string	%1s
	num_osf_rec	keyword	11	string	%11s
	newline character	terminator	1	string	\n

Table 10: Orbit Scenario file. SZA

N	Description	units	Byte Length	Data Type	C Format
1	**SZA=**	keyword	4	string	%4s
	Sun zenith angle		8	+xxx.xxx	%0+8.3f
	<deg>	unit	5	string	%5s
	newline character	terminator	1	string	\n

Table 11: Orbit Scenario file. Orbit changes

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	osf_rec	keyword	7	string	%7s
	newline character	terminator	1	string	\n
2	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	orbit:	keyword	6	string	%6s
	blank space		1	string	%1s
3	**ABS=**	keyword	4	string	%4s
	absolute orbit		6	+xxxxx	%+06ld
	blank space		1	string	%1s
4	**REL=**	keyword	4	string	%4s
	relative orbit		6	+xxxxx	%+06ld
	blank space		1	string	%1s
5	**CYCLE=**	keyword	4	string	%4s
	cycle		4	+xxx	%+04ld
	blank space		1	string	%1s
6	**PHASE=**	keyword	6	string	%6s
	phase		4	+xxx	%+04ld
	blank space		1	string	%1s

Table 11: Orbit Scenario file. Orbit changes

N	Description	units	Byte Length	Data Type	C Format
7	**ENDRECORD**	keyword	9	string	%9s
	newline character	terminator	1	string	\n
8	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	cycle:	keyword	6	string	%+06ld
	blank space		1	string	%1s
9	**DAYS=**	keyword	4	string	%4s
	cycle duration		4	+xxx	%+04ld
	blank space		1	string	%1s
10	**ORBITS=**	keyword	7	string	%7s
	cycle length		6	+xxxxx	%+06ld
	blank space		1	string	%1s
11	**ANX_LONG=**	keyword	9	string	%9s
	ANX longitude		11	+xxx.xxxxxx	%+011.6f
	blank space		1	string	%1s
	<deg>	unit	5	string	%5s
	blank space		1	string	%1s
12	**MLST=**	keyword	5	string	%5s
	quotation mark	-	1	string	\"
	mlst		15	string	%15s
	quotation mark	-	1	string	\"
	blank space		1	string	%1s
13	**ENDRECORD**	keyword	9	string	%9s
	newline character	terminator	1	string	\n
14	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	mlst_curve:	keyword	11	string	%11s
	blank space		1	string	%1s

Table 11: Orbit Scenario file. Orbit changes

N	Description	units	Byte Length	Data Type	C Format
15	**MLST_LINEAR=**	keyword	12	string	%12s
	MLST_linear		4	+xxxx.xxx	%+09.3f
	<sec/year>	unit	10	string	%10s
	blank space		1	string	%1s
16	**MLST_QUADRATIC=**	keyword	15	string	%15s
	MLST quadratic		3	+xxxx.xxx	%+09.3f
	<sec/year2>	unit	11	string	%11s
	blank space		1	string	%1s
17	**ENDRECORD**	keyword	9	string	%9s
	newline character	terminator	1	string	\n
18	**LIST**	keyword	4	string	%4s
	blank space		1	string	%1s
	num_harm=	keyword	9	string	%9s
	number of harmonics		2	xx	%02d
	blank space		1	string	%1s
	; MLST harmonics	comment		string	%s
	newline character	terminator	1	string	\n
19	list of harmonics (see table 12)				
20	**ENDLIST**	keyword	7	string	%7s
	blank space		1	string	%1s
	num_harm	keyword	9	string	%9s
	newline character	terminator	1	string	\n
21	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	anx_time:	keyword	9	string	%9s
	blank space		1	string	%1s
22	**UTC=**	keyword	4	string	%4s
	UTC ANX date		27	string	%27s
	blank space		1	string	%1s
23	**ENDRECORD**	keyword	9	string	%9s
	newline character	terminator	1	string	\n

Table 11: Orbit Scenario file. Orbit changes

N	Description	units	Byte Length	Data Type	C Format
24	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	osf_rec	keyword	7	string	%7s
	newline character	terminator	1	string	\n

Table 12: Orbit Scenario file. MLST harmonics

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	harm:	keyword	5	string	%5s
	blank space		1	string	%1s
2	**DATE=**	keyword	5	string	%5s
	date		13	string	%13s
	blank space		1	string	%1s
3	**PERIOD=**	keyword	7	string	%7s
	period		11	+xxx.xxxxxx	%+011.6f
	blank space		1	string	%1s
	<days>	unit	6	string	%6s
	blank space		1	string	%1s
4	**AMP_SIN=**	keyword	8	string	%8s
	Amplitude for sine coeficient		11	+xxx.xxxxxx	%+011.6f
	blank space		1	string	%1s
	<sec>	unit	8	string	%8s
	blank space		1	string	%1s

Table 12: Orbit Scenario file. MLST harmonics

N	Description	units	Byte Length	Data Type	C Format
5	**AMP_COS=**	keyword	8	string	%8s
	Amplitude for cosine coeficient		11	+xxx.xxxxxx	%+011.6f
	blank space		1	string	%1s
	<sec>	unit	8	string	%8s
	blank space		1	string	%1s
6	**ENDRECORD**	keyword	9	string	%9s
	newline character	terminator	1	string	\n

4.4.3 Example

```
RECORD fhr ;Fixed Header

FILENAME="MPS_ORB_SCTEMM19970829_093100_00000000_00000000_19970101_000000_20991231_000000.N1"
DESTINATION="      TBD"
PHASE_START=+001
CYCLE_START=+001
REL_START_ORBIT=+00001
ABS_START_ORBIT=+00270

ENDRECORD fhr
;-------------------------------------------------
RECORD osf_vhr ;Variable Header

PHASE_STOP=+004
CYCLE_STOP=+086
REL_STOP_ORBIT=+00501
ABS_STOP_ORBIT=+14000

NUM_SZA=+002
NUM_ORBIT_CHANGES=+005

OSF_VERSION=”03”

ENDRECORD osf_vhr
;-------------------------------------------------
LIST num_sza=002 ;Sun Zenith Angles

SZA=+090.000<deg>
SZA=+080.000<deg>

ENDLIST num_sza
;-------------------------------------------------
LIST num_osf_rec=004 ;Orbit Changes
```

```
RECORD osf_rec
  RECORD    orbit: ABS=+00270 REL=+00001 CYCLE=+001 PHASE=+001 ENDRECORD
  RECORD    cycle: DAYS=+035 ORBITS=+00501 ANX_LONG=+000.133500<deg> MLST="22:00:00.000000" EN-
DRECORD
  RECORD mlst_curve: MLST_LINEAR=+0000.000<sec/year>  MLST_QUADRATIC=+0000.000<sec/year2> EN-
DRECORD
  LIST num_harm=00
  ENDLIST num_harm
  RECORD anx_time: UTC="18-AUG-1999 21:59:29.967155" ENDRECORD
ENDRECORD osf_rec

RECORD osf_rec
  RECORD    orbit: ABS=+03004 REL=+00001 CYCLE=+007 PHASE=+002 ENDRECORD
  RECORD    cycle: DAYS=+003 ORBITS=+00043 ANX_LONG=+000.860000<deg> MLST="22:00:00.000000" EN-
DRECORD
  RECORD mlst_curve: MLST_LINEAR=+0000.000<sec/year>  MLST_QUADRATIC=+0000.000<sec/year2> EN-
DRECORD
  LIST num_harm=00
  ENDLIST num_harm
  RECORD anx_time: UTC="25-FEB-2000 21:56:35.714669" ENDRECORD
ENDRECORD osf_rec

RECORD osf_rec
  RECORD    orbit: ABS=+05713 REL=+00230 CYCLE=+070 PHASE=+003 ENDRECORD
  RECORD    cycle: DAYS=+035 ORBITS=+00501 ANX_LONG=+000.851828<deg> MLST="22:00:00.000000" EN-
DRECORD
  RECORD mlst_curve: MLST_LINEAR=+0000.000<sec/year>  MLST_QUADRATIC=+0000.000<sec/year2> EN-
DRECORD
  LIST num_harm=00
  ENDLIST num_harm
  RECORD anx_time: UTC="01-SEP-2000 21:56:37.777146" ENDRECORD
ENDRECORD osf_rec

RECORD osf_rec
  RECORD    orbit: ABS=+45245 REL=+00120 CYCLE=+070 PHASE=+004 ENDRECORD
  RECORD    cycle: DAYS=+030 ORBITS=+00431 ANX_LONG=+000.000000<deg> MLST="22:00:00.000000" EN-
DRECORD
  RECORD mlst_curve: MLST_LINEAR=+0730.950<sec/year>  MLST_QUADRATIC=-0228.000<sec/year2> EN-
DRECORD
  LIST num_harm=02
    RECORD DATE="01-JAN-2000" PERIOD=+365.250000<days> AMP_SIN=+001.650000<sec>
AMP_COS=+005.350000<sec> ENDRECORD
    RECORD DATE="01-JAN-2000" PERIOD=+365.250000<days> AMP_SIN=+000.740000<sec> AMP_COS=-
000.770000<sec> ENDRECORD
  ENDLIST num_harm
  RECORD anx_time: UTC="25-OCT-2010 22:00:00.000000" ENDRECORD
ENDRECORD osf_rec


ENDLIST num_osf_rec
;------------------------------------------------
ENDFILE
```

4.5 Orbit Event file

Table 13: Orbit Event File

N	Description	units	Byte Length	Data Type	C Format
1	**FILE**	keyword	4	string	%4s
	; Orbit Event file	comment		string	%s
	newline character	terminator	1	string	\n
2	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	fhr	keyword	3	string	%3s
	blank space		1	string	%1s
	; Fixed Header	comment		string	%s
	newline character	terminator	1	string	\n
3	**Fixed header record (see section 4.1)**				
4	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	fhr	keyword	3	string	%3s
	newline character	terminator	1	string	\n
5	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	oef_vhr	keyword	7	string	%7s
	blank space		1	string	%1s
	; Variable Header	comment		string	%s
	newline character	terminator	1	string	\n
6	**Fixed header record (see section 4.5.1)**				
7	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	oef_vhr	keyword	7	string	%7s
	newline character	terminator	1	string	\n
8	**; Variable Header**	comment		string	%s
9	**Data block (see section 4.5.2)**				
10	**ENDFILE**	keyword	7	string	%7s

4.5.1 Orbit Event File. Variable Header.

Table 14: Orbit Event File. Variable Header

N	Description	units	Byte Length	Data Type	C Format
1	**PHASE_STOP=**	keyword	6	string	%6s
	phase stop		4	+xxx	%0+4ld
	newline character	terminator	1	string	\n
2	**CYCLE_STOP=**	keyword	11	string	%11s
	cycle stop		4	+xxx	%0+4ld
	newline character	terminator	1	string	\n
3	**REL_STOP_ORBIT=**	keyword	16	string	%16s
	relative stop orbit		6	+xxxxx	%0+6ld
	newline character	terminator	1	string	\n
4	**ABS_STOP_ORBIT=**	keyword	11	string	%11s
	absolute stop orbit		6	+xxxxx	%0+6ld
	newline character	terminator	1	string	\n
5	newline character	terminator	1	string	\n
6	**ORBIT_SCENARIO_FILE=**	keyword	20	string	%20s
	OSF filename			string	%s
	newline character	terminator	1	string	\n
7	**NUM_ORBIT_CHANGES=**	keyword	18	string	%18s
	number of orbit changes		4	+xxx	%0+4d
	newline character	terminator	1	string	\n
8	**NUM_SUN_OCC_BY_MOON=**	keyword	20	string	%20s
	number of Sun occultations by the Moon		4	+xxx	%0+4d
	newline character	terminator	1	string	\n
9	**NUM_ORBITS=**	keyword	11	string	%11s
	number of orbits		6	+xxxxx	%0+6ld
	newline character	terminator	1	string	\n
10	newline character	terminator	1	string	\n

Table 14: Orbit Event File. Variable Header

N	Description	units	Byte Length	Data Type	C Format
11	**OSF_VERSION=**	keyword	12	string	%12s
	quotation mark	-	1	string	\"
	version number of OSF type		3	xx	%02d
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
12	newline character	terminator	1	string	\n

4.5.2 Data Block

Table 15: Orbit Event File. Data Block

N	Description	units	Byte Length	Data Type	C Format
1	**LIST**	keyword	4	string	%4s
	blank space		1	string	%1s
	num_osf_rec=	keyword	11	string	%11s
	number of orbit changes		3	xxx	%3d
	blank space		1	string	%1s
	; orbit changes	comment		string	%s
	newline character	terminator	1	string	\n
2	list of orbit changes(see table 11)				
3	newline character	terminator	1	string	\n
4	**ENDLIST**	keyword	7	string	%7s
	blank space		1	string	%1s
	num_osf_rec	keyword	11	string	%11s
	newline character	terminator	1	string	\n

Table 15: Orbit Event File. Data Block

N	Description	units	Byte Length	Data Type	C Format
5	**LIST**	keyword	4	string	%4s
	blank space		1	string	%1s
	num_sun_occ_by_moon=	keyword	20	string	%20s
	Number of sun_occ_by_moon records		3	xxx	%03ld
	blank space		1	string	%1s
	; Sun occultations by Moon	comment		string	%s
	newline character	terminator	1	string	\n
6	list of sun occultations(see table 16)				
7	newline character	terminator	1	string	\n
8	**ENDLIST**	keyword	7	string	%7s
	blank space		1	string	%1s
	num_sun_occ_by_moon	keyword	19	string	%19s
	newline character	terminator	1	string	\n
5	**LIST**	keyword	4	string	%4s
	blank space		1	string	%1s
	num_oef_rec=	keyword	11	string	%11s
	Number of oef_rec records		5	xxxxx	%05ld
	blank space		1	string	%1s
	; Orbit Records	comment		string	%s
	newline character	terminator	1	string	\n
6	list of orbit event records(see table 17)				
7	newline character	terminator	1	string	\n
8	**ENDLIST**	keyword	7	string	%7s
	blank space		1	string	%1s
	num_oef_rec	keyword	11	string	%11s
	newline character	terminator	1	string	\n

Table 16: Orbit Event File. Sun occultations by Moon

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	sun_occ_by_moon	keyword	15	string	%15s
	blank space		1	string	%1s
2	newline character	terminator	1	string	\n
3	tab	terminator	1	string	\t
4	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	entry:	keyword	6	string	%6s
	blank space		1	string	%1s
5	**ABS_ORBIT=**	keyword	4	string	%4s
	Entry absolute orbit		6	+xxxxx	%+06ld
	blank space		1	string	%1s
5	**TIME=**	keyword	4	string	%4s
	Entry time since ANX		20	+xxxx.xxxxxx	%+012.6f
	<s>	unit	3	string	%s
	blank space		1	string	%1s
6	**ENDRECORD**	keyword	9	string	%9s
7	newline character	terminator	1	string	\n
3	tab	terminator	1	string	\t
4	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	exit:	keyword	6	string	%6s
	blank space		1	string	%1s
5	**ABS_ORBIT=**	keyword	4	string	%4s
	exit absolute orbit		4	+xxxxx	%+06ld
	blank space		1	string	%1s

Table 16: Orbit Event File. Sun occultations by Moon

N	Description	units	Byte Length	Data Type	C Format
6	**TIME=**	keyword	4	string	%4s
	exit time since ANX		20	+xxxx.xxxxxx	%+012.6f
	<s>	unit	3	string	%s
	blank space		1	string	%1s
7	**ENDRECORD**	keyword	9	string	%9s
8	newline character	terminator	1	string	\n
9	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	sun_occ_by_moon	keyword	15	string	%15s
	newline character	terminator	1	string	\n

Table 17: Orbit Event File. Orbit Event Records

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	oef_rec	keyword	15	string	%15s
	blank space		1	string	%1s
2	newline character	terminator	1	string	\n
3	tab	terminator	1	string	\t
4	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	orbit:	keyword	6	string	%6s
	blank space		1	string	%1s
5	**ABS=**	keyword	4	string	%4s
	Absolute orbit number		6	+xxxxx	%0+6ld
	blank space		1	string	%1s
6	**REL=**	keyword	4	string	%4s
	Relative orbit number		6	+xxxxx	%0+6ld
	blank space		1	string	%1s

Table 17: Orbit Event File. Orbit Event Records

N	Description	units	Byte Length	Data Type	C Format
7	**CYCLE=**	keyword	6	string	%6s
	Cycle number		4	+xxx	%0+4ld
	blank space		1	string	%1s
8	**PHASE=**	keyword	6	string	%6s
	Phase number		4	+xxx	%0+4ld
	blank space		1	string	%1s
9	**ENDRECORD**	keyword	9	string	%9s
10	newline character	terminator	1	string	\n
11	tab	terminator	1	string	\t
12	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	cycle:	keyword	6	string	%6s
	blank space		1	string	%1s
13	**DAYS=**	keyword	5	string	%5s
	Days per cycle		4	+xxx	%0+4ld
	blank space		1	string	%1s
14	**ORBITS=**	keyword	7	string	%7s
	Orbits per cycle		6	+xxx	%0+6ld
	blank space		1	string	%1s
15	**ANX_LONG=**	keyword	9	string	%9s
	Longitude at ANX		11	+xxx.xxxxxx	%0+11.6f
	<deg>	unit	5	string	%s
	blank space		1	string	%1s
16	**MLST=**	keyword	5	string	%5s
	“	quotation mark	1	string	%s
	Mean local solar time		15	string	%15s
	“	quotation mark	1	string	%s
	blank space		1	string	%1s
17	**ENDRECORD**	keyword	9	string	%9s

Table 17: Orbit Event File. Orbit Event Records

N	Description	units	Byte Length	Data Type	C Format
18	newline character	terminator	1	string	\n
19	tab	terminator	1	string	\t
20	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	drift:	keyword	6	string	%6s
	blank space		1	string	%1s
21	**MLST_DRIFT=**	keyword	11	string	%11s
	Mean local solar time drift		12	+xxxxx.xxxxxx	%0+12.6f
	<sec/day>	units	9	string	%9s
	blank space		1	string	%1s
22	**ENDRECORD**	keyword	9	string	%9s
23	newline character	terminator	1	string	\n
24	tab	terminator	1	string	\t
25	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	anx_time:	keyword	9	string	%9s
	blank space		1	string	%1s
26	**UTC=**	keyword	4	string	%4s
	“	quotation mark	1	string	%s
	UTC date (dd-MMM-yyyy hh:mm:ss.ssssss)		27	string	%27s
	“	quotation mark	1	string	%s
	blank space		1	string	%1s
27	**ENDRECORD**	keyword	9	string	%9s
28	newline character	terminator	1	string	\n
29	tab	terminator	1	string	\t
30	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	anx_pos:	keyword	8	string	%8s
	blank space		1	string	%1s

Table 17: Orbit Event File. Orbit Event Records

N	Description	units	Byte Length	Data Type	C Format
31	**X=**	keyword	2	string	%2s
	Position X-coordinate		12	+xxxxxxx.xxx	%0+12.3f
	<m>	units	3	string	%s
	blank space		1	string	%1s
32	**Y=**	keyword	2	string	%2s
	Position Y-coordinate		12	+xxxxxxx.xxx	%0+12.3f
	<m>	units	3	string	%s
	blank space		1	string	%1s
33	**Z=**	keyword	2	string	%2s
	Position Z-coordinate		12	+xxxxxxx.xxx	%0+12.3f
	<m>	units	3	string	%s
	blank space		1	string	%1s
34	**ENDRECORD**	keyword	9	string	%9s
35	newline character	terminator	1	string	\n
36	tab	terminator	1	string	\t
37	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	anx_vel:	keyword	8	string	%8s
	blank space		1	string	%1s
38	**VX=**	keyword	3	string	%3s
	Velocity X-coordinate		12	+xxxx.xxxxxx	%0+12.6f
	<m/s>	units	5	string	%s
	blank space		1	string	%1s
39	**VY=**	keyword	3	string	%3s
	Velocity Y-coordinate		12	+xxxx.xxxxxx	%0+12.6f
	<m/s>	units	5	string	%s
	blank space		1	string	%1s

Table 17: Orbit Event File. Orbit Event Records

N	Description	units	Byte Length	Data Type	C Format
40	**VZ=**	keyword	3	string	%3s
	Velocity Z-coordinate		12	+xxxx.xxxxxx	%0+12.6f
	<m/s>	units	5	string	%s
	blank space		1	string	%1s
41	**ENDRECORD**	keyword	9	string	%9s
42	newline character	terminator	1	string	\n
43	tab	terminator	1	string	\t
44	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	kepler:	keyword	7	string	%7s
	blank space		1	string	%1s
45	**A=**	keyword	2	string	%2s
	Semi-major axis		12	+xxxxxxx.xxx	%0+12.3f
	<m>	units	3	string	%s
	blank space		1	string	%1s
46	**E=**	keyword	2	string	%2s
	Eccentricity		12	+x.xxxxxxxxx	%0+12.9f
	blank space		1	string	%1s
47	**I=**	keyword	2	string	%2s
	Inclination		11	+xxx.xxxxxx	%0+11.6f
	<deg>	units	5	string	%s
	blank space		1	string	%1s
48	**RA=**	keyword	3	string	%3s
	Right ascension of the ANX		11	+xxx.xxxxxx	%0+11.6f
	<deg>	units	5	string	%s
	blank space		1	string	%1s

Table 17: Orbit Event File. Orbit Event Records

N	Description	units	Byte Length	Data Type	C Format
49	**AP=**	keyword	3	string	%3s
	Argument of perigee		11	+xxx.xxxxxx	%0+11.6f
	<deg>	units	5	string	%s
	blank space		1	string	%1s
50	**M=**	keyword	2	string	%2s
	Mean anomaly		11	+xxx.xxxxxx	%0+11.6f
	<deg>	units	5	string	%s
	blank space		1	string	%1s
51	**ENDRECORD**	keyword	9	string	%9s
52	newline character	terminator	1	string	\n
53	tab	terminator	1	string	\t
54	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	eclipse:	keyword	8	string	%8s
	blank space		1	string	%1s
55	**EXIT=**	keyword	5	string	%5s
	eclipse exit time		12	+xxxx.xxxxxx	%0+12.6f
	<s>	units	3	string	%s
	blank space		1	string	%1s
56	**ENTRY=**	keyword	6	string	%6s
	eclipse exit time		12	+xxxx.xxxxxx	%0+12.6f
	<s>	units	5	string	%s
	blank space		1	string	%1s
57	**ENDRECORD**	keyword	9	string	%9s
58	newline character	terminator	1	string	\n
59	tab	terminator	1	string	\t

Table 17: Orbit Event File. Orbit Event Records

N	Description	units	Byte Length	Data Type	C Format
60	**LIST**	keyword	4	string	%4s
	blank space		1	string	%1s
	num_sza=	keyword	7	string	%7s
	Number of sza records		3	xxx	%03ld
	blank space		1	string	%1s
	; time of reaching specific Sun Zenith Angles	comment		string	%s
	newline character	terminator	1	string	\n
61	list of sun zenith angles records(see table 18)				
62	newline character	terminator	1	string	\n
63	**ENDLIST**	keyword	7	string	%7s
	blank space		1	string	%1s
	num_sza	keyword	7	string	%7s
	newline character	terminator	1	string	\n
64	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	oef_rec	keyword	7	string	%7s
	newline character	terminator	1	string	\n

Table 18: Orbit Event file. Sun-Zenith angle records

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	sza:	keyword	4	string	%4s
	blank space		1	string	%1s
2	**SZA=**	keyword	4	string	%4s
	Sun-Zenith angle		8	+xxx.xxx	%0+8.3f
	<deg>	unit	5	string	%5s
	blank space		1	string	%1s

Table 18: Orbit Event file. Sun-Zenith angle records

N	Description	units	Byte Length	Data Type	C Format
3	**DOWN=**	keyword	5	string	%5s
	Time at SZA down		12	+xxxx.xxxxxx	%0+12.6f
	<s>	unit	3	string	%s
	blank space		1	string	%1s
4	**UP=**	keyword	3	string	%3s
	Time at SZA up		12	+xxxx.xxxxxx	%0+12.6f
	<s>	unit	3	string	%s
	blank space		1	string	%1s
6	**ENDRECORD**	keyword	9	string	%9s
7	newline character	terminator	1	string	\n

4.5.3 Example

```
FILE  ; Reference Orbit Event File
;---------------------------------------------------
RECORD fhr  ; Fixed header

  FILENAME="MPL_ORB_EVVRGT20051004_174620_00000000_00000008_20060102_215929_20070402_234005.N1"
   DESTINATION="PDCC,MUL "
   PHASE_START=+002
   CYCLE_START=+044
   REL_START_ORBIT=+00001
   ABS_START_ORBIT=+20095

ENDRECORD fhr
;---------------------------------------------------
RECORD oef_vhr  ; Variable header
   PHASE_STOP=+002
   CYCLE_STOP=+057
   REL_STOP_ORBIT=+00001
   ABS_STOP_ORBIT=+26608
   ORBIT_SCENARIO_FILE="MPL_ORB_SCV.N1"
   NUM_ORBIT_CHANGES=+003
   NUM_SUN_OCC_BY_MOON=+009
   NUM_ORBITS=+06514

   OSF_VERSION=”03”

ENDRECORD oef_vhr
;---------------------------------------------------
```

```
LIST num_osf_rec=004

  RECORD osf_rec
    RECORD orbit: ABS=+00001 REL=+00462 CYCLE=+001 PHASE=+000 ENDRECORD
    RECORD cycle: DAYS=+035 ORBITS=+00501 ANX_LONG=+286.525113<deg> MLST="22:00:00.000000" EN-
DRECORD
    RECORD mlst_curve: MLST_LINEAR=+0000.000<sec/year>  MLST_QUADRATIC=+0000.000<sec/year2> EN-
DRECORD
    LIST num_harm=00
    ENDLIST num_harm
    RECORD anx_time: UTC="01-MAR-2002 02:53:55.245278" ENDRECORD
  ENDRECORD osf_rec

  RECORD osf_rec
    RECORD orbit: ABS=+00020 REL=+02426 CYCLE=+002 PHASE=+001 ENDRECORD
    RECORD cycle: DAYS=+194 ORBITS=+02775 ANX_LONG=+168.680802<deg> MLST="22:00:00.000000" EN-
DRECORD
    RECORD mlst_curve: MLST_LINEAR=+0000.000<sec/year>  MLST_QUADRATIC=+0000.000<sec/year2> EN-
DRECORD
    LIST num_harm=00
    ENDLIST num_harm
    RECORD anx_time: UTC="02-MAR-2002 10:45:17.880009" ENDRECORD
  ENDRECORD osf_rec

  RECORD osf_rec
    RECORD orbit: ABS=+00486 REL=+00432 CYCLE=+004 PHASE=+002 ENDRECORD
    RECORD cycle: DAYS=+035 ORBITS=+00501 ANX_LONG=+320.612542<deg> MLST="22:00:00.000000" EN-
DRECORD
    RECORD mlst_curve: MLST_LINEAR=+0000.000<sec/year>  MLST_QUADRATIC=+0000.000<sec/year2> EN-
DRECORD
    LIST num_harm=00
    ENDLIST num_harm
    RECORD anx_time: UTC="04-APR-2002 00:37:34.262318" ENDRECORD
  ENDRECORD osf_rec

  RECORD osf_rec
    RECORD    orbit: ABS=+45245 REL=+00120 CYCLE=+070 PHASE=+004 ENDRECORD
    RECORD    cycle: DAYS=+030 ORBITS=+00431 ANX_LONG=+000.000000<deg> MLST="22:00:00.000000"
ENDRECORD
    RECORD mlst_curve: MLST_LINEAR=+0730.950<sec/year>  MLST_QUADRATIC=-0228.000<sec/year2> EN-
DRECORD
    LIST num_harm=02
      RECORD DATE="01-JAN-2000" PERIOD=+365.250000<days> AMP_SIN=+001.650000<sec>
AMP_COS=+005.350000<sec> ENDRECORD
       RECORD DATE="01-JAN-2000" PERIOD=+365.250000<days> AMP_SIN=+000.740000<sec> AMP_COS=-
000.770000<sec> ENDRECORD
    ENDLIST num_harm
    RECORD anx_time: UTC="25-OCT-2010 22:00:00.000000" ENDRECORD
  ENDRECORD osf_rec


ENDLIST num_osf_rec
;-----------------------------------------------
LIST num_sun_occ_by_moon=009  ; Sun occultations by Moon
```

```
  RECORD sun_occ_by_moon
    RECORD entry: ABS_ORBIT=+21318 TIME=+2491.119995<s> ENDRECORD
    RECORD exit: ABS_ORBIT=+21318 TIME=+3326.406250<s> ENDRECORD
  ENDRECORD sun_occ_by_moon

  RECORD sun_occ_by_moon
    RECORD entry: ABS_ORBIT=+21319 TIME=+1901.867065<s> ENDRECORD
    RECORD exit: ABS_ORBIT=+21319 TIME=+2395.250244<s> ENDRECORD
  ENDRECORD sun_occ_by_moon

  [...]
ENDLIST num_sun_occ_by_moon
;-------------------------------------------------
LIST num_oef_rec=06514  ; Orbit Records

  RECORD oef_rec
    RECORD orbit: ABS=+20095 REL=+00001 CYCLE=+044 PHASE=+002 ENDRECORD
    RECORD cycle: DAYS=+035 ORBITS=+00501 ANX_LONG=+000.133500<deg> MLST="22:00:00.000000" EN-
DRECORD
RECORD drift: MLST_DRIFT=+000.000000<sec/day> ENDRECORD
    RECORD anx_time: UTC="02-JAN-2006 21:59:29.232378" ENDRECORD
    RECORD anx_pos: X=+7165274.767<m> Y=+0016695.235<m> Z=-0000000.000<m> ENDRECORD
    RECORD anx_vel: VX=-0004.890103<m/s> VY=-1630.873926<m/s> VZ=+7377.385722<m/s> ENDRECORD
    RECORD kepler: A=+7159496.305<m> E=+0.001165000 I=+098.549475<deg> RA=+072.400827<deg>
AP=+090.000000<deg> M=+270.133357<deg> ENDRECORD
    RECORD eclipse: EXIT=+1309.188083<s> ENTRY=+5454.993819<s> ENDRECORD
    LIST num_sza=002  ; time of reaching specific Sun Zenith Angles
      RECORD sza: SZA=+090.000<deg> DOWN=+1871.612664<s> UP=+4891.075592<s> ENDRECORD
      RECORD sza: SZA=+080.000<deg> DOWN=+2069.641511<s> UP=+4691.852741<s> ENDRECORD
    ENDLIST num_sza
  ENDRECORD oef_rec

  [...]

  RECORD oef_rec
    RECORD orbit: ABS=+26608 REL=+00001 CYCLE=+057 PHASE=+002 ENDRECORD
    RECORD cycle: DAYS=+035 ORBITS=+00501 ANX_LONG=+000.133500<deg> MLST="22:00:00.000000" EN-
DRECORD
RECORD drift: MLST_DRIFT=+000.000000<sec/day> ENDRECORD
RECORD anx_time: UTC="02-APR-2007 21:59:29.232378" ENDRECORD
    RECORD anx_pos: X=+7165274.767<m> Y=+0016695.235<m> Z=-0000000.000<m> ENDRECORD
    RECORD anx_vel: VX=-0004.890103<m/s> VY=-1630.873926<m/s> VZ=+7377.385722<m/s> ENDRECORD
    RECORD kepler: A=+7159496.305<m> E=+0.001165000 I=+098.549475<deg> RA=+160.870348<deg>
AP=+090.000000<deg> M=+270.133357<deg> ENDRECORD
    RECORD eclipse: EXIT=+0780.368401<s> ENTRY=+4896.331542<s> ENDRECORD
    LIST num_sza=002  ; time of reaching specific Sun Zenith Angles
      RECORD sza: SZA=+090.000<deg> DOWN=+1325.370252<s> UP=+4342.158008<s> ENDRECORD
      RECORD sza: SZA=+080.000<deg> DOWN=+1519.042829<s> UP=+4147.787568<s> ENDRECORD
    ENDLIST num_sza
  ENDRECORD oef_rec

ENDLIST num_oef_rec
;-------------------------------------------------
```

```
ENDFILE
```

4.6 DORIS Navigator File

DORIS Navigator files contains two parts:

- A header in ASCII data
- A data block witten in binary format.

The following table only describes the format of the header.

Table 19: DORIS Navigator File. Header

N	Description	units	Byte Length	Data Type	C Format
1	**PRODUCT=**	keyword	8	string	%8s
	quotation mark	-	1	string	\"
	filename	keyword		string	%s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
2	**PROC_STAGE=**	keyword	11	string	%11s
	procedure		1	string	%1s
	newline character	terminator	1	string	\n
4	**REF_DOC=**	keyword	8	string	%8s
	quotation mark	-	1	string	\"
	reference document		7	string	%7s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
5	newline character	terminator	1	string	\n
6	**ACQUISITION_STATION=**	keyword	20	string	%20s
	quotation mark	-	1	string	\"
	reference document		20	string	%20s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
7	**PROC_CENTER=**	keyword	12	string	%12s
	quotation mark	-	1	string	\"
	processing center		6	string	%6s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n

Table 19: DORIS Navigator File. Header

N	Description	units	Byte Length	Data Type	C Format
8	**PROC_TIME=**	keyword	12	string	%12s
	quotation mark	-	1	string	\"
	processing time		27	string	%27s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
9	**SOFTWARE_VER=**	keyword	13	string	%13s
	quotation mark	-	1	string	\"
	software version		14	string	%14s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
10	newline character	terminator	1	string	\n
11	**SENSING_START=**	keyword	14	string	%14s
	quotation mark	-	1	string	\"
	sensing start		27	string	%27s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
12	**SENSING_STOP=**	keyword	13	string	%13s
	quotation mark	-	1	string	\"
	sensing stop		27	string	%27s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
13	newline character	terminator	1	string	\n
14	**PHASE=**	keyword	6	string	%6s
	phase		1	string	%1s
	newline character	terminator	1	string	\n
15	**CYCLE=**	keyword	6	string	%6s
	cycle number		4	+xxx	%3
	newline character	terminator	1	string	\n
16	**REL_ORBIT=**	keyword	10	string	%10s
	relative orbit		6	+xxxxx	%d
	newline character	terminator	1	string	\n

Table 19: DORIS Navigator File. Header

N	Description	units	Byte Length	Data Type	C Format
17	**ABS_ORBIT=**	keyword	10	string	%10s
	absolute orbit		6	+xxxxx	%d
	newline character	terminator	1	string	\n
18	**STATE_VECTOR_TIME=**	keyword	18	string	%18s
	quotation mark	-	1	string	\"
	state vector time		27	string	%27s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
19	**DELTA_UT1=**	keyword	10	string	%10s
	delta UT1		8	+.xxxxxx	%+8.6f
	<s>		3	string	%3s
	newline character	terminator	1	string	\n
20	**X_POSITION=**	keyword	6	string	%6s
	positon (x coordinate)		12	+xxxxxxx.xxx	%12.3f
	<m>		3	string	%3s
	newline character	terminator	1	string	\n
21	**Y_POSITION=**	keyword	6	string	%6s
	positon (y coordinate)		12	+xxxxxxx.xxx	%12.3f
	<m>		3	string	%3s
	newline character	terminator	1	string	\n
22	**Z_POSITION=**	keyword	6	string	%6s
	positon (z coordinate)		12	+xxxxxxx.xxx	%12.3f
	<m>		3	string	%3s
	newline character	terminator	1	string	\n
23	**X_VELOCITY=**	keyword	6	string	%6s
	velocity (x coordinate)		12	+xxxxxxx.xxx	%12.6f
	<m/s>		5	string	%5s
	newline character	terminator	1	string	\n

Table 19: DORIS Navigator File. Header

N	Description	units	Byte Length	Data Type	C Format
24	**Y_VELOCITY=**	keyword	6	string	%6s
	velocity (y coordinate)		12	+xxxxxxx.xxx	%12.6f
	<m/s>		5	string	%5s
	newline character	terminator	1	string	\n
25	**Z_VELOCITY=**	keyword	6	string	%6s
	velocity (z coordinate)		12	+xxxxxxx.xxx	%12.6f
	<m/s>		5	string	%5s
	newline character	terminator	1	string	\n
26	**VECTOR_SOURCE=**	keyword	13	string	%13s
	quotation mark	-	1	string	\"
	vector source		2	string	%2s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
27	newline character	terminator	1	string	\n
28	**UTC_SBT_TIME=**	keyword	13	string	%13s
	quotation mark	-	1	string	\"
	UTC satellite binary time		27	string	%27s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
29	**SAT_BINARY_TIME=**	keyword	16	string	%16s
	satellite binary time		11	+xxxxxxxxxx	%+11f
	newline character	terminator	1	string	\n
30	**CLOCK_STEP=**	keyword	6	string	%6s
	clock step		11	+xxxxxxxxx	%11f
	<ps>		4	string	%4s
	newline character	terminator	1	string	\n
31	newline character	terminator	1	string	\n

Table 19: DORIS Navigator File. Header

N	Description	units	Byte Length	Data Type	C Format
32	**LEAP_UTC=**	keyword	9	string	%9s
	quotation mark	-	1	string	\"
	UTC time before the leap second		27	string	%27s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
33	**LEAP_SIGN=**	keyword	10	string	%10s
	leap second sign		4	+xxx	%4d
	newline character	terminator	1	string	\n
34	**LEAP_ERR=**	keyword	9	string	%9s
	leap error		1	string	%1s
	newline character	terminator	1	string	\n
35	newline character	terminator	1	string	\n
36	**PRODUCT_ERR=**	keyword	12	string	%12s
	product error		1	string	%1s
	<ps>		4	string	%4s
	newline character	terminator	1	string	\n
37	**TOT_SIZE=**	keyword	6	string	%6s
	total size		20	+x (*20)	%20d
	<bytes>		4	string	%4s
	newline character	terminator	1	string	\n
38	**SPH_SIZE=**	keyword	6	string	%6s
	SPH size		11	+xxxxxxxxx	%11f
	<bytes>		4	string	%4s
	newline character	terminator	1	string	\n
39	**NUM_DSD=**	keyword	6	string	%6s
	Number of DSD		11	+xxxxxxxxx	%11f
	newline character	terminator	1	string	\n
40	**DSD_SIZE=**	keyword	6	string	%6s
	DSD size		11	+xxxxxxxxx	%11f
	<bytes>		4	string	%4s
	newline character	terminator	1	string	\n

Table 19: DORIS Navigator File. Header

N	Description	units	Byte Length	Data Type	C Format
41	**NUM_DATA_SETS=**	keyword	6	string	%6s
	Number of data sets		11	+xxxxxxxxx	%11f
	newline character	terminator	1	string	\n
42	newline character	terminator	1	string	\n
43	**SPH_DESCRIPTOR=**	keyword	15	string	%15s
	quotation mark	-	1	string	\"
	SPH Descriptor		28	string	%28s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
44	**START_LAT=**	keyword	10	string	%10s
	Start latitude		11	string	%+11d
	<10-6degN>	units	10	string	%10s
	newline character	terminator	1	string	\n
45	**START_LON=**	keyword	10	string	%10s
	Start longitude		11	string	%+11d
	<10-6degE>	units	10	string	%10s
	newline character	terminator	1	string	\n
46	**STOP_LAT=**	keyword	9	string	%9s
	Stop latitude		11	string	%+11d
	<10-6degN>	units	10	string	%10s
	newline character	terminator	1	string	\n
47	**STOP_LON=**	keyword	9	string	%9s
	Stop longitude		11	string	%+11d
	<10-6degE>	units	10	string	%10s
	newline character	terminator	1	string	\n
48	**SAT_TRACK=**	keyword	9	string	%9s
	Satellite track			float	%f
	<deg>	units	5	string	%5s
	newline character	terminator	1	string	\n
49	newline character	terminator	1	string	\n

Table 19: DORIS Navigator File. Header

N	Description	units	Byte Length	Data Type	C Format
50	**ISP_ERRORS_SIGNIFICANT=**	keyword	23	string	%23s
	ISP errors			integer	%d
	newline character	terminator	1	string	\n
51	**MISSING_ISPS_SIGNIFICANT=**	keyword	25	string	%25s
	Missing ISP			integer	%d
	newline character	terminator	1	string	\n
52	**ISP_DISCARDED_SIGNIFICANT=**	keyword	26	string	%26s
	Discarded ISP			integer	%d
	newline character	terminator	1	string	\n
53	**RS_SIGNIFICANT=**	keyword	15	string	%15s
	RS Significant			integer	%d
	newline character	terminator	1	string	\n
54	newline character	terminator	1	string	\n
55	**NUM_ERROR_ISPS=**	keyword	15	string	%15s
	Num_error_isps			integer	%d
	newline character	terminator	1	string	\n
56	**ERROR_ISPS_THRESH=**	keyword	15	string	%15s
	Error_isps_thresh			integer	%d
	<%>	unit	3	string	%s
	newline character	terminator	1	string	\n
57	**NUM_MISSING_ISPS=**	keyword	15	string	%15s
	Num_missing_isps			integer	%d
	newline character	terminator	1	string	\n
58	**MISSING_ISPS_THRESH=**	keyword	15	string	%15s
	Missing_isps_thresh			integer	%d
	<%>	unit	3	string	%s
	newline character	terminator	1	string	\n
59	**NUM_DISCARDED_ISPS=**	keyword	15	string	%15s
	num_discarded_isps			integer	%d
	newline character	terminator	1	string	\n

Table 19: DORIS Navigator File. Header

N	Description	units	Byte Length	Data Type	C Format
60	**DISCARDED_ISPS_THRESH=**	keyword	15	string	%15s
	discarded_isps_thresh			integer	%d
	<%>	unit	3	string	%s
	newline character	terminator	1	string	\n
61	**NUM_RS_ISPS=**	keyword	15	string	%15s
	Num_rs_isps				
	newline character	terminator	1	string	\n
62	**RS_THRESH=**	keyword	15	string	%15s
	RS_threshold			integer	%d
	<%>	unit	3	integer	%d
	newline character	terminator	1	string	\n
63	newline character	terminator	1	string	\n
64	**TX_RX_POLAR=**	keyword	12	string	%12s
	quotation mark	-	1	string	\"
	TX_RX_Polar		5	string	%5s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
65	**SWATH=**	keyword	6	string	%6s
	quotation mark	-	1	string	\"
	Swath	-	3	string	%3s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
66	newline character	terminator	1	string	\n
67	DS Blocks (The number of DS blocks is specified in NUM_DSD) (See table 20)				
68	newline character	terminator	1	string	\n

Table 20: DORIS Navigator File. DSD_Block

N	Description	units	Byte Length	Data Type	C Format
1	**DS_NAME=**	keyword	8	string	%8s
	quotation mark	-	1	string	\"
	DS name		28	string	%28s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
2	**DS_TYPE=**	keyword	8	string	%8s
	DS type		1	string	%1s
	newline character	terminator	1	string	\n
3	**FILENAME=**	keyword	9	string	%9s
	quotation mark	-	1	string	\"
	filename		62	string	%62s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
4	**DS_OFFSET=**	keyword	10	string	%10s
	quotation mark	-	1	string	\"
	DS offset		20	string	%20s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
5	**DS_SIZE=**	keyword	8	string	%8s
	quotation mark	-	1	string	\"
	DS size		20	string	%20s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
6	**NUM_DSR=**	keyword	8	string	%8s
	quotation mark	-	1	string	\"
	Number of DSR		10	string	%10s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n

Table 20: DORIS Navigator File. DSD_Block

N	Description	units	Byte Length	Data Type	C Format
7	**DSR_SIZE=**	keyword	9	string	%9s
	quotation mark	-	1	string	\"
	DSR size		10	string	%10s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n

4.6.1 Example

```
PRODUCT="DOR_NAV_0PNPDK20000620_103914_00005120A001_00180_00177_0032.N1"
PROC_STAGE=N
REF_DOC="PO-RS-MDA-GS-2009 3-M  "

ACQUISITION_STATION="PDHS-K              "
PROC_CENTER="PDHS-K"
PROC_TIME="20-JUN-2000 12:34:23.000000"
SOFTWARE_VER="PFHS/5.00     "

SENSING_START="20-JUN-2000 10:39:14.340312"
SENSING_STOP="20-JUN-2000 12:04:34.340312"

PHASE=A
CYCLE=+001
REL_ORBIT=+00180
ABS_ORBIT=+00177
STATE_VECTOR_TIME="20-JUN-2000 11:47:28.032000"
DELTA_UT1=+.000000<s>
X_POSITION=-6394492.635<m>
Y_POSITION=+3232994.628<m>
Z_POSITION=-0000002.041<m>
X_VELOCITY=+0743.376625<m/s>
Y_VELOCITY=+1451.527212<m/s>
Z_VELOCITY=+7377.411489<m/s>
VECTOR_SOURCE="FP"

UTC_SBT_TIME="20-JUN-2000 10:06:52.270000"
SAT_BINARY_TIME=+0003333613
CLOCK_STEP=+3906250000<ps>

LEAP_UTC="21-JUL-1997 12:03:07.000000"
LEAP_SIGN=+000
LEAP_ERR=0

PRODUCT_ERR=0
TOT_SIZE=+00000000000000025847<bytes>
SPH_SIZE=+0000001956<bytes>
NUM_DSD=+0000000003
```

```
DSD_SIZE=+0000000280<bytes>
NUM_DATA_SETS=+0000000001

SPH_DESCRIPTOR="DOR_NAV_0P SPECIFIC HEADER  "
START_LAT=+0062841866<10-6degN>
START_LONG=+0007183174<10-6degE>
STOP_LAT=+0060289298<10-6degN>
STOP_LONG=+0133712091<10-6degE>
SAT_TRACK=+2.00644312E+02<deg>

ISP_ERRORS_SIGNIFICANT=0
MISSING_ISPS_SIGNIFICANT=0
ISP_DISCARDED_SIGNIFICANT=0
RS_SIGNIFICANT=0

NUM_ERROR_ISPS=+0000000000
ERROR_ISPS_THRESH=+0.00000000E+00<%>
NUM_MISSING_ISPS=+0000000000
MISSING_ISPS_THRESH=+0.00000000E+00<%>
NUM_DISCARDED_ISPS=+0000000000
DISCARDED_ISPS_THRESH=+0.00000000E+00<%>
NUM_RS_ISPS=+0000000000
RS_THRESH=+0.00000000E+00<%>

TX_RX_POLAR="     "
SWATH="   "

DS_NAME="DORIS_SOURCE_PACKETS        "
DS_TYPE=M
FILENAME="                                                                "
DS_OFFSET=+0000000000000003203<bytes>
DS_SIZE=+0000000000000022644<bytes>
NUM_DSR=+0000000017
DSR_SIZE=+0000001332<bytes>

DS_NAME="LEVEL_0_CONFIGURATION_FILE  "
DS_TYPE=R
FILENAME="AUX_CN0_AXVSPT19980101_000000_19980101_000000_20001231_000000 "
DS_OFFSET=+0000000000000000000<bytes>
DS_SIZE=+0000000000000000000<bytes>
NUM_DSR=+0000000000
DSR_SIZE=+0000000000<bytes>

DS_NAME="ORBIT_STATE_VECTOR_FILE     "
DS_TYPE=R
FILENAME="AUX_FPO_AXVPDS20000620_084620_20000618_225417_20000622_122443 "
DS_OFFSET=+0000000000000000000<bytes>
DS_SIZE=+0000000000000000000<bytes>
NUM_DSR=+0000000000
DSR_SIZE=+0000000000<bytes>
```

[Data block. Binary data]

4.7 Restituted Attitude File

Table 21: Restituted Attitude File

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	fhr	keyword	3	string	%3s
	blank space		1	string	%1s
	; Fixed Header	comment		string	%s
	newline character	terminator	1	string	\n
2	**Fixed header record (see section 4.1)**				
3	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	fhr	keyword	3	string	%3s
	newline character	terminator	1	string	\n
4	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	fra_vhr	keyword	7	string	%7s
	blank space		1	string	%1s
	; Variable Header	comment		string	%s
	newline character	terminator	1	string	\n
5	**Variable header record (see section 4.7.1)**				
6	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	fra_vhr	keyword	7	string	%7s
	newline character	terminator	1	string	\n
7	**; Variable Header**	comment		string	%s
8	**Data block (see table 22)**				

4.7.1 Restituted Attitude File. Variable Header

Table 22: Restituted Attitude File. Variable Header

N	Description	units	Byte Length	Data Type	C Format
1	**START_TIME=**	keyword	11	string	%11s
	quotation mark	-	1	string	\"
	start_time		27	string	%27s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
2	**STOP_TIME=**	keyword	10	string	%10s
	quotation mark	-	1	string	\"
	stop_time		27	string	%27s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
3	**AOCS_CX=**	keyword	8	string	%8s
	AOCS CX		9	+x.xxxxxx	%9.6f
	<deg>	unit	5	string	%s
	newline character	terminator	1	string	\n
4	**AOCS_CY=**	keyword	8	string	%8s
	AOCS CY		9	+x.xxxxxx	%9.6f
	<deg>	unit	5	string	%s
	newline character	terminator	1	string	\n
5	**AOCS_CZ=**	keyword	8	string	%8s
	AOCS CZ		9	+x.xxxxxx	%9.6f
	<deg>	unit	5	string	%s
	newline character	terminator	1	string	\n
6	**NUM_ATT_REC=**	keyword	12	string	%12s
	Number of Attitde records		7	+xxxxxx	%7d
	newline character	terminator	1	string	\n

4.7.2 Restituted Attitude File. Data Block

Table 23: Restituted Attitude File. Data Block

N	Description	units	Byte Length	Data Type	C Format
1	**LIST**	keyword	4	string	%4s
	blank space		1	string	%1s
	num_onboard_orbit_update=	keyword	25	string	%25s
	Number of onboard orbit updates		2	xx	%2d
	blank space		1	string	%1s
	; number of onboard orbit update	comment		string	%s
	newline character	terminator	1	string	\n
2	list of onboard orbit updates(see table 24)				
3	newline character	terminator	1	string	\n
4	**ENDLIST**	keyword	7	string	%7s
	blank space		1	string	%1s
	num_onboard_orbit_update	keyword	24	string	%24s
	newline character	terminator	1	string	\n
5	newline character	terminator	1	string	\n
6	**LIST**	keyword	4	string	%4s
	blank space		1	string	%1s
	num_att_mode=	keyword	13	string	%13s
	Number of attitude modes		2	xx	%2d
	blank space		1	string	%1s
	; number of attitude modes	comment		string	%s
	newline character	terminator	1	string	\n
7	list of attitude modes(see table 25)				
8	newline character	terminator	1	string	\n
9	**ENDLIST**	keyword	7	string	%7s
	blank space		1	string	%1s
	num_att_mode	keyword	12	string	%12s
	newline character	terminator	1	string	\n
10	newline character	terminator	1	string	\n
11	**; list of AOCS estimator output**	comment		string	%s

Table 23: Restituted Attitude File. Data Block

N	Description	units	Byte Length	Data Type	C Format
1	list of AOCS (see table 26)				

Table 24: Restituted Attitude File. Onboard orbit updates

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	onboard_orbit_update	keyword	20	string	%20s
	newline character	terminator	1	string	\n
2	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	UTC_START=	keyword	10	string	%10s
	quotation mark	-	1	string	\"
	start date		27	string	%27s
	quotation mark	-	1	string	\"
	blank space		1	string	%1s
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n
3	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	UTC_END=	keyword	8	string	%8s
	quotation mark	-	1	string	\"
	end date		27	string	%27s
	quotation mark	-	1	string	\"
	blank space		1	string	%1s
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n

Table 24: Restituted Attitude File. Onboard orbit updates

N	Description	units	Byte Length	Data Type	C Format
4	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	Cummulated_TM_gap_duration=	keyword	27	string	%27s
	Cummulated TM gap duration		6	+xxxxx	%6d
	<sec>	units	1	string	%s
	blank space		1	string	%1s
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n
5	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	pitch	keyword	5	string	%5s
	newline character	terminator	1	string	\n
6	attitude angle record(see table 27)				
7	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	pitch	keyword	5	string	%5s
	newline character	terminator	1	string	\n
8	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	roll	keyword	4	string	%4s
	newline character	terminator	1	string	\n
9	attitude angle record(see table 27)				
10	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	roll	keyword	4	string	%4s
	newline character	terminator	1	string	\n
11	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	yaw	keyword	3	string	%3s
	newline character	terminator	1	string	\n
12	attitude angle record(see table 27)				

Table 24: Restituted Attitude File. Onboard orbit updates

N	Description	units	Byte Length	Data Type	C Format
13	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	yaw	keyword	3	string	%3s
	newline character	terminator	1	string	\n
14	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	onboard_orbit_update	keyword	7	string	%7s
	newline character	terminator	1	string	\n

Table 25: Restituted Attitude File. Attitude modes

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	ATT_MODE	keyword	7	string	%7s
	newline character	terminator	1	string	\n
2	**UTC_START=**	keyword	10	string	%10s
	quotation mark	-	1	string	\"
	date		27	string	%27s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
3	**MODE=**	keyword	5	string	%5s
	quotation mark	-	1	string	\"
	mode			string	%s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
	ENDRECORD	keyword	9	string	%9s
	blank space		1	string	%1s
	ATT_MODE	keyword	7	string	%7s
	newline character	terminator	1	string	\n

Table 26: Restituted Attitude File. AOCS Estimator outputs

N	Description	units	Byte Length	Data Type	C Format
1	**Date**		27	string	%27s
	AOCS CX	-	11	+xxx.xxxxxx	%+11.6
	AOCS CY	-	11	+xxx.xxxxxx	%+11.6
	AOCS CZ	-	11	+xxx.xxxxxx	%+11.6
	newline character	terminator	1	string	\n

Table 27: Restituted Attitude File. Attitude angle record

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	2ndorder:	keyword	9	string	%9s
	blank space		1	string	%1s
	A0=	keyword	3	string	%3s
	A0 parameter		11	+xxx.xxxxxx	%11.6f
	<deg>	units	5	string	%5s
	blank space		1	string	%1s
	A1=	keyword	3	string	%3s
	A1 parameter		11	+xxx.xxxxxx	%11.6f
	<deg/day>	units	9	string	%9s
	blank space		1	string	%1s
	A2=	keyword	3	string	%3s
	A2 parameter		11	+xxx.xxxxxx	%11.6f
	<deg/day^2>	units	11	string	%11s
	blank space		1	string	%1s
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n

Table 27: Restituted Attitude File. Attitude angle record

N	Description	units	Byte Length	Data Type	C Format
2	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	Orbital_harmonics	keyword	17	string	%17s
	newline character	terminator	1	string	\n
3	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	Orbital_phases:	keyword	15	string	%15s
	blank space		1	string	%1s
	W0=	keyword	3	string	%3s
	Orbital phase		12	+xxxx.xxxxxx	%12.6f
	<deg/day>	units	9	string	%9s
	blank space		1	string	%1s
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n
4	**LIST**	keyword	4	string	%4s
	blank space		1	string	%1s
	num_harm=	keyword	9	string	%9s
	Number of harmonics				%d
	blank space		1	string	%1s
	;Number of harmonics needed for Orbital_harmonics	comment		string	%s
	newline character	terminator	1	string	\n
5	list of harmonic records 1(see table 28)				
6	**ENDLIST**	keyword	7	string	%7s
	blank space		1	string	%1s
	num_harm	keyword	8	string	%8s
	newline character	terminator	1	string	\n
7	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	Orbital_harmonics	keyword	17	string	%17s
	newline character	terminator	1	string	\n

Table 27: Restituted Attitude File. Attitude angle record

N	Description	units	Byte Length	Data Type	C Format
8	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	Daily_harmonics	keyword	15	string	%15s
	newline character	terminator	1	string	\n
9	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	Daily_phase:	keyword	15	string	%15s
	blank space		1	string	%1s
	WJ=	keyword	3	string	%3s
	Daily phase		11	+xxx.xxxxxx	%11.6f
	<deg/day>	units	9	string	%9s
	blank space		1	string	%1s
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n
10	**LIST**	keyword	4	string	%4s
	blank space		1	string	%1s
	num_harm=	keyword	9	string	%9s
	Number of harmonics				%d
	blank space		1	string	%1s
	;Number of harmonics needed for Daily_harmonics	comment		string	%s
	newline character	terminator	1	string	\n
11	list of harmonic records 2(see table 29)				
12	**ENDLIST**	keyword	7	string	%7s
	blank space		1	string	%1s
	num_harm	keyword	8	string	%8s
	newline character	terminator	1	string	\n
13	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	Daily_harmonics	keyword	15	string	%15s
	newline character	terminator	1	string	\n

Table 28: Restituted Attitude File. harmonic record 1

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	harm:	keyword	5	string	%5s
	blank space		1	string	%1s
	AMP_1=	keyword	6	string	%6s
	Amplitude		11	+xxx.xxxxxx	%11.6f
	<deg>	units	5	string	%5s
	blank space		1	string	%1s
	PHA_1=	keyword	6	string	%6s
	Phase		11	+xxx.xxxxxx	%11.6f
	<deg>	units	5	string	%5s
	blank space		1	string	%1s
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n

Table 29: Restituted Attitude File. harmonic record 2

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	harm:	keyword	5	string	%5s
	blank space		1	string	%1s
	AMP_2=	keyword	6	string	%6s
	Amplitude		11	+xxx.xxxxxx	%11.6f
	<deg>	units	5	string	%5s
	blank space		1	string	%1s
	PHA_2=	keyword	6	string	%6s
	Phase		11	+xxx.xxxxxx	%11.6f
	<deg>	units	5	string	%5s
	blank space		1	string	%1s
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n

4.7.3 Example

```
RECORD fhr
  FILENAME="RESTITUTED_ATTITUDE_FILE.N1"
  DESTINATION="PUB,PDCC "
  PHASE_START=+002
  CYCLE_START=+039
  REL_START_ORBIT=+00288
  ABS_START_ORBIT=+17877
ENDRECORD fhr

RECORD fra_vhr
 START_TIME="01-AUG-2005 00:00:00.000000"
 STOP_TIME="02-AUG-2005 00:00:00.000000"
 AOCS_CX=-0.167074<deg>
 AOCS_CY=+0.050233<deg>
 AOCS_CZ=+3.912987<deg>
 NUM_ATT_REC=+086400
ENDRECORD fra_vhr

LIST num_onboard_orbit_update=03;number of onboard orbit update
 RECORD onboard_orbit_update
  RECORD UTC_START="31-JUL-2005 14:44:55.128500" ENDRECORD
  RECORD UTC_END="01-AUG-2005 02:29:04.728500" ENDRECORD
```

```
  RECORD Cummulated_TM_gap_duration=+00001<sec> ENDRECORD
  RECORD pitch
   RECORD 2ndorder: A0=+000.022563<deg> A1=-000.036562<deg/day> A2=+000.000000<deg/day^2> EN-
DRECORD
   RECORD Orbital_harmonics
    RECORD Orbital_phases: W0=+5153.147350<deg/day> ENDRECORD
    LIST num_harm=15;Number of harmonics needed for Orbital_harmonics
     RECORD harm: AMP_1=+000.018422<deg> PHA_1=+150.232929<deg> ENDRECORD
     [...]
    ENDLIST num_harm
   ENDRECORD Orbital_harmonics
   RECORD Daily_harmonics
    RECORD Daily_phase: WJ=+720.000000<deg/day> ENDRECORD
    LIST num_harm=30;Number of harmonics needed for Daily_harmonics
     RECORD harm: AMP_2=+000.005552<deg> PHA_2=+265.220687<deg> ENDRECORD
     [...]
    ENDLIST num_harm
   ENDRECORD Daily_harmonics
  ENDRECORD pitch
  RECORD roll
   RECORD 2ndorder: A0=-000.012519<deg> A1=+000.019539<deg/day> A2=+000.000000<deg/day^2> EN-
DRECORD
   RECORD Orbital_harmonics
    RECORD Orbital_phases: W0=+5153.147350<deg/day> ENDRECORD
    LIST num_harm=15;Number of harmonics needed for Orbital_harmonics
     RECORD harm: AMP_1=+000.012554<deg> PHA_1=+320.805569<deg> ENDRECORD
     [...]
    ENDLIST num_harm
   ENDRECORD Orbital_harmonics
   RECORD Daily_harmonics
    RECORD Daily_phase: WJ=+720.000000<deg/day> ENDRECORD
    LIST num_harm=30;Number of harmonics needed for Daily_harmonics
     RECORD harm: AMP_2=+000.003197<deg> PHA_2=+082.666172<deg> ENDRECORD
     [...]
    ENDLIST num_harm
   ENDRECORD Daily_harmonics
  ENDRECORD roll
  RECORD yaw
   RECORD 2ndorder: A0=-000.004672<deg> A1=+000.007137<deg/day> A2=+000.000000<deg/day^2> EN-
DRECORD
   RECORD Orbital_harmonics
    RECORD Orbital_phases: W0=+5153.147350<deg/day> ENDRECORD
    LIST num_harm=15;Number of harmonics needed for Orbital_harmonics
     RECORD harm: AMP_1=+000.009300<deg> PHA_1=+254.309569<deg> ENDRECORD
     [...]
    ENDLIST num_harm
   ENDRECORD Orbital_harmonics
   RECORD Daily_harmonics
    RECORD Daily_phase: WJ=+720.000000<deg/day> ENDRECORD
    LIST num_harm=30;Number of harmonics needed for Daily_harmonics
     RECORD harm: AMP_2=+000.001148<deg> PHA_2=+062.111692<deg> ENDRECORD
     [...]
    ENDLIST num_harm
```

```
   ENDRECORD Daily_harmonics
  ENDRECORD yaw
 ENDRECORD onboard_orbit_update
  [...]

ENDLIST num_onboard_orbit_update

LIST num_att_mode=001;number of attitude modes
 RECORD ATT_MODE
  UTC_START="01-AUG-2005 00:00:00.000000"
  MODE="SYSM"
 ENDRECORD ATT_MODE
ENDLIST num_att_mode

;list of AOCS estimator output, list may contain data gaps due to mode or unavailability of data
01-AUG-2005 00:00:00.477965 +000.002045 -000.000500 +000.000466
01-AUG-2005 00:00:01.477958 +000.002047 -000.000500 +000.000466

01-AUG-2005 23:59:59.473824 -000.001720 -000.000506 +000.000389
```

4.8 pp_converter input file format

4.8.1 Fixed Header

Follows the format described in section 4.1. The fields DESTINATION, PHASE_START, CYCLE_START, REL_START_ORBIT and ABS_START_ORBIT have no meaning and could be fixed to any value.

4.8.2 Variable Header

Table 30: pp_converter input file. Variable Header

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	cif_vhr	keyword	7	string	%7s
	blank space		1	string	%1s
	; Variable Header	comment		string	%s
	newline character	terminator	1	string	\n
2	newline character	empty line	1	string	\n
3	**LUT_DESCRIPTOR=**	keyword	15	string	%15s
	quotation mark	-	1	string	\"
	Atmosphere Descriptor		10	string	%10s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
4	**START_DAY_OF_YEAR=**	keyword	18	string	%18s
	First day in the year for which the atmosphere is considered to be valid		4	+xxx	%+04d
	newline character	terminator	1	string	\n
5	**STOP_DAY_OF_YEAR=**	keyword	17	string	%17s
	Last day in the year for which the atmosphere is considered to be valid		4	+xxx	%+04d
	newline character	terminator	1	string	\n
6	**MIN_LAT=**	keyword	8	string	%8s
	Minimum latitude for the latitude band		8	+xxx.xxx	%+08.3f
	<deg>	unit	5	string	%5s
	newline character	terminator	1	string	\n

Table 30: pp_converter input file. Variable Header

N	Description	units	Byte Length	Data Type	C Format
7	**MAX_LAT=**	keyword	8	string	%8s
	Maximum latitude for the latitude band		8	+xxx.xxx	%+08.3f
	<deg>	unit	5	string	%5s
	newline character	terminator	1	string	\n
8	**NUM_LUT=**	keyword	8	string	%8s
	Number of pairs of coindex of refraction vs. altitude		4	+xxx	%+04d
	newline character	terminator	1	string	\n
9	newline character	empty line	1	string	\n
10	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	cif_vhr	keyword	7	string	%7s
	newline character	terminator	1	string	\n

4.8.3 Data block

The following table describes the data block format.

Table 31: pp_converter input file data block format

N	Description	units	Byte Length	Data Type	C Format
1	**LIST**	keyword	4	string	%4s
	blank space		1	string	%1s
	num_alt=	keyword	8	string	%8s
	Number of pairs of coindex of refraction vs. altitude		3	xxx	%03d
	blank space		1	string	%1s
	newline character	terminator	1	string	\n
2	newline character	empty line	1	string	\n
3	list of **num_alt** alt Records (see format below)				
4	newline character	empty line	1	string	\n

Table 31: pp_converter input file data block format

N	Description	units	Byte Length	Data Type	C Format
5	**ENDLIST**	keyword	7	string	%7s
	blank space		1	string	%1s
	num_alt	keyword	7	string	%7s
	newline character	terminator	1	string	\n

Table 32: pp_converter alt record format

N	Description	units	Byte Length	Data Type	C Format
1	2 blank spaces		2	string	%2s
	RECORD	keyword	6	string	%6s
	blank space		1	string	%1s
	alt:	keyword	4	string	%4s
	blank space	indentation	1	string	%1s
	ALT=	keyword	4	string	%4s
	Altitude	-	8	+xxx.xxx	%+08.3f
	<km>	unit	4	string	%4s
	blank space	indentation	1	string	%1s
	REFR=	keyword	5	string	%5s
	Coindex of refraction	-	8	+xxx.xxx	%+08.3f
	blank space	indentation	1	string	%1s
	ENDRECORD	keyword	9	string	%9s
	blank space		1	string	%1s
	newline character	terminator	1	string	\n

4.8.4 Example

An example **pp_converter** input file is shown below:

```
FILE; Converter Input File
;---------------------------------------------------
RECORD fhr ; Fixed Header
FILENAME="REFRACT_1976.DAT_conv"
DESTINATION="PDS,FOS  "
PHASE_START=+000
CYCLE_START=+000
REL_START_ORBIT=+00000
ABS_START_ORBIT=+00000
ENDRECORD fhr
;---------------------------------------------------
RECORD cif_vhr ; Variable Header
LUT_DESCRIPTOR="STD_1976  "
START_DAY_OF_YEAR=+001
STOP_DAY_OF_YEAR=+365
MIN_LAT=-090.000<deg>
MAX_LAT=+090.000<deg>
NUM_ALT=+046
ENDRECORD cif_vhr
;---------------------------------------------------
LIST num_alt=046
  RECORD alt: ALT=+000.000<km> REFR=+271.950 ENDRECORD
  RECORD alt: ALT=+001.000<km> REFR=+246.930 ENDRECORD
  RECORD alt: ALT=+002.000<km> REFR=+223.620 ENDRECORD
  RECORD alt: ALT=+003.000<km> REFR=+202.060 ENDRECORD
                        ...
  RECORD alt: ALT=+090.000<km> REFR=+010.000 ENDRECORD
  RECORD alt: ALT=+095.000<km> REFR=+000.000 ENDRECORD
  RECORD alt: ALT=+100.000<km> REFR=+000.000 ENDRECORD
ENDLIST num_alt
;---------------------------------------------------
ENDFILE
```

4.9 pp_converter output file format

Table 33: pp_converter output file

N	Description	units	Byte Length	Data Type	C Format
1	**FILE**	keyword	4	string	%4s
	; Converter output file	comment		string	%s
	newline character	terminator	1	string	\n
2	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	fhr	keyword	3	string	%3s
	blank space		1	string	%1s
	; Fixed Header	comment		string	%s
	newline character	terminator	1	string	\n
3	**Fixed header record (see section 4.1)**				
4	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	fhr	keyword	3	string	%3s
	newline character	terminator	1	string	\n
5	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	cof_vhr	keyword	7	string	%7s
	blank space		1	string	%1s
	; Variable Header	comment		string	%s
	newline character	terminator	1	string	\n
6	**Variable header record (see section 4.9.1)**				
7	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	cof_vhr	keyword	7	string	%7s
	newline character	terminator	1	string	\n
8	**; Variable Header**	comment		string	%s
9	**Data block (see table 4.9.2)**				
10	**ENDFILE**	keyword	7	string	%7s

4.9.1 Variable Header

Table 34: pp_converter output file. Variable Header

N	Description	units	Byte Length	Data Type	C Format
1	**MIN_AZ=**	keyword	7	string	%7s
	min_az		11	+xxx.xxxxxx	%+3.11f
	<deg>	unit	5	string	%s
	newline character	terminator	1	string	\n
2	**MAX_AZ=**	keyword	7	string	%7s
	max_az		11	+xxx.xxxxxx	%+3.11f
	<deg>	unit	5	string	%s
	newline character	terminator	1	string	\n
3	**MIN_FREQ=**	keyword	7	string	%7s
	min_freq		11	+xxxxxxxxxx	%+11d
	<MHh>	unit	5	string	%s
	newline character	terminator	1	string	\n
4	**MAX_FREQ=**	keyword	7	string	%7s
	max_freq		11	+xxxxxxxxxx	%+11d
	<MHh>	unit	5	string	%s
	newline character	terminator	1	string	\n
5	**NUM_CORR_FUNCT=**	keyword	15	string	%15s
	number of correction functions		4	+xxx	%+4d
	newline character	terminator	1	string	\n

4.9.2 Data block

Table 35: pp_converter output file. Data block

N	Description	units	Byte Length	Data Type	C Format
1	**LIST**	keyword	4	string	%4s
	blank space		1	string	%1s
	num_corr_funct=	keyword	16	string	%16s
	number of corrective functions		4	+xxx	%+4d
	; Coeficients of the corrective functions	comment		string	%s
	blank space		1	string	%1s
	newline character	terminator	1	string	\n
2	newline character	empty line	1	string	\n
3	list of **corr_funct** Records (see table 36)				
4	newline character	empty line	1	string	\n
5	**ENDLIST**	keyword	7	string	%7s
	blank space		1	string	%1s
	num_corr_funct	keyword	15	string	%15s
	newline character	terminator	1	string	\n
6	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	aver_funct	keyword	10	string	%10s
	newline character	terminator	1	string	\n
7	**NUM_LUT=**	keyword	8	string	%8s
	num_lut	keyword	4	+xxx	%+4d
	newline character	terminator	1	string	\n
8	**CORR_FUNCTION_FILENAME=**	keyword	23	string	%23s
	filename			string	%s
	newline character	terminator	1	string	\n
7	**AVER_QUALITY_INDEX=**	keyword	20	string	%20s
	index		6	+x.xxx	%+6.3f
	newline character	terminator	1	string	\n
8	newline character	terminator	1	string	\n

Table 35: pp_converter output file. Data block

N	Description	units	Byte Length	Data Type	C Format
9	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	gomos:	keyword	10	string	%10s
	newline character	terminator	1	string	\n
10	newline character	terminator	1	string	\n
11	corrective coefficients (see table 37)				
12	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	gomos	keyword	5	string	%5s
	newline character	terminator	1	string	\n
13	newline character	terminator	1	string	\n
14	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	mipas:	keyword	10	string	%10s
	newline character	terminator	1	string	\n
15	newline character	terminator	1	string	\n
16	corrective coefficients (see table 37)				
17	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	mipas	keyword	5	string	%5s
	newline character	terminator	1	string	\n
18	newline character	terminator	1	string	\n
19	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	aver_funct	keyword	10	string	%10s
	newline character	terminator	1	string	\n

Table 36: pp_converter output file. Corrective Function

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	corr_funct	keyword	10	string	%10s
	newline character	terminator	1	string	\n
2	**LUT_NUMBER=**	keyword	11	string	%11s
	lut_number	keyword	4	+xxx	%+4d
	newline character	terminator	1	string	\n
3	**LUT_FILENAME=**	keyword	13	string	%13s
	filename			string	%s
	newline character	terminator	1	string	\n
4	**LUT_DESCRIPTOR=**	keyword	15	string	%15s
	descriptor			string	%s
	newline character	terminator	1	string	\n
5	**CORR_FUNCTION_FILENAME=**	keyword	23	string	%23s
	index			string	%s
	newline character	terminator	1	string	\n
6	**START_DAY_OF_YEAR=**	keyword	18	string	%18s
	start day		4	+xxx	%+4d
	newline character	terminator	1	string	\n
7	**STOP_DAY_OF_YEAR=**	keyword	20	string	%20s
	stop day		4	+xxx	%+4d
	newline character	terminator	1	string	\n
8	**MIN_LAT=**	keyword	20	string	%20s
	min_lat		8	+xxx.xxx	%+8.3f
	newline character	terminator	1	string	\n
9	**MAX_LAT=**	keyword	20	string	%20s
	max_lat		8	+xxx.xxx	%+8.3f
	newline character	terminator	1	string	\n
10	**QUALITY_INDEX=**	keyword	20	string	%20s
	quality index		6	+x.xxx	%+6.3f
	newline character	terminator	1	string	\n

Table 36: pp_converter output file. Corrective Function

N	Description	units	Byte Length	Data Type	C Format
11	newline character	terminator	1	string	\n
12	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	gomos:	keyword	10	string	%10s
	newline character	terminator	1	string	\n
13	newline character	terminator	1	string	\n
14	corrective coefficients (see table 37)				
15	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	gomos	keyword	5	string	%5s
	newline character	terminator	1	string	\n
16	newline character	terminator	1	string	\n
17	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	mipas:	keyword	10	string	%10s
	newline character	terminator	1	string	\n
18	newline character	terminator	1	string	\n
19	corrective coefficients (see table 37)				
20	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	mipas	keyword	5	string	%5s
	newline character	terminator	1	string	\n
21	newline character	terminator	1	string	\n
22	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	corr_funct	keyword	10	string	%10s
	newline character	terminator	1	string	\n

Table 37: pp_converter output file. Corrective coefficients

N	Description	units	Byte Length	Data Type	C Format
1	**MIN_REFR_ALT=**	keyword	13	string	%13s
	min_refr_altitude		10	+xxxxxx.xx	%+10.2f
	<m>	unit	3	string	%s
	newline character	terminator	1	string	\n
2	**INT_REFR_ALT=**	keyword	13	string	%13s
	int_refr_alt		10	+xxxxxx.xx	%+10.2f
	<m>	unit	3	string	%s
	newline character	terminator	1	string	\n
3	**MAX_REFR_ALT=**	keyword	13	string	%13s
	max_refr_altitude		10	+xxxxxx.xx	%+10.2f
	<m>	unit	3	string	%s
	newline character	terminator	1	string	\n
4	newline character	terminator	1	string	\n
5	incr_altitude record (see table 38)				
6	incr_theta record (see table 39)				
7	incr_distance record (see table 40)				
8	incr_range record (see table 41)				

Table 38: pp_converter output file. incr_altitude coefficients

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	incr_altitude	keyword	13	string	%13s
	newline character	terminator	1	string	\n
2	**AH=**	keyword	3	string	%3s
	AH Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n

Table 38: pp_converter output file. incr_altitude coefficients

N	Description	units	Byte Length	Data Type	C Format
3	**BH=**	keyword	3	string	%3s
	BH Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
4	**CH=**	keyword	3	string	%3s
	CH Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
5	**DH=**	keyword	3	string	%3s
	DH Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
6	**RH=**	keyword	3	string	%3s
	RH Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
7	**SH=**	keyword	3	string	%3s
	SH Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
8	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	incr_altitude	keyword	13	string	%13s
	newline character	terminator	1	string	\n
9	newline character	terminator	1	string	\n

Table 39: pp_converter output file. incr_theta coefficients

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	incr_theta	keyword	10	string	%10s
	newline character	terminator	1	string	\n
2	**AT=**	keyword	3	string	%3s
	AT Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n

Table 39: pp_converter output file. incr_theta coefficients

N	Description	units	Byte Length	Data Type	C Format
3	**BT=**	keyword	3	string	%3s
	BT Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
4	**CT=**	keyword	3	string	%3s
	CT Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
5	**DT=**	keyword	3	string	%3s
	DT Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
6	**RT=**	keyword	3	string	%3s
	RT Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
7	**ST=**	keyword	3	string	%3s
	ST Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
8	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	incr_theta	keyword	10	string	%10s
	newline character	terminator	1	string	\n
9	newline character	terminator	1	string	\n

Table 40: pp_converter output file. incr_distance coefficients

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	incr_distance	keyword	13	string	%13s
	newline character	terminator	1	string	\n
2	**AD=**	keyword	3	string	%3s
	AD Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n

Table 40: pp_converter output file. incr_distance coefficients

N	Description	units	Byte Length	Data Type	C Format
3	**BD=**	keyword	3	string	%3s
	BD Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
4	**CD=**	keyword	3	string	%3s
	CD Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
5	**DD=**	keyword	3	string	%3s
	DD Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
6	**RD=**	keyword	3	string	%3s
	RD Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
7	**SD=**	keyword	3	string	%3s
	SD Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
8	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	incr_distance	keyword	13	string	%13s
	newline character	terminator	1	string	\n
9	newline character	terminator	1	string	\n

Table 41: pp_converter output file. incr_range coefficients

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	incr_range	keyword	10	string	%10s
	newline character	terminator	1	string	\n
2	**AR=**	keyword	3	string	%3s
	AR Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n

Table 41: pp_converter output file. incr_range coefficients

N	Description	units	Byte Length	Data Type	C Format
3	**BR=**	keyword	3	string	%3s
	BH Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
4	**CR=**	keyword	3	string	%3s
	CR Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
5	**DR=**	keyword	3	string	%3s
	DR Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
6	**RR=**	keyword	3	string	%3s
	RR Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
7	**SR=**	keyword	3	string	%3s
	SR Coefficient		21	+xxx.xxxxxxxxxxxxxxx	%+21.16f
	newline character	terminator	1	string	\n
8	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	incr_range	keyword	10	string	%10s
	newline character	terminator	1	string	\n
9	newline character	terminator	1	string	\n

4.9.3 Example

```
FILE ; Converter output file
;---------------------------------------------------
RECORD fhr ; Fixed header

FILENAME="./ALL.OUT_conv"

DESTINATION="            "
PHASE_START=+000
CYCLE_START=+000
REL_START_ORBIT=+00000
ABS_START_ORBIT=+00000

ENDRECORD fhr
;---------------------------------------------------
RECORD cof_vhr ; Variable header

MIN_AZ=+160.000000<deg>
MAX_AZ=+200.000000<deg>
MIN_FREQ=+0020500000<Mhz>
MAX_FREQ=+1250000000<Mhz>
NUM_CORR_FUNCT=+006

ENDRECORD cof_vhr
;---------------------------------------------------

LIST num_corr_funct=+006 ; Coeficients of the corrective functions

RECORD corr_funct

  LUT_NUMBER=+001
  LUT_FILENAME="./REFRACT_1976.DAT_conv"
  LUT_DESCRIPTOR="STD_1976  "
  CORR_FUNCTION_FILENAME="interm_outp_file_1.dat"
  START_DAY_OF_YEAR=+001
  STOP_DAY_OF_YEAR=+365
  MIN_LAT=-090.000<deg>
  MAX_LAT=+090.000<deg>
  QUALITY_INDEX=+0.836

  RECORD gomos:

    MIN_REFR_ALT=-030769.23<m>
    INT_REFR_ALT=-004174.48<m>
    MAX_REFR_ALT=+050000.00<m>

    RECORD incr_altitude:
      AH=+000.0074648379928764
      BH=-000.0093929967583201
      CH=+000.0007518779256588
      DH=+000.0003048024629628
```

```
    RH=-004.9252828228391365
    SH=+006.3750390192910960
  ENDRECORD incr_altitude

  RECORD incr_theta:
    AT=-000.0025867778141002
    BT=+000.0028958803896449
    CT=-000.0002378970572475
    DT=-000.0000963966868584
    RT=+001.5550317524011994
    ST=-001.9943193151461702
  ENDRECORD incr_theta

  RECORD incr_distance:
    AD=-000.0085463499350552
    BD=+000.0091595377265429
    CD=-000.0007605025528085
    DD=-000.0003080221151424
    RD=+004.9946722174216980
    SD=-006.3748474338170169
  ENDRECORD incr_distance

  RECORD incr_range:
    AR=-000.0085473287566143
    BR=+000.0091591767620088
    CR=-000.0007605372733051
    DR=-000.0003080362003038
    RR=+004.9950353460274277
    SR=-006.3750578999684215
  ENDRECORD incr_range

ENDRECORD gomos

RECORD mipas:

  MIN_REFR_ALT=+005395.32<m>
  INT_REFR_ALT=+013559.67<m>
  MAX_REFR_ALT=+040093.79<m>

  RECORD incr_altitude:
    AH=-000.0006257120706997
    BH=+000.0013875288061389
    CH=+000.0006295144532726
    DH=+000.0005752204890584
    RH=-007.3217532469383881
    SH=+032.2438926504476839
  ENDRECORD incr_altitude

  RECORD incr_theta:
    AT=-000.0068587404360613
    BT=+000.0179500525670243
    CT=+000.0075825244632390
```

```
      DT=+000.0069286475037521
      RT=-073.3274881746980896
      ST=+338.0121971834632859
    ENDRECORD incr_theta

    RECORD incr_distance:
      AD=+000.0222989661855713
      BD=-000.0571453745079383
      CD=-000.0242225851957694
      DD=-000.0221219118078270
      RD=+233.4801080301084255
      SD=-1077.1157281709117797
    ENDRECORD incr_distance

    RECORD incr_range:
      AR=+000.0222973255557379
      BR=-000.0571466655701799
      CR=-000.0242230773028860
      DR=-000.0221223611842330
      RR=+233.4967626462686496
      SR=-1077.1575716391353126
    ENDRECORD incr_range

  ENDRECORD mipas

ENDRECORD corr_funct

[...]


ENDLIST num_corr_funct

RECORD aver_funct

  NUM_LUT=+006
  CORR_FUNCTION_FILENAME="interm_outp_file_av.dat"
  AVER_QUALITY_INDEX=+0.833

  RECORD gomos:

    MIN_REFR_ALT=-034615.38<m>
    INT_REFR_ALT=-006754.22<m>
    MAX_REFR_ALT=+050000.00<m>

    RECORD incr_altitude:
      AH=+000.0074882989939917
      BH=-000.0095057788053092
      CH=+000.0008698022295335
      DH=+000.0003580734968612
      RH=-008.8330230081498087
      SH=+012.9797650070615074
    ENDRECORD incr_altitude
```

```
  RECORD incr_theta:
    AT=-000.0025229704779716
    BT=+000.0029507648166101
    CT=-000.0002750145291183
    DT=-000.0001135769044360
    RT=+002.8163816880223984
    ST=-004.1131841618789187
  ENDRECORD incr_theta

  RECORD incr_distance:
    AD=-000.0083986542584405
    BD=+000.0093180672321798
    CD=-000.0008928837687123
    DD=-000.0003684939604441
    RD=+008.9708999634042765
    SD=-013.1006760270711240
  ENDRECORD incr_distance

  RECORD incr_range:
    AR=-000.0083996305339452
    BR=+000.0093177048644136
    CR=-000.0008929193019908
    DR=-000.0003685085937915
    RR=+008.9713259942951407
    SR=-013.1010495885299072
  ENDRECORD incr_range

ENDRECORD gomos

RECORD mipas:

  MIN_REFR_ALT=+005395.32<m>
  INT_REFR_ALT=+013559.67<m>
  MAX_REFR_ALT=+040093.79<m>

  RECORD incr_altitude:
    AH=-000.0004447588269692
    BH=+000.0015198212614270
    CH=+000.0006991421452363
    DH=+000.0006388011211030
    RH=-006.5196926461155496
    SH=+027.7538372415911567
  ENDRECORD incr_altitude

  RECORD incr_theta:
    AT=-000.0035243024896141
    BT=+000.0203870301075696
    CT=+000.0087412982824131
    DT=+000.0079868154437605
    RT=-056.0887805381325180
    ST=+236.7986680270565500
```

```
    ENDRECORD incr_theta

    RECORD incr_distance:
      AD=+000.0116436343555956
      BD=-000.0649297427738211
      CD=-000.0279209274235438
      DD=-000.0255020605736994
      RD=+178.4412481540018121
      SD=-753.9514349488545122
    ENDRECORD incr_distance

    RECORD incr_range:
      AR=+000.0116417725405986
      BR=-000.0649311840876566
      CR=-000.0279215055628322
      DR=-000.0255025885019496
      RR=+178.4568504325580989
      SR=-753.9886139375074663
    ENDRECORD incr_range

  ENDRECORD mipas

ENDRECORD aver_funct

;-------------------------------------------------
ENDFILE
```

4.10 Swath Definition file

This file is only used by the PPF_GENREF CFI software in order to produce the Swath Template Files
File type comment (in 1st line of file):

; Swath Definition File

4.10.1 Fixed Header

Follows the format described in section 4.1 with:

- File ID (in file name) = `MPL_SW_DEF`
- originator (in file name) = `EMM`
- DESTINATION = `TBD`

4.10.2 Variable Header

Table 42: Swath Definition File. Variable Header

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	sdf_vhr	keyword	7	string	%7s
	blank space		1	string	%1s
	; Variable Header	comment		string	%s
	newline character	terminator	1	string	\n
2	newline character	empty line	1	string	\n
3	**REPEAT_CYCLE=**	keyword	13	string	%13s
	Repeat Cycle		4	+xxx	%+04d
	<days>	unit	6	string	%6s
	newline character	terminator	1	string	\n
4	**CYCLE_LENGTH=**	keyword	13	string	%13s
	Cycle Length		6	+xxxxx	%+06d
	<orbits>	unit	8	string	%8s
	newline character	terminator	1	string	\n
5	newline character	empty line	1	string	\n
6	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	aocs_ampl:	keyword	10	string	%10s
	blank space	separator	1	string	%1s

Table 42: Swath Definition File. Variable Header

N	Description	units	Byte Length	Data Type	C Format
	PITCH=	keyword	6	string	%6s
	Pitch Amplitude		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	ROLL=	keyword	5	string	%5s
	Roll Amplitude		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	YAW=	keyword	4	string	%4s
	Yaw Amplitude	metres	11	+xxxxxx.xxx	%#+011.3f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	\n
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n
7	**NUM_SWATH=**	keyword	10	string	%10s
	Number of Swath Files Defined		4	+xxx	%+04d
	newline character	terminator	1	string	\n
8	**SDF_VERSION=**	keyword	12	string	%12s
	quotation mark	-	1	string	\"
	Swath definition file version		2	xx	%02ld
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
9	**STF_FREQ=**	keyword	9	string	%9s
	Swath template file frequency		4	+xxx	%+04d
	newline character	terminator	1	string	\n
10	newline character	empty line	1	string	\n
11	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	sdf_vhr	keyword	7	string	%7s
	newline character	terminator	1	string	\n

4.10.3 Data Block

The file will consist of 1 list of variable length:

- Swath Files Definitions.

The structure contains among other details 3 sub-structures which all have variable format:

- geometry: azimuth/elevation/altitude values. 3 cases:
  - line: values for left, mid and right points
  - point: values for 1 point only
  - limb: same as line, but no elevation values (tangent point is used)
- mispointing: pitch/roll/yaw values. 3 cases:
  - all: values for bias and harmonics
  - bias: values for bias only
  - none: no values (i.e. no mispointing)
- specific to ASAR: window/pulse values. 3 cases:
  - wide: values for left and right points
  - narrow: values for 1 point only
  - none: no values (i.e. swath is not an ASAR swath)

Table 43: details the Swath Definition File data block format.

Table 43: Swath Definition File. Data block

N	Description	units	Byte Length	Data Type	C Format
1	**LIST**	keyword	4	string	%4s
	blank space		1	string	%1s
	num_swath=	keyword	14	string	%14s
	Number of Swath Template Files required		5	xxxxx	%05d
	blank space		1	string	%1s
	; Swaths Required	comment		string	%s
	newline character	terminator	1	string	\n
2	newline character	empty line	1	string	\n
3	list of **num_swath** Swath Definitions (see table 44) all separated by empty lines				
4	newline character	empty line	1	string	\n
5	**ENDLIST**	keyword	7	string	%7s
	blank space		1	string	%1s
	num_swath	keyword	13	string	%13s
	newline character	terminator	1	string	\n

Table 44: Swath Definition File. Swath Record

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	swath	keyword	5	string	%5s
	newline character	terminator	1	string	\n
2	2 blank spaces	indentation	2	string	%2s
	SWATH_DESCRIPTOR=	keyword	17	string	%17s
	quotation mark	-	1	string	\"
	Swath Descriptor (for information) ASCII string describing the swath (unused characters are blanked)	-	28	string	%28s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
3	2 blank spaces	indentation	2	string	%2s
	SWATH=	keyword	5	string	%5s
	quotation mark		1	string	\"
	Swath ID (used by software, must be unique) Note that the table gives the list of "standard" Envisat swaths for information. It does not restrict the values for this parameter.		6	string	%6s
	quotation mark		1	string	\"
	newline character	terminator	1	string	\n
4	2 blank spaces	indentation	2	string	%2s
	ALGORITHM=	keyword	10	string	%10s
	quotation mark		1	string	\"
	Algorithm to use one of: - **line** - **point** - **limb** - **inertial** - **asar**		8	string	%8s
	quotation mark		1	string	\"
	newline character	terminator	1	string	\n

Table 44: Swath Definition File. Swath Record

N	Description	units	Byte Length	Data Type	C Format
5	2 blank spaces	indentation	2	string	%2s
	RECORD	keyword	6	string	%6s
	blank space		1	string	%1s
	refraction:	keyword	11	string	%11s
	blank space	separator	1	string	%1s
	MODEL=	keyword	6	string	%6s
	quotation mark	-	1	string	\"
	Refraction Model used one of (right-filled with blanks if needed): - **NO_REF** - **STD_REF** - **USER_REF** - **PRED_REF**		8	string	%8s
	quotation mark	-	1	string	\"
	blank space	separator	1	string	%1s
	FREQ=	keyword	5	string	%5s
	Frequency	MHz	11	+xxxxxxxxxx	%+011d
	<Mhz>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n
6	2 blank spaces	indentation	2	string	%2s
	NUM_SWATH_REC=	keyword	14	string	%14s
	Number of swath records required		6	+xxxxx	%+06d
	newline character	terminator	1	string	\n
7	2 blank spaces	indentation	2	string	%2s
	UNION	keyword	5	string	%5s
	blank space		1	string	%1s
	geometry=	keyword	9	string	%9s
	Geometry Record structure name one of: - **line_geometry** **- point_geometry** - **limb_geometry**		18	string	%18s
	newline character	terminator	1	string	\n

Table 44: Swath Definition File. Swath Record

N	Description	units	Byte Length	Data Type	C Format
8	one of **line_geometry**, **point_geometry** of **limb_geometry** records (see description below)				
9	2 blank spaces	indentation	2	string	%2s
	ENDUNION	keyword	8	string	%8s
	blank space		1	string	%1s
	geometry	keyword	8	string	%8s
	newline character	terminator	1	string	\n
10	2 blank spaces	indentation	2	string	%2s
	UNION	keyword	5	string	%5s
	blank space		1	string	%1s
	mispointing=	keyword	12	string	%12s
	Mispointing Record structure name one of: - **all_mispointing** **- bias_mispointing** - **no_mispointing**		18	string	%18s
	newline character	terminator	1	string	\n
11	one of **all_mispointing**, **bias_mispointing** of **no_mispointing** records (see description below)				
12	2 blank spaces	indentation	2	string	%2s
	ENDUNION	keyword	8	string	%8s
	blank space		1	string	%1s
	mispointing	keyword	11	string	%11s
	newline character	terminator	1	string	\n
13	2 blank spaces	indentation	2	string	%2s
	UNION	keyword	5	string	%5s
	blank space		1	string	%1s
	spec_asar=	keyword	10	string	%10s
	Specific ASAR Record structure name one of: - **wide_asar** **- narrow_asar** - **no_asar**		18	string	%18s
	newline character	terminator	1	string	\n
14	one of **wide_asar**, **narrow_asar** of **no_asar** records (see description below)				

Table 44: Swath Definition File. Swath Record

N	Description	units	Byte Length	Data Type	C Format
15	2 blank spaces	indentation	2	string	%2s
	ENDUNION	keyword	8	string	%8s
	blank space		1	string	%1s
	spec_asar	keyword	9	string	%9s
	newline character	terminator	1	string	\n
16	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	swath	keyword	5	string	%5s
	newline character	terminator	1	string	\n

Table 45: Swath Definition File. line_geometry record

N	Description	units	Byte Length	Data Type	C Format
1	4 blank spaces	indentation	2	string	%2s
	RECORD	keyword	6	string	%6s
	2 blank spaces		2	string	%2s
	left_pt:	keyword	8	string	%8s
	blank space	separator	1	string	%1s
	AZ=	keyword	3	string	%3s
	Azimuth of left point		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	EL=	keyword	3	string	%3s
	Elevation of left point		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	ALT=	keyword	4	string	%4s
	Altitude of left point	metres	11	+xxxxxx.xxx	%#+011.3f
	<m>	unit	3	string	%3s
	blank space	separator	1	string	\n

Table 45: Swath Definition File. line_geometry record

N	Description	units	Byte Length	Data Type	C Format
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n
2	4 blank spaces	indentation	2	string	%2s
	RECORD	keyword	6	string	%6s
	3 blank spaces		3	string	%3s
	mid_pt:	keyword	7	string	%7s
	blank space	separator	1	string	%1s
	AZ=	keyword	3	string	%3s
	Azimuth of mid point		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	EL=	keyword	3	string	%3s
	Elevation of mid point		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	ALT=	keyword	4	string	%4s
	Altitude of mid point	metres	11	+xxxxxx.xxx	%#+011.3f
	<m>	unit	3	string	%3s
	blank space	separator	1	string	\n
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n
3	4 blank spaces	indentation	2	string	%2s
	RECORD	keyword	6	string	%6s
	blank space		1	string	%1s
	right_pt:	keyword	9	string	%9s
	blank space	separator	1	string	%1s
	AZ=	keyword	3	string	%3s
	Azimuth of right point		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s

Table 45: Swath Definition File. line_geometry record

N	Description	units	Byte Length	Data Type	C Format
	EL=	keyword	3	string	%3s
	Elevation of right point		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	ALT=	keyword	4	string	%4s
	Altitude of right point	metres	11	+xxxxxx.xxx	%#+011.3f
	<m>	unit	3	string	%3s
	blank space	separator	1	string	\n
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n

Table 46: Swath Definition File. point_geometry record

N	Description	units	Byte Length	Data Type	C Format
1	4 blank spaces	indentation	2	string	%2s
	RECORD	keyword	6	string	%6s
	blank space		1	string	%1s
	pt:	keyword	3	string	%3s
	blank space	separator	1	string	%1s
	AZ=	keyword	3	string	%3s
	Azimuth of point		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	EL=	keyword	3	string	%3s
	Elevation of point		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	ALT=	keyword	4	string	%4s
	Altitude of point	metres	11	+xxxxxx.xxx	%#+011.3f
	<m>	unit	3	string	%3s
	blank space	separator	1	string	\n
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n

Table 47: Swath Definition File. limb_geometry record

N	Description	units	Byte Length	Data Type	C Format
1	4 blank spaces	indentation	2	string	%2s
	RECORD	keyword	6	string	%6s
	2 blank spaces		2	string	%2s
	left_pt:	keyword	8	string	%8s
	blank space	separator	1	string	%1s
	AZ=	keyword	3	string	%3s
	Azimuth of left point		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	ALT=	keyword	4	string	%4s
	Altitude of left point	metres	11	+xxxxxx.xxx	%#+011.3f
	<m>	unit	3	string	%3s
	blank space	separator	1	string	\n
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n
2	4 blank spaces	indentation	2	string	%2s
	RECORD	keyword	6	string	%6s
	3 blank spaces		3	string	%3s
	mid_pt:	keyword	7	string	%7s
	blank space	separator	1	string	%1s
	AZ=	keyword	3	string	%3s
	Azimuth of mid point		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	ALT=	keyword	4	string	%4s
	Altitude of mid point	metres	11	+xxxxxx.xxx	%#+011.3f
	<m>	unit	3	string	%3s
	blank space	separator	1	string	\n

Table 47: Swath Definition File. limb_geometry record

N	Description	units	Byte Length	Data Type	C Format
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n
3	4 blank spaces	indentation	2	string	%2s
	RECORD	keyword	6	string	%6s
	blank space		1	string	%1s
	right_pt:	keyword	9	string	%9s
	blank space	separator	1	string	%1s
	AZ=	keyword	3	string	%3s
	Azimuth of right point		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	ALT=	keyword	4	string	%4s
	Altitude of right point	metres	11	+xxxxxx.xxx	%#+011.3f
	<m>	unit	3	string	%3s
	blank space	separator	1	string	\n
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n

Table 48: Swath Definition File. all_mispointing record

N	Description	units	Byte Length	Data Type	C Format
1	4 blank spaces	indentation	2	string	%2s
	RECORD	keyword	6	string	%6s
	blank space		1	string	%1s
	bias:	keyword	5	string	%5s
	blank space	separator	1	string	%1s
	PITCH=	keyword	6	string	%6s
	Pitch Bias		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	ROLL=	keyword	5	string	%5s
	Roll Bias		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	YAW=	keyword	4	string	%4s
	Yaw Bias	metres	11	+xxxxxx.xxx	%#+011.3f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	\n
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n
2	4 blank spaces	indentation	2	string	%2s
	RECORD	keyword	6	string	%6s
	2 blank spaces		2	string	%2s
	sin:	keyword	4	string	%4s
	blank space	separator	1	string	%1s
	PITCH=	keyword	6	string	%6s
	Pitch Bias		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s

Table 48: Swath Definition File. all_mispointing record

N	Description	units	Byte Length	Data Type	C Format
	ROLL=	keyword	5	string	%5s
	Roll Bias		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	YAW=	keyword	4	string	%4s
	Yaw Bias	metres	11	+xxxxxx.xxx	%#+011.3f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	\n
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n
3	4 blank spaces	indentation	2	string	%2s
	RECORD	keyword	6	string	%6s
	2 blank spaces		2	string	%2s
	cos:	keyword	4	string	%4s
	blank space	separator	1	string	%1s
	PITCH=	keyword	6	string	%6s
	Pitch Bias		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	ROLL=	keyword	5	string	%5s
	Roll Bias		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	YAW=	keyword	4	string	%4s
	Yaw Bias	metres	11	+xxxxxx.xxx	%#+011.3f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	\n
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n

Table 49: Swath Definition File. bias_mispointing record

N	Description	units	Byte Length	Data Type	C Format
1	4 blank spaces	indentation	2	string	%2s
	RECORD	keyword	6	string	%6s
	blank space		1	string	%1s
	bias:	keyword	5	string	%5s
	blank space	separator	1	string	%1s
	PITCH=	keyword	6	string	%6s
	Pitch Bias		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	ROLL=	keyword	5	string	%5s
	Roll Bias		11	+xxx.xxxxxx	%#+011.6f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	%1s
	YAW=	keyword	4	string	%4s
	Yaw Bias	metres	11	+xxxxxx.xxx	%#+011.3f
	<deg>	unit	5	string	%5s
	blank space	separator	1	string	\n
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n

Table 50: Swath Definition File. no_mispointing record

N	Description	units	Byte Length	Data Type	C Format
	this record is empty by definition				

Table 51: Swath Definition File. wide_asar record

N	Description	units	Byte Length	Data Type	C Format
1	4 blank spaces	indentation	2	string	%2s
	RECORD	keyword	6	string	%6s
	2 blank spaces		2	string	%2s
	left_asar:	keyword	10	string	%10s
	blank space	separator	1	string	%1s
	WINDOW=	keyword	7	string	%7s
	Window of left point		11	+xxx.xxx	%#+08.3f
	<10-6s>	unit	7	string	%7s
	blank space	separator	1	string	%1s
	PULSE=	keyword	6	string	%6s
	Pulse of left point		11	+xxx.xxx	%#+08.3f
	<10-6s>	unit	7	string	%7s
	blank space	separator	1	string	%1s
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n
2	4 blank spaces	indentation	2	string	%2s
	RECORD	keyword	6	string	%6s
	blank space		1	string	%1s
	right_asar:	keyword	11	string	%11s
	blank space	separator	1	string	%1s
	WINDOW=	keyword	7	string	%7s
	Window of right point		11	+xxx.xxx	%#+08.3f
	<10-6s>	unit	7	string	%7s
	blank space	separator	1	string	%1s
	PULSE=	keyword	6	string	%6s
	Pulse of right point		11	+xxx.xxx	%#+08.3f
	<10-6s>	unit	7	string	%7s
	blank space	separator	1	string	%1s

Table 51: Swath Definition File. wide_asar record

N	Description	units	Byte Length	Data Type	C Format
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n

Table 52: Swath Definition File. narrow_asar record

N	Description	units	Byte Length	Data Type	C Format
1	4 blank spaces	indentation	2	string	%2s
	RECORD	keyword	6	string	%6s
	blank space		1	string	%1s
	asar:	keyword	5	string	%5s
	blank space	separator	1	string	%1s
	WINDOW=	keyword	7	string	%7s
	Window of right point		11	+xxx.xxx	%#+08.3f
	<10-6s>	unit	7	string	%7s
	blank space	separator	1	string	%1s
	PULSE=	keyword	6	string	%6s
	Pulse of right point		11	+xxx.xxx	%#+08.3f
	<10-6s>	unit	7	string	%7s
	blank space	separator	1	string	%1s
	ENDRECORD	keyword	9	string	%9s
	newline character	terminator	1	string	\n

Table 53: Swath Definition File. no_asar record

N	Description	units	Byte Length	Data Type	C Format
	this record is empty by definition				

4.10.4 Example

An example Swath Definition File is shown in next figure.

```
FILE ; Swath Definition File
;-------------------------------------------------
RECORD fhr ; Fixed Header

FILENAME="MPL_SW_DEFTEMM19970327_160000_00000000_00000001_yyyymmdd_hhmmss_yyyymmdd_hhmmss.N1"

DESTINATION="........."
PHASE_START=+xxx
CYCLE_START=+xxx
REL_START_ORBIT=+xxxxx
ABS_START_ORBIT=+xxxxx

ENDRECORD fhr
;-------------------------------------------------
RECORD sdf_vhr ; Variable Header

REPEAT_CYCLE=+xxx<days>
CYCLE_LENGTH=+xxxxx<orbits>

NUM_SWATH=+xxx

ENDRECORD sdf_vhr
;-------------------------------------------------
LIST num_swath=xxx ; Swaths Required

RECORD swath
  SWATH_DESCRIPTOR="............................"
  SWATH=".........."
  ALGORITHM="........"
  RECORD refraction: MODEL="........" FREQ=+xxxxxxxxxx<Mhz> ENDRECORD
  NUM_SWATH_REC=+01200
  UNION geometry=line_geometry
    RECORD  left_pt: AZ=+xxx.xxxxxx<deg> EL=+xxx.xxxxxx<deg> ALT=xxxxxx.xxx<m> ENDRECORD
    RECORD   mid_pt: AZ=+xxx.xxxxxx<deg> EL=+xxx.xxxxxx<deg> ALT=xxxxxx.xxx<m> ENDRECORD
    RECORD right_pt: AZ=+xxx.xxxxxx<deg> EL=+xxx.xxxxxx<deg> ALT=xxxxxx.xxx<m> ENDRECORD
  ENDUNION geometry
  UNION mispointing=all_mispointing
    RECORD bias: PITCH=+xxx.xxxxxx<deg> ROLL=+xxx.xxxxxx<deg> YAW=xxx.xxxxxx<deg> ENDRECORD
    RECORD  sin: PITCH=+xxx.xxxxxx<deg> ROLL=+xxx.xxxxxx<deg> YAW=xxx.xxxxxx<deg> ENDRECORD
    RECORD  cos: PITCH=+xxx.xxxxxx<deg> ROLL=+xxx.xxxxxx<deg> YAW=xxx.xxxxxx<deg> ENDRECORD
  ENDUNION mispointing
  UNION spec_asar=wide_asar
    RECORD  left_asar: WINDOW=+xxx.xxx<10-6s> PULSE=+xxx.xxx<10-6s> ENDRECORD
    RECORD right_asar: WINDOW=+xxx.xxx<10-6s> PULSE=+xxx.xxx<10-6s> ENDRECORD
  ENDUNION asar
ENDRECORD swath

RECORD swath
  SWATH_DESCRIPTOR="............................"
```

```
  SWATH=".........."
  ALGORITHM="........"
  RECORD refraction: MODEL="........" FREQ=+xxxxxxxxxx<Mhz> ENDRECORD
  NUM_SWATH_REC=+01200
  UNION geometry=inertial_geometry
    RECORD  left_pt: AZ=+xxx.xxxxxx<deg> ALT=xxxxxx.xxx<m> ENDRECORD
    RECORD   mid_pt: AZ=+xxx.xxxxxx<deg> ALT=xxxxxx.xxx<m> ENDRECORD
    RECORD right_pt: AZ=+xxx.xxxxxx<deg> ALT=xxxxxx.xxx<m> ENDRECORD
  ENDUNION geometry
  UNION mispointing=no_mispointing
  ENDUNION mispointing
  UNION spec_asar=no_asar
  ENDUNION asar
ENDRECORD swath

ENDLIST num_swath
;-------------------------------------------------
ENDFILE
```

4.11 Swath Template file

Table 54: Swath Template File

N	Description	units	Byte Length	Data Type	C Format
1	**FILE**	keyword	4	string	%4s
	; Swath Template File	comment		string	%s
	newline character	terminator	1	string	\n
2	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	fhr	keyword	3	string	%3s
	blank space		1	string	%1s
	; Fixed Header	comment		string	%s
	newline character	terminator	1	string	\n
3	**Fixed header record (see section 4.1)**				
4	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	fhr	keyword	3	string	%3s
	newline character	terminator	1	string	\n
5	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	stf_vhr	keyword	7	string	%7s
	blank space		1	string	%1s
	; Variable Header	comment		string	%s
	newline character	terminator	1	string	\n
6	**stf_vhr (see section 4.11.1)**				
7	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	stf_vhr	keyword	7	string	%7s
	newline character	terminator	1	string	\n
	; Variable Header	comment		string	%s
8	**Data block (see section 4.11.2)**				
9	newline character	terminator	1	string	\n

Table 54: Swath Template File

N	Description	units	Byte Length	Data Type	C Format
10	**ENDFILE**	keyword	7	string	%7s
	; Swath Template File	comment		string	%s
	newline character	terminator	1	string	\n

4.11.1 Variable Header

Table 55: Swath Template File. Variable Header

N	Description	units	Byte Length	Data Type	C Format
1	**REPEAT_CYCLE=**	keyword	13	string	%13s
	Repeat Cycle		4	+xxx	%+04d
	<days>	unit	6	string	%6s
	newline character	terminator	1	string	\n
2	**CYCLE_LENGTH=**	keyword	13	string	%13s
	Cycle Length		6	+xxxxx	%+06d
	<orbits>	unit	8	string	%8s
	newline character	terminator	1	string	\n
3	**MLST_DRIFT=**	keyword	11	string	%11s
	Mean local solar time drift		11	+xxx.xxxxxx	%+011.6f
	<sec/day>	unit	8	string	%8s
	newline character	terminator	1	string	\n
4	**SWATH_DESCRIPTOR=**	keyword	17	string	%17s
	quotation mark	-	1	string	\"
	Swath descriptor:		28	string	%28s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
5	**SWATH=**	keyword	6	string	%6s
	Swath Id.			string	%s
	newline character	terminator	1	string	\n

Table 55: Swath Template File. Variable Header

N	Description	units	Byte Length	Data Type	C Format
6	**SWATH_DEFINITION_FILE=**	keyword	22	string	%22s
	Swath Definition file			string	%s
	newline character	terminator	1	string	\n
7	newline character	terminator	1	string	\n
8	**NUM_SWATH_REC=**	keyword	14	string	%14s
	Number of swath records		6	+xxxxx	%+06d
	newline character	terminator	1	string	\n
9	**TIME_STEP=**	keyword	10	string	%10s
	Time step		11	+xxx.xxxxxx	%+011.6f
	<s>	units	3	string	%s
	newline character	terminator	1	string	\n
10	**SWATH_TYPE=**	keyword	11	string	%11s
	quotation mark	-	1	string	\"
	Swath Type		8	string	%8s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
11	**UNION**	keyword	5	string	%5s
	blank space		1	string	%1s
	swath_altitude=	keyword	15	string	%15s
	swath altitude type one of: - **point_swath_altitude** **- line_swath_altitude** - **inertial_swath_altitude**			string	%s
	newline character	terminator	1	string	\n
12	one of **point_swath_altitude** (see table 56), **line_swath_altitude** (see table 57) or **inertial_swath_altitude** (see table 57) records				
13	**ENDUNION**	keyword	8	string	%8s
	blank space		1	string	%1s
	swath_altitude	keyword	14	string	%14s
	newline character	terminator	1	string	\n

Table 55: Swath Template File. Variable Header

N	Description	units	Byte Length	Data Type	C Format
14	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	refraction:	keyword	3	string	%3s
	blank space		1	string	%1s
	MODEL=	keyword	6	string	%6s
	quotation mark	-	1	string	\"
	Refraction model		8	string	%8s
	quotation mark	-	1	string	\"
	blank space		1	string	%1s
	FREQ=	keyword	5	string	%5s
	Frequency		11	+xxxxxxxxxx	%+011ld
	<Mhz>	units	5	string	%s
	ENDRECORD	keyword	9	string	%s
15	**STF_VERSION=**	keyword	12	string	%12s
	quotation mark	-	1	string	\"
	Swath file version		2	xx	%02ld
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n

Table 56: Swath Template File. Point_Swath_Altitude

N	Description	units	Byte Length	Data Type	C Format
1	**2 blank spaces**		2	string	%2s
	ALTITUDE=	keyword	9	string	%9s
	altitude		11	+xxxxxx.xxx	%+011.3f
	<m>	unit	3	string	%3s
	newline character	terminator	1	string	\n

Table 57: Swath Template File. Line_Swath_Altitude or Inertial_Swath_Altitude

N	Description	units	Byte Length	Data Type	C Format
1	**2 blank spaces**		2	string	%2s
	_LEFT_ALTITUDE=	keyword	15	string	%15s
	altitude		11	+xxxxxx.xxx	%+011.3f
	<m>	unit	3	string	%3s
	newline character	terminator	1	string	\n
2	**2 blank spaces**		2	string	%2s
	__MID_ALTITUDE=	keyword	15	string	%15s
	altitude		11	+xxxxxx.xxx	%+011.3f
	<m>	unit	3	string	%3s
	newline character	terminator	1	string	\n
3	**2 blank spaces**		2	string	%2s
	RIGHT_ALTITUDE=	keyword	15	string	%15s
	altitude		11	+xxxxxx.xxx	%+011.3f
	<m>	unit	3	string	%3s
	newline character	terminator	1	string	\n

4.11.2 Data Block

Table 58: Swath Template File. Data Block

N	Description	units	Byte Length	Data Type	C Format
1	**LIST**	keyword	4	string	%4s
	blank space		1	string	%1s
	num_swath_rec=	keyword	14	string	%14s
	Number of Swath records		5	xxxxx	%05d
	blank space		1	string	%1s
	; Swaths Records	comment		string	%s
	newline character	terminator	1	string	\n
2	newline character	empty line	1	string	\n
3	list of **swath_records** (see format below) all separated by empty lines				
4	newline character	empty line	1	string	\n

Table 58: Swath Template File. Data Block

N	Description	units	Byte Length	Data Type	C Format
5	**ENDLIST**	keyword	7	string	%7s
	blank space		1	string	%1s
	num_swath_rec	keyword	13	string	%13s
	newline character	terminator	1	string	\n

Table 59: Swath Template File. Swath Records

N	Description	units	Byte Length	Data Type	C Format
	UNION	keyword	5	string	%5s
	blank space		1	string	%1s
	swath_rec=	keyword	10	string	%10s
	swath record type one of: - **point_swath_rec** **- line_swath_rec** **- inertial_swath_rec**			string	%s
	newline character	terminator	1	string	\n
	one of **point_swath_rec** (see table 60), **line_swath_rec** (see table 61) or **inertial_swath_rec** (see table 62) records				
	ENDUNION	keyword	8	string	%8s
	blank space		1	string	%1s
	swath_rec	keyword	9	string	%9s
	newline character	terminator	1	string	\n

Table 60: Swath Template File. Point_Swath_Record

N	Description	units	Byte Length	Data Type	C Format
1	**REC_NUM=**	keyword	8	string	%8s
	Record number		6	+xxxxx	%+06d
	newline character	terminator	1	string	\n

Table 60: Swath Template File. Point_Swath_Record

N	Description	units	Byte Length	Data Type	C Format
2	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	pt:	keyword	3	string	%3s
	blank space		1	string	%1s
	LONG=	keyword	5	string	%5s
	longitude		11	+xxx.xxxxxx	%+011.6f
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	LAT=	keyword	4	string	%4s
	latitude		11	+xxx.xxxxxx	%+011.6f
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	ENDRECORD	keyword	9	string	%s

Table 61: Swath Template File. Line_Swath_Record

N	Description	units	Byte Length	Data Type	C Format
1	**REC_NUM=**	keyword	8	string	%8s
	Record number		6	+xxxxx	%+06d
	newline character	terminator	1	string	\n

Table 61: Swath Template File. Line_Swath_Record

N	Description	units	Byte Length	Data Type	C Format
2	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	left_pt:	keyword	7	string	%7s
	blank space		1	string	%1s
	LONG=	keyword	5	string	%5s
	longitude		11	+xxx.xxxxxx	%+011.6f
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	LAT=	keyword	4	string	%4s
	latitude		11	+xxx.xxxxxx	%+011.6f
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	ENDRECORD	keyword	9	string	%s
3	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	mid_pt:	keyword	6	string	%6s
	blank space		1	string	%1s
	LONG=	keyword	5	string	%5s
	longitude		11	+xxx.xxxxxx	%+011.6f
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	LAT=	keyword	4	string	%4s
	latitude		11	+xxx.xxxxxx	%+011.6f
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	ENDRECORD	keyword	9	string	%s

Table 61: Swath Template File. Line_Swath_Record

N	Description	units	Byte Length	Data Type	C Format
4	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	right_pt:	keyword	6	string	%6s
	blank space		1	string	%1s
	LONG=	keyword	5	string	%5s
	longitude		11	+xxx.xxxxxx	%+011.6f
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	LAT=	keyword	4	string	%4s
	latitude		11	+xxx.xxxxxx	%+011.6f
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	ENDRECORD	keyword	9	string	%s

Table 62: Swath Template File. Inertial_Swath_Record

N	Description	units	Byte Length	Data Type	C Format
1	**REC_NUM=**	keyword	8	string	%8s
	Record number		6	+xxxxx	%+06d
	newline character	terminator	1	string	\n

Table 62: Swath Template File. Inertial_Swath_Record

N	Description	units	Byte Length	Data Type	C Format
2	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	left_pt:	keyword	8	string	%8s
	blank space		1	string	%1s
	RA=	keyword	3	string	%3s
	longitude		11	+xxx.xxxxxx	%+011.6f
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	DEC=	keyword	4	string	%4s
	latitude		11	+xxx.xxxxxx	%+011.6f
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	ENDRECORD	keyword	9	string	%s
3	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	mid_pt:	keyword	6	string	%6s
	blank space		1	string	%1s
	RA=	keyword	3	string	%3s
	longitude		11	+xxx.xxxxxx	%+011.6f
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	DEC=	keyword	4	string	%4s
	latitude		11	+xxx.xxxxxx	%+011.6f
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	ENDRECORD	keyword	9	string	%s

Table 62: Swath Template File. Inertial_Swath_Record

N	Description	units	Byte Length	Data Type	C Format
3	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	right_pt:	keyword	9	string	%9s
	blank space		1	string	%1s
	RA=	keyword	3	string	%3s
	longitude		11	+xxx.xxxxxx	%+011.6f
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	LAT=	keyword	4	string	%4s
	latitude		11	+xxx.xxxxxx	%+011.6f
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	ENDRECORD	keyword	9	string	%s

4.11.3 Example

```
FILE ; Swath Template File

RECORD fhr ; Fixed header

FILENAME="MERIS__501_.N1"

DESTINATION="........."
PHASE_START=+000
CYCLE_START=+000
REL_START_ORBIT=+00000
ABS_START_ORBIT=+00000

ENDRECORD fhr

RECORD stf_vhr ; Variable header

REPEAT_CYCLE=+035<days>
CYCLE_LENGTH=+00501<orbits>
MLST_DRIFT=+000.000000<sec/day>
SWATH_DESCRIPTOR="MERIS                          "
SWATH="MERIS__501"
SWATH_DEFINITION_FILE="../../data/MERIS_SDF.N1"
```

```
NUM_SWATH_REC=+01200
TIME_STEP=+005.029940<s>
SWATH_TYPE="line    "
UNION swath_altitude=line_swath_altitude
  _LEFT_ALTITUDE=+000000.000<m>
  __MID_ALTITUDE=+000000.000<m>
  RIGHT_ALTITUDE=+000000.000<m>
ENDUNION swath_altitude
RECORD refraction: MODEL="NO_REF  " FREQ=+0440000000<Mhz> ENDRECORD
STF_VERSION="02"

ENDRECORD stf_vhr

LIST num_swath_rec=01200 ; Swath Records

UNION swath_rec=line_swath_rec
  REC_NUM=+00001
  RECORD  left_pt: LONG=-004.851105<deg> LAT=-001.076912<deg> ENDRECORD
  RECORD   mid_pt: LONG=+000.000000<deg> LAT=+000.000000<deg> ENDRECORD
  RECORD right_pt: LONG=+004.851105<deg> LAT=+001.076912<deg> ENDRECORD
ENDUNION swath_rec

[...]

UNION swath_rec=line_swath_rec
  REC_NUM=+01200
  RECORD  left_pt: LONG=-029.936006<deg> LAT=-001.374400<deg> ENDRECORD
  RECORD   mid_pt: LONG=-025.084106<deg> LAT=-000.298504<deg> ENDRECORD
  RECORD right_pt: LONG=-020.233148<deg> LAT=+000.779548<deg> ENDRECORD
ENDUNION swath_rec

ENDLIST num_swath_rec

ENDFILE
```

4.12 Zone Database file

Table 63: Zone DB File

N	Description	units	Byte Length	Data Type	C Format
1	**FILE**	keyword	4	string	%4s
	; Zones Database File	comment		string	%s
	newline character	terminator	1	string	\n
2	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	fhr	keyword	3	string	%3s
	blank space		1	string	%1s
	; Fixed Header	comment		string	%s
	newline character	terminator	1	string	\n
3	**Fixed header record (see section 4.1)**				
4	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	fhr	keyword	3	string	%3s
	newline character	terminator	1	string	\n
5	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	zdb_vhr	keyword	7	string	%7s
	blank space		1	string	%1s
	; Variable Header	comment		string	%s
	newline character	terminator	1	string	\n
6	**NUM_ZONES=**	keyword	10	string	%10s
	Number of zones		6	+xxxxx	%+05d
	newline character	terminator	1	string	\n
7	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	zdb_vhr	keyword	7	string	%7s
	newline character	terminator	1	string	\n
	; Variable Header	comment		string	%s
8	**Data block (see section 4.12.1)**				

Table 63: Zone DB File

N	Description	units	Byte Length	Data Type	C Format
9	newline character	terminator	1	string	\n
10	**ENDFILE**	keyword	7	string	%7s
	; Zone Database File	comment		string	%s
	newline character	terminator	1	string	\n

4.12.1 Data Block

Table 64: Zone DB File. Data Block

N	Description	units	Byte Length	Data Type	C Format
1	**LIST**	keyword	4	string	%4s
	blank space		1	string	%1s
	num_zones=	keyword	10	string	%10s
	Number of zones		5	xxxxx	%05d
	blank space		1	string	%1s
	; Zones	comment		string	%s
	newline character	terminator	1	string	\n
2	newline character	empty line	1	string	\n
3	list of **zones** (see table 65)				
4	newline character	empty line	1	string	\n
5	**ENDLIST**	keyword	7	string	%7s
	blank space		1	string	%1s
	num_zones	keyword	9	string	%9s
	newline character	terminator	1	string	\n

Table 65: Zone DB File. Zones

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	zone	keyword	4	string	%4s
	newline character	terminator	1	string	\n
2	**ZONE_DESCRIPTOR=**	keyword	16	string	%16s
	zone description		28	string	%28s
	newline character	terminator	1	string	\n
3	**ZONE=**	keyword	5	string	%5s
	quotation mark	-	1	string	\"
	Zone Id.		8	string	%8s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
4	**SURFACE=**	keyword	16	string	%16s
	quotation mark	-	1	string	\"
	surface type		8	string	%8s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
5	**PROJECTION=**	keyword	16	string	%16s
	quotation mark	-	1	string	\"
	projection		12	string	%12s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
6	**CREATOR=**	keyword	16	string	%16s
	quotation mark	-	1	string	\"
	creator		28	string	%28s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n

Table 65: Zone DB File. Zones

N	Description	units	Byte Length	Data Type	C Format
7	**LIST**	keyword	4	string	%4s
	blank space		1	string	%1s
	num_polygon_pt=	keyword	15	string	%15s
	Number of zones		3	xxx	%03d
	blank space		1	string	%1s
	; polygon definition (if 1 pt, use also diametre below)	comment		string	%s
	newline character	terminator	1	string	\n
8	list of points (see table 66)				
9	**ENDLIST**	keyword	7	string	%7s
	blank space		1	string	%1s
	num_polygon_pt	keyword	14	string	%14s
	newline character	terminator	1	string	\n
10	**DIAM=**	keyword	5	string	%5s
	diameter		12	+xxxxxxx.xxx	%012.3f
	<m>	units	3	string	%s
	newline character	terminator	1	string	\n
11	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	zone	keyword	4	string	%4s
	newline character	terminator	1	string	\n

Table 66: Zone DB File. Polygon Points

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	polygon_pt:	keyword	11	string	%11s
	blank space		1	string	%1s
	LONG=	keyword	5	string	%5s
	longitude		11	+xxx.xxxxxx	%+011.6d
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	LAT=	keyword	4	string	%4s
	latitude		11	+xxx.xxxxxx	%+011.6d
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	ENDRECORD	keyword	9	string	%s

4.12.2 Example

```
FILE ; Zones Database

RECORD fhr ; Fixed Header

FILENAME="ZONE_DB_FILE.N1"

DESTINATION="PDS      "
PHASE_START=+000
CYCLE_START=+000
REL_START_ORBIT=+00000
ABS_START_ORBIT=+00000

ENDRECORD fhr

RECORD zdb_vhr ; Variable Header

NUM_ZONES=+00037

ENDRECORD zdb_vhr

LIST num_zones=00037 ; Zones
```

```
RECORD zone
  ZONE_DESCRIPTOR="                              "
  ZONE="ZMIK____"
  SURFACE="         "
  PROJECTION="             "
  CREATOR="TEST DATA                    "
  LIST num_polygon_pt=003 ; polygon definition (if 1 pt, use also diametre below
    RECORD polygon_pt: LONG=+000.000000<deg> LAT=+000.000000<deg> ENDRECORD
    RECORD polygon_pt: LONG=+000.000000<deg> LAT=+000.000000<deg> ENDRECORD
    RECORD polygon_pt: LONG=+000.000000<deg> LAT=+000.000000<deg> ENDRECORD
  ENDLIST num_polygon_pt
  DIAM=+0000000.000<m>
ENDRECORD zone

[...]

ENDLIST num_zones

ENDFILE
```

4.13 Ground Stations file

Table 67: Ground Stations File

N	Description	units	Byte Length	Data Type	C Format
1	**FILE**	keyword	4	string	%4s
	; Ground Stations File	comment		string	%s
	newline character	terminator	1	string	\n
2	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	fhr	keyword	3	string	%3s
	blank space		1	string	%1s
	; Fixed Header	comment		string	%s
	newline character	terminator	1	string	\n
3	**Fixed header record (see section 4.1)**				
4	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	fhr	keyword	3	string	%3s
	newline character	terminator	1	string	\n
5	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	gdb_vhr	keyword	7	string	%7s
	blank space		1	string	%1s
	; Variable Header	comment		string	%s
	newline character	terminator	1	string	\n
6	**NUM_GROUND_STA=**	keyword	15	string	%15s
	Number of stations		6	+xxxxx	%+05d
	newline character	terminator	1	string	\n
7	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	gdb_vhr	keyword	7	string	%7s
	newline character	terminator	1	string	\n
	; Variable Header	comment		string	%s
8	**Data block (see section 4.13.1)**				

Table 67: Ground Stations File

N	Description	units	Byte Length	Data Type	C Format
9	newline character	terminator	1	string	\n
10	**ENDFILE**	keyword	7	string	%7s
	; Ground Stations File	comment		string	%s
	newline character	terminator	1	string	\n

4.13.1 Data Block

Table 68: Ground Stations File. Data Block

N	Description	units	Byte Length	Data Type	C Format
1	**LIST**	keyword	4	string	%4s
	blank space		1	string	%1s
	num_ground_sta=	keyword	14	string	%14s
	Number of stations		5	xxxxx	%05d
	blank space		1	string	%1s
	; Ground Stations	comment		string	%s
	newline character	terminator	1	string	\n
2	newline character	empty line	1	string	\n
3	list of **ground stations**(see table 69)				
4	newline character	empty line	1	string	\n
5	**ENDLIST**	keyword	7	string	%7s
	blank space		1	string	%1s
	num_ground_sta	keyword	13	string	%13s
	newline character	terminator	1	string	\n

Table 69: Ground Stations File. Ground Stations

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	ground_sta	keyword	10	string	%10s
	newline character	terminator	1	string	\n
2	**STATION_DESCRIPTOR=**	keyword	19	string	%19s
	Station description		28	string	%28s
	newline character	terminator	1	string	\n
3	**STATION=**	keyword	8	string	%8s
	quotation mark	-	1	string	\"
	Station Id.		8	string	%8s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
4	**ANTENNA=**	keyword	8	string	%8s
	quotation mark	-	1	string	\"
	Antenna		8	string	%8s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
5	**PURPOSE=**	keyword	8	string	%8s
	quotation mark	-	1	string	\"
	Purpose		28	string	%28s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n
6	**TYPE=**	keyword	5	string	%5s
	quotation mark	-	1	string	\"
	type		4	string	%4s
	quotation mark	-	1	string	\"
	newline character	terminator	1	string	\n

Table 69: Ground Stations File. Ground Stations

N	Description	units	Byte Length	Data Type	C Format
7	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	validity:	keyword	9	string	%9s
	blank space		1	string	%1s
	START=	keyword	6	string	%6s
	quotation mark	-	1	string	\"
	Start date		11	string	%11s
	quotation mark	-	1	string	\"
	blank space		1	string	%1s
	STOP=	keyword	5	string	%5s
	quotation mark	-	1	string	\"
	Stop date		11	string	%11s
	quotation mark	-	1	string	\"
	blank space		1	string	%1s
	ENDRECORD	keyword	9	string	%s

Table 69: Ground Stations File. Ground Stations

N	Description	units	Byte Length	Data Type	C Format
8	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	location:	keyword	9	string	%9s
	blank space		1	string	%1s
	LONG=	keyword	5	string	%5s
	longitude		11	+xxx.xxxxxx	%+011.6d
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	LAT=	keyword	4	string	%4s
	latitude		11	+xxx.xxxxxx	%+011.6d
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	ALT=	keyword	4	string	%4s
	altitude		9	+xxxx.xxx	%+09.3d
	<m>	units	3	string	%s
	blank space		1	string	%1s
	ENDRECORD	keyword	9	string	%s
6	**DEFAULT_EL=**	keyword	11	string	%11s
	Default elevation		11	string	%+011.6s
	<deg>	units	5	string	%5s
	newline character	terminator	1	string	\n
9	**LIST**	keyword	4	string	%4s
	blank space		1	string	%1s
	num_mask_pt=	keyword	11	string	%11s
	Number of points		3	xxx	%03d
	blank space		1	string	%1s
	; mask definition	comment		string	%s
	newline character	terminator	1	string	\n
10	list of mask points (see table 70)				

Table 69: Ground Stations File. Ground Stations

N	Description	units	Byte Length	Data Type	C Format
11	**ENDLIST**	keyword	7	string	%7s
	blank space		1	string	%1s
	num_mask_pt	keyword	11	string	%11s
	newline character	terminator	1	string	\n
12	**ENDRECORD**	keyword	9	string	%9s
	blank space		1	string	%1s
	ground_sta	keyword	10	string	%10s
	newline character	terminator	1	string	\n

Table 70: Ground Stations File. Mask Points

N	Description	units	Byte Length	Data Type	C Format
1	**RECORD**	keyword	6	string	%6s
	blank space		1	string	%1s
	mask_pt:	keyword	8	string	%8s
	blank space		1	string	%1s
	AZ=	keyword	3	string	%3s
	longitude		11	+xxx.xxxxxx	%+011.6d
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	EL=	keyword	3	string	%3s
	latitude		11	+xxx.xxxxxx	%+011.6d
	<deg>	units	5	string	%s
	blank space		1	string	%1s
	ENDRECORD	keyword	9	string	%s

4.13.2 Example

```
FILE ; Ground Stations Database

RECORD fhr ; Fixed Header

FILENAME="GROUND_STATION_FILE.N1"
```

```
DESTINATION="PDS,FOS  "
PHASE_START=+000
CYCLE_START=+000
REL_START_ORBIT=+00000
ABS_START_ORBIT=+00000

ENDRECORD fhr

RECORD gdb_vhr ; Variable Header

NUM_GROUND_STA=+124

ENDRECORD gdb_vhr

LIST num_ground_sta=124 ; Ground Stations

RECORD ground_sta
  STATION_DESCRIPTOR="Fairbanks (ALASKA) 12M anten"
  STATION="GFAIRBCX"
  ANTENNA="X-BAND  "
  PURPOSE="GLOBAL                      "
  TYPE="    "
  RECORD validity: START="1995-JAN-01" STOP="2010-JAN-01" ENDRECORD
  RECORD location: LONG=-147.520800<deg> LAT=+064.976500<deg> ALT=+0289.000<m> ENDRECORD
  DEFAULT_EL=+005.000000<deg>
  LIST num_mask_pt=005 ; mask definition
    RECORD mask_pt: AZ=+000.000000<deg> EL=+009.500000<deg> ENDRECORD
    RECORD mask_pt: AZ=+050.000000<deg> EL=+007.100000<deg> ENDRECORD
    RECORD mask_pt: AZ=+180.000000<deg> EL=+007.100000<deg> ENDRECORD
    RECORD mask_pt: AZ=+310.000000<deg> EL=+007.100000<deg> ENDRECORD
    RECORD mask_pt: AZ=+360.000000<deg> EL=+009.500000<deg> ENDRECORD
  ENDLIST num_mask_pt
ENDRECORD ground_sta

ENDLIST num_ground_sta

ENDFILE
```