

SIS SES - 121

Magellan

Software Interface Specification

Small Forces File

National Aeronautics and
Space Administration

JPL

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

<p>PROJECT MAGELLAN</p> <p>SOFTWARE INTERFACE SPECIFICATIONS</p> <p>Cover Sheet</p>	<p>NUMBER: SES-121</p> <p>REVISION: Original</p> <p>DATE: 1 OCT 1987</p>												
<p>SIS NAME: Small Forces File</p>													
<p>DOMAIN:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Sub_System</th> <th style="text-align: left;">Function</th> <th style="text-align: left;">Program</th> <th style="text-align: left;">Make/Use</th> </tr> </thead> <tbody> <tr> <td>SES</td> <td>Small Forces Input Generator</td> <td>SFIG</td> <td>Make</td> </tr> <tr> <td>NAV</td> <td>Trajectory Analysis</td> <td>DPTRAJ,GIN</td> <td>Use</td> </tr> </tbody> </table>		Sub_System	Function	Program	Make/Use	SES	Small Forces Input Generator	SFIG	Make	NAV	Trajectory Analysis	DPTRAJ,GIN	Use
Sub_System	Function	Program	Make/Use										
SES	Small Forces Input Generator	SFIG	Make										
NAV	Trajectory Analysis	DPTRAJ,GIN	Use										
<p>Computer System: Univac</p>													
<p>PURPOSE OF INTERFACE (SUMMARY): This interface specification provides the format and syntax for transmission of the Small Forces File from the Spacecraft Engineering Software to all users.</p>													
<p>INTERFACE MEDIUM:</p> <p>Disk File: <input checked="" type="checkbox"/> [X]</p> <p>Magnetic Tape: Tracks: Density: Data Code:</p> <p>Other:</p>													
<p>SIS COORDINATOR: O. Short</p>													
<p>SIGNATURES: See Attachment</p>													

SIGNATURES:

Approval :	Position	Name	Date
	S/W Sys E	<u>Wyatt Underwood</u> W. Underwood	<u>19 October 87</u>
	GDSE	<u>Jody Gunn</u> J. M. Gunn	<u>12/16/87</u>

Sub_System: Program	Position	Name	Date
SES:	Sys E	<u>O. Short</u> O. Short	<u>10-5-87</u>
SFIG	(AACS) Cog E	<u>Charles Gay</u> C. Gay	<u>5 OCTOBER 1987</u>
	(PPS) Cog E	<u>K. Hamlyn</u> K. Hamlyn	<u>10/5/87</u>
NAV:	Sys E	<u>J. E. Ekelund</u> J. E. Ekelund	<u>10/13/87</u>
DPTRAJ	Cog E	<u>J. E. Ekelund</u> J. E. Ekelund	<u>10/13/87</u>
	Cog P	<u>R. F. Sunseri</u> R. F. Sunseri	<u>10/13/87</u>

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Vellum Files (2)	

Custodian: Owen Short

PROJECT MAGELLAN
SOFTWARE INTERFACE SPECIFICATION

Small Forces File

SIS SES-121

1 October 1987

ABSTRACT: This document describes the form and syntax of the Project Magellan Small Forces Input File generated by the Spacecraft Engineering Subsystem (SES). The file contains information on forces produced by un-coupled reaction wheel desaturations.

National Aeronautics and
Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California 91109

November 30, 1992

TO: MAGELLAN PROJECT MANAGEMENT
FROM: S. Collins, CMSS
SUBJ: SES - SIS SES-121

The attached change requests were not included in any revisions of the subject document. Change pages have been attached were available. The change requests and the attached document officially closes out this document for the Magellan Project.

MAGELLAN CHANGE REQUEST

				CMSS REC. DATE: 1 <u>3/13/90</u>	MCR NO. <u>2633</u>
SUBSYSTEM/TEAM 3 <u>NAV</u>	ORIGINATOR 4 <u>D. Engelhardt</u>	PHONE 5 <u>3-1254</u>	MAIL STOP 6 <u>230-207</u>	PAGE 1 OF 2	
TITLE OF CHANGE 7 <u>DAILY</u> transfer of small forces file from SCT to NAV.				FAR/FR NO. 8	FORM 18 NO. 9
				REF. MCR NO. 10	
OTHER SUBSYSTEMS/TEAMS AFFECTED: 11 <u>SCT</u>			INSTITUTIONS AFFECTED: 12 <input type="checkbox"/> DSN <input type="checkbox"/> FPSO <input type="checkbox"/> OTHER _____		
DESCRIPTION OF CHANGE 13 <u>Change Team-to-Team interface to specify the frequency of delivery of the small forces file from the SCT to NAV as DAILY</u> HARDWARE CHANGE REQUIRED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO (<u>Mon-FRI</u>). SOFTWARE CHANGE REQUIRED? <input type="checkbox"/> FLIGHT <input type="checkbox"/> GROUND <input checked="" type="checkbox"/> NONE					
REASON FOR CHANGE 14 <u>The small forces file is required by NAV to compute orbit solutions and predictions. The NAV Team will be doing these computations daily, so a daily delivery of this file is necessary, as specified in the SIS SES-121.</u>					
DOCUMENTATION AFFECTED: 15 Check items affected and indicate document number. <input type="checkbox"/> FRD _____ <input type="checkbox"/> SRD _____ <input type="checkbox"/> ATP/SATP _____ <input type="checkbox"/> SDD _____ <input type="checkbox"/> PDD _____ <input type="checkbox"/> USER'S GUIDE _____ <input checked="" type="checkbox"/> SIS <u>SES-121</u> <input checked="" type="checkbox"/> OTHER <u>630-537 Team to Team Interface</u>			NEEDED IMPLEMENTATION DATE: 16 <u>7/19/90</u> <u>(VOI - 3 weeks)</u> PRIORITY: 17 <input checked="" type="checkbox"/> CAT 1. no workaround exists <input type="checkbox"/> CAT 2. arduous workaround exists <input type="checkbox"/> CAT 3. acceptable workaround exists <input type="checkbox"/> CAT 4. desirable		
			SUBSYSTEM ENGINEER/TEAM CHIEF 18 <u>[Signature]</u> DATE <u>3/12/90</u>		
CONCURRENCE: The undersigned concur that this proposal is worthy of evaluation. 19					
OFFICE MANAGER: <u>[Signature]</u> <u>3/12/90</u>					
COMMENTS 20 <u>once a day rather than 3 times per week for the 5 day day work week</u>					
CHANGE CONTROL CATEGORY <input type="checkbox"/> 1A <input type="checkbox"/> 1B					
When signature is filled in and status is approved, you are authorized to proceed with the implementation of this MCR.					
CCB Chairman <u>[Signature]</u>			DATE <u>4-30-90</u>		STATUS <u>approved</u>
Project Manager _____					

SECTION 1
GENERAL DESCRIPTION

1.1 CONTENT OVERVIEW

This Software Interface Specification (SIS) contains the description of the Small Forces File for Project Magellan.

1.2 SCOPE

The format and syntax specifications in this SIS apply to all phases of Project Magellan.

1.3 APPLICABLE DOCUMENTS

NVI-5241 Rev. C DPTRAJ-ODP User Reference Manual, SOM Volume 1 and Volume 2

NVI-5241 Rev. C DPTRAJ and ODP Interfaces and File Format Descriptions, SOM Volume 3

1.4 SUBSYSTEM SITING

1.4.1 Interface Location, Medium

This interface shall consist of a file generated on a PC in formatted FORTRAN.

1.4.2 Data Source, Destinations, and Transfer Method

The Small Forces File shall be generated on a PC and uploaded into the Univac computer system. The user of the Small Forces File is the NAV program GIN. Transfer shall be accomplished by making the Small Forces File accessible to users on the Univac.

1.4.3 Generation Method and Frequency

The Small Forces File shall be created using a special utility program or editor. *by (985)*
~~Approximately two occurrences of the file are anticipated on a daily basis (one Predict, one History).~~ *DURING ORBITAL OPERATIONS DELIVERY WILL BE DAILY (MON-FRI ONLY)*

1.4.4 Pertinent Relationships with Other Interfaces

None.

1.4.5 Labeling and Identification

Internal labeling of the Small Forces File is accomplished with header records as defined in Section 4.2.

1.5 ASSUMPTIONS AND CONSTRAINTS

N/A.

*CHARLES PER
K. HAMILTON - OPS LEAD*

SES-121

MAGELLAN CHANGE REQUEST				CMSS REC. DATE: 1 8/24/90	MCR NO. 2 879
SUBSYSTEM/TEAM 3 NAV	ORIGINATOR 4 EKELUND	PHONE 5 47590	MAIL STOP 6 301/220	PAGE 1 OF 1	
TITLE OF CHANGE 7 NAV Team to use NAV SW ON SUN COMPUTER for OPERATIONS.				FAR/FR NO. 8	FORM 18 NO. 9
				REF. MCR NO. 10	
OTHER SUBSYSTEMS/TEAMS AFFECTED: 11 NAVT, NAVS			INSTITUTIONS AFFECTED: 12 <input type="checkbox"/> DSN <input type="checkbox"/> FPSO <input type="checkbox"/> OTHER _____		
DESCRIPTION OF CHANGE 13 MGN NAV Team would use the Sun computer as the "operations" computer. (Assumes all SW on SUNS external) 1/fg to be identical HARDWARE CHANGE REQUIRED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO to UNISYS SW SOFTWARE CHANGE REQUIRED? <input type="checkbox"/> FLIGHT <input checked="" type="checkbox"/> GROUND <input checked="" type="checkbox"/> NONE					
REASON FOR CHANGE 14 The Sun computer is being used currently by the MGN NAV team for most of the tasks it performs for MGN operations. The Sun computer allows the team to perform their operational tasks more efficiently with much less turn-around required for certain functions.					
DOCUMENTATION AFFECTED: 15 Check items affected and indicate document number. <input type="checkbox"/> FRD _____ <input type="checkbox"/> SRD _____ <input checked="" type="checkbox"/> ATP/SATP _____ <input checked="" type="checkbox"/> SDD ? _____ <input checked="" type="checkbox"/> PDD _____ <input checked="" type="checkbox"/> USER'S GUIDE _____ <input checked="" type="checkbox"/> SIS all NAV external _____ <input type="checkbox"/> OTHER _____			NEEDED IMPLEMENTATION DATE: 16 n.l.t. end of prime mission		
			PRIORITY: 17 <input type="checkbox"/> CAT 1. no workaround exists <input type="checkbox"/> CAT 2. arduous workaround exists <input type="checkbox"/> CAT 3. acceptable workaround exists <input checked="" type="checkbox"/> CAT 4. desirable		
			SUBSYSTEM ENGINEER/TEAM CHIEF 18 John E. Ekolund 8/15/90		
CONCURRENCE: The undersigned concur that this proposal is worthy of evaluation. 19					
OFFICE MANAGER: <i>Judy [Signature]</i>			8/28/90		
COMMENTS 20					
CHANGE CONTROL CATEGORY <input type="checkbox"/> 1A <input type="checkbox"/> 1B					
When signature is filled in and status is approved, you are authorized to proceed with the implementation of this MCR.					
CCB Chairman <i>James [Signature]</i>			DATE 3-8-91		STATUS Approval
Project Manager _____					

DOCUMENT CHANGE LOG

Change Letter	Date	Affected Portions
Original	10/1/87	All

List of TBD Items

Page	Resolution Date	Item

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SECTION 1

GENERAL DESCRIPTION

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1.4.3 Generation Method and Frequency

The Small Forces File shall be created using a special utility program or editor. Approximately two occurrences of the file are anticipated on a daily basis (one Predict, one History).

1.4.4 Pertinent Relationships with Other Interfaces

None.

1.4.5 Labeling and Identification

Internal labeling of the Small Forces File is accomplished with header records as defined in Section 4.2.

1.5 ASSUMPTIONS AND CONSTRAINTS

N/A.

SECTION 2

INTERFACE CHARACTERISTICS

- 2.1 **HARDWARE CHARACTERISTICS AND LIMITATIONS**
N/A.
- 2.2 **VOLUME AND SIZE**
This file will not exceed 10 records of 80 bytes each, fixed length.
- 2.3 **INTERFACE MEDIUM CHARACTERISTICS**
The interface medium will be a Unisys disk file written in ASCII format.
- 2.4 **FAILURE PROTECTION, DETECTION, AND RECOVERY FEATURES**
None.
- 2.5 **END-OF-FILE (OR MEDIUM) CONVENTIONS**
\$\$EOF shall designate end of file.

SECTION 3

ACCESS

- 3.1 PROGRAMS USING THE INTERFACE DATA
See cover sheet.
- 3.2 SYNCHRONIZATION CONSIDERATIONS
N/A
- 3.3 INPUT/OUTPUT PROTOCOLS, CALLING SEQUENCES
N/A

SECTION 4

DETAILED INTERFACE SPECIFICATIONS

4.1 STRUCTURE AND ORGANIZATION OVERVIEW

This section was inferred from document SOM-NVI-5241 Rev. C, "DPTRAJ-ODP Interfaces and File Format Descriptions". It describes in detail the format and content that shall be used for the Navigation Constants File, for which the Small Forces File is an input.

4.2 SUBSTRUCTURE DEFINITION AND FORMAT

1. General Description

The detailed contents and structure of this file format begins on the next page.

 HEADER RECORD 1 - Identifies the file name

Columns	Content	Description
1-2	"* "	Header character
3-15	"SMALL FORCES "	File identifier (general)
16-27	"HISTORY DATA" or "PREDICT DATA"	File identifier (specific)

 HEADER RECORD 2 - Specifies the date and time of file creation

Columns	Content	Description
1-2	"* "	Header character
3-16	"CREATION: SCT "	Specifies that the file creation is by the SCT
17-27	dd-mmm-yyyy	Day, month and year of file creation, eg 04-DEC-1986 (Local Date)
28-28	" "	Blank space
29-36	hh:mm:ss	Hours, minutes and seconds of file creation (Local Time)

 HEADER RECORD 3 - User input file description

Columns	Content	Description
1-2	"* "	Header character
3-80	user input	File description input by user i.e. user free to put his own information here

 DATA RECORD 1 - Specifies momentum unload start time

Columns	Content	Description
1-12	"STRT_TIME = "	Record label
13-31	yy-ddd/hh:mm:ss.fff	Unload event start time (SCET)

 DATA RECORD 2 - Specifies momentum unload transition time

Columns	Content	Description
1-12	"TRAN_TIME = "	Record label
13-31	yy-ddd/hh:mm:ss.fff	Unload event transition time (SCET)

 DATA RECORD 3 - Specifies momentum unload end time

Columns	Content	Description
1-12	"STOP_TIME = "	Record label
13-31	yy-ddd/hh:mm:ss.fff	Unload event stop time (SCET)

 DATA RECORD 4 - Specifies average number of thruster firings per
 0.9375 Hz cycle during the start to transition period

Columns	Content	Description
1-12	"STRT2TRAN = "	Record label
13-20	F8.6	Average number of thruster firings per 0.9375 Hz computer cycle during the start to transition period

 DATA RECORD 5 - Specifies average number of thruster firings per
 0.9375 Hz cycle during the transition to stop period

Columns	Content	Description
1-12	"TRAN2STOP = "	Record label
13-20	F8.6	Average number of thruster firings per 0.9375 Hz computer cycle during the transition to stop period

 DATA RECORD 6 - Specifies thruster impulse bit

Columns	Content	Description
1-12	"IMPLS_BIT = "	Record label
13-20	F8.6	Impulse Bit in Newton-seconds

 END OF FILE RECORD 1 - Indicates end of file

Columns	Content	Description
1-5	"\$\$EOF"	Signifies end of data

4.3 Sample Files:

```
* SMALL FORCES PREDICT DATA
* CREATION: SCT 08-APR-1989 09:25:41
* SAMPLE SMALL FORCES PREDICT FILE
STRT_TIME = 89-100/12:37:00.000
TRAN_TIME = 89-100/12:37:14.381
STOP_TIME = 89-100/12:40:14.145
STRT2TRAN = 2.000000
TRAN2STOP = 1.091429
IMPLS_BIT = 0.022240
$$EOF
```

```
* SMALL FORCES HISTORY DATA
* CREATION: SCT 11-JUL-1989 11:30:05
* SAMPLE SMALL FORCES HISTORY FILE
STRT_TIME = 89-190/17:05:00.000
TRAN_TIME = 89-190/17:09:19.887
STOP_TIME = 89-190/17:09:34.268
STRT2TRAN = 2.000000
TRAN2STOP = 1.214286
IMPLS_BIT = 0.022200
$$EOF
```