

		Ref : Issue : Rev. : Date : Page : i
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Title

EMERALD
(Flight Dynamic Software)
Interface Control Document

	Name and Function	Date	Signature
Prepared by			
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		Ref : Issue : Rev. : Date : Page : ii
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SUMMARY

This document aims at specifying the interfaces between the EMERALD (Flight Dynamic Software) to satellite. It specifies the protocol and the format of the exchanged data.

TABLE OF CONTENTS

1	FLIGHT DYNAMIC SYSTEM INTERFACE	4
1.1	INPUT DATA	4
1.1.1	GPS TELEMETRY PARAMETERS (LOCALISATION MEASUREMENTS FILE)	4
1.1.2	SATELLITE CONFIGURATION FOR FDS	7
1.1.3	CONJUNCTION DATA MESSAGE	8
1.2	OUTPUT DATA	10
1.2.1	Predicted Orbit : I_PRED	10
1.2.2	Predicted Orbit : I_NODE	12
1.2.3	ANTENNA POINTING FILE	14
1.2.4	TRANSPONDER ACTIVATION PLAN : I_TRAN	17
1.2.5	TRANSPONDER ACTIVATION PLAN : I_PASS	19
1.2.6	NORAD 2-LINES ELEMENT	22
1.2.7	Collision Avoidance Assessment:	25

1 FLIGHT DYNAMIC SYSTEM INTERFACE

1.1 INPUT DATA

1.1.1 GPS TELEMETRY PARAMETERS (LOCALISATION MEASUREMENTS FILE)

DEFINITION

This interface corresponds to the production of the parameters concerning the GPS parameters contained in the telemetry.

FILE NAME

The file name format is : SatId_BeginDate_EndDate.Type

File name example : THEO_201103112220_201103120034.LMF

Name	Description	Field description	Range
SatId	Satellite Identification	THEOS Satellite Identification is "THEO"	
BeginDate		YYYY : Year MM : Month DD : Day hh : Hour mm : Minutes	> 1950 [01,12] [01,31] [00,23] [00,59]
EndDate		YYYY : Year MM : Month DD : Day hh : Hour mm : Minutes	> 1950 [01,12] [01,31] [00,23] [00,59]
Type	Fix string set to : "LMF"		

Format description

The LMF file contains two parts : a header and a body.

Header

Header Bloc content	Description	Value
FILE_HEADER	Mandatory keyword	
FILE_TYPE:=	File type	Fixed string set to : "LMF"
FILE_FORMAT:=	ICD reference and issue	
GEN_DATE:=	File generation date & time (2 fields)	Absolute date and time : YYYY/MM/DD hh:mm:ss
GEN_APP_NAME:=	Name of the application creating the file	
GEN_APP_RLS:=	Release of the application creating the file	
END_FILE_HEADER	Mandatory keyword	

Body

The file body is located after the END_FILE_HEADER keyword.

Record Type	Number of lines	Description
SAT_ID	1	Satellite Identification
MEAS	N	Localization data

Record SAT_ID description

Field Name	Description	Field Requirement
RecordKey	Record type	"SAT_ID:="
SatId	Satellite Identification	THEOS Satellite Identification is "THEO"

Record MEAS description

Field Name	Description	Field Requirement
RecordKey	Record type	"MEAS:="
MeasDate	Measurement date	Date in calendar Format : YYYY/MM/DD
MeasTime	Measurement time	Time in calendar Format including milliseconds : hh:mm:ss.sss
MeasCode	Measurement code	PX GPS Position coordinate X (km), range [-134217; 134217] PY GPS Position coordinate Y (km), range [-134217; 134217] PZ GPS Position coordinate Z (km), range [-134217; 134217] VX GPS Velocity along X (m/s), range [-32768; 32767] VY GPS Velocity along Y (m/s), range [-32768; 32767] VZ GPS Velocity along Z (m/s), range [-32768; 32767]

FILE EXAMPLE

FILE_HEADER

FILE_TYPE:= LMF

FILE_FORMAT:= DSG.ICD.92800.ASTR 3.0

GEN_DATE:= 2015/06/16 15:09:07

GEN_APP_NAME:= SCC THEOS

GEN_APP_RLS:= 0.0.0

END_FILE_HEADER

SAT_ID:=THEO

MEAS:= 2015/05/19 03:23:07.250 PX GPS FILTER IB 1305.874000000000 EC

MEAS:= 2015/05/19 03:23:07.250 PY GPS FILTER IB -1545.844500000000 EC

MEAS:= 2015/05/19 03:23:07.250 PZ GPS FILTER IB -6921.722000000000 EC

MEAS:= 2015/05/19 03:23:07.250 VX GPS FILTER IB 0.719253051758 EC

MEAS:= 2015/05/19 03:23:07.250 VY GPS FILTER IB -7.260875976562 EC

MEAS:= 2015/05/19 03:23:07.250 VZ GPS FILTER IB 1.757759765625 EC

LOCATION

System Directory/SCC/FDS

1.1.2 SATELLITE CONFIGURATION FOR FDS

DEFINITION

This interface allows to define the technical characteristics of the satellite for FDS function as a list of identified parameters with their value.

FILE NAME

I_CNFF_<creation_date>.asc

Name	Description	Field description	Range
"I_CNFF"	Fix string set to : "I_CNFF"		
BeginDate		YYYY : Year MM : Month DD : Day hh : Hour mm : Minutes ss : Second	> 1950 [01,12] [01,31] [00,23] [00,59] [00,59]
EndDate		YYYY : Year MM : Month DD : Day hh : Hour mm : Minutes ss : Second	> 1950 [01,12] [01,31] [00,23] [00,59] [00,59]
Type	Fix string set to : "asc"		

FORMAT

ASCII file

CONTENT

This interface provides the FDS with all the satellite configuration parameters which are useful for computation. The content of the file is the following :-- Bus configuration

SIOSA = "ON" or "OFF" – IOS A board status

SIOSB = "ON" or "OFF" – IOS B board status

SIOCA = "ON" or "OFF" – IOC A board status

SIOCB = "ON" or "OFF" – IOC B board status

RW_F_STATE = "FOUR_WHEELS" or "WHEEL_i_OFF" I = 1 to 4 -- Wheels configuration

CLUSTER_FOUR_WHEELS = (0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0) – Wheel cluster projection in case of four wheels active.

		Ref : Issue : Rev. : Date : Page : 8
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CLUSTER_WHEEL_1_OFF = (0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0) – Wheel cluster projection in case of wheel 1 inactive
CLUSTER_WHEEL_2_OFF = (0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0) – Wheel cluster projection in case of wheel 2 inactive.

CLUSTER_WHEEL_3_OFF = (0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0) – Wheel cluster projection in case of wheel 3 inactive.

1.1.3 CONJUNCTION DATA MESSAGE

DEFINITION

This interface allows to define the conjunction data of the satellite between space object for FDS function as a collision avoidance.

FILE NAME

The file name format is :

<OBJECT_DESIGNATOR_1>_conj_<OBJECT_DESIGNATOR_2>_<TCA>_<CREATION_DATE>.txt

File name example : 33396_conj_41830_2016306180725_304003459858.txt

Name	Description	Field description	Range
Objcet1_ID	The satellite catalog designator for the object.	THEOS Satellite Identification is “33396”	
“_conj_”	Fix string set to : “_conj_”		
Objcet2_ID	The satellite catalog designator for the object.	Space object Identification is “xxxxx”	
TCA	Message creation date/time in Coordinated Universal Time (UTC).	YYYY : Year DDD : DayofYear hh : Hour mm : Minutes ss : seconds	> 2000 [01,366] [00,23] [00,59] [00,59]
CREATION_DATE	Message creation date/time in Coordinated Universal Time (UTC).	DDD : DayofYear hh : Hour mm : Minutes ss : seconds ms : microseconds	[01,366] [00,23] [00,59] [00,59] [000,999]
Type	Fix string set to : “txt”		

FORMAT

ASCII file

CONTENT

The CDM contains information about a single conjunction between object1 and object2. It contains:

- Object1/Object2 positions/velocities at TCA with respect to one of a small set of widely used reference frames;
- Object1/Object2 covariances at TCA with respect to an object centered reference frame;
- the relative position/velocity of Object2 with respect to an Object1 centered reference frame;
- information relevant to how all the above data was determined.

The CDM in KVN shall consist of digital data represented as ASCII text lines. The lines constituting a CDM shall be represented as a combination of the following:

- a) a header;
- b) relative metadata/data (metadata/data describing relative relationships between Object1 and Object2);
- c) metadata (data about how Object1 and Object2 data were created);
- d) data (for both Object1 and Object2); and
- e) optional comments (explanatory information).

NOTES – Detail and More information on “CCSDS RECOMMENDED STANDARD FOR CONJUNCTION DATA MESSAGES” (CCSDS 508.0-B-1) , BLUE BOOK June 2013.

Location

System Directory/Vectors/CDM_report

1.2 OUTPUT DATA

1.2.1 Predicted Orbit : I_PRED

DEFINITION

According to position and telemetry data provided by the satellite during previous passes and transmitted by the SCC, the FDS shall update the orbit prediction. The FDS shall also transmit the updated orbit prediction to the MPC which will use it for the current day mission plan preparation.

FILE NAME

I_PRED_ BeginDate _ EndDate.asc

File name example : I_PRED_20170201_120000_20170204_120000.asc

Name	Description	Field description	Range
"I_PRED"	Fix string set to : "I_PRED"		
BeginDate		YYYY : Year MM : Month DD : Day hh : Hour mm : Minutes ss : Second	> 1950 [01,12] [01,31] [00,23] [00,59] [00,59]
EndDate		YYYY : Year MM : Month DD : Day hh : Hour mm : Minutes ss : Second	> 1950 [01,12] [01,31] [00,23] [00,59] [00,59]
Type	Fix string set to : "asc"		



Ref :
Issue : Rev. :
Date :
Page : 11

FILE EXAMPLE

SPACECRAFT THEOS : Orbit Ephemeris Mean of J2000

#

Period from : 2017/02/01 12:00:00 to : 2017/02/04 12:00:00

#

#

# Epoch (Calendar)	Epoch (MJD)	S Major Axis	Eccentricity	Inclination	RAAN	Arg of Perigee	True Anomaly	R Apogee	R Perigee	Flight angle	Nadir angle	Angular rate	Ang momentum
2017/02/01 12:00:00	57785.50000000	7196.585405	0.0020294647	98.790167	101.986187	-244.281865	-173.422560	7211.190621	7181.980189	-0.013346	89.986654	0.001030	53558.848887
2017/02/01 12:00:10	57785.50011574	7196.753580	0.0020045324	98.790064	101.986349	-243.956061	-173.158196	7211.179705	7182.327454	-0.013709	89.986291	0.001030	53559.477376
2017/02/01 12:00:20	57785.50023148	7196.923339	0.0019793729	98.789961	101.986509	-243.640751	-172.883331	7211.168734	7182.677944	-0.014078	89.985922	0.001030	53560.111746
2017/02/01 12:00:30	57785.50034722	7197.094617	0.0019539982	98.789856	101.986668	-243.336398	-172.597499	7211.157726	7183.031507	-0.014452	89.985548	0.001030	53560.751748
2017/02/01 12:00:40	57785.50046296	7197.267344	0.0019284205	98.789751	101.986824	-243.043502	-172.300201	7211.146702	7183.387987	-0.014832	89.985168	0.001030	53561.397122
2017/02/01 12:00:50	57785.50057870	7197.441451	0.0019026528	98.789644	101.986978	-242.762597	-171.990903	7211.135683	7183.747219	-0.015218	89.984782	0.001030	53562.047604
2017/02/01 12:01:00	57785.50069444	7197.616865	0.0018767086	98.789537	101.987130	-242.494250	-171.669036	7211.124694	7184.109036	-0.015609	89.984391	0.001030	53562.702925

LOCATION

System Directory/FDS/MPC

1.2.2 Predicted Orbit : I_NODE

DEFINITION

According to position and telemetry data provided by the satellite during previous passes and transmitted by the SCC, the FDS shall update the orbit prediction. The FDS shall also transmit the updated node crossing prediction to the MPC which will use it for the current day mission plan preparation.

FILE NAME

I_NODE_ BeginDate _ EndDate.asc

File name example : I_NODE_20170201_120000_20170204_120000.asc

Name	Description	Field description	Range
"I_NODE"	Fix string set to : "I_NODE"		
BeginDate		YYYY : Year MM : Month DD : Day hh : Hour mm : Minutes ss : Second	> 1950 [01,12] [01,31] [00,23] [00,59] [00,59]
EndDate		YYYY : Year MM : Month DD : Day hh : Hour mm : Minutes ss : Second	> 1950 [01,12] [01,31] [00,23] [00,59] [00,59]
Type	Fix string set to : "asc"		



Ref :
Issue : Rev. :
Date :
Page : 13

FILE EXAMPLE

EQUATOR CROSSING EVENTS FOR SPACECRAFT THEOS

#

Period from : 2017/02/01 12:00:00.000 to 2017/02/04 12:00:00.000

#

##*****

#

Mean of J2000

Epoch (Calendar) Epoch (MJD) EVENT S Major Axis Eccentricity Inclination RAAN Arg of Perigee True Anom

##*****

2017/02/01 12:16:17.139	57785.511309476	ASCENDING	7209.540	0.001238	98.78215	101.99248	68.52442	291.49783
2017/02/01 13:06:56.486	57785.546487106	DESCENDING	7209.408	0.001244	98.78146	102.02722	111.66911	68.35334
2017/02/01 13:57:44.841	57785.581768993	ASCENDING	7209.523	0.001233	98.78096	102.06178	69.58307	290.43944
2017/02/01 14:48:24.232	57785.616947129	DESCENDING	7209.474	0.001251	98.77980	102.09665	111.83598	68.18644
2017/02/01 15:39:12.617	57785.652229368	ASCENDING	7209.409	0.001220	98.77920	102.13036	70.52589	289.49671
2017/02/01 16:29:52.089	57785.687408442	DESCENDING	7209.470	0.001235	98.77849	102.16563	111.95208	68.07047
2017/02/01 17:20:40.441	57785.722690290	ASCENDING	7209.346	0.001215	98.77901	102.19917	70.67810	289.34457
2017/02/01 18:11:19.920	57785.757869443	DESCENDING	7209.433	0.001233	98.77963	102.23450	111.87599	68.14682
2017/02/01 19:02:08.248	57785.793151017	ASCENDING	7209.407	0.001224	98.78003	102.26857	70.09806	289.92475
2017/02/01 19:52:47.639	57785.828329154	DESCENDING	7209.448	0.001247	98.78112	102.30344	112.09571	67.92703
2017/02/01 20:43:35.984	57785.863610924	ASCENDING	7209.434	0.001236	98.78167	102.33822	70.04716	289.97581
2017/02/01 21:34:15.304	57785.898788240	DESCENDING	7209.459	0.001260	98.78218	102.37290	112.47846	67.54456
2017/02/01 22:25:03.646	57785.934069971	ASCENDING	7209.453	0.001238	98.78243	102.40819	70.18946	289.83352
2017/02/01 23:15:42.939	57785.969246975	DESCENDING	7209.504	0.001274	98.78254	102.44231	112.77654	67.24660

LOCATION

System Directory/FDS/MPC

1.2.3 ANTENNA POINTING FILE

DEFINITION

The result of this activity is to provide the satellite control center with computed set of S band ground station antenna pointing data according to satellite visibilities.

FILE NAME

SatId_StationId_Antennald_BeginDate_EndDate.Type

File name example : THEO_SiRacha_A1_201702020230_201702020241.APF

Name	Description	Field description	Range
SatId	Satellite Identification	THEOS Satellite Identification is "THEO"	
StationId	Station Identifier		
Antennald	Antenna Identifier		
BeginDate		YYYY : Year MM : Month DD : Day hh : Hour mm : Minutes ss : Second	> 1950 [01,12] [01,31] [00,23] [00,59] [00,59]
EndDate		YYYY : Year MM : Month DD : Day hh : Hour mm : Minutes ss : Second	> 1950 [01,12] [01,31] [00,23] [00,59] [00,59]
Type	Fix string set to : "APF"		

Format description

The APF file contains two parts : a header and a body

Header

Header Bloc content	Description	Value
FILE_HEADER	Mandatory keyword	
FILE_TYPE:=	File type	Fixed string set to : “APF”
FILE_FORMAT:=	ICD reference and issue	
GEN_DATE:=	File generation date & time (2 fields)	Absolute date and time : YYYY/MM/DD hh:mm:ss
GEN_APP_NAME:=	Name of the application creating the file	
GEN_APP_RLS:=	Release of the application creating the file	
END_FILE_HEADER	Mandatory keyword	

Body

The file body is located after the END_FILE_HEADER keyword.

Record Type	Number of lines	Description
SAT_ID	1	Satellite Identification
ANTENNA	1	Antenna Identification
STEP	<= 2000	Pointing data

Record SAT_ID description

Field Name	Description	Field Requirement
RecordKey	Record type	“SAT_ID:=”
SatId	Satellite Identification	THEOS Satellite Identification is “THEO”

Record ANTENNA description

Field Name	Description	Field Requirement
RecordKey	Record type	“ANTENNA:=”
StationId	Station Identifier	
AntennaId	Antenna Identifier	

Record STEP description

Field Name	Description	Field Requirement
RecordKey	Record type	"STEP:="
Step_Date	Date of the pointing step	Date in calendar format : YYYY/MM/DD
Step_Time	Time of the pointing step	Time in calendar format including millisecond : hh:mm:ss.sss
Elevation	Antenna Elevation	In Deg , range : [- 90 , + 90]
Azimuth	Antenna Azimuth	In Deg , range : [0 , + 360]
Distance	Sat to Antenna distance	In Km , range : [0 , 999 999]
Doppler	Expected Doppler	DF/F , no unit , range is [-0.0001; 0.0001] (TBC)

FILE EXAMPLE

FILE_HEADER

FILE_TYPE:= APF

FILE_FORMAT:= DSG.ICD.92800.ASTR

GEN_DATE:= 2017/02/01 07:32:14

GEN_APP_NAME:= QUARTZ++

GEN_APP_RLS:= LEO

END_FILE_HEADER

SAT_ID:= THEO

ANTENNA:= SiRacha A1

** Date EL(deg) AZ(deg) Range(km) Doppler(Df/f)

STEP:= 2017/02/02 02:30:04.100 5.234 39.924 2840.536 0.000018626194

STEP:= 2017/02/02 02:30:04.200 5.240 39.932 2839.978 0.000018624519

STEP:= 2017/02/02 02:30:04.300 5.246 39.941 2839.420 0.000018622842

STEP:= 2017/02/02 02:30:04.400 5.251 39.949 2838.861 0.000018621165

LOCATION

System Directory/FDS/SCC

1.2.4 TRANSPONDER ACTIVATION PLAN : I_TRAN

DEFINITION

The result of this activity is to provide the satellite control center with an ASCII file containing the time and related orders to manage the on board S band transmitter activation according to the set of S band ground station - satellite visibilities.

FILE NAME

I_TRAN_BeginDate_EndDate.Type

File name example : I_TRAN_20170202_000000_20170204_000000.asc

Name	Description	Field description	Range
"I_TRAN"	Fix string set to : "I_TRAN"		
BeginDate		YYYY : Year MM : Month DD : Day hh : Hour mm : Minutes ss : Second	> 1950 [01,12] [01,31] [00,23] [00,59] [00,59]
EndDate		YYYY : Year MM : Month DD : Day hh : Hour mm : Minutes ss : Second	> 1950 [01,12] [01,31] [00,23] [00,59] [00,59]
Type	Fix string set to : "asc"		

FILE EXAMPLE

TTQ DHS

--- Visibility for ground station : SiRacha

CMD CTXTRSPON,TIMETAG="2017/02/02 02:27:30.000" ENDCMD

CMD CTXTRSPOFF,TIMETAG="2017/02/02 02:43:42.750" ENDCMD

--- Visibility for ground station : SiRacha

CMD CTXTRSPON,TIMETAG="2017/02/02 04:07:27.500" ENDCMD

CMD CTXTRSPOFF,TIMETAG="2017/02/02 04:23:38.250" ENDCMD

--- Visibility for ground station : SiRacha

CMD CTXTRSPON,TIMETAG="2017/02/02 13:37:53.750" ENDCMD

CMD CTXTRSPOFF,TIMETAG="2017/02/02 13:49:10.250" ENDCMD

--- Visibility for ground station : SiRacha

CMD CTXTRSPON,TIMETAG="2017/02/02 15:14:15.500" ENDCMD

CMD CTXTRSPOFF,TIMETAG="2017/02/02 15:32:07.750" ENDCMD

ENDTTQ

LOCATION

System Directory/FDS/SCC

1.2.5 TRANSPONDER ACTIVATION PLAN : I_PASS

DEFINITION

The result of this activity is to provide the satellite control center with an ASCII file containing the time of S band ground station - satellite visibilities.

FILE NAME

I_PASS_BeginDate_EndDate.Type

File name example : I_PASS_20170202_000000_20170204_000000.asc

Name	Description	Field description	Range
"I_PASS"	Fix string set to : "I_PASS"		
BeginDate		YYYY : Year MM : Month DD : Day hh : Hour mm : Minutes ss : Second	> 1950 [01,12] [01,31] [00,23] [00,59] [00,59]
EndDate		YYYY : Year MM : Month DD : Day hh : Hour mm : Minutes ss : Second	> 1950 [01,12] [01,31] [00,23] [00,59] [00,59]
Type	Fix string set to : "asc"		

Format description

The file body is located after the END_FILE_HEADER keyword.

Record Type	Number of lines	Description
SAT_NAME	1	Satellite Name
PERIOD	1	Period of Pass plan
PASS_PLAN	<= 1	Detail of Pass plan

Record SAT_NAME description

Field Name	Description	Field Requirement
RecordKey	Record type	“Spacecraft : ”
SatName	Satellite Name	THEOS Satellite Name is “THEOS”

Record PERIOD description

Field Name	Description	Field Requirement
RecordKey	Record type	“Pass plan from ”
Period	Period of Pass plan	BeginDate + “to” + EndDate

Record PASS_PLAN description

Field Name	Description	Field Requirement
Pass_BeginDate	Date of the begin pass plan	Date in calendar format : YYYY/MM/DD
Pass_BeginTime	Time of the begin pass plan	Time in calendar format including millisecond : hh:mm:ss.sss
Pass_EndDate	Date of the end pass plan	Date in calendar format : YYYY/MM/DD
Pass_EndTime	Time of the end pass plan	Time in calendar format including millisecond : hh:mm:ss.sss
Duration	Pass plan duration	In second
Station	Station Identifier	

FILE EXAMPLE

Spacecraft : THEOS

Pass plan from 2017/02/02 00:00:00.000 to 2017/02/04 00:00:00.000

Beginning	End	Duration (s)	Station(s)
-----------	-----	--------------	------------

2017/02/02 02:30:00.036	2017/02/02 02:41:12.613	672.6	SiRacha
2017/02/02 04:09:57.670	2017/02/02 04:21:08.104	670.4	SiRacha
2017/02/02 13:40:23.806	2017/02/02 13:46:40.247	376.4	SiRacha
2017/02/02 15:16:45.710	2017/02/02 15:29:37.677	772.0	SiRacha
2017/02/03 02:11:43.244	2017/02/03 02:20:54.038	550.8	SiRacha
2017/02/03 03:50:12.591	2017/02/03 04:02:31.466	738.9	SiRacha
2017/02/03 14:57:28.228	2017/02/03 15:10:25.619	777.4	SiRacha
2017/02/03 16:42:56.855	2017/02/03 16:45:18.038	141.2	SiRacha

LOCATION

System Directory/FDS/SCC

1.2.6 NORAD 2-LINES ELEMENT

DEFINITION

The result of this activity is to provide the satellite control center with an orbit bulletin compatible with Two Lines Elements format.

FILE NAME

SatId_<TLE>_BeginDate.Type

File name example : THEO_TLE_20170202_000000.asc

Name	Description	Field description	Range
SatId	Satellite Identification	THEOS Satellite Identification is "THEO"	
<TLE>	Fix string set to : "TLE"		
BeginDate		YYYY : Year MM : Month DD : Day hh : Hour mm : Minutes ss : Second	> 1950 [01,12] [01,31] [00,23] [00,59] [00,59]
Type	Fix string set to : "asc"		

Format description

Record Type	Number of lines	Description
SAT_NAME	1	Satellite Name
LINE_1	1	Two-Line Element Line 1
LINE_2	1	Two-Line Element Line 2

Record SAT_NAME description

Field Name	Description	Field Requirement
SatName	Satellite Name	THEOS Satellite Name is "THEOS"

Record LINE_1 description

Column	Description
01	Line Number of Element Data
03-07	Satellite Number
08	Classification
10-11	International Designator (Last two digits of launch year)
12-14	International Designator (Launch number of the year)
15-17	International Designator (Piece of the launch)
19-20	Epoch Year (Last two digits of year)
21-32	Epoch (Day of the year and fractional portion of the day)
34-43	First Time Derivative of the Mean Motion
45-52	Second Time Derivative of Mean Motion (decimal point assumed)
54-61	BSTAR drag term (decimal point assumed)
63	Ephemeris type
65-68	Element number
69	Checksum (Modulo 10) (Letters, blanks, periods, plus signs = 0; minus signs = 1)

Record LINE_2 description

Column	Description
01	Line Number of Element Data
03-07	Satellite Number
09-16	Inclination [Degrees]
18-25	Right Ascension of the Ascending Node [Degrees]
27-33	Eccentricity (decimal point assumed)
35-42	Argument of Perigee [Degrees]
44-51	Mean Anomaly [Degrees]
53-63	Mean Motion [Revs per day]
64-68	Revolution number at epoch [Revs]
69	Checksum (Modulo 10)



Ref :	
Issue :	Rev. :
Date :	
Page :	24

FILE EXAMPLE

THEOS

1 33396U 08049A 17033.00000000 .00000000 00000-0 +15687-9 2 11

2 33396 98.6963 102.6886 0001494 103.2704 233.7231 14.20058998 11

LOCATION

System Directory/FDS/SCC

1.2.7 Collision Avoidance Assessment:

DEFINITION

The result of this activity is to provide the calculate the probability of a collision with information from Conjunction Data Message (CDM). In the form of probability value.

FILE NAME

CollisionProbOut.txt

Format description

Record CollisionProbOut description

Field Name	Description	Field Requirement
PROBABILITY OF COLLISION	Probability of collision	The results are expressed in Exponential form
RELATIVE DISTANCE	Relative distance between Satellite and space object	The results are expressed in meters
PROB	The probability of each.	The results are expressed in Exponential form
DELTA V (M/S)	The difference of the Velocity to be increased.	The results are expressed in meters per second
DELTA A (M)	The difference of the Semi-major axis to be increased.	The results are expressed in meters
DELTA M (KG)	The difference of the Propellant Mass to be increased.	The results are expressed in kilometer
RELATIVE DISTANCE (M)	The difference of the relative distance to be increased.	The results are expressed in meters



FILE EXAMPLE

Probability of collision = 9.15154e-010

Relative distance = 346.884

Collision probability is greater than threshold.

Re-orbit at time 2014/10/15 08:06:09.03

Prob	Delta V (m/s)	Delta a (m)	Delta M (kg)	Relative Distance (m)
9.15154e-010	0	0	0	346.884
3.19338e-021	0.005	9.67676	0.00242316	1428.26
3.93408e-020	0.01	19.3535	0.0048457	2689.03
2.8428e-021	0.015	29.0303	0.00726763	3960.29
4.12763e-023	0.02	38.707	0.00968893	5234.42
1.8409e-025	0.025	48.3838	0.0121096	6509.72
2.77492e-028	0.03	58.0605	0.0145297	7785.63
1.44948e-031	0.035	67.7373	0.0169491	9061.89
2.61914e-035	0.04	77.4141	0.019368	10338.4
1.62141e-039	0.045	87.0908	0.0217862	11615
3.38909e-044	0.05	96.7676	0.0242038	12891.7
2.34993e-049	0.055	106.444	0.0266208	14168.5
5.28237e-055	0.06	116.121	0.0290372	15445.4

LOCATION

System Directory/System/caa