

# Space Program Operations Contract

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## SPACE SHUTTLE ORBITER OPERATIONAL LEVEL C FUNCTIONAL SUBSYSTEM SOFTWARE REQUIREMENTS

### DISPLAYS AND CONTROLS

### VOLUME 3:

### APPENDIXES A, B AND F

**Prepared by The Boeing Company  
Space Exploration**

Under Subcontract 6000132079, PDRD P1433q

December 21, 2007

DRD 1.4.3.3-q

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FUNCTIONAL SUBSYSTEM SOFTWARE  
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**NASA Contract No. NNJ06VA01C, DRD 1.4.3.3-q  
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## FOREWORD

The Space Shuttle Operational Flight Subsystem Software Requirements (FSSR) represent the total computer program that operates the Orbiter general purpose flight computer. The requirements are specified at three levels:

Level A – System Level – Computer Program Development Specification (CPDS)

Level B – Functional Level – Computer Program Development Specification (CPDS)

Level C – Detail Level – Functional Subsystem Software Requirements (FSSR)

Level A specifies system-level constraints and capabilities that are not oriented toward any particular program end item. Levels B and C specify the functional and detailed level requirements and are program end-item oriented. The Level B and C requirements are specified in separate documents for guidance, navigation, and control (GN&C), Systems Management (SM), and Vehicle Utility (VU), data flow, and Payloads (PL). The Level C requirements for the subsystem operating programs (SOPs) are subdivided into five separate volumes. The requirements are described in the following FSSRs:

- STS 83 – 0001 Entry guidance
- STS 83 – 0002 Ascent/RTLS Guidance
- STS 83 – 0003 On-Orbit/Deorbit Guidance
- STS 83 – 0004 Entry Navigation
- STS 83 – 0005 Ascent/RTLS Navigation
- STS 83 – 0006 On-Orbit/Deorbit Navigation
- STS 83 – 0007 Entry/GRTLS Digital Autopilot
- STS 83 – 0008 Ascent/Transition Digital Autopilot
- STS 83 – 0009 On-Orbit Digital Autopilot
- STS 83 – 0010 Redundancy Management
- STS 83 – 0013 IMU Subsystem Operating Program
- STS 83 – 0014 Navigation Aids and Star Tracker Subsystem Operating Program
- STS 83 – 0015 Sensor/Controller Subsystem Operating Program
- STS 83 – 0016 Effector Subsystem Operating Program
- STS 87 – 0017 Remote Manipulator System (RMS)
- STS 83 – 0020 Displays and Controls
- STS 83 – 0026 Sequencing
- \* JSC 19478-XXX Payload Management
- \* JSC 19590-XXX Systems Management

This Level C document is:

STS 83-0020V3

Space Shuttle Orbiter,  
Operational Flight, Level C,  
Functional Subsystem Software Requirements,  
Displays and Controls Volume 3: Appendices A, B and F

\* Where XXX = STS Flight Number

The D&C FSSR is comprised of all cathode-ray tube (CRT) or equivalent electronic display formats for the Primary Flight Software (PFS) and the Backup Flight Software (BFS) in support of the Space Shuttle Program. This volume includes information relative to the crew interfaces with the CRT or equivalent electronic display formats and keyboards; and the data required to generate codes with the SM Preprocessor, Display Format Generator or the BFS SAV-D/Avis Processors. Detailed requirements are also included for the processing of CRT or equivalent electronic Messages, GN&C Annunciation (class 2 and 3 faults), GN&C Display Processing, Dedicated Display Processing, GN&C Interfaces, and I-Loads.

The text material describing the CRT or equivalent electronic formats and KEYBOARD ITEM numbers are reference information only for Systems Level, Systems Management and Vehicle Utility PFS displays and are requirements for Guidance, Navigation and Control and BFS displays. See section 3.1 of this FSSR for a general statement about Multifunction Electronic Display Subsystem (MEDS) equivalency. The functional and detail software processing requirements, including those in the various appendices, are under the configuration control management of the Shuttle Avionics Software Control Board (SASCB).



**DOCUMENT CHANGE RECORD**

The following tabulation summarizes the change activity associated with this document.

<b>DOCUMENT CHANGE RECORD</b>			
<b>Issue and Date</b>	<b>Change Summary/Effectivity</b>		
OI-34 Release December 21, 2007	This baseline release for effectivity OI-34 and subs includes:		
	<u>CR</u>	<u>OI</u>	<u>Title</u>
	92816D	34	Remove Software Related to FICS
	93017G	33	Baseline RSS99D0100 with Expanded Downlist
	93160B	32	Year End Roll Over (YERO) Reset
	93167A	33	Bearing Displays Documentation Clean-up
	93175	32	Expand Effectivity of SCR 93160B
	93176	34	Remove Active MPLM Support from BFS
	93187	32	BFS HUD K-Load Change
	93194A	34	BFS HUD Additions
	93202A	32	Range Change for On-Orbit ADI Rate Switch
	93203B	33	Landing Sites and Alternate Sites Update on Bearing Displays
	93215A	34	Protect Ascent Bearing Spec From MM 104 Retrograde Guidance Solution

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**CHANGE REQUEST SUMMARY**

The following tabulation lists the paragraphs, tables (T), and figures (F) that have been changed as a result of approved change requests for this release. Changes incorporated prior to this release are listed in Appendix R. Changes from approved change requests (CRs) to this document are indicated by a change bar in the outer margin of the changed page.

<b>CHANGE REQUEST SUMMARY</b>			
<b>Paragraph</b>	<b>CR No.</b>	<b>OI</b>	<b>CR Title</b>
N/A	93175	32	Expand Effectivity of SCR 93160B
A.3-1.(T)	93176	34	Remove Active MPLM Support from BFS
A.5-1.(T)	93176	34	Remove Active MPLM Support from BFS
B.4.110-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
B.4.112.1.3	93176	34	Remove Active MPLM Support from BFS
B.4.112.3-1.(T)	93176	34	Remove Active MPLM Support from BFS
B.4.150-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
B.4.154-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
B.4.160-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
	93167A	33	Bearing Displays Documentation Clean-up
B.5.7-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
B.5.16	92816D	34	Remove Software Related to FICS
B.5.16-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
	92816D	34	Remove Software Related to FICS
B.5.16-6.(T)	92816D	34	Remove Software Related to FICS
B.5.16.3	92816D	34	Remove Software Related to FICS
B.5.19-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
B.5.21-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
B.5.21-6.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
B.5.25-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
B.5.26-3.(F)	93203B	33	Landing Sites and Alternate Sites Update on Bearing Displays
B.5.26-5.(T)	93160B	32	Year End Roll Over (YERO) Reset
	93017G	33	Baseline RSS99D0100 with Expanded Downlist
	93167A	33	Bearing Displays Documentation Clean-up
B.5.26-9.(F)	93215A	34	Protect Ascent Bearing Spec From MM 104 Retrograde Guidance Solution
B.5.26-22.(F)	93167A	33	Bearing Displays Documentation Clean-up

<b>CHANGE REQUEST SUMMARY</b>			
<b>Paragraph</b>	<b>CR No.</b>	<b>OI</b>	<b>CR Title</b>
B.5.26-24.(F)	93167A	33	Bearing Displays Documentation Clean-up
B.5.26.4	93215A	34	Protect Ascent Bearing Spec From MM 104 Retrograde Guidance Solution
B.5.26.5	93203B	33	Landing Sites and Alternate Sites Update on Bearing Displays
B.5.26.8.1	93167A	33	Bearing Displays Documentation Clean-up
B.5.26.9.1	93215A	34	Protect Ascent Bearing Spec From MM 104 Retrograde Guidance Solution
B.5.26.13	93167A	33	Bearing Displays Documentation Clean-up
B.5.26.14.1	93167A	33	Bearing Displays Documentation Clean-up
B.5.26.14.2	93167A	33	Bearing Displays Documentation Clean-up
B.5.26.15	93167A	33	Bearing Displays Documentation Clean-up
B.5.27-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
	93167A	33	Bearing Displays Documentation Clean-up
B.5.27-6.(T)	93167A	33	Bearing Displays Documentation Clean-up
B.5.27-9.(T)	93167A	33	Bearing Displays Documentation Clean-up
F.4.103-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
F.4.103-6.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
F.4.104-5.(T)	93160B	32	Year End Roll Over (YERO) Reset
	93017G	33	Baseline RSS99D0100 with Expanded Downlist
F.4.104-6.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
F.4.105-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
F.4.105-6.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
F.4.106-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
F.4.106-6.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
F.4.107-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
F.4.107-6.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
F.4.108-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
F.4.108-6.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
F.4.108-8.(T)	93194A	34	BFS HUD Additions
F.4.128-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
	93167A	33	Bearing Displays Documentation Clean-up
F.4.168-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
F.4.168-6.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist

<b>CHANGE REQUEST SUMMARY</b>			
<b>Paragraph</b>	<b>CR No.</b>	<b>OI</b>	<b>CR Title</b>
F.4.169-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
F.4.169-6.(T)	93202A	32	Range Change for On-Orbit ADI Rate Switch
	93017G	33	Baseline RSS99D0100 with Expanded Downlist
F.4.230-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
F.4.230-6.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
F.4.252-5.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
F.4.252-8.(T)	93187	32	BFS HUD K-Load Change
F.4.260-5.(T)	93194A	34	BFS HUD Additions
F.4.260-8.(T)	93187	32	BFS HUD K-Load Change
	93194A	34	BFS HUD Additions
F.4.260.1	93187	32	BFS HUD K-Load Change
	93194A	34	BFS HUD Additions
F.4.260.1-1.(T)	93187	32	BFS HUD K-Load Change
	93194A	34	BFS HUD Additions
F.4.260.1-2.(T)	93194A	34	BFS HUD Additions

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## APPENDIX A CRT MESSAGES

### A.1 PFS CRT Messages

The CRT message software requirements for Guidance, Navigation and Control (GNC) and Vehicle Utility (VU) are defined in this Appendix. These CRT message requirements are Class 1 Code and as such are not reconfigurable on a flight by flight basis.

CRT message software requirements for Systems Software (SS) are defined in the Systems Software Level A CPDS. Those for Systems Management (SM)/Payload Management (PM) Non-FDA processes are defined in the SM Level B CPDS; SM FDA and PM FDA are defined in the SM Level C Flight Software Requirements (FSR) and PM Level C FSR, respectively, for each flight.

<u>CRT Display Category</u>	<u>Message CRT ID Prefix</u>
• System Level (SS)	N/A
• Guidance, Navigation and Control (GNC)	GXX or <del>Y</del>
• System Management (SM)	SXX or <del>Y</del>
• Expanded Capability (SM)	1XX or <del>Y</del>
• SM (Payload Unique)	2XX or <del>Y</del>
• Vehicle Utility (VU)	GXX, SXX or <del>Y</del>

#### A.1.1 PFS Major/Minor Fields

Within each of the display categories, available CRT messages are specified in the form of two independent elements that can be sequentially combined to form the complete message:

1. Major Field. The generic message that identifies a subsystem (or subsystem element) along with a related abnormal condition. When the condition is simply failure, it may be omitted from the message. The User Interface & MCDS interface is considered as a subsystem for operator errors (e.g., ILLEGAL ENTRY). Each individual major field text has a unique, three-character numeric ID.

The Major Field numeric IDs are assigned as follows:

<u>Display Category</u>	<u>ID Number Range</u>
SS	100 thru 130
GNC	131 thru 299
SM	300 thru 699
SM (Payload Unique)	700 thru 999

NOTE: VU uses GNC or SM IDs as applicable.

The alphanumeric major field text nomenclature has a limit of 14 characters; where the source of the message is GPC processing, the initial three characters are reserved for a CRT ID message prefix. The prefix identifies the Major Function G-GNC, S-SM, 1-SM (Expanded) OR 2-SM (Payload Unique) followed by the numeric CRT page ID number or second two characters of the numeric CRT page ID number for the SM Payload Unique displays (SPEC or DISP). If the prefix is blank, the message will be indented four spaces except for the "ILLEGAL ENTRY" which will not be

indented. Messages originating from the Cargo PC and received via the SM GPCF function shall be transmitted exactly as received.

2. Minor Field. A supplementary part of the message which modifies the major field and identifies a subdivision, direction, location, parameter, or specific unit of a group. Each individual minor field has a unique, two-character numeric ID assigned which follows the major field ID. The ID is a hexadecimal value (00 thru FF). The alphanumeric minor field text nomenclature has a limit of four characters. Minor fields are potentially available for use in any display category and may be duplicated across display categories.

The minor field numeric IDs are assigned as follows:

- Payload Unique B0 thru FF
- Common to Payload and Reconfigurable SM only B0 thru FF
- All others 00 thru AF

3. Message IDs. CRT message major and minor fields serve as dictionaries to be associated with one or more error signals. Their sequentially combined IDs constitute a message ID. (If there is no minor field, the major field is followed by 00).

The measurement/stimulus ID of the error signal is correlated with the message ID. All signals identified with a specific CRT message are OR'd; i.e., the presence of any one signal will cause the message to appear on the CRT display message line and also on the FAULT summary display page for alarm CLASS 2 and 3 messages.

4. Message Limits. The ICC capability for messages which are annunciated across the common set shall not be exceeded, and the maximum number shall be 1024. A single message shall be defined as any combination of major and minor fields and alarm class.



## A.2 PFS Error Signals

Signal information provided for CRT messages consists of the following items:

1. Measurement/stimulus ID (12 characters)
2. Signal nomenclature (34 characters)
3. Alarm class (1 character)
  - Class 0 – Limit sense only (parameter Status Indicator without fault message alert tone or light)
  - Class 1 – Emergency (no software interface)
  - Class 2 – Caution and warning (C/W)
  - Class 3 – Alert (from SM)
  - Class 4 – GPC–detected errors (DPS)
  - Class 5 – Operator errors (user)
4. Indicator within class (2 characters)
  - A matrix code to identify a specific C/W light (alarm ID)
5. Parameter source (3 characters)
  - Analogous to display category SS, GNC, SM, and VU
6. Message ID (five characters)
  - Major and minor fields, in sequence
7. Preprocessor card requirements are defined in Section 8.0 of the SM Level B CPDS.

Software signals assigned to Alarm Class 2 directly activate certain caution and warning lights (identified by alarm ID); this includes the backup C/W alarm, which is activated by either primary or backup software in this alarm class. C/W software processing via the GNC Annunciation Interface (GAX) is presented in Appendix B (B.4.110). The SM alert light annunciates any abnormal condition in Alarm Class 3.

### **A.3 PFS/BFS C&W Light/CRT Message Correlation**

Table A.3–1 shows the correlation between the Caution and Warning Lights and the CRT messages for Class 2 Alarms using the following elements.

1. Alarm ID (2 characters)  
A matrix code to identify a specific C/W light.
2. Caution or Warning Light Nomenclature (24 characters)
3. CRT Message Major Field Nomenclature (14 characters)
4. CRT Message Minor Field Nomenclature (4 characters)
5. PFS Message ID (5 characters)  
Major and Minor fields, in sequence
6. BFS Message ID (3 characters)

Table A.3-1. PFS/BFS LIGHT/CRT MESSAGE CORRELATION ALARM CLASS 2					
ALARM ID	CAUTION AND WARNING LIGHT	CRT MESSAGE FIELD		PFS	BFS
		MAJOR	MINOR	MESSAGE	ID
00	BACKUP C/W ALARM*	MPS HE P	L		029
			R		030
			C		031
		MPS LH2/O2	MANF		032
			L		037
			R		038
			C		039
		RM FAIL	XFER		044
		SM1 SMOKE ALRM		(1)	052
		(PFS) S67 AC OVLD (BFS) SM1 AC OVLD	1	(1)	112
			2	(1)	113
			3	(1)	114
		(PFS) S67 AC VOLTS (BFS) SM1 AC VOLTS	1	(1)	116
			2	(1)	117
			3	(1)	118
		(PFS) S86 APU TEMP (BFS) SM2 APU TEMP	1	(1)	120
			2	(1)	121
			3	(1)	122
		(PFS) S66 AV BAY (BFS) SM2 AV BAY	TEMP	(1)	127
		(PFS) S66 CABIN (BFS) SM1 CABIN	N2	(1)	064
			O2	(1)	065
			FAN	(1)	066
			HX T	(1)	
			PRES	(1)	068
			PPO2	(1)	069
		(PFS) S68 CRYO H2 (BFS) SM2 CRYO H2	PRES	(1)	072
		(PFS) S68 CRYO O2	PRES	(1)	076

Table A.3-1. PFS/BFS LIGHT/CRT MESSAGE CORRELATION ALARM CLASS 2						
ALARM ID	CAUTION AND WARNING LIGHT	CRT MESSAGE FIELD		PFS	BFS	
		MAJOR	MINOR	MESSAGE	ID	
00	BACKUP C/W ALARM*	(BFS) SM2 CRYO O2	HTR	(1)	078	
		(PFS) S88 EVAP OUT T	1	(1)	080	
		(BFS) SM2 EVAP OUT T	2	(1)	081	
		(PFS) S69 FC PUMP (BFS) SM1 FC PUMP	1	(1)	084	
			2	(1)	085	
			3	(1)	086	
		(PFS) S69 FC REAC (BFS) SM1 FC REAC	1	(1)	088	
			2	(1)	089	
			3	(1)	090	
		(PFS) S69 FC STACK T (BFS) SM1 FC STACK T	1	(1)	092	
			2	(1)	093	
			3	(1)	094	
		(PFS) S88 FREON FLOW (BFS) SM2 FREON FLOW	1	(1)	096	
			2	(1)	097	
		(PFS) S88 H2O PUMP P (BFS) SM2 H2O PUMP P	1	(1)	100	
			2	(1)	101	
		(PFS) S86 HYD PRESS (BFS) SM2 HYD PRESS	1	(1)	104	
			2	(1)	105	
			3	(1)	106	
		(PFS) S67 MAIN BUS V (BFS) SM1 MAIN BUS V	A	(1)	108	
			B	(1)	109	
			C	(1)	110	
		GPC	1		10201	
			2		10202	
			3		10203	
			4		10204	
			5		10205	
		I/O ERROR***	FF1		10312	
FF2			10313			
FF3			10314			
FF4			10315			

Table A.3-1. PFS/BFS LIGHT/CRT MESSAGE CORRELATION ALARM CLASS 2					
ALARM ID	CAUTION AND WARNING LIGHT	CRT MESSAGE FIELD		PFS	BFS
		MAJOR	MINOR	MESSAGE	ID
00	BACKUP C/W ALARM*		FA1	10316	
			FA2	10317	
			FA3	10318	
			FA4	10319	
			CRT1	10324	
			CRT2	10345	
			CRT3	10346	
			CRT4	10347	
		BCE STRG1***	A	10606	
			B	10607	
			C	10608	
			D	10628	
			ADTA	10644	
			TAC	10636	
			MLS	10634	
			IMU	10633	
			MTU	10651	
			STRK	10653	
			NSP	10649	
			GPS	10626	
		BCE STRG2***	A	10706	
			B	10707	
			C	10708	
			D	10728	
			ADTA	10744	
			TAC	10736	
			MLS	10734	
			IMU	10733	
			MTU	10751	
			GPS	10726	
		BCE STRG3***	A	10806	

Table A.3-1. PFS/BFS LIGHT/CRT MESSAGE CORRELATION ALARM CLASS 2					
ALARM ID	CAUTION AND WARNING LIGHT	CRT MESSAGE FIELD		PFS	BFS
		MAJOR	MINOR	MESSAGE	ID
00	BACKUP C/W ALARM*		B	10807	
			C	10808	
			D	10828	
			ADTA	10844	
			TAC	10836	
			MLS	10834	
			IMU	10833	
			MTU	10851	
			STRK	10853	
			NSP	10849	
			GPS	10826	
		BCE STRG4***	A	10906	
			B	10907	
			C	10908	
			D	10928	
			ADTA	10944	
		SM2 APU SPD HI	1		056
			2		057
			3		058
		SM2 APU SPD LO	1		060
			2		061
			3		062
		DK XMTR	1		844
			2		845
			3		846
			4		847
		01	FCS SATURATION	FCS SAT	POS
MOM	13443				015
02	IMU	RM DLMA	IMU	13833	
03	RGA/ACCEL	RM DLMA	RGA	13854	
			ACC	13855	

Table A.3-1. PFS/BFS LIGHT/CRT MESSAGE CORRELATION ALARM CLASS 2					
ALARM ID	CAUTION AND WARNING LIGHT	CRT MESSAGE FIELD		PFS	BFS
		MAJOR	MINOR	MESSAGE	ID
04	LEFT RHC	RHC	L	13330	
05	RIGHT/AFT RHC	RHC	R	13331	
			A	13306	
06	FCS CHANNEL	FCS CH	1	13101	024
			2	13102	025
			3	13103	026
			4	13104	027
07	AIR DATA	RM DLMA	ADTA	13844	
08	RCS JET	F RCS	DJET	16567	
			FJET	16568	
			LJET	16569	
			RJET	16570	
			UJET	16571	
			JET		000
		L RCS	AJET	16672	
			DJET	16667	
			LJET	16669	
			UJET	16671	
			JET		004
		R RCS	AJET	16772	
			DJET	16767	
			RJET	16770	
			UJET	16771	
JET			008		
09	FWD RCS	F RCS	TK P	16565	002
			LEAK	16566	001
10	LEFT RCS	F RCS	TK P	16665	006

Table A.3-1. PFS/BFS LIGHT/CRT MESSAGE CORRELATION ALARM CLASS 2					
ALARM ID	CAUTION AND WARNING LIGHT	CRT MESSAGE FIELD		PFS	BFS
		MAJOR	MINOR	MESSAGE	ID
			LEAK	16666	005
		RCS XFEED	L	19030	
11	RIGHT RCS	R RCS	TK P	16765	010
			LEAK	16766	009
		RCS XFEED	R	19031	
12	OMS TVC	L OMS	GMBL	15660	019
		R OMS	GMBL	15760	023
13	LEFT OMS	L OMS	TK P	15665	018
			PC	15663	017
14	RIGHT OMS	R OMS	TK P	15765	022
			PC	15763	021
15	PAYLOAD CAUTION**	206 PL CL 2			040
* The BACKUP C/W ALARM is activated by any software C/W signal, including software backups to hardwired C/W lights. (The SYS SSME error signals are a backup to the hardwired MPS light.)					
** The PAYLOAD CAUTION may be activated in the PFS by a C/W signal from the payload reconfigurable SM software. These signals are defined in the JSC-19478-XXX Payload Management, Level C Flight Software Requirements (where XXX represents the number assigned to a specific OPS flight).					
*** These messages will be Class 2 when they are not detected by all GPCs in the PASS redundant set; otherwise they will be Class 3.					
(1) PFS CRT(SM) Message ID, which is reconfigurable. See JSC-19590-XXX SM Level C Flight Software Requirements document (where XXX represents the number of the specific OPS flight).					



## A.4 PFS CRT MESSAGE SOFTWARE REQUIREMENTS

The CRT message software requirements are covered under Primary Flight System (PFS).

### A.4.1 Primary Flight System Requirements.

The CRT Message Requirements Listing TABLE A.4.2-1 combines all the requirement details for each message in a composite line format listing by message ID (MSGID). Other data shown are TEXT, MAJOR and MINOR fields, message source (MSG SRC), measurement number (MEAS.NO.), SIGNAL NOMENCLATURE, ALARM CLASS/ID (ALRM C/ID), and Caution and Warning light (C/W LIGHT), if applicable.

The Caution and Warning Lights which may be driven by flight software have been assigned identification numbers (2 digit integer) and are listed below for information along with the nomenclature which appears when the Light is energized.

C & W LIGHTS	
<u>ID</u>	<u>NOMENCLATURE</u>
00	BU C/W AL
01	FCS SATUR
02	IMU
03	RGA/ACCEL
04	LEFT RHC
05	R/AFT RHC
06	FCS CHNL
07	AIR DATA
08	RCS JET
09	FWD RCS
10	LEFT RCS
11	RIGHT RCS
12	OMS TVC
13	LEFT OMS
14	RIGHT OMS
15	PL CAUT

Table A.4.2. PFS GNC AND VU CRT MESSAGE REQUIREMENTS

				CRT MESSAGE LISTING				ALRM	C/W	
LIN	-----TEXT-----			MSG				C	ID	LIGHT
NO	MSGID	MAJOR	MINOR	SRC	MEAS NO	SIGNAL NOMENCLATURE				
001	10000	ILLEGAL	ENTRY	VU	V93J6370C	ILLEGAL ENTRY MSG VU GTS		5		
002	10000	ILLEGAL	ENTRY	VU	V93X3943X	ILLEGAL ENTRY MSG (VU G8 NWS CHECK)		5		
003	10000	ILLEGAL	ENTRY	VU	V93X3993X	ILLEGAL ENTRY MSG VU FCS/DED DIS CO		5		
004	10000	ILLEGAL	ENTRY	VU	V93X7700X	ILLEGAL ENTRY MSG VU SCMD DISP		5		
004A	10000	ILLEGAL	ENTRY	GNC	V94X0101X	ILLEGAL ENTRY MSG (VERT SIT 1)		5		
005	10000	ILLEGAL	ENTRY	GNC	V94X4860X	ILLEGAL ENTRY MSG (XXXXXX TRAJ 1 DISP)		5		
005A	10000	ILLEGAL	ENTRY	GNC	V94X4861X	ILLEGAL ENTRY MSG (XXXXXX TRAJ 2 DISP)		5		
005B	10000	ILLEGAL	ENTRY	GNC	V94X4862X	ILLEGAL ENTRY MSG (RTLS TRAJ 2 DISP)		5		
006	10000	ILLEGAL	ENTRY	GNC	V94X4804X	ILLEGAL ENTRY MSG (XXXXX MNVR YYYY)		5		
007	10000	ILLEGAL	ENTRY	GNC	V94X4806X	ILLEGAL ENTRY MSG (STRK/COAS CNTL)		5		
008	10000	ILLEGAL	ENTRY	GNC	V94X4807X	ILLEGAL ENTRY MSG (IMU ALIGN)		5		
009	10000	ILLEGAL	ENTRY	GNC	V94X4808X	ILLEGAL ENTRY MSG (RCS)		5		
010	10000	ILLEGAL	ENTRY	GNC	V94X4809X	ILLEGAL ENTRY MSG (ORBIT)		5		
011	10000	ILLEGAL	ENTRY	GNC	V94X4810X	ILLEGAL ENTRY MSG (HORIZ SIT)		5		
012	10000	ILLEGAL	ENTRY	GNC	V94X4811X	ILLEGAL ENTRY MSG (OVERRIDE)		5		
013	10000	ILLEGAL	ENTRY	GNC	V94X4814X	ILLEGAL ENTRY MSG (REL NAV DISPLAY)		5		
014	10000	ILLEGAL	ENTRY	GNC	V94X4816X	ILLEGAL ENTRY MSG (ORBIT TGT)		5		
015	10000	ILLEGAL	ENTRY	GNC	V94X4817X	ILLEGAL ENTRY MSG (OEX CONFIG)		5		
016	10000	ILLEGAL	ENTRY	GNC	V94X4818X	ILLEGAL ENTRY MSG (ENTRY CONTROLS)		5		
017	10000	ILLEGAL	ENTRY	GNC	V94X4819X	ILLEGAL ENTRY MSG (OEX SETUP)		5		
018	10000	ILLEGAL	ENTRY	VU	V99X1950X	ILLEGAL ENTRY MSG VU BTU		5		
019	10000	ILLEGAL	ENTRY	VU	V99X1952X	ILLEGAL ENTRY MSG VU SST		5		
020	10000	ILLEGAL	ENTRY	VU	V99X1953X	ILLEGAL ENTRY MSG VU TCS		5		
021	10000	ILLEGAL	ENTRY	VU	V99X1954X	ILLEGAL ENTRY MSG VU MM R/W		5		
022	10000	ILLEGAL	ENTRY	VU	V99X2281X	ILLEGAL ENTRY MSG VU ACT CNTL DISP		5		
023	10000	ILLEGAL	ENTRY	VU	V99X2304X	ILLEGAL ENTRY MSG VU IMU ALIGN		5		
023A	10000	ILLEGAL	ENTRY	GNC	V94X1133X	ILLEGAL ENTRY MSG (GPS STATUS DISP)		5		
024	10300	I/O ERROR		VU	V99X1960X	I/O ERROR MSG VU BTU		3		
025	10300	I/O ERROR		VU	V99X1962X	I/O ERROR MSG VU SST		3		
026	13101	FCS CH	1	GNC	V94X4387X	FCS CH 1 FL MSG		2	06	FCS CHNL
027	13102	FCS CH	2	GNC	V94X4392X	FCS CH 2 FL MSG		2	06	FCS CHNL
028	13103	FCS CH	3	GNC	V94X4396X	FCS CH 3 FL MSG		2	06	FCS CHNL
029	13104	FCS CH	4	GNC	V94X4399X	FCS CH 4 FL MSG		2	06	FCS CHNL
030	13206	SBTC/THC	A	GNC	V94X4419X	A THC CH 1/2/3 FL/DLMA MSG		3		
031	13230	SBTC/THC	L	GNC	V94X4403X	L SBTC/THC CH 1/2/3 FL/DLMA MSG		3		
032	13231	SBTC/THC	R	GNC	V94X4404X	R SBTC CH 1/2/3 FL/DLMA MSG		3		
033	13306	RHC	A	GNC	V94X4406X	A RHC CH 1,2,3 FL MSG		3		
034	13306	RHC	A	GNC	V94X4412X	A RHC DLMA MSG		2	05	R/AFT RHC
035	13330	RHC	L	GNC	V94X4407X	L RHC CH 1,2,3 FL MSG		3		
036	13330	RHC	L	GNC	V94X4411X	L RHC DLMA MSG		2	04	LEFT RHC
037	13331	RHC	R	GNC	V94X4408X	R RHC CH 1,2,3 FL MSG		3		
038	13331	RHC	R	GNC	V94X4413X	R RHC DLMA MSG		2	05	R/AFT RHC
039	13442	FCS SAT	POS	GNC	V94X4416X	FCS POS SAT MSG		2	01	FCS SATUR
040	13443	FCS SAT	MOM	GNC	V94X4417X	FCS HM EXCEED MSG		2	01	FCS SATUR
041	13537	BODY FLAP	HOLD	GNC	V94X4155X	BODY FLAP HOLD MSG		3		
042	13538	BODY FLAP	CYCL	GNC	V94X4157X	BODY FLAP ALERT CYCLE MSG		3		
043	13586	BODY FLAP	FAIL	GNC	V94X4158X	BODY FLAP ALERT FAIL MSG		3		
044	13633	RM FAIL	IMU	GNC	V94X4714X	IMU 1/2/3 FL MSG		3		
045	13634	RM FAIL	MLS	GNC	V94X4721X	MLS 1/2/3 FL MSG		3		
046	13636	RM FAIL	TAC	GNC	V94X4724X	TAC 1/2/3 FL MSG		3		
047	13644	RM FAIL	ADTA	GNC	V94X4737X	ADTA 1/2/3/4 FL MSG		3		
048	13654	RM FAIL	RGA	GNC	V94X4733X	RGA 1/2/3/4 FL MSG		3		

Table A.4.2. PFS GNC AND VU CRT MESSAGE REQUIREMENTS

CRT MESSAGE LISTING									
LIN	-----TEXT-----			MSG					
NO	MSGID	MAJOR	MINOR	SRC	MEAS NO	SIGNAL NOMENCLATURE	ALRM	C/W	
							C	ID	LIGHT
049	13655		RM FAIL	ACC	GNC	V94X4729X	AA 1/2/3/4 FL MSG	3	
050	13700	G33	RNDZ RADAR		GNC	V94X4711X	RR DATA VALID MSG	3	
051	13829		RM DLMA	WOW	GNC	V94X4812X	WOW PL MA MSG	3	
052	13832		RM DLMA	MANF	GNC	V94X4314X	RCS MANF DILEMMA MSG	3	
053	13833		RM DLMA	IMU	GNC	V94X4716X	IMU DLMA MSG	2	02 IMU
054	13834		RM DLMA	MLS	GNC	V94X4435X	MLS DLMA MSG	3	
055	13835		RM DLMA	PRL	GNC	V94X4415X	HYD DILEMMA MSG	3	
056	13836		RM DLMA	TAC	GNC	V94X4725X	TAC DLMA MSG	3	
057	13844		RM DLMA	ADTA	GNC	V94X4738X	ADTA DLMA MSG	2	07 AIR DATA
058	13854		RM DLMA	RG	GNC	V94X4791X	ORB RGA DLMA MSG	2	03 RGA/ACCEL
059	13855		RM DLMA	ACC	GNC	V94X4790X	AA DLMA MSG	2	03 RGA/ACCEL
060	13901		IMU BITE/T	1	GNC	V94X4430X	IMU 1 TEMP/BITE MSG	3	
061	13902		IMU BITE/T	2	GNC	V94X4431X	IMU 2 TEMP/BITE MSG	3	
062	13903		IMU BITE/T	3	GNC	V94X4432X	IMU 3 TEMP/BITE MSG	3	
063	14000		TGT T		GNC	V94X4379X	TRANSFER TIME SINGULARITY MSG	3	
064	14100		ET SEP-MAN		GNC	V94X4539X	ET SEP-MANUAL MSG	3	
065	14230		BDY FLP SW	L	GNC	V94X4820X	LH BODY FLAP SW MSG	3	
066	14231		BDY FLP SW	R	GNC	V94X4821X	RH BODY FLAP SW MSG	3	
067	14330		PNL TRIM	L	GNC	V94X4822X	LH PNL TRIM SW MSG	3	
068	14331		PNL TRIM	R	GNC	V94X4823X	RH PNL TRIM SW MSG	3	
069	14786		RCS PWR	FAIL	GNC	V94X4313X	RCS PWR FAIL MSG	3	
070	14800		SENSE SW		GNC	V94X4828X	AFT SENSE SW MSG	3	
071	14908		ME SHDN SW	C	GNC	V94X4110X	ME-1 SHUTDOWN SW MSG	3	
072	14930		ME SHDN SW	L	GNC	V94X4111X	ME-2 SHUTDOWN SW MSG	3	
073	14931		ME SHDN SW	R	GNC	V94X4112X	ME-3 SHUTDOWN SW MSG	3	
074	15008		MPS CMD	C	GNC	V94X4748X	ME-1 CMD PATH FL MSG	3	
075	15030		MPS CMD	L	GNC	V94X4749X	ME-2 CMD PATH FL MSG	3	
076	15031		MPS CMD	R	GNC	V94X4750X	ME-3 CMD PATH FL MSG	3	
077	15100		ET SEP-AUT		GNC	V94X4534X	ET SEP-AUTO MSG	3	
078	15200	G51	RL MODE SW		GNC	V94X4830X	ENTRY ROLL MODE SWITCH MSG	3	
079	15300		TGT EL ANG		GNC	V94X4832X	TPI_EL_ANG MSG	3	
080	15400		TGT ITER		GNC	V94X4829X	ITER LIM	3	
081	15508		MPS DATA	C	GNC	V94X4745X	ME-1 FLT DATA PATH FL MSG	3	
082	15530		MPS DATA	L	GNC	V94X4746X	ME-2 FLT DATA PATH FL MSG	3	
083	15531		MPS DATA	R	GNC	V94X4747X	ME-3 FLT DATA PATH FL MSG	3	
084	15660		L OMS	GMBL	GNC	V94X4464X	OMS L GMBL FL MSG	2	12 OMS TVC
085	15661		L OMS	QTY	GNC	V94X4704X	OMS L TK LVL LO MSG	3	
086	15662		L OMS	VLV	GNC	V94X4756X	LT OMS HE/VAP ISO V MISCOMP MSG	3	
087	15663		L OMS	PC	GNC	V94X4800X	LT OMS PC TRANS FL MSG	2	13 LEFT OMS
088	15665		L OMS	TK P	GNC	V94X4455X	OMS L OX/FU TK P HI/LO MSG	2	13 LEFT OMS
089	15665		L OMS	TK P	GNC	V94X4700X	OMS L PRESS MSG	3	
090	15760		R OMS	GMBL	GNC	V94X4465X	OMS R GMBL FL MSG	2	12 OMS TVC
091	15761		R OMS	QTY	GNC	V94X4705X	OMS R TK LVL LO MSG	3	
092	15762		R OMS	VLV	GNC	V94X4757X	RT OMS HE/VAP ISO V MISCOMP MSG	3	
093	15763		R OMS	PC	GNC	V94X4801X	RT OMS PC TRANS FL MSG	2	14 RIGHT OMS
094	15765		R OMS	TK P	GNC	V94X4456X	OMS R OX/FU TK P HI/LO MSG	2	14 RIGHT OMS
095	15765		R OMS	TK P	GNC	V94X4701X	OMS R PRESS MSG	3	
096	15861	G23	OMS/RCS	QTY	GNC	V94X4754X	OMS PROP USED EXCEEDS MSG	3	
097	15908		MPS ELEC	C	GNC	V94X4742X	ME-1 ELEC LKUP MSG	3	
098	15930		MPS ELEC	L	GNC	V94X4743X	ME-2 ELEC LKUP MSG	3	
099	15931		MPS ELEC	R	GNC	V94X4744X	ME-3 ELEC LKUP MSG	3	
100	16008		MPS HYD	C	GNC	V94X4739X	ME-1 HYD LKUP MSG	3	

Table A.4.2. PFS GNC AND VU CRT MESSAGE REQUIREMENTS

CRT MESSAGE LISTING									
LIN	-----TEXT-----			MSG					
NO	MSGID	MAJOR	MINOR	SRC	MEAS NO	SIGNAL NOMENCLATURE	ALRM	C/W	
							C	ID	LIGHT
101	16030			GNC	V94X4740X	ME-2 HYD LKUP MSG	3		
102	16031			GNC	V94X4741X	ME-3 HYD LKUP MSG	3		
103	16108			GNC	V94X4275X	SSME-1 FAIL MSG	2	00	BU C/W AL
104	16130			GNC	V94X4276X	SSME-2 FAIL MSG	2	00	BU C/W AL
105	16131			GNC	V94X4277X	SSME-3 FAIL MSG	2	00	BU C/W AL
106	16200			GNC	V94X4786X	HIGH-G MSG	3		
107	1634F			GNC	V94X4278X	GNC GRD C/O IN PROGRESS MSG	3		
108	1645E			GNC	V94X4383X	TAL TARGET ERROR MSG	3		
109	1645F			GNC	V94X4384X	RTLS TARGET ERROR MSG	3		
110	16564			GNC	V94X4472X	RCS FWD HE P LO MSG	3		
111	16565			GNC	V94X4476X	RCS F FU/OX TK P HI/LO MSG	2	09	FWD RCS
112	16566			GNC	V94X4485X	RCS F FU/OX QTY LK MSG	2	09	FWD RCS
113	16567			GNC	V94X4498X	RCS F 1/2/3/4 D JET FL MSG	2	08	RCS JET
114	16568			GNC	V94X4501X	RCS F 1/2/3 F JET FLMSG	2	08	RCS JET
115	16569			GNC	V94X4489X	RCS F 1/3/5 L JET FLMSG	2	08	RCS JET
116	16570			GNC	V94X4492X	RCS F 2/4/5 R JET FLMSG	2	08	RCS JET
117	16571			GNC	V94X4495X	RCS F 1/2/3 U JET FLMSG	2	08	RCS JET
118	16573			GNC	V94X4767X	RCS F QTY ALERT MSG	3		
119	16664			GNC	V94X4470X	RCS L HE P LO MSG	3		
120	16665			GNC	V94X4474X	RCS L FU/OX TK P HI/LO MSG	2	10	LEFT RCS
121	16666			GNC	V94X4483X	RCS L FU/OX QTY LK MSG	2	10	LEFT RCS
122	16667			GNC	V94X4515X	RCS L 2/3/4/5 D JET FL MSG	2	08	RCS JET
123	16669			GNC	V94X4508X	RCS L 1/2/3/4/5 L JET FL MSG	2	08	RCS JET
124	16671			GNC	V94X4511X	RCS L 1/2/4 U JET FLMSG	2	08	RCS JET
125	16672			GNC	V94X4503X	RCS L 1/3 A JET FL MSG	2	08	RCS JET
126	16673			GNC	V94X4765X	RCS L QTY ALERT MSG	3		
127	16764			GNC	V94X4471X	RCS R HE P LO MSG	3		
128	16765			GNC	V94X4475X	RCS R FU/OX TK P HI/LO MSG	2	11	RIGHT RCS
129	16766			GNC	V94X4484X	RCS R FU/OX QTY LK MSG	2	11	RIGHT RCS
130	16767			GNC	V94X4528X	RCS R 2/3/4/5 D JET FL MSG	2	08	RCS JET
131	16770			GNC	V94X4521X	RCS R 1/2/3/4/5 R JET FL MSG	2	08	RCS JET
132	16771			GNC	V94X4524X	RCS R 1/2/4 U JET FLMSG	2	08	RCS JET
133	16772			GNC	V94X4517X	RCS R 1/3 A JET FL MSG	2	08	RCS JET
134	16773			GNC	V94X4766X	RCS R QTY ALERT MSG	3		
135	16830	G23		GNC	V94X4530X	RCS L OUT P/TEMP HI/LO MSG	3		
136	16831	G23		GNC	V94X4531X	RCS R OUT P/TEMP HI/LO MSG	3		
137	16841	G23		GNC	V94X4535X	RCS F OUT P/TEMP HI/LO MSG	3		
138	16900			GNC	V94X4113X	DAP RECONFIGURATION	3		
139	17000			GNC	V94X4375X	SPEED BRAKE MSG	3		
140	17100			GNC	V94X4758X	MNVR T-30 & DAP NOT IN AUTO MSG	3		
141	17300			GNC	V94X4538X	SEP INHIBIT FLAG MSG	3		
142	17400			GNC	V94X4101X	ADTA/MLS/TAC/RR EDITHIST MSG	3		
143	17436			GNC	V94X4376X	TACAN NAV EDIT MSG	3		
144	17495			GNC	V94X4377X	ALTITUDE NAV EDIT MSG	3		
145	17500			GNC	V94X4760X	MEP ALERT MSG	3		
146	17686			GNC	V94X4279X	SSME REPOS FAILED MSG	3		
147	17700			VU	V99X4365X	ANNUN CMD/POS COMP FAIL PARAM	3		
148	18200			GNC	V94X4792X	TAEM GUIDANCE DOWNMODE MSG	3		
149	18606			GNC	V94X4763X	A SW DEFAULT MSG	3		
150	18630			GNC	V94X4761X	L SW DEFAULT MSG	3		
151	18631			GNC	V94X4762X	R SW DEFAULT MSG	3		
152	18700			GNC	V94X4378X	ADTA PROBES DEPLOY MSG	3		

Table A.4.2. PFS GNC AND VU CRT MESSAGE REQUIREMENTS

CRT MESSAGE LISTING									
LIN	-----TEXT-----				MSG	ALRM	C/W		
NO	MSGID	MAJOR	MINOR	SRC	MEAS_NO	SIGNAL NOMENCLATURE	C	ID	LIGHT
153	18900			GNC	V94X4703X	ROLL REF MSG	3		
154	19030	RCS XFEED	L	GNC	V94X4316X	RCS LEFT RECONFIG MSG	2	10	LEFT RCS
155	19031	RCS XFEED	R	GNC	V94X4317X	RCS RIGHT RECONFIG MSG	2	11	RIGHT RCS
156	19326	NO UPDATE	GPS	GNC	V94X1048X	NO GPS UPDATE MSG	3		
157	19402	G55 GPS FAIL	2	GNC	V94X1049X	GPS RECEIVER 2 FAILED MSG	3		
158	17426	NAV EDIT	GPS	GNC	V94X1050X	GPS NAV EDIT MSG	3		
159	19401	G55 GPS FAIL	1	GNC	V94X6018X	GPS RECEIVER 1 FAILED MSG	3		
160	19403	G55 GPS FAIL	3	GNC	V94X6019X	GPS RECEIVER 3 FAILED MSG	3		
161	13826	RM DLMA	GPS	GNC	V94X6021X	GPS RECEIVER DILEMMA MSG	3		
162	19501	G55 QA FL GPS	1	GNC	V94X6022X	GPS RECEIVER 1 QA FAIL MSG	3		
163	19502	G55 QA FL GPS	2	GNC	V94X6023X	GPS RECEIVER 2 QA FAIL MSG	3		
164	19503	G55 QA FL GPS	3	GNC	V94X6024X	GPS RECEIVER 3 QA FAIL MSG	3		
165	19211	DAP DNMODE	RHC	GNC	V94X0001X	RHC DNMODE MSG	3		

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## A.5 BFS CRT Messages Requirements

Table A.5–1 BFS CRT messages presents the CRT and error messages supported by BFS. The message information provided for the BFS messages consists of the following items:

1.	MSG ID	CRT Message ID (3 Characters)	
2.	MAJOR FIELD	CRT Message Major Field Nomenclature (14 Character Field)	
3.	MINOR FIELD	CRT Message Minor Field Nomenclature (4 Character Field)	
4.	ALARM CLASS	Alarm Class (See Section A.2) Note: All 6 alarm classes (0 through 5) defined in Section A.2 are valid for BFS, regardless of whether any alarms exist in a particular class or not. For example, at the time of this writing (OI-28) no Class 4 alarms exist for BFS however Class 4 is still a valid class.	
5.	SIGNAL SOURCE	<u>Error Signal Source</u>	<u>Acronym</u>
		Display Output Processor	DOP
		GNC Annunciation Interface	GAX
		MCDS Interface	MI
		Sequence	SEQ
		Backup Operating System	BOS
		System	SYS
		System Management	SM
		Payload	PYLD
		Payload Bay Door	PBD
6.	C&W LIGHT	Caution & Warning Light Nomenclature	

NOTE: Alarm Class 2 (C&W) and Alarm Class 3 (SM ALERT) CRT Messages which have identical Major and Minor Field Nomenclature are assigned Independent Unique Message IDs.

NOTE: CRT Message ID to downlist correlation.

The BFS downlist consists of a Major and Minor Field that relates to the DEU message Major and Minor Field as follows:

The value in the downlist Major Field times 4 added to the value in the downlist Minor Field equals the Message ID listed in Table A.5–1.

Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
000	F RCS	JET	2	MI	RCS JET
001	F RCS	LEAK	2	SEQ	FWD RCS
002	F RCS	TK P	2	SEQ	FWD RCS
003					
004	L RCS	JET	2	MI	RCS JET
005	L RCS	LEAK	2	SEQ	LEFT RCS
006	L RCS	TK P	2	SEQ	LEFT RCS
007					
008	R RCS	JET	2	MI	RCS JET
009	R RCS	LEAK	2	SEQ	RIGHT RCS
010	R RCS	TK P	2	SEQ	RIGHT RCS
011					
012					
013					
014	FCS SAT	POS	2	MI	FCS SAT
015	FCS SAT	MOM	2	MI	FCS SAT
016					
017	L OMS	PC	2	MI	LEFT OMS
018	L OMS	TK P	2	MI	LEFT OMS
019	L OMS	GMBL	2	MI	OMS TVC
020					
021	R OMS	PC	2		RIGHT OMS
022	R OMS	TK P	2	MI	RIGHT OMS
023	R OMS	GMBL	2	MI	OMS TVC
024	FCS CH	1	2	MI	FCS CHANNEL
025	FCS CH	2	2	MI	FCS CHANNEL
026	FCS CH	3	2	MI	FCS CHANNEL
027	FCS CH	4	2	MI	FCS CHANNEL
028					
029	MPS HE P	L	2	MI	BACKUP C&W
030	MPS HE P	R	2	MI	BACKUP C&W
031	MPS HE P	C	2	MI	BACKUP C&W



Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
032	MPS LH2/O2	MANF	2	MI	BACKUP C&W
033					
034					
035					
036					
037	SSME FAIL	L	2	SEQ	BACKUP C&W
038	SSME FAIL	R	2	SEQ	BACKUP C&W
039	SSME FAIL	C	2	SEQ	BACKUP C&W
040	206 PL CL 2		2	PYLD	PAYLOAD C&W
041					
042					
043					
044	RM FAIL	XFER	2	GAX	BACKUP C&W
045					
046					
047					
048					
049					
050					
051					
052	SM1 SMOKE ALRM		2	SM	BACKUP C&W
053					
054					
055					
056	SM2 APU SPD HI	1	2	SM	BACKUP C&W
057	SM2 APU SPD HI	2	2	SM	BACKUP C&W
058	SM2 APU SPD HI	3	2	SM	BACKUP C&W
059					
060	SM2 APU SPD LO	1	2	SM	BACKUP C&W
061	SM2 APU SPD LO	2	2	SM	BACKUP C&W
062	SM2 APU SPD LO	3	2	SM	BACKUP C&W
063					

Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
064	SM1 CABIN	N2	2	SM	BACKUP C&W
065	SM1 CABIN	O2	2	SM	BACKUP C&W
066	SM1 CABIN	FAN	2	SM	BACKUP C&W
067					
068	SM1 CABIN	PRES	2	SM	BACKUP C&W
069	SM1 CABIN	PPO2	2	SM	BACKUP C&W
070					
071					
072	SM2 CRYO H2	PRES	2	SM	BACKUP C&W
073					
074					
075					
076	SM2 CRYO O2	PRES	2	SM	BACKUP C&W
077					
078	SM2 CRYO O2	HTR	2	SM	BACKUP C&W
079					
080	SM2 EVAP OUT T	1	2	SM	BACKUP C&W
081	SM2 EVAP OUT T	2	2	SM	BACKUP C&W
082					
083					
084	SM1 FC PUMP	1	2	SM	BACKUP C&W
085	SM1 FC PUMP	2	2	SM	BACKUP C&W
086	SM1 FC PUMP	3	2	SM	BACKUP C&W
087					
088	SM1 FC REAC	1	2	SM	BACKUP C&W
089	SM1 FC REAC	2	2	SM	BACKUP C&W
090	SM1 FC REAC	3	2	SM	BACKUP C&W
091					
092	SM1 FC STACK T	1	2	SM	BACKUP C&W
093	SM1 FC STACK T	2	2	SM	BACKUP C&W
094	SM1 FC STACK T	3	2	SM	BACKUP C&W
095					

Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
096	SM2 FREON FLOW	1	2	SM	BACKUP C&W
097	SM2 FREON FLOW	2	2	SM	BACKUP C&W
098					
099					
100	SM2 H2O PUMP P	1	2	SM	BACKUP C&W
101	SM2 H2O PUMP P	2	2	SM	BACKUP C&W
102					
103					
104	SM2 HYD PRESS	1	2	SM	BACKUP C&W
105	SM2 HYD PRESS	2	2	SM	BACKUP C&W
106	SM2 HYD PRESS	3	2	SM	BACKUP C&W
107					
108	SM1 MAIN BUS V	A	2	SM	BACKUP C&W
109	SM1 MAIN BUS V	B	2	SM	BACKUP C&W
110	SM1 MAIN BUS V	C	2	SM	BACKUP C&W
111					
112	SM1 AC OVLD	1	2	SM	BACKUP C&W
113	SM1 AC OVLD	2	2	SM	BACKUP C&W
114	SM1 AC OVLD	3	2	SM	BACKUP C&W
115					
116	SM1 AC VOLTS	1	2	SM	BACKUP C&W
117	SM1 AC VOLTS	2	2	SM	BACKUP C&W
118	SM1 AC VOLTS	3	2	SM	BACKUP C&W
119					
120	SM2 APU TEMP	1	2	SM	BACKUP C&W
121	SM2 APU TEMP	2	2	SM	BACKUP C&W
122	SM2 APU TEMP	3	2	SM	BACKUP C&W
123					
124					
125					
126					
127	SM2 AV BAY	TEMP	2	SM	BACKUP C&W

Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
128					
129					
130					
131	F RCS	HE P	3	SEQ	
132					
133					
134					
135	L RCS	HE P	3	SEQ	
136					
137					
138					
139	R RCS	HE P	3	SEQ	
140	SM0 TIRE PRESS	L IB	3	SM	
141	SM0 TIRE PRESS	L OB	3	SM	
142	SM0 TIRE PRESS	R IB	3	SM	
143	SM0 TIRE PRESS	R OB	3	SM	
144					
145	MPS HE P	L	3	GAX	
146	MPS HE P	R	3	GAX	
147	MPS HE P	C	3	GAX	
148	SM0 THRM PRPLT		3	SM	
149					
150					
151					
152	SM0 THRM	APU	3	SM	
153	SM0 THRM	FRN	3	SM	
154	SM0 THRM	H2O	3	SM	
155	SM0 THRM	EVAP	3	SM	
156	SM0 THRM	HYD	3	SM	
157					
158					
159					

Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
160	SM2 APU	1	3	SM	
161	SM2 APU	2	3	SM	
162	SM2 APU	3	3	SM	
163					
164					
165					
166	SM2 AV BAY	FAN	3	SM	
167					
168					
169					
170					
171	SM1 CABIN	IMU	3	SM	
172					
173					
174					
175	SM1 CNTL/ESS V		3	SM	
176	SM1 FC STACK T	1	3	SM	
177	SM1 FC STACK T	2	3	SM	
178	SM1 FC STACK T	3	3	SM	
179					
180	SM1 DC VOLT FC	1	3	SM	
181	SM1 DC VOLT FC	2	3	SM	
182	SM1 DC VOLT FC	3	3	SM	
183					
184	SM1 FC AMPS	1	3	SM	
185	SM1 FC AMPS	2	3	SM	
186	SM1 FC AMPS	3	3	SM	
187					
188	SM2 HYD QTY	1	3	SM	
189	SM2 HYD QTY	2	3	SM	
190	SM2 HYD QTY	3	3	SM	
191					

Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
192	SM2 HYD RSVR T	1	3	SM	
193	SM2 HYD RSVR T	2	3	SM	
194	SM2 HYD RSVR T	3	3	SM	
195					
196	SM2 W/B QTY	1	3	SM	
197	SM2 W/B QTY	2	3	SM	
198	SM2 W/B QTY	3	3	SM	
199					
200	SM1 MAIN BUS V	A	3	SM	
201	SM1 MAIN BUS V	B	3	SM	
202	SM1 MAIN BUS V	C	3	SM	
203					
204	SM2 APU SPD HI	1	3	SM	
205	SM2 APU SPD HI	2	3	SM	
206	SM2 APU SPD HI	3	3	SM	
207					
208					
209					
210					
211	ET SEP-INH		3	SEQ	
212	SM2 HYD ACUM P	1	3	SM	
213	SM2 HYD ACUM P	2	3	SM	
214	SM2 HYD ACUM P	3	3	SM	
215					
216	SM1 FC COOL P	1	3	SM	
217	SM1 FC COOL P	2	3	SM	
218	SM1 FC COOL P	3	3	SM	
219					
220	SM1 FC EXIT T	1	3	SM	
221	SM1 FC EXIT T	2	3	SM	
222	SM1 FC EXIT T	3	3	SM	
223					

Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
224	BCE STRG 1	A	3	BOS	
225	BCE STRG 2	A	3	BOS	
226	BCE STRG 3	A	3	BOS	
227	BCE STRG 4	A	3	BOS	
228	BCE STRG 1	TAC	3	BOS	
229	BCE STRG 2	TAC	3	BOS	
230	BCE STRG 3	TAC	3	BOS	
231					
232					
233					
234					
235	ROLL REF		3	DOP 2	
236	BCE STRG 1	IMU	3	BOS	
237	BCE STRG 2	IMU	3	BOS	
238	BCE STRG 3	IMU	3	BOS	
239					
240	BCE STRG 1	D	3	BOS	
241	BCE STRG 2	D	3	BOS	
242	BCE STRG 3	D	3	BOS	
243	BCE STRG 4	D	3	BOS	
244	BCE STRG 1	B	3	BOS	
245	BCE STRG 2	B	3	BOS	
246	BCE STRG 3	B	3	BOS	
247	BCE STRG 4	B	3	BOS	
248	BCE STRG 1	ADTA	3	BOS	
249	BCE STRG 2	ADTA	3	BOS	
250	BCE STRG 3	ADTA	3	BOS	
251	BCE STRG 4	ADTA	3	BOS	
252	BCE STRG 1	C	3	BOS	
253	BCE STRG 2	C	3	BOS	
254	BCE STRG 3	C	3	BOS	
255	BCE STRG 4	C	3	BOS	

Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
256	BCE STRG 1	MTU	3	BOS	
257	BCE STRG 2	MTU	3	BOS	
258	BCE STRG 3	MTU	3	BOS	
259					
260	I/O ERROR	PL1	3	BOS	
261	I/O ERROR	FLEX	3	BOS	
262					
263					
264	I/O ERROR	PL2	3	BOS	
265					
266					
267	I/O ERROR	PCM	3	BOS	
268	BCE STRG 1	PASS	3	BOS	
269	BCE STRG 2	PASS	3	BOS	
270	BCE STRG 3	PASS	3	BOS	
271	BCE STRG 4	PASS	3	BOS	
272	BCE STRG 1	NSP	3	BOS	
273					
274	BCE STRG 3	NSP	3	BOS	
275					
276	BCE STRG 1	GPS	3	BOS	
277	BCE STRG 2	GPS	3	BOS	
278	BCE STRG 3	GPS	3	BOS	
279					
280	I/O ERROR	FF1	3	BOS	
281	I/O ERROR	FF2	3	BOS	
282	I/O ERROR	FF3	3	BOS	
283	I/O ERROR	FF4	3	BOS	
284	I/O ERROR	FA1	3	BOS	
285	I/O ERROR	FA2	3	BOS	
286	I/O ERROR	FA3	3	BOS	
287	I/O ERROR	FA4	3	BOS	



Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
288	GPC	PWR	3	BOS	
289	GPC	BITE	3	BOS	
290					
291	GPC	IOP	3	BOS	
292					
293					
294					
295	TFL FAIL		3	BOS	
296					
297					
298					
299	S63 PBD SEQ	FAIL	3	PBD SEQ	
300					
301					
302					
303	206 PL CL 3		3	PYLD	
304					
305					
306					
307	NAV EDIT		3	MI	
308	RM FAIL	IMU	3	MI	
309					
310	RM FAIL	ADTA	3	MI	
311	RM FAIL	XFER	3	GAX	
312					
313					
314					
315	SW TO MEP		3	MI	
316					
317					
318					
319	MPS LH2/O2	ULL	3	MI	

Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
320	L OMS	TEMP	3	GAX	
321					
322	L OMS	TK P	3	MI	
323					
324	R OMS	TEMP	3	GAX	
325					
326	R OMS	TK P	3	MI	
327					
328	CRT BITE	1	3	MI	
329	CRT BITE	2	3	MI	
330	CRT BITE	3	3	MI	
331	CRT BITE	4	3	MI	
332	I/O ERROR	CRT1	3	MI	
333	I/O ERROR	CRT2	3	MI	
334	I/O ERROR	CRT3	3	MI	
335	I/O ERROR	CRT4	3	MI	
336					
337	MPS CMD	L	3	SEQ	
338	MPS CMD	R	3	SEQ	
339	MPS CMD	C	3	SEQ	
340					
341	MPS DATA	L	3	SEQ	
342	MPS DATA	R	3	SEQ	
343	MPS DATA	C	3	SEQ	
344					
345	MPS ELEC	L	3	SEQ	
346	MPS ELEC	R	3	SEQ	
347	MPS ELEC	C	3	SEQ	
348					
349	MPS HYD	L	3	SEQ	
350	MPS HYD	R	3	SEQ	
351	MPS HYD	C	3	SEQ	

Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
352	SM2 FU TK VLV	APU	3	SM	
353					
354					
355					
356					
357					
358					
359					
360					
361					
362					
363					
364					
365					
366					
367	SM1 CABN dP/dT	BU	3	SM	
368	OTT ST IN		3	GAX	
369					
370					
371					
372					
373	TARGET ERR	RTLS	3	GAX	
374					
375					
376	S63 PBD CONFIG		3	PBD SEQ	
377					
378					
379					
380	SM1 FC PH	1	3	SM	
381	SM1 FC PH	2	3	SM	
382	SM1 FC PH	3	3	SM	
383					

Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
384	SM1 FC DELTA V	1	3	SM	
385	SM1 FC DELTA V	2	3	SM	
386	SM1 FC DELTA V	3	3	SM	
387					
388					
389					
390					
391					
392					
393					
394					
395					
396					
397					
398					
399					
400	SM0 TIRE PRESS	L NG	3	SM	
401	SM0 TIRE PRESS	R NG	3	SM	
402					
403					
404					
405					
406					
407					
408					
409					
410					
411					
412					
413					
414					
415					

Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
416					
417					
418					
419					
420					
421					
422					
423					
424					
425					
426					
427					
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430					
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447					

Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
448	SM0 BRAKE P	2/3	3	SM	
449	SM0 BRAKE P	1/3	3	SM	
450					
451					
452					
453					
454					
455					
456					
457					
458					
459					
460	MPS PNEU P	TK	3	MI	
461	MPS PNEU P	REG	3	MI	
462	MPS PNEU P	ACUM	3	MI	
463					
464	MPS H2 OUT	P C	3	MI	
465	MPS H2 OUT	P L	3	MI	
466	MPS H2 OUT	P R	3	MI	
467					
468	MPS O2 OUT	T C	3	MI	
469	MPS O2 OUT	T L	3	MI	
470	MPS O2 OUT	T R	3	MI	
471					
472					
473					
474					
475					
476					
477					
478					
479					

Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
480	SSME REPOS	FAIL	3	SEQ	
481					
482					
483					
484	APU 1 COOL	DOWN	3	SM	
485					
486					
487					
488	APU 2 COOL	DOWN	3	SM	
489					
490					
491					
492	APU 3 COOL	DOWN	3	SM	
493					
494					
495					
496	ILLEGAL	TIG	3	GAX	
497					
498					
499					
500	SM2 CRYO H2	MANF	3	SM	
501					
502					
503					
504	SM2 CRYO O2	MANF	3	SM	
505					
506					
507					
508	SM1 CNTL RPC		3	SM	
509					
510					
511					

Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
512					
513					
514					
515					
516					
517					
518					
519					
520					
521					
522					
523					
524					
525					
526					
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541					
542					
543					



Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
544					
545					
546					
547					
548					
549					
550					
551					
552					
553					
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568					
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570					
571					
572					
573					
574					
575					

Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
576					
577					
578					
579					
580					
581					
582					
583					
584					
585					
586					
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605					
606					
607					

Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
608					
609					
610					
611					
612					
613					
614					
615					
616					
617					
618					
619					
620					
621					
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623					
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629					
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631					
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634					
635					
636					
637					
638					
639					

Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
640					
641					
642					
643					
644					
645					
646					
647					
648					
649					
650					
651					
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Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
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Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
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Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
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Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
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Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
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Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
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843					
844	DK XMTR	1	2	BOS	BACKUP C&W
845	DK XMTR	2	2	BOS	BACKUP C&W
846	DK XMTR	3	2	BOS	BACKUP C&W
847	DK XMTR	4	2	BOS	BACKUP C&W
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Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
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Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
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Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
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Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
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Table A.5-1. BFS CRT MESSAGES					
MSG ID	MAJOR FIELD	MINOR FIELD	ALARM CLASS	SIGNAL SOURCE	C&W LIGHT
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Note: Blank fields in table indicate that the MSG ID is not used.					

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## **A.6 GPCIPL Messages**

This appendix contains listings and explanations (Ref. MG077202) of the GPCIPL (9.0 & SUBS) error/advisory messages that may appear on the message line of the DEU. Table A.6–1 lists the messages by message number (error/advisory number). The messages are spelled as they appear on the message line.

Table A.6-1. GPCIPL PROGRAM FAILURE/ADVISORY MESSAGES (BY MESSAGE NUMBER)		
MESSAGE NUMBER	M/S ID	MESSAGE TEXT
MSG001	V94X4870X	R/M REGISTER IS NOT ZERO AFTER A MASTER RESET
MSG002	V94X4869X	C/M IDLE NOT SET AFTER MASTER RESET
MSG003	V94X4872X	INT REG A BITS 1–15 NOT 0 AFTER A MASTER RESET
MSG004	V94X4873X	MASTER RESET DID NOT CLEAR THE TX REGISTER
MSG005	V94X4874X	MASTER RESET DID NOT CLEAR THE RX REGISTER
MSG006	V94X4875X	MASTER RESET DID NOT CLEAR THE DO REGISTER
MSG007	V94X4876X	MASTER RESET DID NOT CLEAR THE HALT REGISTER
MSG008	V94X4877X	MASTER RESET DID NOT CLEAR THE INTB REGISTER
MSG009	V94X4878X	MASTER RESET DID NOT CLEAR THE INTC REGISTER
MSG010	V94X4879X	MASTER RESET DID NOT CLEAR THE INTD REGISTER
MSG011	V94X4880X	MASTER RESET DID NOT CLEAR THE INTE REGISTER
MSG012	V94X4881X	MASTER RESET DID NOT CLEAR THE GO/NO–GO REGISTER
MSG013	V94X4882X	MASTER RESET DID NOT CLEAR THE BSY/WAIT REGISTER
MSG014	V94X4883X	AN EXPECTED C/M IDLE INTERRUPT DID NOT OCCUR
MSG015	V94X4884X	A PCO_TO RESET BCE HALT BITS_DID NOT RESET ALL
MSG016	V94X4885X	A PCO_TO ENABLE BCE XMITTERS_DID NOT ENABLE ALL
MSG017	V94X4886X	A PCO_TO ENABLE BCE RECEIVERS_DID NOT ENABLE ALL
MSG018	V94X5160X	MSC OR TESTED BCE IS NO–GO
MSG019	V94X5159X	MSC OR TESTED BCE STILL BUSY
MSG020	V94X4889X	AN EXPECTED EXTERNAL INTERRUPT 2 DID NOT OCCUR
MSG021	V94X4890X	MSC COULD NOT TALLY HIGHEST FW MEMORY LOCATION
MSG022	V94X4894X	SYSTEM SOFTWARE LOADER CHECKSUM ERROR
MSG023	V94X4895X	MASTER RESET DID NOT CAUSE AN INTERRUPT
MSG024	V94X5212X	PGM CHK: ILLEGAL INSTRUCTION
MSG025	V94X4903X	PGM CHK: PRIVILEGED INSTRUCTION
MSG026	V94X4906X	PGM CHK: FIXED POINT OVERFLOW
MSG027	V94X4907X	PGM CHK: SIGNIFICANCE ERROR
MSG028	V94X4909X	PGM CHK: CPU STOR PROT VIOLATION
MSG029	V94X5213X	PGM CHK: INTRPT CODE INVALID
MSG030	V94X4911X	PGM CHK: EXPONENT UNDERFLOW –FLOATING POINT–
MSG031	V94X4912X	PGM CHK: EXPONENT OVERFLOW – CONVERT INSTRUCTION–
MSG032	V94X4913X	PGM CHK: EXPONENT OVERFLOW –FLOATING POINT–
MSG033	V94X4914X	PGM CHK: DIVIDE INSTRUCTION –FLOATING–
MSG034	V94X5214X	EXI INTRPT: CODE NOT 0 AFTER MASTER RESET

Table A.6-1. GPCIPL PROGRAM FAILURE/ADVISORY MESSAGES (BY MESSAGE NUMBER)		
MESSAGE NUMBER	M/S ID	MESSAGE TEXT
MSG035	V94X5215X	EXI INTRPT: CODE NOT 0 AFTER INTRPT OCCURED
MSG036	V94X4916X	UNEXPED SVC INTRPT
MSG037	V94X4917X	UNEXPED CLK 1 INTRPT
MSG038	V94X4918X	UNEXPED CLK 2 INTRPT
MSG039	V94X4919X	UNEXPED IM INTRPT
MSG040	V94X4920X	UNEXPED EXT 0 INTRPT
MSG041	V94X4928X	UNEXPED EXT 2 INTRPT
MSG042	V94X4929X	UNEXPED EXT 3 INTRPT
MSG043	V94X4930X	UNEXPED EXT 4 INTRPT
MSG044	V94X4931X	BCE TIME-OUT N RETRY FAIL-DEUIPL
MSG045	V94X4932X	GPC ID VALUE NOT IN RANGE 1-5
MSG046	V94X4935X	REG 4 NOT LOADED CORRECTLY VIA R2-TO-R3-TO-R4
MSG047	V94X4936X	THE SUM FORMED IN R2 IS TOO HIGH
MSG048	V94X4937X	THE SUM FORMED IN R2 IS TOO LOW
MSG049	V94X4938X	THE SHIFT TEST FAILED
MSG050	V94X4939X	BHE/BL INSTR/COND CODE FAILED
MSG051	V94X4940X	BLE INSTRUCTION FAILED TO BRANCH
MSG052	V94X4941X	BLE/BH INSTR/COND CODE FAILED
MSG053	V94X4942X	BHE INSTR/COND CODE FAILED
MSG054	V94X4943X	BM INSTR/COND CODE FAILED
MSG055	V94X4944X	BE INSTR/COND CODE FAILED
MSG056	V94X4945X	TRB/BO INSTR/COND CODE FAILED
MSG057	V94X4946X	OHI INSTR FAILED
MSG058	V94X4947X	OVERFLOW NOT SET/BOV INSTR FAIL
MSG059	V94X4948X	CARRY BIT NOT SET/BOC INSTR FAIL
MSG060	V94X4949X	SIGN BIT NOT SET/BP INSTR FAILED
MSG061	V94X4950X	LACR INSTR DID NOT SET CC TO INDICATE LT 0
MSG062	V94X4951X	AH/BP/BZ INSTR/COND CODE FAILED
MSG063	V94X4952X	TS-TEST AND SET-INSTR FAILED
MSG064	V94X4953X	TB/BO INSTR/COND CODE FAILED
MSG065	V94X4954X	BVC INSTR/COND CODE FAILED
MSG066	V94X4955X	DR/MHI/CHI INSTR/COND CODE FAIL
MSG067	V94X4956X	FLOATING POINT TEST 1 FAILURE
MSG068	V94X4957X	FLOATING POINT TEST 2 FAILURE
MSG069	V94X4958X	FLOATING POINT TEST 3 FAILURE

Table A.6-1. GPCIPL PROGRAM FAILURE/ADVISORY MESSAGES (BY MESSAGE NUMBER)		
MESSAGE NUMBER	M/S ID	MESSAGE TEXT
MSG070	V94X4959X	FLOATING POINT TEST 4 FAILURE
MSG071	V94X4960X	FLOATING POINT TEST 5 FAILURE
MSG072	V94X4961X	FLOATING POINT TEST 6 FAILURE
MSG073	V94X5148X	BRANCH INDIRECT FAILED
MSG074	V94X5149X	SRDR SHIFT FAIL
MSG075	V94X5216X	SELF TEST IN PROGRESS
MSG076	V94X4965X	ST PROT INTRPT FAILED TO OCCUR
MSG077	V94X4966X	ST PROT INTRPT CODE NOT 7
MSG078	V94X4967X	INT CODE NOT HEX F AFTER INSTR MON INTRPT
MSG079	V94X4968X	FIXED PT OVERFLOW NOT MASKABLE
MSG080	V94X4969X	FIXED PT OVERFLOW INTRPT FAILED TO OCCUR
MSG081	V94X4970X	INT CODE NOT 4 AFTER FIXED PT OVFLO INTRPT
MSG082	V94X4974X	R/M VOTER TEST 1 FAILURE
MSG083	V94X4975X	COULD NOT SET TIME OUT LATCH WITH WATCHDOG
MSG084	V94X4976X	DID NOT GET AN EXPECTED EXT 0 INTERRUPT
MSG085	V94X4977X	WATCHDOG INT BIT NOT ON AFTER EXT 0 INTRPT
MSG086	V94X4978X	EXPED EXT 4 INTRPT DID NOT OCCUR
MSG087	V94X4979X	EXPED EXT 3 INTRPT DID NOT OCCUR
MSG088	V94X4980X	EXPED EXT 1 INTRPT DID NOT OCCUR
MSG089	V94X4981X	EXPED EXT 0 INTRPT DID NOT OCCUR
MSG090	V94X4983X	UNEXPED INT REG E VALUE AFTER EXT 4 INTRPT
MSG091	V94X4984X	UNEXPED INT REG D VALUE AFTER EXT 3 INTRPT
MSG092	V94X4985X	UNEXPED INT REG B VALUE AFTER EXT 1 INTRPT
MSG093	V94X4986X	UNEXPED INT REG A VALUE AFTER EXT 0 INTRPT
MSG094	V94X4993X	GPC POWER FAIL AT LOCATION SHOWN – RECOVERED OK
MSG095	V94X4994X	MSC @STP OR BCE #STP WRAP FAILED
MSG096	V94X4998X	REAL TIME MSC TIME OUT
MSG097	V94X4999X	NO POLL RESPONSE
MSG098	V94X5070X	REAL TIME IPL RETRY FAILURE
MSG099	V94X5071X	DEU INITIALIZATION FAILURE
MSG100	V94X5072X	UNEXPECTED EXT 0 INTRPT: CODE=0 /WATCHDOG TIMER/
MSG101	V94X5073X	UNEXPECTED EXT 0 INTRPT: CODE=0 /IOP FAIL LATCH/
MSG102	V94X5074X	UNEXPCTD EXT 0 INTRP: CODE=0 CNTRL/MONITR IDLE
MSG103	V94X5075X	UNEXPCTD EXT 0 INTRP: CODE=0 IOP ROS PRITY ERROR
MSG104	V94X5076X	UNEXPECTED EXT 0 INTRP: CODE=0 /IOP FAULT/

Table A.6-1. GPCIPL PROGRAM FAILURE/ADVISORY MESSAGES (BY MESSAGE NUMBER)		
MESSAGE NUMBER	M/S ID	MESSAGE TEXT
MSG105	V94X5077X	R/M VOTER TEST 2 FAILURE
MSG106	V94X5078X	I/O STORE PROTECT TEST FAILED
MSG107	V94X5079X	COULD NOT SET ALL TERMINATE CONTROL LATCHES
MSG108	V94X5080X	UNEXPECTED IOP PROGRAMMED INTERRUPT
MSG109	V94X5069X	IOP ROS PARITY TEST FAILED
MSG110	V94X5082X	THE INSTRUCTION MONITOR IS NOT MASKABLE
MSG111	V94X5083X	THE INS MON DID NOT INTRPT ON AN UNPROT INSTRCTN
MSG112	V94X5088X	DEU BITE ERROR
MSG113	V94X5089X	STARTUP SELF-TEST ABENDED WITH TOO MANY ERRORS
MSG114	V94X5090X	MMU COMPUTED CHECKSUM MISCOMPARE
MSG115	V94X5091X	MMU WILL NOT GO READY
MSG116	V94X5092X	MMU EXPECTED POSITION ERROR
MSG117	V94X5093X	MMU SOURCE SELECT SWITCH POSITION ERROR
MSG118	V94X5094X	MMU BITE STATUS REG A OR B ERROR
MSG119	V94X5095X	MMU BCE I/O ERROR
MSG120	V94X5098X	IM INTRPT ON PROTECTED INTSTR
MSG121	V94X5131X	BCE WRAP-#STP ERR -AT LEAST 1 BCE DID NOT FINISH
MSG122	V94X5132X	MSC-@STP WRAP ERROR-MSC NOT IN WAIT
MSG123	V94X5133X	IOP INTRPT REG A/B HAS STUCK BIT
MSG124	V94X5134X	IOP INTRPT REG C HAS STUCK BITS
MSG125	V94X5135X	IOP PROCESSORS ENABLE TEST FAIL
MSG126	V94X5136X	BCE # 25 FAILED @STP WRAP TEST
MSG127	V94X5137X	BCE TRANS/RECV REGS LOAD/READ/DISABL TEST FAILED
MSG128	V94X5138X	IOP SELF TEST MSC PROGRAM COUNTER INCORRECT
MSG129	V94X5150X	ILLEGAL IOP TERMINATE A DIA BIT 12 = 1
MSG130	V94X5140X	> > > GPC POWER REFAIL - PROGRAM/MACHINE WERE RESET
MSG131	V94X5141X	> > > GPC POWER REFAIL - FULL RECOVERY SUCCESSFUL
MSG132	V94X5142X	GPCIPL RR.VV.PP.II.MM LOADED
MSG133	V94X5143X	GPC ID CHANGED FROM ## TO %%
MSG134	V94X5144X	AT LEAST 1 TESTED BCE DID NOT SET ITS IND_BIT
MSG135	V94X5145X	MSC DETECTED AT LEAST 1 TESTED BCE IS STILL BUSY
MSG136	V94X5146X	AT LEAST 1 TESTED BCE COULD NOT RESET ITS INDCTR
MSG137	V94X5147X	DCP RR.VV.PP.II.MM LOADED
MSG138	V94X5151X	ILLEGAL GPC/CRT ID ENTRY

Table A.6-1. GPCIPL PROGRAM FAILURE/ADVISORY MESSAGES (BY MESSAGE NUMBER)		
MESSAGE NUMBER	M/S ID	MESSAGE TEXT
MSG139	V94X5152X	SELECTED FORMAT WAS NOT IN INITIAL LOAD
MSG140	V94X5153X	DESIRED SYSTEM SOFTWARE NOT ALLOCATED ON THE MMU
MSG141	V94X5193X	DEU = > ## ERASED
MSG142	V94X5194X	ITEM 27 PURGE SELECTION NOT 1-8
MSG143	V94X5195X	ITEM # 1-16 AND 27-29 NOT VALID IF PAGE 2 IS UP
MSG144	V94X5196X	INVALID PAGE 2 REQUEST = > ITEM # 1-16 OR 27-29 UP
MSG145	V94X5197X	PURGE OPTION MUST BE SET BEFORE ITEM 28 EXEC
MSG146	V94X5198X	ITEM N NUMBER IN ERROR. IT MUST BE NUMERIC.
MSG147	V94X5199X	ITEM NUMBER < 1 AND > ## NOT SUPPORTED
MSG148	V94X5200X	PURGE OPTION IN PROGRESS = > ## DESCHEDULED
MSG149	V94X5201X	ILLEGAL KYBD ENTRY WHILE ## IN PROGRESS
MSG150	V94X5202X	DEU KYBD BUFFER CHECKSUM ERROR
MSG151	V94X5203X	MASS MEMORY 1 OR 2 NOT SELECTED
MSG152	V94X5204X	DEU = > ## IS DE-ASSIGNED
MSG153	V94X5205X	DEU ## IS ASSIGNED TO GPC %%
MSG154	V94X5206X	##DEULOAD CHECKSUM ERROR IN TRANSACTION ##
MSG155	V94X5207X	##BSL AREA: CHECKSUM ERROR IN TRANSACTION: ##
MSG156	V94X5208X	##PURLOAD CHECKSUM ERROR IN TRANSACTION ##
MSG157	V94X5209X	##PURGE COMPLETE
MSG158	V94X5210X	##PURGE STARTED
MSG159	V94X5217X	IOP PROCESSORS HALT TEST FAIL
MSG160	V94X5218X	IU STORE BACK FAILURE
MSG161	V94X5219X	IU 64 BIT STOREBACK FAILURE
MSG162	V94X5225X	IU STORE BACK OCCUR TOO SOON
MSG163	V94X5226X	REGISTER CONFLICT TEST1 FAILED
MSG164	V94X5227X	REGISTER CONFLICT TEST2 FAILED
MSG165	V94X5228X	REGISTER CONFLICT TEST3 FAILED
MSG166	V94X5229X	REGISTER CONFLICT TEST4 FAILED
MSG167	V94X5230X	REGISTER CONFLICT TEST5 FAILED
MSG168	V94X5231X	REGISTER CONFLICT TEST6 FAILED
MSG169	V94X5232X	REGISTER CONFLICT TEST7 FAILED
MSG170	V94X5233X	EA FAILS TO STOP FOR THE EX
MSG171	V94X5234X	HALFWORD MEMORY OPERAND CONFLICT TEST1 FAILED
MSG172	V94X5235X	FULLWORD MEMORY OPERAND CONFLICT TEST1 FAILED

Table A.6-1. GPCIPL PROGRAM FAILURE/ADVISORY MESSAGES (BY MESSAGE NUMBER)		
MESSAGE NUMBER	M/S ID	MESSAGE TEXT
MSG173	V94X5236X	HALFWORD MEMORY OPERAND CONFLICT TEST2 FAILED
MSG174	V94X5237X	FULLWORD MEMORY OPERAND CONFLICT TEST2 FAILED
MSG175	V94X5238X	EXT1 MC QUEUE BAD PARITY INTRPT DID NOT OCCUR
MSG176	V94X5239X	DEVICE OUT DATA PARITY ERROR INTRPT NOT OCCUR
MSG177	V94X5245X	LOCAL STORE PARITY ERROR INTRPT DID NOT OCCUR
MSG178	V94X5246X	DMA ADDR BAD PARITY INTRPT DID NOT OCCUR
MSG179	V94X5247X	DMA DATA BAD PARITY INTRPT DID NOT OCCUR
MSG180	V94X5248X	OCTAL MIA BAD PARITY INTRPT DID NOT OCCUR
MSG181	V94X5249X	IU FILE BIT-SETTING TEST1 FAILED
MSG182	V94X5250X	IU FILE BIT-SETTING TEST2 FAILED
MSG183	V94X5251X	CPU HARDCORE TEST FAILED
MSG184	V94X5252X	CPU LOCAL STORE SECTOR TEST FAIL
MSG185	V94X5253X	CPU LOCAL CONSTANT SECTOR FAILED
MSG186	V94X5254X	ENDOP TIMER TEST FAILED
MSG187	V94X5255X	INTRPT PG: H-BUS FAILED
MSG188	V94X5256X	INTRPT PG: INBUS FAILED
MSG189	V94X5257X	INTRPT PG: ARITHMETIC INTRPT FAILED
MSG190	V94X5258X	INTRPT PG: EU ROS PARITY INTRPT FAILED
MSG191	V94X5259X	INTRPT PG: MCH CHK INTRPT DID NOT OCCUR
MSG192	V94X5260X	INTRPT PG: MCH CHK INTRPT CODE INCORRECT
MSG193	V94X5261X	INTRPT PG: MCH CHK INTRPT NOT MASKABLE
MSG194	V94X5262X	INTRPT PG: ST PROT INTRPT NOT OCCUR
MSG195	V94X5263X	INTRPT PG: ST PROT INTRPT CODE NOT 7
MSG196	V94X5264X	INTRPT PG: MONOLITHIC ST PROT BITS NOT ZERO
MSG197	V94X5265X	INTRPT PG: UNEXPED ST PROT INT
MSG198	V94X5266X	INTRPT PG: ST PROT BITS NOT ONES
MSG199	V94X5267X	INTRPT PG: H-BUS SUBCOMMAND FAIL
MSG200	V94X5268X	CLOCK1 CANNOT BE SET TO ZEROS
MSG201	V94X5269X	CLOCK1 CANNOT BE SET TO ONES
MSG202	V94X5270X	CLOCK1 ST PROT INTRPT NOT OCCUR
MSG203	V94X5271X	CLOCK1 UNEXPECTED ST PROT INTRPT
MSG204	V94X5272X	CLOCK1 OUT OF TOLERANCE
MSG205	V94X5273X	CLOCK1 INTERRUPT DID NOT OCCUR
MSG206	V94X5274X	CLOCK2 CANNOT BE SET TO ZEROS
MSG207	V94X5275X	CLOCK2 CANNOT BE SET TO ONES

Table A.6-1. GPCIPL PROGRAM FAILURE/ADVISORY MESSAGES (BY MESSAGE NUMBER)		
MESSAGE NUMBER	M/S ID	MESSAGE TEXT
MSG208	V94X5276X	CLOCK2 ST PROT INTRPT NOT OCCUR
MSG209	V94X5277X	CLOCK2 UNEXPECTED ST PROT INTRPT
MSG210	V94X5278X	CLOCK2 OUT OF TOLERANCE
MSG211	V94X5279X	CLOCK2 INTERRUPT DID NOT OCCUR
MSG212	V94X5280X	ITEM ENTRY NUMBER ILLEGAL
MSG213	V94X5281X	MEMORY READ/WRITE TEST1 FAILED
MSG214	V94X5282X	MEMORY READ/WRITE TEST2 FAILED
MSG215	V94X5283X	MEMORY READ/WRITE TEST3 FAILED
MSG216	V94X5284X	MEMORY HWORD EVEN/ODD ADDRESSING FAILED
MSG217	V94X5285X	MEMORY FWORD EVEN/ODD ADDRESSING FAILED
MSG218	V94X5286X	MEMORY EDAC SOFT ERROR TEST FAIL
MSG219	V94X5287X	MEMORY EDAC HARD ERROR TEST FAIL
MSG220	V94X5288X	MCH INTRPT: DMA MEMORY MULTI-BIT ERROR
MSG221	V94X5289X	MCH INTRPT: CPU MEMORY MULTI-BIT ERROR
MSG222	V94X5290X	MCH INTRPT: INTRPT CODE INVALID
MSG223	V94X5291X	MCH INTRPT: CPU MICRO STORE PARITY ERROR
MSG224	V94X5292X	MCH INTRPT: INTERRUPT PAGE FAULT
MSG225	V94X5293X	MCH INTRPT: ENDOP TIMER TIMEOUT
MSG226	V94X5294X	MCH INTRPT: EA FAULT
MSG227	V94X5295X	MCH INTRPT: CPU CANNOT CONTINUE
MSG228	V94X5296X	INSTR LDM FAILED AND ALTERED COND CODE
MSG229	V94X5297X	INSTR LDM/STDM FAILED
MSG230	V94X5298X	INSTR LDM WITH INDEX FAILED
MSG231	V94X5299X	INSTR LDM INDIR. FAILED
MSG232	V94X5305X	INSTR LDM INDIR. WITH INDEX FAIL
MSG233	V94X5306X	INSTR LDM WITH Z-CON ADDRESSING FAILED
MSG234	V94X5307X	INSTR STDM INDIR. FAIL
MSG235	V94X5308X	INSTR STDM WITH POST INDEX FAIL
MSG236	V94X5309X	INSTR STDM USING Z-CON FAILED
MSG237	V94X5310X	INSTR LXA FAIL
MSG238	V94X5311X	INSTR LXA USING INDEX FAILED
MSG239	V94X5312X	INSTR LXA INDIR. FAILED
MSG240	V94X5313X	INSTR LXA TO LOAD DSE-S
MSG241	V94X5314X	INSTR LXA INDIR. WITH INDEX FAIL
MSG242	V94X5315X	INSTR STXAR FAIL



Table A.6-1. GPCIPL PROGRAM FAILURE/ADVISORY MESSAGES (BY MESSAGE NUMBER)		
MESSAGE NUMBER	M/S ID	MESSAGE TEXT
MSG243	V94X5316X	INSTR STXA WITH INDEX FAILED
MSG244	V94X5317X	INSTR STXA INDIR. WITH AUTO INDEX FAILED
MSG245	V94X5318X	UNEXPED EX1: DMA STORE PROTECT VIOLATION CODE
MSG246	V94X5319X	UNEXPED EX1: DEV OUT DATA ERROR CODE
MSG247	V94X5325X	UNEXPED EX1: R1 R2 R3 PARITY ERROR CODE
MSG248	V94X5326X	UNEXPED EX1: FB DMA ADDR/DATA PARITY ERROR CODE
MSG249	V94X5327X	UNEXPED EX1: MC QUEUE CONTROL PARITY ERROR CODE
MSG250	V94X5328X	UNEXPED EX1: MIA PARITY ERROR
MSG251	V94X5329X	UNEXPED EX1: DIAG PROC 25 ERROR
MSG252	V94X5330X	MEMORY UNIQUE ADDRESSING FAILED
MSG253	V94X5331X	EXT 1 INTRPT DID NOT OCCUR FOR LOCAL STORE R1
MSG254	V94X5332X	EXT 1 INTRPT DID NOT OCCUR FOR LOCAL STORE R2
MSG255	V94X5333X	UNEXPED EX1: QUEUE OVERFLOW
MSG256	V94X5334X	UNEXPED EX1: DMA TIMEOUT
MSG257	V94X5335X	SECTOR %% TOP ADDRESS DSE ERROR
MSG258	V94X5336X	INTRPT PG: COMMAND PLA TEST 0 FAILED
MSG259	V94X5337X	INTRPT PG: COMMAND PLA TEST 1 FAILED
MSG260	V94X5338X	INTRPT PG: COMMAND PLA TEST 2 FAILED
MSG261	V94X5339X	INTRPT PG: COMMAND PLA TEST 4 FAILED
MSG262	V94X5346X	INTRPT PG: COMMAND PLA TEST 5 FAILED
MSG263	V94X5347X	INTRPT PG: PRIORITY MICRO TEST FAILED
MSG264	V94X5348X	THIS MSG MARKS END OF MSG LIST.

Table A.6-1. GPCIPL PROGRAM FAILURE/ADVISORY MESSAGES (BY MESSAGE NUMBER)		
MESSAGE NUMBER	M/S ID	MESSAGE TEXT

NOTE: REFERENCE MSG132 & MSG137

RR = RELEASE NUMBER    VV = VERSION NUMBER    PP = PATCH LEVEL  
 II = I-LOAD NUMBER    MM = MASS MEMORY AREA NUMBER

REFERENCE MSG133    ## = CURRENT GPCID    %% = NEW GPCID  
 REFERENCE MSG141    ## = DEUID  
 REFERENCE MSG147    %% = ITEM NUMBER

REFERENCE MSG148, MSG149, MSG154, MSG156, MSG157, MSG158  
 FIRST ## = TYPE OF ERROR, SECOND ## = TRANSACTION NUMBER

REFERENCE MSG152    ## = CURRENT DEUID  
 REFERENCE MSG153    ## = DEUID    %% = GPCID

REFERENCE MSG155  
 FIRST ## = BSL AREA NUMBER, SECOND ## = TRANSACTION NUMBER

### A.7 Back-Up System Loader Messages (BFS)

This appendix contains listings and explanations (Ref. MG077202) of the error advisory messages that may be driven onto the message line of the Back-Up System Loader Menu. The listings and the explanations are applicable to the GPCIPL (9.0 & SUBS) Program. The messages are listed by message number in Table A.7-1. The messages are spelled exactly as they appear on the CRT.

Table A.7-1. BACKUP SYSTEM LOADER MESSAGES (BY MESSAGE NUMBER)

MESSAGE NUMBER	M/S ID	MESSAGE TEXT
MSG001	V94X5161X	UNEXP SVC INT
MSG002	V94X5162X	UNEXP PROG CHECK
MSG003	V94X5163X	UNEXP CLOCK2 INT
MSG004	V94X5164X	UNEXP IM INT
MSG005	V94X5165X	UNEXP EXT 0 INT
MSG006	V94X5166X	UNEXP EXT 1 INT
MSG007	V94X5167X	BFS RR.VV.PP.II.MM LOADED_##
MSG008	V94X5168X	BSL RR.VV.PP.II.MM LOADED
MSG009	V94X5170X	UNEXP MACH CHECK
MSG010	V94X5171X	UNEXP EXT 3 INT
MSG011	V94X5172X	UNEXP EXT 4 INT
MSG012	V94X5173X	EXT 0 INT-W/D
MSG013	V94X5174X	EXT 0 INT-IOP FAIL LATCH
MSG014	V94X5175X	EXT 0 INT-C/M ID
MSG015	V94X5176X	EXT 0 INT-ROS PARITY
MSG016	V94X5177X	EXT 0 INT-IOP FAULT
MSG017	V94X5178X	UNEXP IOP PG INT
MSG018	V94X5179X	END EX 0 ERRORS
MSG019	V94X5180X	SVC INT-WILD BR
MSG020	V94X5181X	DEU BITE ERROR
MSG021	V94X5182X	NO DEU RESPONSE
MSG022	V94X5183X	BFS CHECKSUM ERROR XACTION ##
MSG023	V94X5184X	MMU WILL NOT GO READY
MSG024	V94X5185X	MMU EXPECTED POSITION ERROR
MSG025	V94X5186X	SPARE MESSAGE
MSG026	V94X5187X	MMU BITE STATUS REG A OR B ERROR
MSG027	V94X5188X	MMU I/O ERROR BCE 18 OR 19
MSG028	V94X5190X	INVALID SVC #
MSG029	V94X5191X	IMU CHKPT DATA-COMPUTED CHECKSUM ERROR-XACTON ##
MSG030	V94X5192X	TFL FORMAT = > %%%-COMPUTED CHECKSUM ERROR-XCTN ##
MSG031	V94X5193X	TFL FORMAT = > 0102 EXPCTD/IS FORMAT %%% = > XCTN ##
MSG032	V94X5194X	THIS MSG MARKS END OF MESSAGES

NOTE: REFERENCE MSG007 & MSG008

RR = RELEASE NUMBER VV = VERSION NUMBER PP = PATCH LEVEL

II = I-LOAD NUMBER MM = MASS MEMORY AREA NUMBER

## = SET MMU SEL SW TO OFF

REFERENCE MSG022,MSG029,MSG030,MSG031

## = TRANSACTION NUMBER

REFERENCE MSG030,MSG031

%%% = FORMAT NUMBER

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## APPENDIX B GN&C DISPLAY INTERFACE PROCESSING

### B.4.110 GUIDANCE, NAVIGATION AND CONTROL/ANNUNCIATION INTERFACE SUPPORT (GAX) - (PFS)

The GAX principal function shall accept data from other GN&C functions and perform support processing required to convert this data into suitable format for CRT display. This principal function shall also provide annunciation processing including all GN&C CRT messages, and the GN&C caution and warning processing.

The GAX principal function processing shall continue across the ascent (OPS 1), on-orbit (OPS 2), GN&C 8 (OPS 8), entry (OPS 3) and RTLS (OPS 6) operational sequences. The GAX requirements text has been partitioned to support the individual displays to assist OPS computer load estimates. The GN&C displays which are supported by GAX are as follows:

- B.4.110.1 GNC SYSTEM SUMMARY 1 OPS 1, 2, 3, 6, 8
- B.4.110.2 GNC SYSTEM SUMMARY 2 OPS 2, 8

The GNC System Summary 1 display shall support the entry, ascent, and orbit flight phases. This system summary shall display those parameters which are common to entry, ascent and orbit. The second system summary display available during orbit is the GNC System Summary 2 display which displays those parameters that are unique to the orbit flight phase. GNC System Summary 1 is also available during RTLS as indicated above.

The fixed formats for each of these displays are shown in sections 4.2.15 and 4.2.18. The functional level requirements are documented in the OFT Level B, GN&C, CPDS. The display support processing interfaces are shown in Table B.4.110.3-1, where the display function destinations are Entry System Summary, Ascent System Summary, and Orbit System Summary. The correlation between these three display functions and the two CRT displays listed above is provided in Tables 4.2.15-2 and 4.2.18-2, where each of the GAX outputs may be traced to the individual displays as required. The output display indicators are defined to be either logical or integer, but for requirements purposes the range is defined by the symbol to be displayed and the design is left to the discretion of the programmer.

The annunciation processing portion of the GAX principal function shall provide any support required to generate the GN&C caution and warning lights, alerts, and CRT messages. These requirements are defined in paragraphs B.4.110.1.1 & 2.1 GN&C ANNUNCIATION/C&W/MESSAGES.

The interfaces are shown in Table B.4.110.3-1. The K-Load constant parameters required by GAX are defined in Table B.4.110-8.

Paragraphs B.4.110.1.5 & 2.5 contain the equations common to several functions of the GAX principal function. This section is referenced when required by the associated functions of GAX.

#### **B.4.110.1 GNC SYSTEM SUMMARY 1 SUPPORT PROCESSING**

The GAX principal function shall provide processing required to support the GNC Systems Summary 1 display. This display shall support the Ascent, Orbit, Entry and RTLS flight phases. The various types of GN&C support processing for this display are:

- RCS Jet Manifold Status – Entry
- RCS Jet Manifold Status – Ascent
- RCS Jet Manifold Status – Orbit
- RCS Isolation Valve OP/CL I/O Status
- Hinge moment Conversion and Status
- Elevon Position Saturation Status
- Controller/Sensor Status
- FCS SRB/MPS/AERO Channel Status

The requirements for these support functions are defined in the following paragraphs:

##### RCS Jet Manifold Status–Entry/Ascent/Orbit

This function shall generate the RCS jet manifold status indicators for the forward, left and right manifolds.

The jets associated with the RCS system are represented by a three character ID. The first character field represents the jet module: F (forward), L (left), R (right). The center character field represents the jet manifold: 1,2,3,4,5. The third character field indicates the jet exhaust direction: L (left), R (right), U (up), D (down), F (forward) and A (aft).

MANIFOLD	JETS			
F1	F1F	F1L	F1U	F1D
F2	F2F	F2R	F2U	F2D
F3	F3F	F3L	F3U	F3D
F4	F4R	F4D	—	—
* F5	F5L	F5R		
L1	L1A	L1L	L1U	—
L2	L2L	L2U	L2D	—
L3	L3A	L3L	L3D	—
L4	L4L	L4U	L4D	—
* L5	L5D	L5L		
R1	R1A	R1R	R1U	—
R2	R2R	R2U	R2D	—
R3	R3A	R3R	R3D	—
R4	R4R	R4U	R4D	—
* R5	R5D	R5R		

\* The fifth manifold is supported only during on-orbit.

The individual jets each have three status flags. These three flags are defined as follows:

- (1) Jet failed-on flag indicating failure of an individual thruster to shut down upon command.
- (2) Jet leaking flag indicating a leaking thruster.
- (3) Jet failed-off flag indicating failure of an individual thruster to fire upon command.

The display manifold jet fail status indicators for entry/orbit/ascent (in descending order of precedence) are “ON”, “LK”, “OFF”, or (blank) and shall be determined as follows:

O U T P U T	RCS “XX” Display Indicator	ON	LK	OFF	(blank)
I N P U T	“XX” “A” Fail-On Flag	Failed- On —(or)—	Good —(and)—	Good —(and)—	Good —(and)—
	“XX” “B” Fail-On Flag	Failed- On —(or)—	Good —(and)—	Good —(and)—	Good —(and)—
	“XX” “C” Fail-On Flag	Failed- On —(or)—	Good —(and)—	Good —(and)—	Good —(and)—
	“XX” “D” Fail-On Flag	Failed- On	Good	Good	Good
			and	and	and
	“XX” “A” Leak Flag	—	Leak —(or)—	Good —(and)—	Good —(and)—
	“XX” “B” Leak Flag	—	Leak —(or)—	Good —(and)—	Good —(and)—
	“XX” “C” Leak Flag	—	Leak —(or)—	Good —(and)—	Good —(and)—
	“XX” “D” Leak Flag	—	Leak	Good and	Good and
	“XX” “A” Fail-Off Flag	—	—	Failed- Off —(or)—	Good —(and)—
	“XX” “B” Fail-Off Flag	—	—	Failed- Off —(or)—	Good —(and)—
	“XX” “C” Fail-Off Flag	—	—	Failed- Off —(or)—	Good —(and)—
“XX” “D” Fail-Off Flag	—	—	Failed- Off	Good	

where If “XX” = manifold (L1, L2, L3, L4, R1, R2, R3, R4) then A, B, C = jets associated with the manifold.

If “XX” = manifold (F1, F2, F3) then A, B, C, D = jets associated with the manifold.

If “XX” = manifold (F4, F5, L5, R5) then A, B = jets associated with the manifold.



RCS Isolation OP/CL I/O Status

This function shall generate the forward, left and right manifold isolation valve OP/CL I/O status indicators for display. The I/O status is dependent on the commfaults for the fuel and oxidizer isolation valve closed discretes and the RCS MANF “XX” RM dilemma flags as follows:

INPUTS			OUTPUT
RCS OX “XX” Is Vlv CL Commfault	RCS FU “XX” Is Vlv CL Commfault	RCS MANF “XX” DILEMMA Flag	RCS “XX” Is Vlv OP/CL Display Status Indicator
FAULT (or)	FAULT (and)	1 or 0	M
GOOD (and)	GOOD (and)	1	?
GOOD (and)	GOOD (and)	0	∅

where “XX” = F1, F2, F3, F4, F5, L1, L2, L3, L4, L5, R1, R2, R3, R4, R5.

Hinge Moment Conversion and Status

This function shall display the converted (VDC to percent of maximum allowed) elevon (LIB, LOB, RIB, ROB) primary delta pressures as elevon hinge moment. The hinge moment shall be limited between –99 and +99 percent for display. The pressures shall be converted as defined in the Conversion Processing portion of Paragraph B.4.110.1.5.

This function shall also determine the status associated with each of these pressures. The elevon hinge moment shall be tested against a high limit only.

The limit check processing is defined in Paragraph B.4.110.1.5. The K–Load scale factor and high limit check constant value are defined in Table B.4.110–8.

The hinge moment display status shall be determined as follows:

XXX Hinge Mom Limit Status	XXX Hinge Mom Display Status Ind
“exceed” limit	↑
“within” limit	(blank)

where XXX = LIB,LOB,RIB,ROB.

Elevon Position Saturation Status

The function shall determine the elevon (LIB,LOB,RIB,ROB) surface position saturation status. The elevon position saturation status shall be generated by checking the individual elevon positions against both a high and low limit. The limit check processing is defined in Paragraph B.4.110.1.5. The K-Load limit check constant values are defined in Table B.4.110-8. The display elevon position saturation status shall be determined as follows:

XXX Position Sat Status	XXX Sat Display Status
“below” limit	↓
“exceed” limit	↑
“within” limit	(blank)

where XXX = LIB, LOB, RIB, ROB.

Controller/Sensor Status

This function shall compute the RHC, THC and speedbrake controller status and the IMU, TACAN, GPS, MSBLS, ADTA, AA and RGA sensor status. The status shall reflect the following types of information:

RM failure – indicate the automatic FDIR’s opinion of equipment failures

Communication fault – indicates whether valid updates of input parameters were performed by FCOS.

Disagree – for the three LRU case, when one failure has occurred RM is unable to isolate failures on the remaining two LRU’s and the disagree flag is set.

Fault detect – indicates that RM has detected a problem and is attempting to isolate the problem.

Loss-of-Lock – indicates absence or invalidity of “echo” signal.

Power failure – indicates that RM has detected LRU loss of power.

The status indicators or the left and right speedbrake controllers shall be determined as follows:

INPUTS				OUTPUT
“A” “X” Commfault	“A” “X” Fail	“A” “X” Deselect	“A” Disagree	“A” “X” Display Status IND
Fault	—	—	—	M
Good and Good (and)	(Fail or Good (and)	Deselect Select (and)	— Disagree	↓ ?
Good (and)	Good (and)	Select (and)	Good	(blank)

where “A” = R SPD BK, L SPD BK  
“X” = 1,2,3

The status indicators for the left, right and aft RHC’s shall be determined as follows:

O U T P U T	“A” RHC “X” Display Status Indicator	M	↓	?	(blank)
I N P U T S	“A” RHC “X” Pitch Commfault	Fault —(or)—	Good —(and)—	Good —(and)—	Good —(and)—
	“A” RHC “X” Roll Commfault	Fault —(or)—	Good —(and)—	Good —(and)—	Good —(and)—
	“A” RHC “X” Yaw Commfault	Fault	Good	Good	Good
			and	and	and
	“A” RHC “X” Fail	—	Fail —(or)—	Good —(and)—	Good —(and)—
	“A” RHC “X” Deselect	—	Deselect	Select	Select
				and	and
	“A” RHC Pitch Disagree	—	—	Disagree —(or)—	Good —(and)—
	“A” RHC Roll Disagree	—	—	Disagree —(or)—	Good —(and)—
	“A” RHC Yaw Disagree	—	—	Disagree	Good

where “A” = Left, Right, Aft  
 “X” = 1, 2, 3

The status indicators for the forward and aft THC's are dependent on the +/- x,y,z axes and shall be determined as follows:

O U T P U T	J THC "I" Display Status Ind	M	↓	?	(blank)	
	I N P U T S	J THC +X "I" Commfault	Fault —(or)—	Good —(and)—	Good —(and)—	Good —(and)—
		J THC -X "I" Commfault	Fault —(or)—	Good —(and)—	Good —(and)—	Good —(and)—
		J THC +Y "I" Commfault	Fault —(or)—	Good —(and)—	Good —(and)—	Good —(and)—
		J THC -Y "I" Commfault	Fault —(or)—	Good —(and)—	Good —(and)—	Good —(and)—
		J THC +Z "I" Commfault	Fault —(or)—	Good —(and)—	Good —(and)—	Good —(and)—
		J THC -Z "I" Commfault	Fault	Good	Good	Good
				and	and	and
		J THC +X "I" Fail	—	Fail —(or)—	Good —(and)—	Good —(and)—
		J THC -X "I" Fail	—	Fail —(or)—	Good —(and)—	Good —(and)—
		J THC +Y "I" Fail	—	Fail —(or)—	Good —(and)—	Good —(and)—
		J THC -Y "I" Fail	—	Fail —(or)—	Good —(and)—	Good —(and)—
		J THC +Z "I" Fail	—	Fail —(or)—	Good —(and)—	Good —(and)—
J THC -Z "I" Fail	—	Fail —(or)—	Good —(and)—	Good —(and)—		

O U T P U T	J THC "I" Display Status Ind	M	↓	?	(blank)		
	I N P U T S	J THC "I" Deselect	—	Deselect	Select	Select	
				and	and	and	
		J THC +X Disagree	—	—	Fault	Good	—(or)— —(and)—
		J THC -X Disagree	—	—	Fault	Good	—(or)— —(and)—
		J THC +Y Disagree	—	—	Fault	Good	—(or)— —(and)—
		J THC -Y Disagree	—	—	Fault	Good	—(or)— —(and)—
		J THC +Z Disagree	—	—	Fault	Good	—(or)— —(and)—
J THC -Z Disagree	—	—	Fault	Good	Good		

where "I" = 1,2,3;  
"J" = Forward, Aft

The status indicators for the TACAN LRU's shall be determined as follows:

O U T P U T	TACAN "X" "YYY" Display Status Indicator	M	↓	?	(blank)		
	I N P U T S	TAC "X" "YYY" Commfault/Lockon Flag	Bad	Good	Good	Good	
				and	and	and	
		TAC "X" "YYY" Fail	—	Fail	Good	Good	
				—(or)—	and	and	
		TAC "X" Deselect	—	Deselect	Select	Select	Select
					and	and	and
TAC "YYY" Dilemma	—	—	Dilemma	Good	Good		

where "X" =1,2,3 and  
"YYY"= Bearing,Range

The status indicator for the GPS LRUs shall be determined as follows:

O U T P U T  I N P U T S	GPS "X" Display Status Indicator	M	↓	?	(blank)
	GPS_COMMFAULT(x)	Fault	—	Good	Good
				and	and
	CREW_DESELECT_RCVR(x)	—	—(or)—	Deselect	Select
				and	and
	RCVR_FAIL(x)	—	—	Fail	Good
				and	and
GPS_DISP_DILEMMA(x)	—	—	Dilemma	Good	

where "x" = 1, 2, 3

The status for the MSBLS shall be determined as follows:

O U T P U T	MSBLS "X" Display Status Indicator	M	↓	?	(blank)	
	I N P U T S	MSBLS "X" Commfault	Fault —(or)—	Good —(and)—	Good —(and)—	Good —(and)—
		MSBLS "X" Range Loss of lock	Loss —(or)—	Good —(and)—	Good —(and)—	Good —(and)—
		MSBLS "X" Elevation loss of lock	Loss —(or)—	Good —(and)—	Good —(and)—	Good —(and)—
		MSBLS "X" Azimuth loss of lock	Loss	Good	Good	Good
		MSBLS "X" Fail	—	Fail —(or)—	Good —(and)—	Good —(and)—
		MSBLS "X" Deselect	—	Deselect	Select and	Select and
		MSBLS Range Disagree	—	—	Disagree —(or)—	Good —(and)—
		MSBLS Elevation Disagree	—	—	Disagree —(or)—	Good —(and)—
MSBLS Azimuth Disagree		—	—	Disagree	Good	

where "X" = 1,2,3

The status for the Rate Gyros shall be determined as follows:



O U T P U T	RGA "X" Display Status Indicator	M	↓	?	(blank)
I N P U T S	RGA "X" Roll Rate Commfault	Fault —(or)—	Good —(and)—	Good —(and)—	Good —(and)—
	RGA "X" Pitch Rate Commfault	Fault —(or)—	Good —(and)—	Good —(and)—	Good —(and)—
	RGA "X" Yaw Rate Commfault	Fault	Good	Good	Good
	RGA "X" Fail	—	and	and	and
			Fail	Good	Good
			—(or)—	—(and)—	—(and)—
	RGA "X" Deselect	—	Deselect —(or)—	Select —(and)—	Select —(and)—
	RGA "X" Power Fail	—	Fail	Good	Good
	RGA Pitch Rate Disagree	—	—	and	and
				Disagree	Good
				—(or)—	—(and)—
RGA Yaw Rate Disagree	—	—	Disagree	Good	
			—(or)—	—(and)—	
RGA Roll Rate Disagree	—	—	Disagree	Good	

where "X" = 1,2,3,4

O U T P U T	RGA "X" Display Status Indicator	M	↓	?	(blank)
I N P U T S	AA "X" Lat Accel Commfault	Fault  —(or)—	Good  —(and)—	Good  —(and)—	Good  —(and)—
	AA "X" Norm Accel Commfault	Fault	Good	Good	Good
	AA "X" Fail	—	and	and	and
			Fail	Good	Good
			—(or)—	—(and)—	—(and)—
	AA "X" Deselect	—	Deselect	Select	Select
	AA Normal Accel Disagree	—	—	and	and
				Disagree	Good
			—(or)—	—(and)—	
AA Lateral Accel Disagree	—	—	Disagree	Good	

where "X" = 1,2,3,4

The status indicators for the ADTA LRU's are determined by the commfault, the RM failure, crew deselect, and the RM dilemma. The RM ADTA dilemma flag is set after the first failure whenever RM detects a failure that cannot be isolated. The status shall be determined as follows:

INPUTS				OUTPUT
ADTA "X" Commfault	ADTA "X" Fail	ADTA "X" Deselect	ADTA Disagree	ADTA "X" Display Status Indicator
Fault	—	—	—	M
Good and	(Fail or	Deselect)	—	↓
Good (and)	Good (and)	Select (and)	Dilemma	?
Good (and)	Good (and)	Select (and)	Good	(blank)

where "X" = 1,2,3,4

The status indicators for the IMU LRU's are determined by the commfault, the RM failure, crew deselect, RM fault detect and RM dilemma. The status shall be determined as follows:

O U T P U T	IMU "X" DISPLAY STATUS INDICATOR	M	↓	?	(blank)	
	I N P U T S	IMU "X" Commfault	Fault	Good	Good	Good
			and	and	and	
		IMU "X" Fail	—	Fail	Good	Good
			—(or)—	—(and)—	—(and)—	
IMU "X" Deselect		—	Deselect	Select	Select	
	—	—	and	and		
IMU "X" Dilemma	—	—	Dilemma	Good		

where "X" = 1, 2, 3

FCS SRB/MPS/AERO Status

This function shall generate the flight control system channel status. This status is dependent on the SRB rock and tilt actuators elevon, speedbrake, and rudder aerosurfaces, and main engine pitch and yaw axes and shall be determined as follows:

O U T P U T	SRB FCS "X" I/O, Fail Display Status Ind	M	↓	(blank)	
	I N P U T S	SRB 4 Rock Actr "X" Commfault	Fault —(or)—	Good —(and)—	Good —(and)—
		SRB 5 Rock Actr "X" Commfault	Fault —(or)—	Good —(and)—	Good —(and)—
		SRB 4 Tilt Actr "X" Commfault	Fault —(or)—	Good —(and)—	Good —(and)—
		SRB 5 Tilt Actr "X" Commfault	Fault	Good	Good
				and	and
		SRB 4 Rock Actr "X" Fail	—	Fail —(or)—	Good —(and)—
		SRB 5 Rock Actr "X" Fail	—	Fail —(or)—	Good —(and)—
		SRB 4 Tilt Actr "X" Fail	—	Fail —(or)—	Good —(and)—
SRB 5 Tilt Actr "X" Fail	—	Fail	Good		

where "X" = 1, 2, 3, 4

O U T P U T	MPS FCS "X" I/O, Fail Display Status Ind	M	↓	(blank)	
	I N P U T S	ME 1 Pitch "X" Commfault	Fault —(or)—	Good —(and)—	Good —(and)—
		ME 2 Pitch "X" Commfault	Fault —(or)—	Good —(and)—	Good —(and)—
		ME 3 Pitch "X" Commfault	Fault —(or)—	Good —(and)—	Good —(and)—
		ME 1 Yaw "X" Commfault	Fault —(or)—	Good —(and)—	Good —(and)—
		ME 2 Yaw "X" Commfault	Fault —(or)—	Good —(and)—	Good —(and)—
		ME 3 Yaw "X" Commfault	Fault	Good	Good
		ME 1 Pitch Actr "X" Fail	—	Fail —(or)—	Good —(and)—
		ME 2 Pitch Actr "X" Fail	—	Fail —(or)—	Good —(and)—
		ME 3 Pitch Actr "X" Fail	—	Fail —(or)—	Good —(and)—
		ME 1 Yaw Actr "X" Fail	—	Fail —(or)—	Good —(and)—
		ME 2 Yaw Actr "X" Fail	—	Fail —(or)—	Good —(and)—
ME 3 Yaw Actr "X" Fail		—	Fail	Good	

where "X" = 1, 2, 3, 4

O U T P U T	AERO FCS "X" I/O Fail Status Indicator	M	↓	(blank)
	RIB Elevon Actr "X" Commfault	Fault —(or)—	Good —(and)—	Good —(and)—
	ROB Elevon Actr "X" Commfault	Fault —(or)—	Good —(and)—	Good —(and)—
	LIB Elevon Actr "X" Commfault	Fault —(or)—	Good —(and)—	Good —(and)—
	LOB Elevon Actr "X" Commfault	Fault —(or)—	Good —(and)—	Good —(and)—
	SBK Actr "X" Commfault	Fault —(or)—	Good —(and)—	Good —(and)—
	RUD Actr "X" Commfault	Fault	Good	Good
	RIB Elevon Actr "X" Fail	—	Fail —(or)—	Good —(and)—
	ROB Elevon Actr "X" Fail	—	Fail —(or)—	Good —(and)—
	LIB Elevon Actr "X" Fail	—	Fail —(or)—	Good —(and)—
	LOB Elevon Actr "X" Fail	—	Fail —(or)—	Good —(and)—
	SBK Actr "X" Fail	—	Fail —(or)—	Good —(and)—
	RUD Actr "X" Fail	—	Fail	Good
I N P U T S				

where "X" = 1, 2, 3, 4

#### **B.4.110.1.1 GN&C ANNUNCIATION/C&W/MESSAGES (ASCENT/RTL/ENTRY)**

The GAX principal function shall provide all GN&C CRT messages and corresponding annunciation information to systems software. The detailed processing required to drive the GN&C CRT messages, C&W lights, and alerts is defined in the following paragraphs.

The GAX Support Interface Table, B.4.110.3-1, provides a direct means of tracing interfaces from the software inputs to the GN&C system summary displays. This table is formatted to show the exact combination of input signals necessary to generate an output. The table is further broken down into the following sections: Hinge Moment Conversion; Saturation; FCS Channel Status; Sensor/Controller; OMS System; RCS Jet Manifold Stat; and RCS Conv & Status.

Table B.4.110.4-1 provides the detailed interfaces required to support the GN&C annunciation. This table is formatted such that the inputs required and corresponding message/annunciation output are grouped and listed sequentially by message ID. All outputs are sent to System Software for subsequent annunciation. In order to output a message when distinct but related failure conditions occur, a message/annunciation output may be driven by multiple unique inputs. Whenever a fault condition has been annunciated for a unique input, the annunciation for that input shall be inhibited. The annunciation processing for a unique input shall be reenabled whenever the fault condition is removed. Annunciation outputs which are enabled and available in multiple OPS sequences shall not be reannunciated at any legal OPS transition.

A subset of the input parameters driving the message/annunciation requirements also support the display processing portion of the GAX principal function. For requirements purposes, the interfaces required for annunciation processing have been formatted in Table B.4.110.4-1 to show the exact combination of input signals necessary to generate an output. These interfaces are redundant to a subset of the total GAX interfaces defined in Table B.4.110.3-1.

Definition of the K-Load scale factor and low and/or high limit constant values for those input signals requiring conversion and/or limit, check processing may be found in Table B.4.110-8. Table A.4.2 presents message requirements which support GAX.

Note that if a fault flag from an applications source is cleared before being processed by GAX, then the associated fault message will not be annunciated. For GAX to annunciate a fault message, the processing of that message must occur while the source fault flag is still set.

The types of message processing required are defined in the following paragraphs.

**B.4.110.1.2 DIRECT ANNUNCIATION PROCESSING (ASCENT/RTLS/ENTRY)**

This category of GN&C annunciation requires no special processing. The input referenced directly drives the CRT message and corresponding annunciation. A subset of message/annunciation outputs may be driven by multiple unique input signals. In this case, the signals which drive a message/annunciation output are grouped together and listed directly preceding the message/annunciation output. Each input interface shall be processed individually. However, each group of input signals that drive the same message/annunciation output shall be processed as a set prior to processing another message/annunciation signal.

The discrete signals input directly from the hardware each have an associated communication failure signal. Should a commfault condition occur, the annunciation corresponding to the signal shall be discontinued until the commfault condition is cleared. The commfaults associated with these inputs are defined in Table B.4.110.3-1.

The interfaces and complete message description and corresponding annunciation is defined in Table B.4.110.4-1 where the messages are organized sequentially by message ID. The messages pertaining to this category are referenced below by their unique message IDs.

DIRECT ANNUNCIATION TABLE FOR ASCENT (OPS 1)

MSG IDs				
13101	14786	15760	16569	19031
13102	14908	15761	16570	19211
13103	14930	15908	16573	19326
13104	14931	15930	16666*	19401
13330*	15008	15931	16667	19402
13331*	15030	16008	16669	19403
13633	15031	16030	16671	19501
13654	15056	16031	16673	19502
13655	15057	16108	16766*	19503
13826	15058	16130	16767	
13832	15059	16131	16770	
13833*	15100	1634F	16771	
13844	15508	1645E	16772	
13854	15530	1645F	16773	
13855	15531	16563	17426	
13901	15660	16566*	18630	
13902	15661	16567	18631	
13903	15663	16568	19030	



DIRECT ANNUNCIATION TABLE FOR ENTRY (OPS 3)

13101	13655	15661	16573	17426	19402
13102	13826	15663	16666*	17436	19403
13103	13832	15760	16667	17495	19501
13104	13833*	15761	16669	17500	19502
13230	13834	15763	16671	17686	19503
13231	13836	15766	16672	18200	
13330*	13844*	16200	16673	18630	
13331*	13854	1634F	16766*	18631	
13632	13855	16566*	16767	18900	
13633	13901	16567	16770	19030	
13634	13902	16568	16771	19031	
13636	13903	16569	16773	19211	
13644	14786	16570	17000	19326	
13654	15660	16571	17400	19401	

DIRECT ANNUNCIATION TABLE FOR RTLS (OPS 6)

13101	13826	14931	15761	16567	16770	19031
13102	13832	15008	15763	16568	16771	19211
13103	13833*	15030	15908	16569	16772	19326
13104	13834	15031	15930	16570	16773	19401
13230	13836	15056	15931	16571	17000	19402
13231	13844*	15057	16008	16573	17400	19403
13330*	13854	15058	16030	16666*	17426	19501
13331*	13855	15059	16031	16667	17436	19502
13632	13901	15100	16108	16669	17495	19503
13633	13902	15508	16130	16671	17500	
13634	13903	15530	16131	16672	18200	
13636	14786	15531	16200	16673	18630	
13644	14908	15661	1645F	16766*	18631	
13655	14930	15663	16566*	16767	19030	

\* The messages associated with these MSG IDs are annunciated at a 1.04 Hz rate in the specified OPS.  
The other listed messages are annunciated at a .52 Hz rate.

**B.4.110.1.3 LIMIT CHECK ANNUNCIATION PROCESSING (RTL/ENTRY)**

This category of GN&C messages requires limit check processing to determine out of limits conditions. However, should a communication failure occur, the limit check processing for the associated parameter shall be discontinued until the commfault is cleared. This protects out-of-limit failure annunciation due to commfault conditions. The commfault interfaces associated with the parameters requiring limit checks are defined in the display processing interface Table B.4.110.3-1. To avoid alerting the crew of transient out of limit conditions, the input fault conditions may require noise filtering. The noise filter processing requirements are defined in paragraph B.4.110.1.5. A subset of the message/annunciation outputs may be driven by multiple unique input signals. In this case, the signals which drive the message/annunciation are grouped together and listed directly preceding the message/annunciation output. Every interface shall be processed individually. However, each group of signals that drive the same message/annunciation shall be processed as a set prior to processing another message/annunciation output. The limit check equations are defined in Paragraph B.4.110.1.5. The K-Load low limit and/or high limit constant values required are listed in Table B.4.110-8.

The input parameters, the noise filter counter threshold value for each input parameter requiring noise filtering and the associated message/annunciation outputs are defined in Table B.4.110.4-1. This table is formatted such that the inputs required are listed directly preceding the message/annunciation output. The outputs are listed sequentially by message ID. The message/annunciation parameters pertaining to this category are referenced below by their unique message IDs.

MSG IDs

Inputs Require  
Low/High Limit Check

13442\*

Inputs Require  
High Limit Check

13443\*

\* The messages associated with these MSG IDs are annunciated at a 1.04 Hz rate in the specified flight phase. The other listed messages are annunciated at a .52 Hz rate.

**B.4.110.1.4 UNIQUE ANNUNCIATION PROCESSING (ASCENT/RTL/ENTRY)**

- BODY FLAP ALERT (13537, 13538, 13586)

The BODY FLAP ALERT messages will be generated as a function of the state of the BODY FLAP ALERT signal (V90J6420C) as specified in the table below:

V90J6420C	Signal	MSG ID
1	BODY FLAP ALERT HOLD MSG	13537
2	BODY FLAP ALERT HOLD MSG	13537
3	BODY FLAP ALERT CYCLE	13538
4	BODY FLAP ALERT FAIL	13586

#### **B.4.110.1.5 UNIQUE ANNUNCIATION PROCESSING (ENTRY)**

The unique annunciation processing function shall provide the special processing requirements for those annunciations which are exceptions to the previously defined annunciation categories.

- FCS SATURATION – POSITION/HINGE MOMENT (13442, 13443)

During Hydraulic Thermal Conditioning the inputs which drive these messages/annunciation outputs require a different type of processing defined as follows:

During MM 301, MM 302, and MM 303 when the SURF DRIVE ON/OFF CMD (V93X6961X) is SET (i.e., ON), output of FCS SAT POS (13442) and FCS SAT MOM (13443) messages and annunciation shall be inhibited.

- FCS Saturation – Position (13442)

During MM 602 when Q BAR (V95P3011C) is less than 20 PFS or during MM 305 or MM 603 when the Weight on Main Wheels Indicator (V96X0050X) discrete is latched in the “1” state (TRUE), output of the FCS SAT POS (13442) message and annunciation shall be inhibited.

The input parameters and the message/annunciation outputs are defined in Table B.4.110.4–1.

#### **B.4.110.1.6 GAX COMMON PROCESSING (RTLS/ENTRY)**

The GAX principal function requires special processing equations which are common to multiple subsystems. To eliminate repetition of these common equation types, they have been grouped into the following paragraphs and referenced when required by associated functions of GAX.

- LOW AND HIGH LIMIT CHECK EQUATION

If  $CONV < LOWER\_LIMIT$

Then CONV status = below limit

Else If  $CONV > UPPER\_LIMIT$

Then CONV status = exceed limit

Else CONV status = within limit.

where CONV, CONV status, and LOWER LIMIT are as defined above. UPPER LIMIT represents the upper limit check constant value associated with the converted input signal.

The limit check K-Load constant values are defined in Table B.4.110-8. Although the limit check values and associated limit check processing have been defined in engineering units for requirements purposes, the programmer shall have the flexibility to perform the equivalent limit check on the unconverted hardware input signal in VDC.

- FALSE ALARM AVOIDANCE NOISE FILTER

If a parameter has been out of limits for NF\_LIM (K-Load value) consecutive cycles, that parameter shall be defined to be out of limit. The fault annunciation for that parameter shall be enabled. A parameter fault annunciation so enabled shall not be enabled again until the out-of-limit count has been reinitialized and the parameter has again been out of limits NF\_LIM consecutive times. The in and out-of-limits count shall be reinitialized if the parameter value has been within limits NF\_LIM consecutive times.

#### B.4.110.2 GNC SYSTEM SUMMARY 2 SUPPORT PROCESSING

The GAX principal function shall provide processing required to support the GNC System Summary 2 display. This display processing is required in on-orbit flight phase only. The various types of GNC support processing for this display are:

- OMS Pressure Conversion and Status
- RCS Conversion and Status
- RCS Jet Manifold Status
- OMS Engine Valve Conversion
- OMS Engine Inlet Pressure Conversion
- OMS Aft Quantity Conversion and Status

The interfaces for the GNC System Summary 2 support processing are shown in Table B.4.110.3-1. The detailed requirements for the above listed support functions are defined in the following paragraphs:

##### OMS Pressure Conversion and Status

This function shall display the converted (VDC to PSIA) left and right OMS helium/tank pressure, fuel tank pressure, oxidizer tank pressure, N2 tank pressure, and N2 regulator pressure. This function shall also determine the status associated with each of these parameters the fuel and oxidizer inlet pressure for the left and right OMS pods shall be converted (VDC to PSIA) for display. The OMS engine valves 1 and 2 shall be converted (VDC to PCT) for display. These pressures shall be converted as defined in the Conversion processing portion of Paragraph B.4.110.2.5. The pressures shall be tested against a low and/or high limit as required.

He Tk P	– Low Limit Check
Fu Tk P	– Low and High Limit Check
Ox Tk P	– Low and High Limit Check
N2 Tk P	– Low Limit Check
N2 Reg P	– Low and High Limit Check

The limit check processing is defined in Paragraph B.4.110.2.5. The individual K-Load scale factor and low and/or high limit constant values are defined in Table B.4.110-8.

The displayed OMS pressure status indicators are dependent on the FCOS commfaults and associated limit check status of the input parameter. If a communication failure condition occurs, the limit check processing for the corresponding parameter shall be discontinued until the commfault is cleared. These indicators shall be determined as follows:

OMS 'VDC' X Y Commfault	OMS 'PSIA' X Y Limit Status	OMS X Y Displayed Status Ind
Fault	—	M
Good	“exceeds” limit	↑
Good	“below” limit	↓
Good	“within” limit	(blank)

where X = left, right

Y = He Tk P, Ox Tk P, Fu Tk P, N2 Tk P, N2 Reg P and 'VDC' Commfault represents the communication failure associated with the hardware input signal.

'PSIA' Limit Status represents the limit check status of the converted hardware signal.

The helium tank pressures and the N2 tank pressures are not checked against an upper limit and thus shall never “exceed” limit.

RCS Conversion and Status

This function shall display the converted (VDC to PSIA) forward, left and right RCS helium fuel tank pressure, helium oxidizer tank pressure, fuel tank pressure, oxidizer tank pressure and manifold pressures. This function shall also determine the status associated with the helium and tank pressure parameters. The pressures shall be converted as defined in the conversion processing portion of Paragraph B.4.110.2.5. These pressures shall be tested against a low and/or high limit as required.

- He Fu Tk P – Low Limit Check
- He Ox Tk P – Low Limit Check
- Fu Tk P – Low and High Limit Check
- Ox Tk P – Low and High Limit check
- Manf P – Conversion Only

The limit check processing is defined in Paragraph B.4.110.2.5. The individual K-Load scale factors and low and/or high limit constant values are defined in Table B.4.110-8.

The displayed RCS pressure status indicators are dependent on the FCOS commfaults and associated limit check status of the input parameter. If a communication failure condition occurs, the limit check processing for the corresponding parameter shall be discontinued until the commfault is cleared. These indicators shall be determined as follows:

RCS X Y 'VDC' Commfault	RCS X Y 'PSIA' Limit Status	RCS X Y Displayed Status Ind
FAULT	—	M
GOOD	“exceeds” limit	↑
GOOD	“below” limit	↓
GOOD	“within” limit	(blank)

where X = left, right, forward.

Y = He fuel, He oxidizer, Tk fuel, Tk oxidizer, and 'VDC' Commfault represents the communication failure associated with the hardware input signal. 'PSIA' Limit Status represents the limit check status of the converted hardware signal.

The helium tank pressures are not checked against an upper limit and thus shall never “exceed” limit.

The RCS quantity remaining computed by the RCS Quantity Monitor principal function is in suitable format (percent) for display and can be sent directly to the display. The quantity remaining status is dependent on the quantity alert and the leak flags. This status shall be determined as follows:

O U T P U T	Displayed RCS “X” “Y” Qty Status Ind	↓	(blank)
I N P U T	RCS “X” “Y” Leak flag	Fail	Good
	RCS “X” Quantity Alert	—(or)—	—(and)—
S		Fail	Good

where “X” = Forward, left, right

“Y” = Fuel, oxidizer

OMS Engine Valve Conversion

This function shall display the converted (VDC to percent open) engine valve 1 and 2 positions for the left and right OMS engines. These parameters shall be converted using a bias and scale factor for each valve as defined by conversion equation number (2) in the Conversion Processing portion of Paragraph B.4.110.2.5.

The associated K-Load scale factor and bias constant values are defined in Table B.4.110-8.

OMS Engine Inlet Pressure Conversion.

This function shall display the converted (VDC to PSIA) left and right OMS engine fuel inlet pressure and oxidizer inlet pressure. These parameters shall be converted as defined in the conversion processing portion of Paragraph B.4.110.2.5. The K-Load scale factor constant values are defined in Table B.4.110-8.

Aft OMS Quantity Conversion and Status

This function shall display the converted (VDC to percent) left and right OMS aft fuel quantity and aft oxidizer quantity. These parameters shall be converted as defined in the conversion processing portion of Paragraph B.4.110.2.5. The K-Load scale factor constant values are defined in Table B.4.110-8.

The displayed OMS aft quantity status indicators are dependent on the FCOS commfaults and associated hardware low limit discretes. These indicators shall be determined as follows:

OMS AFT QTY X Y Commfault	OMS AFT QTY X Y HDWR Low Limit Discrete	OMS AFT QTY X Y Display Status Ind
FAULT	—	M
GOOD	“ 1 ” (Low)	↓
GOOD	“ 0 ”	(blank)

where X = Left, right  
Y = Fuel, Oxidizer

and the Commfault represents the communication failure associated with the hardware quantity input signal.



#### **B.4.110.2.1 GN&C ANNUNCIATION/C&W/MESSAGES (ORBIT)**

The GAX principal function shall provide all GN&C CRT messages and corresponding annunciation information to systems software. The detailed processing required to drive the GN&C CRT messages, C&W lights, and alerts is defined in the following paragraphs.

The GAX Support Interface Table, B.4.110.3-1, provides a direct means of tracing interfaces for the software inputs to the GN&C system summary displays. This table is formatted to show the exact combination of input signals necessary to generate an output. The table is further broken down into the following sections: Hinge Moment Conversion; Saturation; FCS Channel Status; Sensor/Controller; OMS System; RCS Jet Manifold Stat; and RCS Conv & Status.

Table B.4.110.4-1 provides the detailed interfaces required to support the GN&C annunciation. This table is formatted such that the inputs required and corresponding message/annunciation output are grouped by message ID. All outputs are sent to System Software for subsequent annunciation. In order to output a message when distinct but related failure conditions occur, a message/annunciation output may be driven by multiple unique inputs. Whenever a fault condition has been annunciated for a unique input, the annunciation for that input shall be inhibited. The annunciation processing for a unique input shall be reenabled whenever the fault condition is removed. Annunciation outputs which are enabled and available in multiple OPS sequences shall not be reannunciated at any legal OPS transition.

A subset of the input parameters driving the message/annunciation requirements also support the display processing portion of the GAX principal function. For requirements purposes, the interfaces required for annunciation processing have been formatted in Table B.4.110.4-1 to show the exact combination of input signals necessary to generate an output. These interfaces are redundant to a subset of the total GAX interfaces defined in Table B.4.110.3-1.

Definition of the K-load scale factor and low and/or high limit constant values for those input signals requiring conversion and/or limit check processing may be found in Table B.4.110-8. Table A.4.2 presents message requirements which support GAX.

Note that if a fault flag from an applications source is cleared before being processed by GAX, then the associated fault message will not be annunciated. For GAX to annunciate a fault message, the processing of that message must occur while the source fault flag is still set.

The types of message processing required are defined in the following paragraphs:

#### **B.4.110.2.2 DIRECT ANNUNCIATION PROCESSING (ORBIT)**

This category of GN&C annunciation requires no special processing. The input referenced directly drives the CRT message and corresponding annunciation. A subset of message/annunciation outputs may be driven by multiple unique input signals. In this case, the signals which drive a message/annunciation output are grouped together and listed directly preceding the message/annunciation output. Each input interface shall be processed individually. However, each group of input signals that drive the same message/annunciation output shall be processed as a set prior to processing another message/annunciation signal.

The discrete signals input directly from the hardware each have an associated communication failure signal. Should a commfault condition occur, the annunciation corresponding to the signal shall be discontinued until the commfault condition is cleared. The commfaults associated with these inputs are defined in Table B.4.110.3-1.

The interfaces and complete message description and corresponding annunciation is defined in Table B.4.110.4.1. The messages pertaining to this category are referenced below by their unique message IDs.

DIRECT ANNUNCIATION TABLE FOR ORBIT (OPS 2&8)

	<u>MSG IDs</u>	
13206	15762	16771
13230	1634F	16773
13306*	16566*	17426
13330*	16567	18606
13331*	16568	18630
13633	16569	18631
13826	16570	19211
13832	16571	19326
13833*	16573	19401
13901	16666*	19402
13902	16667	19403
13903	16669	19501
14000*	16671	19502
14786	16672	19503
15400*	16673	
15661	16766*	
15662	16767	
15761	16770	

\* The messages associated with these MSG IDs are annunciated at a 1.04 Hz rate in the specified OPS. The other listed messages are annunciated at a .52 Hz rate.

**B.4.110.2.3 LIMIT CHECK ANNUNCIATION PROCESSING (ORBIT)**

This category of GN&C messages requires limit check processing to determine out of limits conditions. However, should a communication failure occur, the limit check processing for the associated parameter shall be discontinued until the commfault is cleared. This protects out-of-limit failure annunciation due to commfault conditions. The commfault interfaces associated with the parameters requiring limit checks are defined in the display processing interface Table B.4.110.3-1. To avoid alerting the crew of transient out-of-limit conditions, the input fault conditions may require noise filtering. The noise filter processing requirements are defined in paragraph B.4.110.2.5. A subset of the message/annunciation outputs may be driven by multiple unique input signals. In this case, the signals which drive the message/annunciation are grouped together and listed directly preceding the message/annunciation output. Every interface shall be processed individually. However, each group of signals that drive the same message/annunciation shall be processed as a set prior to processing another message/annunciation output. The limit check equations are defined in Paragraph B.4.110.2.5. The K-Load low limit and/or high limit constant values required are listed in Table B.4.110-8.

The input parameters, the noise filter counter threshold value for each input parameter requiring noise filtering and the associated message/annunciation outputs are defined in Table B.4.110.4-1. This table is formatted such that the inputs required are listed directly preceding the message/annunciation output. The message/annunciation parameters pertaining to this category are referenced below by their unique message IDs.

Inputs Require	<u>MSG IDs</u>
<u>Low Limit Check</u>	<u>High/Low Limit Check</u>
16564	15665
16664	15765
16764	16565 *
	16665 *
	16765 *
	16830
	16831
	16841

\* The messages associated with these MSG IDs are annunciated at a 1.04 Hz rate in the specified flight phase. The other listed messages are annunciated at a .52 Hz rate.

#### B.4.110.2.4 UNIQUE ANNUNCIATION PROCESSING (ORBIT)

The unique annunciation processing function shall provide the special processing requirements for those annunciations which are exceptions to the previously defined annunciation categories.

- Left/Right SYS OMS (15665,15765)

The inputs which drive these messages/annunciation outputs require different types of processing defined as follows:

For the Left OMS Pod:

<u>Input</u>	<u>Reqmt</u>
OMS L INLET P	Commfault check/Low/High Limit test and Noise filter
OMS L HE TK P 2	Commfault check/Low Limit test & Noise filter
OMS L ENG REG OUT P	Commfault check/Low/High Limit test & Noise filter
OMS L ENG PNEU SUPPLY P 2	Commfault check/Low Limit test & Noise filter

Each out of limits condition shall drive the left SYS OMS (15665).

For the right OMS Pod substitute “R” for “L” and process as defined above. (Drive 15765)

The limit check processing and noise filter processing requirements are defined in paragraph B.4.110.2.5. The K-Load low and/or high limit check constant values are listed in Table B.4.110-8. The input parameters, the noise filtering, and the message/annunciation outputs are defined in Table B.4.110.4-1.

#### B.4.110.2.5 GAX COMMON PROCESSING (ORBIT)

The GAX principal function requires special processing equations which are common to multiple subsystems. To eliminate repetition of these common equation types, they have been grouped into the following paragraphs and referenced when required by associated functions of GAX.

- CONVERSION EQUATIONS

$$(1) \text{ CONV} = \text{SCALE\_FACTOR} * \text{VDC}$$

$$(2) \text{ CONV} = \text{BIAS} + \text{SCALE\_FACTOR} * \text{VDC}$$

where VDC represents the input signal from the appropriate hardware.

SCALE\_FACTOR represents the corresponding slope of the conversion equation.

BIAS (when required) represents the additive term needed when 0 VDC does not equal 0 engineering units (i.e., the zero-crossing).

CONV represents the input hardware signal converted to engineering units.

The conversion K-Load constants associated with the input signals are defined in Table B.4.110-8.

- LOW LIMIT CHECK EQUATION

IF CONV < LOWER\_LIMIT

Then CONV status = below limit

Else CONV status = within limit

where CONV represents the input hardware signal converted to engineering units.

CONV status represents the limit check status associated with the converted input signal.

LOWER LIMIT represents the low limit check constant value associated with the converted input signal.

The limit check K-Load constant values are defined in Table B.4.110-8. Although the limit check constant values and associated limit check processing have been defined in engineering units for requirements purposes, the programmer shall have the flexibility to perform the equivalent limit check on the unconverted hardware input signal in VDC.

- LOW AND HIGH LIMIT CHECK EQUATION

If CONV < LOWER LIMIT

Then CONV status = below limit

Else If CONV > UPPER LIMIT

Then CONV status = exceed limit

Else CONV status = within limit.

where CONV, CONV status, and LOWER LIMIT are as defined above.

UPPER LIMIT represents the upper limit check constant value associated with the converted input signal.

The limit check K-Load constant values are defined in Table B.4.110-8. Although the limit check constant values and associated limit check processing have been defined in engineering units for requirements purposes, the programmer shall have the flexibility to perform the equivalent limit check on the unconverted hardware input signal in VDC.

- FALSE ALARM AVOIDANCE NOISE FILTER

If a parameter has been out of limits for NF\_LIM (K-Load value) consecutive cycles, that parameter shall be defined to be out of limit. The fault annunciation for that parameter shall be enabled. A parameter fault annunciation so enabled shall not be enabled again until the out-of-limit count has been reinitialized and the parameter has again been out of limits NF\_LIM consecutive times. The in and out-of-limits count shall be reinitialized if the parameter value has been within limits NF\_LIM consecutive times.

**B.4.110.3 GAX Interface Support Functions**

- Table B.4.110-5      Input Functional Parameters
- Table B.4.110-6      Output Functional Parameters
- Table B.4.110-7      I-Loads
- Table B.4.110-8      K-Loads
- Table B.4.110-9      Constants

Table B.4.110.3-1.(1). GAX Support Interface Table Hinge Moment Conversion					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V90P2515C	SEL LOB ELVN PRI DELTA PRESS	SF		0, 5	VDC
V94U4125C	LT OTBD ELVN HINGE MOM PCT		G SYS SUMM 1	+/-99	PCT
V94X4676X	LOB HINGE MOM EXCEED STATUS		G SYS SUMM 1	↑, ⚡	
V90P2516C	SEL LIB ELVN PRI DELTA PRESS	SF		0, 5	VDC
V94U4126C	LT INBD ELVN HINGE MOM PCT		G SYS SUMM 1	+/-99	PCT
V94X4677X	LIB HINGE MOM EXCEED STATUS		G SYS SUMM 1	↑, ⚡	
V90P2517C	SEL ROB ELVN PRI DELTA PRESS	SF		0, 5	VDC
V94U4127C	RT OTBD ELVN HINGE MOM PCT		G SYS SUMM 1	+/-99	PCT
V94X4679X	ROB HINGE MOM EXCEED STATUS		G SYS SUMM 1	↑, ⚡	
V90P2518C	SEL RIB ELVN PRI DELTA PRESS	SF		0, 5	VDC
V94U4128C	RT INBD ELVN HINGE MOM PCT		G SYS SUMM 1	+/-99	PCT
V94X4678X	RIB HINGE MOM EXCEED STATUS		G SYS SUMM 1	↑, ⚡	

Table B.4.110.3-1.(2). GAX Support Interface Table Saturation					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V95H8010CA	COMP L INBD ELEVON POS	ELPFB SOP		-36.5, +21.5	DEG
V94J4135C	LIB HI/LO SATURATION STATUS		G SYS SUMM 1	↑, ↓, ⧸	
V95H8060CA	COMP L OUTBD ELEVON POS	ELPFB SOP		-36.5, +21.5	DEG
V94J4136C	LOB HI/LO SATURATION STATUS		G SYS SUMM 1	↑, ↓, ⧸	
V95H8110CA	COMP R INBD ELEVON POS	ELPFB SOP		-36.5, +21.5	DEG
V94J4137C	RIB HI/LO SATURATION STATUS		G SYS SUMM 1	↑, ↓, ⧸	
V95H8160CA	COMP R OUTBD ELEVON POS	ELPFB SOP		-36.5, +21.5	DEG
V94J4138C	ROB HI/LO SATURATION STATUS		G SYS SUMM 1	↑, ↓, ⧸	



Table B.4.110.3-1.(3). GAX Support Interface Table FCS Channel Status					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V79X3260X	L INBOARD ELEVON ACTR 1 FAIL	ASA 1		0,1	
V79X3265X	L OTBOARD ELEVON ACTR 1 FAIL	ASA 1		0,1	
V79X3270X	R INBOARD ELEVON ACTR 1 FAIL	ASA 1		0,1	
V79X3275X	R OTBOARD ELEVON ACTR 1 FAIL	ASA 1		0,1	
V79X3331X	RUDDER ACTR 1 FAIL OUTPUT	ASA 1		0,1	
V79X3336X	SPEEDBRAKE ACTR 1 FAIL	ASA 1		0,1	
V91X7010X	LIB ELEVON 1 COMMFAULT	FCOS		0,1	
V91X7060X	LOB ELEVON 1 COMMFAULT	FCOS		0,1	
V91X7110X	RIB ELEVON 1 COMMFAULT	FCOS		0,1	
V91X7160X	ROB ELEVON 1 COMMFAULT	FCOS		0,1	
V91X3851X	RUDDER 1 COMMFAULT	FCOS		0,1	
V91X3801X	SPEEDBRAKE 1 COMMFAULT	FCOS		0,1	
V79X5100X	LH SRB ROCK ACTR A FAIL	ATVC 1		0,1	
V79X5150X	RH SRB ROCK ACTR A FAIL	ATVC 1		0,1	
V79X5101X	LH SRB TILT ACTR A FAIL	ATVC 1		0,1	
V79X5151X	RH SRB TILT ACTR A FAIL	ATVC 1		0,1	
V91X2470X	LH SRB ROCK ACTR A COMMFAULT	FCOS		0,1	
V91X2478X	RH SRB ROCK ACTR A COMMFAULT	FCOS		0,1	
V91X2471X	LH SRB TILT ACTR A COMMFAULT	FCOS		0,1	
V91X2479X	RH SRB TILT ACTR A COMMFAULT	FCOS		0,1	
V79X1170X	MPS ENG 1 P ACTR A FAIL	ATVC 1		0,1	

Table B.4.110.3-1.(3). GAX Support Interface Table FCS Channel Status						
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS	
V79X1270X	MPS ENG 2 P ACTR A FAIL	ATVC 1	G SYS SUMM 1	0,1		
V79X1370X	MPS ENG 3 P ACTR A FAIL	ATVC 1		0,1		
V79X1171X	MPS ENG 1 Y ACTR A FAIL	ATVC 1		0,1		
V79X1271X	MPS ENG 2 Y ACTR A FAIL	ATVC 1		0,1		
V79X1371X	MPS ENG 3 Y ACTR A FAIL	ATVC 1		0,1		
V91X2544X	MPS ENG 1 P ACTR A COMMFAULT	FCOS		0,1		
V91X2552X	MPS ENG 2 P ACTR A COMMFAULT	FCOS		0,1		
V91X2560X	MPS ENG 3 P ACTR A COMMFAULT	FCOS		0,1		
V91X2545X	MPS ENG 1 Y ACTR A COMMFAULT	FCOS		0,1		
V91X2553X	MPS ENG 2 Y ACTR A COMMFAULT	FCOS		0,1		
V91X2561X	MPS ENG 3 Y ACTR A COMMFAULT	FCOS		0,1		
V94J4210C	FCS CH 1 I/O, FAIL STATUS				M, ↓, ∅	
V79X3261X	L INBOARD ELEVON ACTR 2 FAIL	ASA 2		0,1		
V79X3266X	L OTBOARD ELEVON ACTR 2 FAIL	ASA 2		0,1		
V79X3271X	R INBOARD ELEVON ACTR 2 FAIL	ASA 2		0,1		
V79X3276X	R OTBOARD ELEVON ACTR 2 FAIL	ASA 2		0,1		
V79X3332X	RUDDER ACTR 2 FAIL OUTPUT	ASA 2		0,1		
V79X3337X	SPEEDBRAKE ACTR 2 FAIL	ASA 2		0,1		
V91X7011X	LIB ELEVON 2 COMMFAULT	FCOS		0,1		
V91X7061X	LOB ELEVON 2 COMMFAULT	FCOS		0,1		
V91X7111X	RIB ELEVON 2 COMMFAULT	FCOS		0,1		
V91X7161X	ROB ELEVON 2 COMMFAULT	FCOS		0,1		
V91X3852X	RUDDER 2 COMMFAULT	FCOS		0,1		

Table B.4.110.3-1.(3). GAX Support Interface Table FCS Channel Status					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V91X3802X	SPEEDBRAKE 2 COMMFAULT	FCOS		0,1	
V91X5105X	LH SRB ROCK ACTR B FAIL	ATVC 2		0,1	
V79X5155X	RH SRB ROCK ACTR B FAIL	ATVC 2		0,1	
V79X5106X	LH SRB TILT ACTR B FAIL	ATVC 2		0,1	
V79X5156X	RH SRB TILT ACTR B FAIL	ATVC 2		0,1	
V91X2472X	LH SRB ROCK ACTR B COMMFAULT	FCOS		0,1	
V91X2480X	RH SRB ROCK ACTR B COMMFAULT	FCOS		0,1	
V91X2473X	LH SRB TILT ACTR B COMMFAULT	FCOS		0,1	
V91X2481X	RH SRB TILT ACTR B COMMFAULT	FCOS		0,1	
V79X1173X	MPS ENG 1 P ACTR B FAIL	ATVC 2		0,1	
V79X1273X	MPS ENG 2 P ACTR B FAIL	ATVC 2		0,1	
V79X1373X	MPS ENG 3 P ACTR B FAIL	ATVC 2		0,1	
V79X1174X	MPS ENG 1 Y ACTR B FAIL	ATVC 2		0,1	
V79X1274X	MPS ENG 2 Y ACTR B FAIL	ATVC 2		0,1	
V79X1374X	MPS ENG 3 Y ACTR B FAIL	ATVC 2		0,1	
V91X2546X	MPS ENG 1 P ACTR B COMMFAULT	FCOS		0,1	
V91X2554X	MPS ENG 2 P ACTR B COMMFAULT	FCOS		0,1	
V91X2562X	MPS ENG 3 P ACTR B COMMFAULT	FCOS		0,1	
V91X2547X	MPS ENG 1 P ACTR B COMMFAULT	FCOS		0,1	
V91X2555X	MPS ENG 2 P ACTR B COMMFAULT	FCOS		0,1	
V91X2563X	MPS ENG 3 Y ACTR B COMMFAULT	FCOS		0,1	
V94J4211C	FCS CH 2 I/O, FAIL STATUS		G SYS SUMM 1	M, ↓, ⅈ	
V79X3262X	L INBOARD ELEVON ACTR 3 FAIL	ASA 3		0,1	

Table B.4.110.3-1.(3). GAX Support Interface Table FCS Channel Status					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V79X3267X	L OTBOARD ELEVON ACTR 3 FAIL	ASA 3		0,1	
V79X3272X	R INBOARD ELEVON ACTR 3 FAIL	ASA 3		0,1	
V79X3277X	R OTBOARD ELEVON ACTR 3 FAIL	ASA 3		0,1	
V79X3333X	RUDDER ACTR 3 FAIL OUTPUT	ASA 3		0,1	
V79X3338X	SPEEDBRAKE ACTR 3 FAIL	ASA 3		0,1	
V91X7012X	LIB ELEVON 3 COMMFAULT	FCOS		0,1	
V91X7062X	LOB ELEVON 3 COMMFAULT	FCOS		0,1	
V91X7112X	RIB ELEVON 3 COMMFAULT	FCOS		0,1	
V91X7162X	ROB ELEVON 3 COMMFAULT	FCOS		0,1	
V91X3853X	RUDDER 3 COMMFAULT	FCOS		0,1	
V91X3803X	SPEEDBRAKE 3 COMMFAULT	FCOS		0,1	
V79X5110X	LH SRB ROCK ACTR C FAIL	ATVC 3		0,1	
V79X5160X	RH SRB ROCK ACTR C FAIL	ATVC 3		0,1	
V79X5111X	LH SRB TILT ACTR C FAIL	ATVC 3		0,1	
V79X5161X	RH SRB TILT ACTR C FAIL	ATVC 3		0,1	
V91X2474X	LH SRB ROCK ACTR C COMMFAULT	FCOS		0,1	
V91X2482X	RH SRB ROCK ACTR C COMMFAULT	FCOS		0,1	
V91X2475X	LH SRB TILT ACTR C COMMFAULT	FCOS		0,1	
V91X2483X	RH SRB TILT ACTR C COMMFAULT	FCOS		0,1	
V79X1176X	MPS ENG 1 P ACTR C FAIL	ATVC 3		0,1	
V79X1276X	MPS ENG 2 P ACTR C FAIL	ATVC 3		0,1	
V79X1376X	MPS ENG 3 P ACTR C FAIL	ATVC 3		0,1	
V79X1177X	MPS ENG 1 Y ACTR C FAIL	ATVC 3		0,1	

Table B.4.110.3-1.(3). GAX Support Interface Table FCS Channel Status					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V79X1277X	MPS ENG 2 Y ACTR C FAIL	ATVC 3		0,1	
V79X1377X	MPS ENG 3 Y ACTR C FAIL	ATVC 3		0,1	
V79X2548X	MPS ENG 1 P ACTR C COMMFAULT	FCOS		0,1	
V79X2556X	MPS ENG 2 P ACTR C COMMFAULT	FCOS		0,1	
V79X2564X	MPS ENG 3 P ACTR C COMMFAULT	FCOS		0,1	
V79X2549X	MPS ENG 1 Y ACTR C COMMFAULT	FC S		0,1	
V79X2557X	MPS ENG 2 Y ACTR C COMMFAULT	FCOS		0,1	
V79X2565X	MPS ENG 3 Y ACTR C COMMFAULT	FCOS		0,1	
V94J4212C	FCS CH 3 I/O, FAIL STATUS		G SYS SUMM 1	M, ↓, ♂	
V79X3263X	L INBOARD ELEVON ACTR 4 FAIL	ASA 4		0,1	
V79X3268X	L OTBOARD ELEVON ACTR 4 FAIL	ASA 4		0,1	
V79X3273X	R INBOARD ELEVON ACTR 4 FAIL	ASA 4		0,1	
V79X3278X	R OTBOARD ELEVON ACTR 4 FAIL	ASA 4		0,1	
V79X3334X	RUDDER ACTR 4 FAIL OUTPUT	ASA 4		0,1	
V79X3339X	SPEEDBRAKE ACTR 4 FAIL	ASA 4		0,1	
V91X7013X	LIB ELEVON 4 COMMFAULT	FCOS		0,1	
V91X7063X	LOB ELEVON 4 COMMFAULT	FCOS		0,1	
V91X7113X	RIB ELEVON 4 COMMFAULT	FCOS		0,1	
V91X7163X	ROB ELEVON 4 COMMFAULT	FCOS		0,1	
V91X3854X	RUDDER 4 COMMFAULT	FCOS		0,1	
V91X3804X	SPEEDBRAKE 4 COMMFAULT	FCOS		0,1	
V79X5115X	LH SRB ROCK ACTR D FAIL	ATVC 4		0,1	

Table B.4.110.3-1.(3). GAX Support Interface Table FCS Channel Status					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V79X5165X	RH SRB ROCK ACTR D FAIL	ATVC 4		0,1	
V79X5116X	LH SRB TILT ACTR D FAIL	ATVC 4		0,1	
V79X5166X	RH SRB TILT ACTR D FAIL	ATVC 4		0,1	
V91X2476X	LH SRB ROCK ACTR D COMMFAULT	FCOS		0,1	
V91X2484X	RH SRB ROCK ACTR D COMMFAULT	FCOS		0,1	
V91X2477X	LH SRB TILT ACTR D COMMFAULT	FCOS		0,1	
V91X2485X	RH SRB TILT ACTR D COMMFAULT	FCOS		0,1	
V79X1178X	MPS ENG 1 P ACTR D FAIL	ATVC 4		0,1	
V79X1278X	MPS ENG 2 P ACTR D FAIL	ATVC 4		0,1	
V79X1378X	MPS ENG 3 P ACTR D FAIL	ATVC 4		0,1	
V79X1179X	MPS ENG 1 Y ACTR D FAIL	ATVC 4		0,1	
V79X1279X	MPS ENG 2 Y ACTR D FAIL	ATVC 4		0,1	
V79X1379X	MPS ENG 3 Y ACTR D FAIL	ATVC 4		0,1	
V91X2550X	MPS ENG 1 P ACTR D COMMFAULT	FCOS		0,1	
V91X2558X	MPS ENG 2 P ACTR D COMMFAULT	FCOS		0,1	
V91X2566X	MPS ENG 3 P ACTR D COMMFAULT	FCOS		0,1	
V91X2551X	MPS ENG 1 Y ACTR D COMMFAULT	FCOS		0,1	
V91X2559X	MPS ENG 2 Y ACTR D COMMFAULT	FCOS		0,1	
V91X2567X	MPS ENG 3 Y ACTR D COMMFAULT	FCOS		0,1	
V94J4213C	FCS CH4 I/O, FAIL STATUS		G SYS SUMM 1	M, ↓, ⅈ	

Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller

MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V91X6500X	LH RHC ROLL CMD A COMMFAULT	FCOS		0,1	
V91X6525X	LH RHC PITCH CMD A COMMFAULT	FCOS		0,1	
V91X6540X	LH RHC YAW CMD A COMMFAULT	FCOS		0,1	
V90X6201X	LEFT RHC 1 FAIL	RHC FDIR		0,1	
V93X4201XB	LH RHC 1 DES CMD	V5.1.6		0,1	
V93X4201XA	LH RHC 1 DES CMD	RM/ORB		0,1	
V90X6005X	LEFT RHC ROLL DISAGREE	RHC FDIR		0,1	
V90X6035X	LEFT RHC PITCH DISAGREE	RHC FDIR		0,1	
V90X6065X	LEFT RHC YAW DISAGREE	RHC FDIR		0,1	
V94J4140C	L RHC CH 1 I/O, FAIL STATUS		G SYS SUMM 1	M, ↓,?,/	
V91X6501X	LH RHC ROLL CMD B COMMFAULT	FCOS		0,1	
V91X6526X	LH RHC PITCH CMD B COMMFAULT	FCOS		0,1	
V91X6541X	LH RHC YAW CMD B COMMFAULT	FCOS		0,1	
V90X6231X	LEFT RHC 2 FAIL	RHC FDIR		0,1	
V93X4203XB	LH RHC 2 DES CMD	V5.1.6		0,1	
V93X4203XA	LH RHC 2 DES CMD	RM/ORB		0,1	
V90X6005X	LEFT RHC ROLL DISGREE	RHC FDIR		0,1	
V90X6035X	LEFT RHC PITCH DISAGREE	RHC FDIR		0,1	
V90X6065X	LEFT RHC YAW DISAGREE	RHC FDIR		0,1	
V94J4141C	L RHC CH 2 I/O, FAIL STATUS		G SYS SUMM 1	M, ↓,?,/	
V91X6502X	LH RHC ROLL CMD C COMMFAULT	FCOS		0,1	
V91X6527X	LH RHC PITCH CMD C COMMFAULT	FCOS		0,1	

Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V91X6542X	LH RHC YAW CMD C COMMFAULT	FCOS		0,1	
V90X6261X	LEFT RHC 3 FAIL	RHC FDIR		0,1	
V93X4205XB	LH RHC 3 DES CMD	V5.1.6		0,1	
V93X4205XA	LH RHC 3 DES CMD	RM/ORB		0,1	
V90X6005X	LEFT RHC ROLL DISAGREE	RHC FDIR		0,1	
V90X6035X	LEFT RHC PITCH DISAGREE	RHC FDIR		0,1	
V90X6065X	LEFT RHC YAW DISAGREE	RHC FDIR		0,1	
V94J4142C	L RHC CH 3 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, <del>♯</del>	
V91X6550X	RH RHC ROLL CMD A COMMFAULT	FCOS		0,1	
V91X6575X	RH RHC PITCH CMD A COMMFAULT	FCOS		0,1	
V91X6590X	RH RHC YAW CMD A COMMFAULT	FCOS		0,1	
V90X6301X	RIGHT RHC 1 FAIL	RHC FDIR		0,1	
V93X4231XB	RH RHC 1 DES CMD	V5.1.6		0,1	
V93X4231XA	RH RHC 1 DES CMD	RM/ORB		0,1	
V90X6105X	RIGHT RHC ROLL DISAGREE	RHC FDIR		0,1	
V90X6135X	RIGHT RHC PITCH DISAGREE	RHC FDIR		0,1	
V90X6165X	RIGHT RHC YAW DISAGREE	RHC FDIR		0,1	
V94J4143C	R RHC CH 1 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, <del>♯</del>	
V91X6551X	RH RHC ROLL CMD B COMMFAULT	FCOS		0,1	
V91X6576X	RH RHC PITCH CMD B COMMFAULT	FCOS		0,1	
V91X6591X	RH RHC YAW CMD B COMMFAULT	FCOS		0,1	
V90X6331X	RIGHT RHC 2 FAIL	RHC FDIR		0,1	
V93X4233XB	RH RHC 2 DES CMD	V5.1.6		0,1	



Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller

MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V93X4233XA	RH RHC 2 DES CMD	RM/ORB		0,1	
V90X6105X	RIGHT RHC ROLL DISAGREE	RHC FDIR		0,1	
V90X6135X	RIGHT RHC PITCH DISAGREE	RHC FDIR		0,1	
V90X6165X	RIGHT RHC YAW DISAGREE	RHC FDIR		0,1	
V94J4144C	R RHC CH 2 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ♂	
V91X6552X	RH RHC ROLL CMD C COMMFAULT	FCOS		0,1	
V91X6577X	RH RHC PITCH CMD C COMMFAULT	FCOS		0,1	
V91X6592X	RH RHC YAW CMD C COMMFAULT	FCOS		0,1	
V90X6361X	RIGHT RHC 3 FAIL	RHC FDIR		0,1	
V93X4235XB	RH RHC 3 DES CMD	V5.1.6		0,1	
V93X4235XA	RH RHC 3 DES CMD	RM/ORB		0,1	
V90X6105X	RIGHT RHC ROLL DISAGREE	RHC FDIR		0,1	
V90X6135X	RIGHT RHC PITCH DISAGREE	RHC FDIR		0,1	
V90X6165X	RIGHT RHC YAW DISAGREE	RHC FDIR		0,1	
V94J4145C	R RHC CH 3 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ♂	
V91X7792X	AFT RHC ROLL CMD A COMMFAULT	FCOS		0,1	
V91X7782X	AFT RHC PITCH CMD A COMMFAULT	FCOS		0,1	
V91X7772X	AFT RHC YAW CMD A COMMFAULT	FCOS		0,1	
V90X6362X	AFT RHC 1 FAIL	RHC FDIR		0,1	
V93X4296XB	AFT RHC 1 DES CMD	V5.1.6		0,1	
V93X4296XA	AFT RHC 1 DES CMD	RM/ORB		0,1	
V90X6205X	AFT RHC ROLL DISAGREE	RHC FDIR		0,1	
V90X6235X	AFT RHC PITCH DISAGREE	RHC FDIR		0,1	

Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V90X6265X	AFT RHC YAW DISAGREE	RHC FDIR		0,1	
V94J4590C	AFT RHC CH 1 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, <del>♠</del>	
V91X7783X	AFT RHC ROLL CMD B COMMFAULT	FCOS		0,1	
V91X7778X	AFT RHC PITCH CMD B COMMFAULT	FCOS		0,1	
V91X7780X	AFT RHC YAW CMD B COMMFAULT	FCOS		0,1	
V90X6363X	AFT RHC 2 FAIL	RHC FDIR		0,1	
V93X4297XB	AFT RHC 2 DES CMD	V5.1.6		0,1	
V93X4297XA	AFT RHC 2 DES CMD	RM/ORB		0,1	
V90X6205X	AFT RHC ROLL DISAGREE	RHC FDIR		0,1	
V90X6235X	AFT RHC PITCH DISAGREE	RHC FDIR		0,1	
V90X6265X	AFT RHC YAW DISAGREE	RHC FDIR		0,1	
V94J4591C	AFT RHC CH 2 I/O, STATUS		G SYS SUMM 1	M,↓,?, <del>♠</del>	
V91X7788X	AFT RHC ROLL CMD C COMMFAULT	FCOS		0,1	
V91X7784X	AFT RHC PITCH CMD C COMMFAULT	FCOS		0,1	
V91X7791X	AFT RHC YAW CMD C COMMFAULT	FCOS		0,1	
V90X6364X	AFT RHC 3 FAIL	RHC FDIR		0,1	
V93X4298XB	AFT RHC 3 DES CMD	V5.1.6		0,1	
V93X4298XA	AFT RHC 3 DES CMD	RM/ORB		0,1	
V90X6205X	AFT RHC ROLL DISAGREE	RHC FDIR		0,1	
V90X6235X	AFT RHC PITCH DISAGREE	RHC FDIR		0,1	
V90X6265X	AFT RHC YAW DISAGREE	RHC FDIR		0,1	
V94J4592C	AFT RHC CH 3 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, <del>♠</del>	
V91X6653X	FWD THC POS X OUTPUT A COMMFAULT	FCOS		0,1	
V91X6644X	FWD THC NEG X OUTPUT A COMMFAULT	FCOS		0,1	

Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller

MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V91X6654X	FWD THC POS Y OUTPUT A COMMFAULT	FCOS		0,1	
V91X6645X	FWD THC NEG Y OUTPUT A COMMFAULT	FCOS		0,1	
V91X6655X	FWD THC POS Z OUTPUT A COMMFAULT	FCOS		0,1	
V91X6646X	FWD THC NEG Z OUTPUT A COMMFAULT	FCOS		0,1	
V90X7829X	FWD THC POS X OUTPUT- A FAIL	GNC SW RM		0,1	
V90X7820X	FWD THC NEG X OUTPUT- A FAIL	GNC SW RM		0,1	
V90X7830X	FWD THC POS Y OUTPUT- A FAIL	GNC SW RM		0,1	
V90X7821X	FWD THC NEG Y OUTPUT- A FAIL	GNC SW RM		0,1	
V90X7831X	FWD THC POS Z OUTPUT- A FAIL	GNC SW RM		0,1	
V90X7822X	FWD THC NEG Z OUTPUT- A FAIL	GNC SW RM		0,1	
V93X4207XB	FWD THC X,Y,Z OUT DES A	V5.1.6		0,1	
V93X4207XA	FWD THC X,Y,Z OUT DES A	RM/ORB		0,1	
V90X8131X	FWD THC POS X OUTPUT DIS	GNC SW RM		0,1	
V90X8128X	FWD THC NEG X OUTPUT DIS	GNC SW RM		0,1	
V90X8132X	FWD THC POS Y OUTPUT DIS	GNC SW RM		0,1	
V90X8129X	FWD THC NEG Y OUTPUT DIS	GNC SW RM		0,1	
V90X8133X	FWD THC POS Z OUTPUT DIS	GNC SW RM		0,1	
V90X8130X	FWD THC NEG Z OUTPUT DIS	GNC SW RM		0,1	
V94J4593C	FWD THC 1 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ♂	

Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V91X6656X	FWD THC POS X OUTPUT B COMMFAULT	FCOS		0,1	
V91X6647X	FWD THC NEG X OUTPUT B COMMFAULT	FCOS		0,1	
V91X6657X	FWD THC POS Y OUTPUT B COMMFAULT	FCOS		0,1	
V91X6648X	FWD THC NEG Y OUTPUT B COMMFAULT	FCOS		0,1	
V91X6658X	FWD THC POS Z OUTPUT B COMMFAULT	FCOS		0,1	
V91X6649X	FWD THC NEG Z OUTPUT B COMMFAULT	FCOS		0,1	
V90X7832X	FWD THC POS X OUTPUT- B FAIL	GNC SW RM		0,1	
V90X7823X	FWD THC NEG X OUTPUT- B FAIL	GNC SW RM		0,1	
V90X7833X	FWD THC POS Y OUTPUT- B FAIL	GNC SW RM		0,1	
V90X7824X	FWD THC NEG Y OUTPUT- B FAIL	GNC SW RM		0,1	
V90X7834X	FWD THC POS Z OUTPUT- B FAIL	GNC SW RM		0,1	
V90X7825X	FWD THC NEG Z OUTPUT- B FAIL	GNC SW RM		0,1	
V93X4208XB	FWD THC X,Y,Z OUT DES B	V5.1.6		0,1	
V93X4208XA	FWD THC X,Y,Z OUT DES B	RM/ORB		0,1	
V90X8131X	FWD THC POS X OUTPUT DIS	GNC SW RM		0,1	
V90X8128X	FWD THC NEG X OUTPUT DIS	GNC SW RM		0,1	
V90X8132X	FWD THC POS Y OUTPUT DIS	GNC SW RM		0,1	
V90X8129X	FWD THC NEG Y OUTPUT DIS	GNC SW RM		0,1	
V90X8133X	FWD THC POS Z OUTPUT DIS	GNC SW RM		0,1	

Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller

MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V90X8130X	FWD THC NEG Z OUTPUT DIS	GNC SW RM		0,1	
V94J4594C	FWD THC 2 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ♂	
V91X6659X	FWD THC POS X OUTPUT C COMMFAULT	FCOS		0,1	
V91X6650X	FWD THC NEG X OUTPUT C COMMFAULT	FCOS		0,1	
V91X6660X	FWD THC POS Y OUTPUT C COMMFAULT	FCOS		0,1	
V91X6651X	FWD THC NEG Y OUTPUT C COMMFAULT	FCOS		0,1	
V91X6661X	FWD THC POS Z OUTPUT C COMMFAULT	FCOS		0,1	
V91X6652X	FWD THC NEG Z OUTPUT C COMMFAULT	FCOS		0,1	
V90X7835X	FWD THC POS X OUTPUT-C FAIL	GNC SW RM		0,1	
V90X7826X	FWD THC NEG X OUTPUT-C FAIL	GNC SW RM		0,1	
V90X7836X	FWD THC POS Y OUTPUT-C FAIL	GNC SW RM		0,1	
V90X7827X	FWD THC NEG Y OUTPUT-C FAIL	GNC SW RM		0,1	
V90X7837X	FWD THC POS Z OUTPUT-C FAIL	GNC SW RM		0,1	
V90X7828X	FWD THC NEG Z OUTPUT-C FAIL	GNC SW RM		0,1	
V93X4209XB	FWD THC X,Y,Z OUT DES C	V5.1.6		0,1	
V93X4209XA	FWD THC X,Y,Z OUT DES C	RM/ORB		0,1	
V90X8131X	FWD THC POS X OUTPUT DIS	GNC SW RM		0,1	
V90X8128X	FWD THC NEG X OUTPUT DIS	GNC SW RM		0,1	
V90X8132X	FWD THC POS Y OUTPUT DIS	GNC SW RM		0,1	

Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V90X8129X	FWD THC NEG Y OUTPUT DIS	GNC SW RM		0,1	
V90X8133X	FWD THC POS Z OUTPUT DIS	GNC SW RM		0,1	
V90X8130X	FWD THC NEG Z OUTPUT DIS	GNC SW RM		0,1	
V94J4595C	FWD THC 3 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ♂	
V91X6600X	AFT THC POS X OUTPUT A COMMFAULT	FCOS		0,1	
V91X6615X	AFT THC NEG X OUTPUT A COMMFAULT	FCOS		0,1	
V91X6601X	AFT THC POS Y OUTPUT A COMMFAULT	FCOS		0,1	
V91X6616X	AFT THC NEG Y OUTPUT A COMMFAULT	FCOS		0,1	
V91X6602X	AFT THC POS Z OUTPUT A COMMFAULT	FCOS		0,1	
V91X6617X	AFT THC NEG Z OUTPUT A COMMFAULT	FCOS		0,1	
V90X7799X	AFT THC POS X OUTPUT-A FAIL	GNC SW RM		0,1	
V90X7790X	AFT THC NEG X OUTPUT-A FAIL	GNC SW RM		0,1	
V90X7800X	AFT THC POS Y OUTPUT-A FAIL	GNC SW RM		0,1	
V90X7791X	AFT THC NEG Y OUTPUT-A FAIL	GNC SW RM		0,1	
V90X7801X	AFT THC POS Z OUTPUT-A FAIL	GNC SW RM		0,1	
V90X7792X	AFT THC NEG Z OUTPUT-A FAIL	GNC SW RM		0,1	
V93X4237XB	AFT THC X,Y,Z OUT DES A	V5.1.6		0,1	
V93X4237XA	AFT THC X,Y,Z OUT DES A	RM/ORB		0,1	
V90X7892X	AFT THC NEG Y OUTPUT DIS	GNC SW RM		0,1	

Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V90X7891X	AFT THC NEG X OUTPUT DIS	GNC SW RM		0,1	
V90X7895X	AFT THC POS Y OUTPUT DIS	GNC SW RM		0,1	
V90X7894X	AFT THC POS X OUTPUT DIS	GNC SW RM		0,1	
V90X7896X	AFT THC POS Z OUTPUT DIS	GNC SW RM		0,1	
V90X7893X	AFT THC NEG Z OUTPUT DIS	GNC SW RM		0,1	
V94J4596C	AFT THC 1 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ♂	
V91X6604X	AFT THC POS X OUTPUT B COMMFAULT	FCOS		0,1	
V91X6619X	AFT THC NEG X OUTPUT B COMMFAULT	FCOS		0,1	
V91X6605X	AFT THC POS Y OUTPUT B COMMFAULT	FCOS		0,1	
V91X6620X	AFT THC NEG Y OUTPUT B COMMFAULT	FCOS		0,1	
V91X6606X	AFT THC POS Z OUTPUT B COMMFAULT	FCOS		0,1	
V91X6621X	AFT THC NEG Z OUTPUT B COMMFAULT	FCOS		0,1	
V90X7802X	AFT THC POS X OUTPUT-B FAIL	GNC SW RM		0,1	
V90X7793X	AFT THC NEG X OUTPUT-B FAIL	GNC SW RM		0,1	
V90X7803X	AFT THC POS Y OUTPUT-B FAIL	GNC SW RM		0,1	
V90X7794X	AFT THC NEG Y OUTPUT-B FAIL	GNC SW RM		0,1	
V93X4238XB	AFT THC X,Y,Z OUT DES B	V5.1.6		0,1	
V93X4238XA	AFT THC X,Y,Z OUT DES B	RM/ORB		0,1	
V90X7804X	AFT THC POS Z OUTPUT-B FAIL	GNC SW RM		0,1	

Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V90X7795X	AFT THC NEG Z OUTPUT-B FAIL	GNC SW RM		0,1	
V90X7894X	AFT THC POS X OUTPUT DIS	GNC SW RM		0,1	
V90X7891X	AFT THC NEG X OUTPUT DIS	GNC SW RM		0,1	
V90X7895X	AFT THC POS Y OUTPUT DIS	GNC SW RM		0,1	
V90X7892X	AFT THC NEG Y OUTPUT DIS	GNC SW RM		0,1	
V90X7896X	AFT THC POS Z OUTPUT DIS	GNC SW RM		0,1	
V90X7893X	AFT THC NEG Z OUTPUT DIS	GNC SW RM		0,1	
V94J4597C	AFT THC 2 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ∅	
V91X6608X	AFT THC POS X OUTPUT COMMFAULT	FCOS		0,1	
V91X6623X	AFT THC NEG X OUTPUT COMMFAULT	FCOS		0,1	
V91X6609X	AFT THC POS Y OUTPUT COMMFAULT	FCOS		0,1	
V91X6624X	AFT THC NEG Y OUTPUT COMMFAULT	FCOS		0,1	
V91X6610X	AFT THC POS Z OUTPUT COMMFAULT	FCOS		0,1	
V91X6625X	AFT THC NEG Z OUTPUT COMMFAULT	FCOS		0,1	
V90X7805X	AFT THC POS X OUTPUT-C FAIL	GNC SW RM		0,1	
V90X7796X	AFT THC NEG X OUTPUT-C FAIL	GNC SW RM		0,1	
V90X7806X	AFT THC POS Y OUTPUT-C FAIL	GNC SW RM		0,1	
V90X7797X	AFT THC NEG Y OUTPUT-C FAIL	GNC SW RM		0,1	
V90X7807X	AFT THC POS Z OUTPUT-C FAIL	GNC SW RM		0,1	



Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V90X7798X	AFT THC NEG Z OUTPUT- C FAIL	GNC SW RM		0,1	
V93X4239XB	AFT THC X,Y,Z OUT DES C	V5.1.6		0,1	
V93X4239XA	AFT THC X,Y,Z OUT DES C	RM/ORB		0,1	
V90X7894X	AFT THC POS X OUTPUT DIS	GNC SW RM		0,1	
V90X7891X	AFT THC NEG X OUTPUT DIS	GNC SW RM		0,1	
V90X7895X	AFT THC POS Y OUTPUT DIS	GNC SW RM		0,1	
V90X7892X	AFT THC NEG Y OUTPUT DIS	GNC SW RM		0,1	
V90X7896X	AFT THC POS Z OUTPUT DIS	GNC SW RM		0,1	
V90X7893X	AFT THC NEG Z OUTPUT DIS	GNC SW RM		0,1	
V94J4598C	AFT THC 3 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ♂	
V91X6800X	LH SBTC CMD A COMMFAULT	FCOS		0,1	
V90X6830X	LEFT SPEEDBRAKE COMMAND A FAIL	SBTC FDIR		0,1	
V93X4211X	LH SPD BRK 1 DES CMD	V5.1.6		0,1	
V90X6805X	LEFT SPEEDBRAKE CMD DISAGREE	SBTC FDIR		0,1	
V94J4146C	L SBTC CH 1 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ♂	
V91X6801X	LH SBTC CMD B COMMFAULT	FCOS		0,1	
V90X6831X	LEFT SPEEDBRAKE COMMAND B FAIL	SBTC FDIR		0,1	
V93X4213X	LH SPD BRK 2 DES CMD	V5.1.6		0,1	
V90X6805X	LEFT SPEEDBRAKE CMD DISAGREE	SBTC FDIR		0,1	
V94J4147C	L SBTC CH 2 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ♂	

Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V91X6802X	LH SBTC CMD C COMMFAULT	FCOS		0,1	
V90X6832X	LEFT SPEEDBRAKE COMMAND C FAIL	SBTC FDIR		0,1	
V93X4215X	LH SPD BRK 3 DES CMD	V5.1.6		0,1	
V90X6805X	LEFT SPEEDBRAKE CMD DISAGREE	SBTC FDIR		0,1	
V94J4148C	L SBTC CH 3 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ⧸	
V91X6850X	RH SBTC CMD A COMMFAULT	FCOS		0,1	
V90X6930X	RIGHT SPEEDBRAKE COMMAND A FAIL	SBTC FDIR		0,1	
V93X4241X	RH SPD BRK 1 DES CMD	V5.1.6		0,1	
V90X6905X	RIGHT SPEEDBRAKE CMD DISAGREE	SBTC FDIR		0,1	
V94J4149C	R SBTC CH 1 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ⧸	
V91X6851X	RH SBTC CMD B COMMFAULT	FCOS		0,1	
V90X6931X	RIGHT SPEEDBRAKE COMMAND B FAIL	SBTC FDIR		0,1	
V93X4243X	RH SPD BRK 2 DES CMD	V5.1.6		0,1	
V90X6905X	RIGHT SPEEDBRAKE CMD DISAGREE	SBTC FDIR		0,1	
V94J4150C	R SBTC CH 2 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ⧸	
V91X6852X	RH SBTC CMD C COMMFAULT	FCOS		0,1	
V90X6932X	RIGHT SPEEDBRAKE COMMAND C FAIL	SBTC FDIR		0,1	
V93X4245X	RH SPD BRK 3 DES CMD	V5.1.6		0,1	
V90X6905X	RIGHT SPEEDBRAKE CMD DISAGREE	SBTC FDIR		0,1	
V94J4151C	R SBTC CH 3 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ⧸	
V91X3101X	IMU 1 COMMFAULT	FCOS		0,1	
V90X2601X	IMU 1 FAIL	IMU RM		0,1	

Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V93X6711XA	IMU 1 SEL/DES CMD	IMU ALIGN DISP		0,1	
V93X6711XB	IMU 1 SEL/DES CMD	OVERRIDE DISP		0,1	
V90X2552X	IMU DILEMMA INDICATOR	IMU RM		0,1	
V94J4160C	IMU 1 I/O, FAIL STATUS		G SYS SUMM 1 IMU ALIGN DISP OVERRIDE DISP	M,↓,?, ∅	
V91X3131X	IMU 2 COMMFAULT	FCOS		0,1	
V90X2701X	IMU 2 FAIL	IMU RM		0,1	
V93X6712XA	IMU 2 SEL/DES CMD	IMU ALIGN DISP		0,1	
V93X6712XB	IMU 2 SEL/DES CMD	OVERRIDE DISP		0,1	
V90X2552X	IMU DILEMMA INDICATOR	IMU RM		0,1	
V94J4161C	IMU 2 I/O, FAIL STATUS		G SYS SUMM 1 IMU ALIGN DISP OVERRIDE DISP	M,↓,?, ∅	
V91X3161X	IMU 3 COMMFAULT	FCOS		0,1	
V90X2801X	IMU 3 FAIL	IMU RM		0,1	
V93X6713XA	IMU 3 SEL/DES CMD	IMU ALIGN DISP		0,1	
V93X6713XB	IMU 3 SEL/DES CMD	OVERRIDE DISP		0,1	
V90X2552X	IMU DILEMMA INDICATOR	IMU RM		0,1	
V94J4162C	IMU 3 I/O, FAIL STATUS		G SYS SUMM 1 IMU ALIGN DISP OVERRIDE DISP	M,↓,?, ∅	
V91X3650X	AA 1 LATERAL ACCEL COMMFAULT	FCOS		0,1	

Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V91X3651X	AA 1 NORMAL ACCEL COMMFAULT	FCOS		0,1	
V90X5701X	AA 1 FAIL	AA FDIR		0,1	
V93X4435XB	AA 1 DES CMD/FAIL	V5.1.4.1		0,1	
V90X5725X	AA NORMAL ACC DISAGREE	AA FDIR		0,1	
V90X5726X	AA LATERAL ACC DISAGREE	AA FDIR		0,1	
V94J4165C	AA 1 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ⅈ	
V91X3660X	AA 2 LATERAL ACCEL COMMFAULT	FCOS		0,1	
V91X3661X	AA 2 NORMAL ACCEL COMMFAULT	FCOS		0,1	
V90X5801X	AA 2 FAIL	AA FDIR		0,1	
V93X4436XB	AA 2 DES CMD/FAIL	V5.1.4.1		0,1	
V90X5725X	AA NORMAL ACC DISAGREE	AA FDIR		0,1	
V90X5726X	AA LATERAL ACC DISAGREE	AA FDIR		0,1	
V94J4166C	AA 2 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ⅈ	
V91X3670X	AA 3 LATERAL ACCEL COMMFAULT	FCOS		0,1	
V91X3671X	AA 3 NORMAL ACCEL COMMFAULT	FCOS		0,1	
V90X5901X	AA 3 FAIL	AA FDIR		0,1	
V93X4437XB	AA 3 DES CMD/FAIL	V5.1.4.1		0,1	
V90X5725X	AA NORMAL ACC DISAGREE	AA FDIR		0,1	
V90X5726X	AA LATERAL ACC DISAGREE	AA FDIR		0,1	
V94J4167C	AA 3 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ⅈ	
V91X3680X	AA 4 LATERAL ACCEL COMMFAULT	FCOS		0,1	
V91X3681X	AA 4 NORMAL ACCEL COMMFAULT	FCOS		0,1	
V90X5951X	AA 4 FAIL	AA FDIR		0,1	
V93X4438XB	AA 4 DES CMD/FAIL	V5.1.4.1		0,1	

Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V90X5725X	AA NORMAL ACC DISAGREE	AA FDIR		0,1	
V90X5726X	AA LATERAL ACC DISAGREE	AA FDIR		0,1	
V94J4168C	AA 4 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ♂	
V91X3700X	RGA 1 ROLL COMMFAULT	FCOS		0,1	
V91X3701X	RGA 1 PITCH COMMFAULT	FCOS		0,1	
V91X3702X	RGA 1 YAW COMMFAULT	FCOS		0,1	
V90X5401X	ORB RGA 1 FAIL	ORB RG FDIR		0,1	
V93X4516XB	RGA 1 DES CMD/FAIL	V5.1.4.2		0,1	
V90X5429X	ORB RGA ROLL RATE DISAGREE	ORB RG FDIR		0,1	
V90X5430X	ORB RGA PITCH RATE DISAGREE	ORB RG FDIR		0,1	
V90X5431X	ORB RGA YAW RATE DISAGREE	ORB RG FDIR		0,1	
V90X5406X	ORB RGA 1 POWER FAIL	ORB RGA SMRD RM		0,1	
V94J4180C	RGA 1 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ♂	
V91X3730X	RGA 2 ROLL COMMFAULT	FCOS		0,1	
V91X3731X	RGA 2 PITCH COMMFAULT	FCOS		0,1	
V91X3732X	RGA 2 YAW COMMFAULT	FCOS		0,1	
V90X5501X	ORB RGA 2 FAIL	ORB RG FDIR		0,1	
V93X4518XB	RGA 2 DES CMD/FAIL	V5.1.4.2		0,1	
V90X5429X	ORB RGA ROLL RATE DISAGREE	ORB RG FDIR		0,1	
V90X5430X	ORB RGA PITCH RATE DISAGREE	ORB RG FDIR		0,1	
V90X5431X	ORB RGA YAW RATE DISAGREE	ORB RG FDIR		0,1	
V90X5407X	ORB RGA 2 POWER FAIL	ORB RGA SMRD RM		0,1	

Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V94J4181C	RGA 2 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ♂	
V91X3760X	RGA 3 ROLL COMMFAULT	FCOS		0,1	
V91X3761X	RGA 3 PITCH COMMFAULT	FCOS		0,1	
V91X3762X	RGA 3 YAW COMMFAULT	FCOS		0,1	
V90X5601X	ORB RGA 3 FAIL	ORB RG FDIR		0,1	
V93X4520XB	RGA 3 DES CMD/FAIL	V5.1.4.2		0,1	
V90X5429X	ORB RGA ROLL RATE DISAGREE	ORB RG FDIR		0,1	
V90X5430X	ORB RGA PITCH RATE DISAGREE	ORB RG FDIR		0,1	
V90X5431X	ORB RGA YAW RATE DISAGREE	ORB RG FDIR		0,1	
V90X5408X	ORB RGA 3 POWER FAIL	ORB RGA SMRD RM		0,1	
V94J4182C	RGA 3 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ♂	
V91X3790X	RGA 4 ROLL COMMFAULT	FCOS		0,1	
V91X3791X	RGA 4 PITCH COMMFAULT	FCOS		0,1	
V91X3792X	RGA 4 YAW COMMFAULT	FCOS		0,1	
V90X5651X	ORB RGA 4 FAIL	ORB RG FDIR		0,1	
V93X4522XB	RGA 4 DES CMD/FAIL	V5.1.4.2		0,1	
V90X5429X	ORB RGA ROLL RATE DISAGREE	ORB RG FDIR		0,1	
V90X5430X	ORB RGA PITCH RATE DISAGREE	ORB RG FDIR		0,1	
V90X5431X	ORB RGA YAW RATE DISAGREE	ORB RG FDIR		0,1	
V90X5409X	ORB RGA 4 POWER FAIL	ORB RGA SMRD RM		0,1	
V94J4183C	RGA 4 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ♂	
V95X5140X	TACAN 1 RANGE COMFAULT/LOCKON FLAG	TAC SOP		0,1	

Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller

MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V95X5141X	TACAN 1 BEAR COMFAULT/LOCKON FLAG	TAC SOP		0,1	
V90X3601X	TACAN 1 FAIL	TACAN RM		0,1	
V93X4411XA	TACAN 1 DES CMD	HOR SIT DISP		0,1	
V93X4411XB	TACAN 1 DES CMD	V5.1.4.1		0,1	
V90X3605X	TACAN DILEMMA	TACAN RM		0,1	
V94J4190C	TACAN 1 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ∅	
V95X5240X	TACAN 2 RANGE COMFAULT/LOCKON FLAG	TAC SOP		0,1	
V95X5241X	TACAN 2 BEAR COMFAULT/LOCKON FLAG	TAC SOP		0,1	
V90X3701X	TACAN 2 FAIL	TACAN RM		0,1	
V93X4413XA	TACAN 2 DES CMD	HOR SIT DISP		0,1	
V93X4413XB	TACAN 2 DES CMD	V5.1.4.1		0,1	
V90X3605X	TACAN DILEMMA	TACAN RM		0,1	
V94J4191C	TACAN 2 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ∅	
V95X5340X	TACAN 3 RANGE COMFAULT/LOCKON FLAG	TAC SOP		0,1	
V95X5341X	TACAN 3 BEAR COMFAULT/LOCKON FLAG	TAC SOP		0,1	
V90X3801X	TACAN 3 FAIL	TACAN RM		0,1	
V93X4415XA	TACAN 3 DES CMD	HOR SIT DISP		0,1	
V93X4415XB	TACAN 3 DES CMD	V5.1.4.1		0,1	
V90X3605X	TACAN DILEMMA	TACAN RM		0,1	
V94J4192C	TACAN 3 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ∅	
V91X3550X	MSBLS 1 COMMFAULT	FCOS		0,1	
V95X6104X	MSBLS NO 1 RANGE LOCKED-ON	MSBLS SOP		0,1	

Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V95X6124X	MSBLS NO 1 AZIMUTH LOCKED-ON	MSBLS SOP		0,1	
V95X6144X	MSBLS NO 1 ELEVATION LOCKED-ON	MSBLS SOP		0,1	
V90X3101X	MSBLS 1 FAIL	MSBLS FDIR		0,1	
V93X4421X	MSBLS 1 DES CMD	V5.1.4.1		0,1	
V90X3065X	MSBLS RANGE DISAGREE	MSBLS FDIR		0,1	
V90X3005X	MSBLS AZIMUTH DISAGREE	MSBLS FDIR		0,1	
V90X3035X	MSBLS ELEVATION DISAGREE	MSBLS FDIR		0,1	
V94J4193C	MSBLS 1 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ♂	
V91X3560X	MSBLS 2 COMMFAULT	FCOS		0,1	
V95X6204X	MSBLS NO 2 RANGE LOCKED-ON	MSBLS SOP		0,1	
V95X6224X	MSBLS NO 2 AZIMUTH LOCKED-ON	MSBLS SOP		0,1	
V95X6244X	MSBLS NO 1 ELEVATION LOCKED-ON	MSBLS SOP		0,1	
V90X3201X	MSBLS 2 FAIL	MSBLS FDIR		0,1	
V93X4423X	MSLBS 2 DES CMD	V5.1.4.1		0,1	
V90X3065X	MSBLS RANGE DISAGREE	MSBLS FDIR		0,1	
V90X3005X	MSBLS AZIMUTH DISAGREE	MSBLS FDIR		0,1	
V90X3035X	MSBLS ELEVATION DISAGREE	MSBLS FDIR		0,1	
V94J4194C	MSBLS 2 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ♂	
V91X3570X	MSBLS 3 COMMFAULT	FCOS		0,1	
V95X6304X	MSLBS NO 3 RANGE LOCKED-ON	MSBLS SOP		0,1	
V95X6324X	MSBLS NO 3 AZIMUTH LOCKED-ON	MSBLS SOP		0,1	



Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V95X6344X	MSBLS NO 3 ELEVATION LOCKED-ON	MSBLS SOP		0,1	
V90X3301X	MSBLS 3 FAIL	MSBLS FDIR		0,1	
V93X4425X	MSBLS 3 DES CMD	V5.1.4.1		0,1	
V90X3065X	MSBLS RANGE DISAGREE	MSBLS FDIR		0,1	
V90X3005X	MSBLS AZIMUTH DISGREE	MSBLS FDIR		0,1	
V90X3035X	MSBLS ELEVATION DISAGREE	MSBLS FDIR		0,1	
V94J4195C	MSBLS 3 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ♂	
V91X3300X	ADTA 1 COMMFAULT	FCOS		0,1	
V90X5001X	ADTA 1 FAIL	ADTA RM		0,1	
V93X4571XB	ADTA 1 DES CMD	6.47		0,1	
V93X4571XA	ADTA 1 DES CMD	V5.1.4.2		0,1	
V90X4840X	DELAYED ADTA DILEMMA FLAG	ADTA RM		0,1	
V94J4200C	ADTA 1 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ♂	
V91X3330X	ADTA 2 COMMFAULT	FCOS		0,1	
V90X5051X	ADTA 2 FAIL	ADTA RM		0,1	
V93X4573XB	ADTA 2 DES CMD	6.47		0,1	
V93X4573XA	ADTA 2 DES CMD	V5.1.4.2		0,1	
V90X4840X	DELAYED ADTA DILEMMA FLAG	ADTA RM		0,1	
V94J4201C	ADTA 2 I/O, FAIL STATUS		G SYS SUMM 1 ORIDE DISP	M,↓,?, ♂	
V91X3360X	ADTA 3 COMMFAULT	FCOS		0,1	
V90X5101X	ADTA 3 FAIL	ADTA RM		0,1	
V93X4575XB	ADTA 3 DES CMD	6.47		0,1	
V93X4575XA	ADTA 3 DES CMD	V5.1.4.2		0,1	
V90X4840X	DELAYED ADTA DILEMMA FLAG	ADTA RM		0,1	
V94J4202C	ADTA 3 I/O, FAIL STATUS		G SYS SUMM 1 ORIDE DISP	M,↓,?, ♂	
V91X3390X	ADTA 4 COMMFAULT	FCOS		0,1	

Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V90X5151X	ADTA 4 FAIL	ADTA RM		0,1	
V93X4577XB	ADTA 4 DES CMD	6.47		0,1	
V93X4577XA	ADTA 4 DES CMD	V5.1.4.2		0,1	
V90X4340X	DELAYED ADTA DILEMMA FLAG	ADTA RM		0,1	
V94J4203C	ADTA 4 I/O, FAIL STATUS		G SYS SUMM 1 ORIDE DISP	M,↓,?, ⅈ	
V91X0015X	FF1 GPS1 COMMFAULT	FCOS		0,1	
V93X1205XA	DESELECT GPS 1 RCVR CMD	GPS STATUS DISPLAY		0,1	
V93X1205XB	DESELECT GPS 1 RCVR CMD	HORIZ SIT DISPLAY		0,1	
V93X1205XC	DESELECT GPS 1 RCVR CMD	REL NAV DISPLAY		0,1	
V94X0935X	GPS 1 RCVR FAIL IND	GPS SOP		0,1	
V94X0022X	GPS_DISP_DILEMMA(1)	GPS RCVR STATE PROC		0,1	
V94J6001C	GPS 1 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ⅈ	
V91X0016X	FF2 GPS2 COMMFAULT	FCOS		0,1	
V93X1206XA	DESELECT GPS 2 RCVR CMD	GPS STATUS DISPLAY		0,1	
V93X1206XB	DESELECT GPS 2 RCVR CMD	HORIZ SIT DISPLAY		0,1	
V93X1206XC	DESELECT GPS 2 RCVR CMD	REL NAV DISPLAY		0,1	
V94X0936X	GPS 2 RCVR FAIL IND	GPS SOP		0,1	
V94X0023X	GPS_DISP_DILEMMA(2)	GPS RCVR STATE PROC		0,1	
V94J6002C	GPS 2 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ⅈ	
V91X0017X	FF3 GPS3 COMMFAULT	FCOS		0,1	
V93X1207XA	DESELECT GPS 3 RCVR CMD	GPS STATUS DISPLAY		0,1	
V93X1207XB	DESELECT GPS 3 RCVR CMD	HORIZ SIT DISPLAY		0,1	

Table B.4.110.3-1.(4). GAX Support Interface Table Sensor/Controller

MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V93X1207XC	DESELECT GPS 3 RCVR CMD	REL NAV DISPLAY		0,1	
V94X0937X	GPS 3 RCVR FAIL IND	GPS SOP		0,1	
V94X0024X	GPS_DISP_DILEMMA(3)	GPS RCVR STATE PROC		0,1	
V94J6003C	GPS 3 I/O, FAIL STATUS		G SYS SUMM 1	M,↓,?, ∅	

Table B.4.110.3-1.(5). GAX Support Interface Table OMS System					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V43P4122C	OMS-L POD HE TANK PRESS 2	DSC OL2		0-5	VDC
V91X5170X	OMS L POD HE TK PRESS 2 COMMFAULT	FCOS		0,1	
V94P4220C	OMS HE TK PRESS L		G SYS SUMM 2	0,5000	PSIA
V94J4240C	OMS HE TK PRESS L LO/IO STATUS		G SYS SUMM 2	M,↓, ⚡	
V43P5122C	OMS-R POD HE TANK PRESS 2	DSC OR2		0-5	VDC
V91X5171X	OMS R POD HE TK PRESS 2 COMMFAULT	FCOS		0,1	
V94P4221C	OMS HE TK PRESS R		G SYS SUMM 2	0,5000	PSIA
V94J4241C	OMS HE TK PRESS R LO/IO STATUS		G SYS SUMM 2	M,↓, ⚡	
V43P4321C	OMS-L POD FUEL TANK ULLAGE PRESS	DSC OL1		0-5	VDC
V91X5172X	OMS L POD FU TK ULLAGE P COMMFAULT	FCOS		0,1	
V94P4222C	OMS FU TK PRESS L		G SYS SUMM 2	0,400	PSIA
V94J4242C	OMS FU TK PRESS L HI/LO/IO STATUS		G SYS SUMM 2	M,↓,↑, ⚡	
V43P5321C	OMS-R POD FU TANK ULLAGE PRESS	DSC OR1		0-5	VDC
V91X5173X	OMS R POD FU TK ULLAGE P COMMFAULT	FCOS		0,1	
V94P4223C	OMS FU TK PRESS R		G SYS SUMM 2	0,400	PSIA
V94J4243C	OMS FU TK PRESS R HI/LO/IO STATUS		G SYS SUMM 2	M,↓,↑, ⚡	
V43P4221C	OMS-L POD OXDZR TANK ULLAGE PRESS	DSC OL2		0-5	VDC
V91X5174X	OMS L POD OX TK ULLAGE P COMMFAULT	FCOS		0,1	
V94P4224C	OMS OX TK PRESS L		G SYS SUMM 2	0,400	PSIA
V94J4244C	OMS OX TK PRESS L HI/LO/IO STATUS		G SYS SUMM 2	M,↓,↑, ⚡	
V43P5221C	OMS-R POD OXDZR TANK ULLAGE PRESS	DSC OR2		0-5	VDC
V91X5175X	OMS R POD OX TK ULLAGE P COMMFAULT	FCOS		0,1	

Table B.4.110.3-1.(5). GAX Support Interface Table OMS System					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V94P4225C	OMS OX TK PRESS R		G SYS SUMM 2	0,400	PSIA
V94J4245C	OMS OX TK PRESS R HI/LO/IO STATUS		G SYS SUMM 2	M,↓,↑, ⅈ	
V43P4549C	OMS-L ENG RGLTR OUT PRESS	DSC OL1		0-5	VDC
V91X5176X	OMS L ENG REG OUT PRESS COMMFAULT	FCOS		0,1	
V94P4230C	OMS N2 REG PRESS L		G SYS SUMM 2	0,500	PSIA
V94J4250C	OMS N2 REG PRESS L HI/LO/IO STATUS		G SYS SUMM 2	M,↓,↑, ⅈ	
V43P5549C	OMS-R ENG RGLTR OUT PRESS	DSC OR1		0-5	VDC
V91X5177X	OMS R ENG REG OUT PRESS COMMFAULT	FCOS		0,1	
V94P4231C	OMS N2 REG PRESS R		G SYS SUMM 2	0,500	PSIA
V94J4251C	OMS N2 REG PRESS R HI/LO/IO STATUS		G SYS SUMM 2	M,↓,↑, ⅈ	
V43P4645C	OMS-L ENG OX INLET PRESS	DSC OL1		0-5	VDC
V94P4639C	OMS ENG OX INLET PRESS LEFT		G SYS SUMM 2	0,400	PSIA
V43P4646C	OMS-L ENG FU INLET PRESS	DSC OL2		0-5	VDC
V94P4641C	OMS ENG FU INLET PRESS LEFT		G SYS SUMM 2	0,400	PSIA
V43P5645C	OMS-R ENG OX INLET PRESS	DSC OR1		0-5	VDC
V94P4640C	OMS-R ENG OX INLET PRESS RIGHT		G SYS SUMM 2	0,400	PSIA
V43P5646C	OMS-R ENG FU INLET PRESS	DSC OR2		0-5	VDC
V94P4642C	OMS ENG FU INLET PRESS RIGHT		G SYS SUMM 2	0,400	PSIA
V43P4548C	OMS-L ENG PNEU SUPPLY PRESS 2	DSC OL1		0-5	VDC
V91X2581X	OMS-L ENG PNEU PRESS 2 COMMFAULT	FCOS		0,1	
V94P4604C	OMS ENG PNEU PRESS 2 LEFT		G SYS SUMM 2	0,5000	PSIA

Table B.4.110.3-1.(5). GAX Support Interface Table OMS System					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V94J4644C	OMS-L ENG PNEU PRESS 2 LO/IO STAT		G SYS SUMM 2	M,↓, ∅	
V43P5548C	OMS-R ENG PNEU SUPPLY PRESS 2	DSC OR1		0-5	VDC
V91X2582X	OMS-R ENG PNEU PRESS 2 COMMFAULT	FCOS		0,1	
V94P4605C	OMS ENG PNEU PRESS 2 RIGHT		G SYS SUMM 2	0,5000	PSIA
V94J4643C	OMS-R ENG PNEU PRESS 2 LO/IO STAT		G SYS SUMM 2	M,↓, ∅	
V43H4655C	OMS-L BI-PROP VLV 1 POSN OP	DSC OR2		0-5	VDC
V94Q4645C	OMS L ENG BI-PROP VLV 1 POS PCT OP		G SYS SUMM 2	0,100	PCT
V43H5655C	OMS-R ENG BI-PROP VLV 1 POSN OP	DSC OR2		0-5	VDC
V94Q4646C	OMS R ENG BI-PROP VLV 2 POS PCT OP		G SYS SUMM 2	0,100	PCT
V43H4656C	OMS-L ENG BI-PROP VLV 2 POSN OP	DSC OL2		0-5	VDC
V94Q4647C	OMS L ENG BI-PROP VLV 2 POS PCT OP		G SYS SUMM 2	0-100	PCT
V43H5656C	OMS-R ENG BI-PROP VLV 2 POSN OP	DSC OR2		0-5	VDC
V94Q4648C	OMS R ENG BI-PROP VLV 2 POS PCT OP		G SYS SUMM 2	0,100	PCT
V43Q4232C	OMS-L POD OX AFT COMPARTMENT QTY	OMS HDWR		0-5	VDC
V43X4233X	OMS-L POD OX TANK LEVEL LOW	OMS HDWR		0,1	
V91X2577X	OMS-L POD OX AFT QTY COMMFAULT	FCOS		0,1	
V91X2627X	OMS-L POD OX TK LEVEL LOW CF	FCOS		0,1	
V94Q4629C	OMS-L AFT OX QTY PERCENT DISP		G SYS SUMM 2	0,30.1	PCT
V94J4633C	OMS-L AFT OX QTY LO/IO STATUS		G SYS SUMM 2	M,↓, ∅	

Table B.4.110.3-1.(5). GAX Support Interface Table OMS System					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V43Q4332C	OMS-L POD FU AFT COMPARTMENT QTY	OMS HDWR		0-5	VDC
V43X4333X	OMS-L POD FU TANK LEVEL LOW	OMS HDWR		0,1	
V91X2579X	OMS-L POD FU AFT QTY COMMFAULT	FCOS		0,1	
V91X2629X	OMS-L POD FU TK LEVEL LOW CF	FCOS		0,1	
V94Q4631C	OMS-L AFT FU QTY PERCENT DISP		G SYS SUMM 2	0, 30.1	PCT
V94J4635C	OMS-L AFT FU QTY LO/IO STATUS		G SYS SUMM 2	M,↓, ∅	
V43Q5232C	OMS-R POD OX AFT COMPARTMENT QTY	OMS HDWR		0,5	VDC
V43X5233X	OMS-R POD OX TANK LEVEL LOW	OMS HDWR		0,1	
V91X2578X	OMS-R POD OX AFT QTY COMMFAULT	FCOS		0,1	
V91X2628X	OMS-R POD OX TK LEVEL LOW CF	FCOS		0,1	
V94Q4630C	OMS-R AFT OX QTY PERCENT DISP		G SYS SUMM 2	0,30.1	PCT
V94J4634C	OMS-R AFT OX QTY LO/IO STATUS		G SYS SUMM 2	M,↓, ∅	
V43Q5332C	OMS-R POD FU AFT COMPARTMENT QTY	OMS HDWR		0-5	VDC
V43X5333X	OMS-R POD FU TANK LEVEL LOW	OMS HDWR		0,1	
V91X2580X	OMS-R POD FU AFT QTY COMMFAULT	FCOS		0,1	
V91X2630X	OMS-R POD FU TK LEVEL LOW CF	FCOS		0,1	
V94Q4632C	OMS-R AFT FU QTY PERCENT DISP		G SYS SUMM 2	0,30.1	PCT
V94J4636C	OMS-R AFT FU QTY LO/IO STATUS		G SYS SUMM 2	M,↓, ∅	

Table B.4.110.3-1.(6). GAX Support Interface Table RCS Jet Manifold Stat					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V90X4649X	JET F1F FAILED ON	RCS RM		0,1	
V90X4650X	JET F1L FAILED ON	RCS RM		0,1	
V90X4651X	JET F1U FAILED ON	RCS RM		0,1	
V90X4652X	JET F1D FAILED ON	RCS RM		0,1	
V90X4694X	JET F1F LEAKING	RCS RM		0,1	
V90X4695X	JET F1L LEAKING	RCS RM		0,1	
V90X4696X	JET F1U LEAKING	RCS RM		0,1	
V90X4697X	JET F1D LEAKING	RCS RM		0,1	
V90X4598X	JET F1F FAILED OFF	RCS RM		0,1	
V90X4599X	JET F1L FAILED OFF	RCS RM		0,1	
V90X4601X	JET F1U FAILED OFF	RCS RM		0,1	
V90X4602X	JET F1D FAILED OFF	RCS RM		0,1	
V94J4260C	F1 JET FAIL ON, LK, OFF		G SYS SUMM 1 G SYS SUMM 2	ON,LK, OFF, ∅	
V90X4653X	JET F2F FAILED ON	RCS RM		0,1	
V90X4654X	JET F2R FAILED ON	RCS RM		0,1	
V90X4655X	JET F2U FAILED ON	RCS RM		0,1	
V90X4656X	JET F2D FAILED ON	RCS RM		0,1	
V90X4698X	JET F2F LEAKING	RCS RM		0,1	
V90X4699X	JET F2R LEAKING	RCS RM		0,1	
V90X4564X	JET F2U LEAKING	RCS RM		0,1	
V90X4565X	JET F2D LEAKING	RCS RM		0,1	
V90X4603X	JET F2F FAILED OFF	RCS RM		0,1	
V90X4604X	JET F2R FAILED OFF	RCS RM		0,1	
V90X4605X	JET F2U FAILED OFF	RCS RM		0,1	
V90X4606X	JET F2D FAILED OFF	RCS RM		0,1	
V94J4261C	F2 JET FAIL ON, LK, OFF		G SYS SUMM 1 G SYS SUMM 2	ON,LK, OFF, ∅	
V90X4657X	JET F3F FAILED ON	RCS RM		0,1	
V90X4658X	JET F3L FAILED ON	RCS RM		0,1	
V90X4659X	JET F3U FAILED ON	RCS RM		0,1	
V90X4660X	JET F3D FAILED ON	RCS RM		0,1	
V90X4566X	JET F3F LEAKING	RCS RM		0,1	
V90X4567X	JET F3L LEAKING	RCS RM		0,1	
V90X4568X	JET F3U LEAKING	RCS RM		0,1	



Table B.4.110.3-1.(6). GAX Support Interface Table RCS Jet Manifold Stat					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V90X4569X	JET F3D LEAKING	RCS RM		0,1	
V90X4607X	JET F3F FAILED OFF	RCS RM		0,1	
V90X4608X	JET F3L FAILED OFF	RCS RM		0,1	
V90X4609X	JET F3U FAILED OFF	RCS RM		0,1	
V90X4610X	JET F3D FAILED OFF	RCS RM		0,1	
V94J4262C	F3 JET FAIL ON, LK, OFF		G SYS SUMM 1 G SYS SUMM 2	ON,LK, OFF, ʘ	
V90X4661X	JET F4R FAILED ON	RCS RM		0,1	
V90X4662X	JET F4D FAILED ON	RCS RM		0,1	
V90X4615X	JET F4R LEAKING	RCS RM		0,1	
V90X4616X	JET F4D LEAKING	RCS RM		0,1	
V90X4611X	JET F4R FAILED OFF	RCS RM		0,1	
V90X4612X	JET F4D FAILED OFF	RCS RM		0,1	
V94J4263C	F4 JET FAIL ON, LK, OFF		G SYS SUMM 1 G SYS SUMM 2	ON,LK, OFF, ʘ	
V90X4663X	JET F5L FAILED ON	RCS RM		0,1	
V90X4664X	JET F5R FAILED ON	RCS RM		0,1	
V90X4617X	JET F5L LEAKING	RCS RM		0,1	
V90X4618X	JET F5R LEAKING	RCS RM		0,1	
V90X4613X	JET F5L FAILED OFF	RCS RM		0,1	
V90X4614X	JET F5R FAILED OFF	RCS RM		0,1	
V94J4272C	F5 JET FAIL ON, LK, OFF		G SYS SUMM 1 G SYS SUMM 2	ON,LK, OFF, ʘ	
V90X4620X	JET L1A FAILED ON	RCS RM		0,1	
V90X4621X	JET L1L FAILED ON	RCS RM		0,1	
V90X4622X	JET L1U FAILED ON	RCS RM		0,1	
V90X4665X	JET L1A LEAKING	RCS RM		0,1	
V90X4666X	JET L1L LEAKING	RCS RM		0,1	
V90X4667X	JET L1U LEAKING	RCS RM		0,1	
V90X4570X	JET L1A FAILED OFF	RCS RM		0,1	
V90X4571X	JET L1L FAILED OFF	RCS RM		0,1	
V90X4572X	JET L1U FAILED OFF	RCS RM		0,1	
V94J4264C	L1 JET FAIL ON, LK, OFF		G SYS SUMM 1 G SYS SUMM 2	ON,LK, OFF, ʘ	
V90X4623X	JET L2L FAILED ON	RCS RM		0,1	
V90X4624X	JET L2U FAILED ON	RCS RM		0,1	

Table B.4.110.3-1.(6). GAX Support Interface Table RCS Jet Manifold Stat					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V90X4625X	JET L2D FAILED ON	RCS RM		0,1	
V90X4668X	JET L2L LEAKING	RCS RM		0,1	
V90X4669X	JET L2U LEAKING	RCS RM		0,1	
V90X4670X	JET L2D LEAKING	RCS RM		0,1	
V90X4573X	JET L2L FAILED OFF	RCS RM		0,1	
V90X4574X	JET L2U FAILED OFF	RCS RM		0,1	
V90X4575X	JET L2D FAILED OFF	RCS RM		0,1	
V94J4265C	L2 JET FAIL ON, LK, OFF		G SYS SUMM 1 G SYS SUMM 2	ON,LK, OFF, ∅	
V90X4626X	JET L3A FAILED ON	RCS RM		0,1	
V90X4627X	JET L3L FAILED ON	RCS RM		0,1	
V90X4628X	JET L3D FAILED ON	RCS RM		0,1	
V90X4671X	JET L3A LEAKING	RCS RM		0,1	
V90X4672X	JET L3L LEAKING	RCS RM		0,1	
V90X4673X	JET L3D LEAKING	RCS RM		0,1	
V90X4576X	JET L3A FAILED OFF	RCS RM		0,1	
V90X4577X	JET L3L FAILED OFF	RCS RM		0,1	
V90X4578X	JET L3D FAILED OFF	RCS RM		0,1	
V94J4266C	L3 JET FAIL ON, LK, OFF		G SYS SUMM 1 G SYS SUMM 2	ON,LK, OFF, ∅	
V90X4629X	JET L4L FAILED ON	RCS RM		0,1	
V90X4630X	JET L4U FAILED ON	RCS RM		0,1	
V90X4631X	JET L4D FAILED ON	RCS RM		0,1	
V90X4674X	JET L4L LEAKING	RCS RM		0,1	
V90X4675X	JET L4U LEAKING	RCS RM		0,1	
V90X4676X	JET L4D LEAKING	RCS RM		0,1	
V90X4579X	JET L4L FAILED OFF	RCS RM		0,1	
V90X4580X	JET L4U FAILED OFF	RCS RM		0,1	
V90X4581X	JET L4D FAILED OFF	RCS RM		0,1	
V94J4267C	L4 JET FAIL ON, LK, OFF		G SYS SUMM 1 G SYS SUMM 2	ON,LK, OFF, ∅	
V90X4633X	JET L5L FAILED ON	RCS RM		0,1	
V90X4632X	JET L5D FAILED ON	RCS RM		0,1	
V90X4678X	JET L5L LEAKING	RCS RM		0,1	
V90X4677X	JET L5D LEAKING	RCS RM		0,1	
V90X4583X	JET L5L FAILED OFF	RCS RM		0,1	

Table B.4.110.3-1.(6). GAX Support Interface Table RCS Jet Manifold Stat					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V90X4582X V94J4274C	JET L5D FAILED OFF L5 JET FAIL ON, LK, OFF	RCS RM	G SYS SUMM 1 G SYS SUMM 2	0,1 ON,LK, OFF, ∅	
V90X4634X	JET R1A FAILED ON	RCS RM		0,1	
V90X4635X	JET R1R FAILED ON	RCS RM		0,1	
V90X4636X	JET R1U FAILED ON	RCS RM		0,1	
V90X4679X	JET R1A LEAKING	RCS RM		0,1	
V90X4681X	JET R1R LEAKING	RCS RM		0,1	
V90X4682X	JET R1U LEAKING	RCS RM		0,1	
V90X4584X	JET R1A FAILED OFF	RCS RM		0,1	
V90X4585X	JET R1R FAILED OFF	RCS RM		0,1	
V90X4586X V94J4268C	JET R1U FAILED OFF R1 JET FAIL ON, LK, OFF	RCS RM	G SYS SUMM 1 G SYS SUMM 2	0,1 ON,LK, OFF, ∅	
V90X4637X	JET R2R FAILED ON	RCS RM		0,1	
V90X4638X	JET R2U FAILED ON	RCS RM		0,1	
V90X4639X	JET R2D FAILED ON	RCS RM		0,1	
V90X4683X	JET R2R LEAKING	RCS RM		0,1	
V90X4684X	JET R2U LEAKING	RCS RM		0,1	
V90X4685X	JET R2D LEAKING	RCS RM		0,1	
V90X4587X	JET R2R FAILED OFF	RCS RM		0,1	
V90X4588X	JET R2U FAILED OFF	RCS RM		0,1	
V90X4589X V94J4269C	JET R2D FAILED OFF R2 JET FAIL ON, LK, OFF	RCS RM	G SYS SUMM 1 G SYS SUMM 2	0,1 ON,LK, OFF, ∅	
V90X4641X	JET R3A FAILED ON	RCS RM		0,1	
V90X4642X	JET R3R FAILED ON	RCS RM		0,1	
V90X4643X	JET R3D FAILED ON	RCS RM		0,1	
V90X4686X	JET R3A LEAKING	RCS RM		0,1	
V90X4687X	JET R3R LEAKING	RCS RM		0,1	
V90X4688X	JET R3D LEAKING	RCS RM		0,1	
V90X4590X	JET R3A FAILED OFF	RCS RM		0,1	
V90X4591X	JET R3R FAILED OFF	RCS RM		0,1	
V90X4592X V94J4270C	JET R3D FAILED OFF R3 JET FAIL ON, LK, OFF	RCS RM	G SYS SUMM 1 G SYS SUMM 2	0,1 ON,LK, OFF, ∅	

Table B.4.110.3-1.(6). GAX Support Interface Table RCS Jet Manifold Stat					
MML NO.	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V90X4644X	JET R4R FAILED ON	RCS RM		0,1	
V90X4645X	JET R4U FAILED ON	RCS RM		0,1	
V90X4646X	JET R4D FAILED ON	RCS RM		0,1	
V90X4689X	JET R4R LEAKING	RCS RM		0,1	
V90X4690X	JET R4U LEAKING	RCS RM		0,1	
V90X4691X	JET R4D LEAKING	RCS RM		0,1	
V90X4593X	JET R4R FAILED OFF	RCS RM		0,1	
V90X4594X	JET R4U FAILED OFF	RCS RM		0,1	
V90X4595X	JET R4D FAILED OFF	RCS RM		0,1	
V94J4271C	R4 JET FAIL ON, LK, OFF		G SYS SUMM 1 G SYS SUMM 2	ON,LK, OFF, ∅	
V90X4648X	JET R5R FAILED ON	RCS RM		0,1	
V90X4647X	JET R5D FAILED ON	RCS RM		0,1	
V90X4693X	JET R5R LEAKING	RCS RM		0,1	
V90X4692X	JET R5D LEAKING	RCS RM		0,1	
V90X4597X	JET R5R FAILED OFF	RCS RM		0,1	
V90X4596X	JET R5D FAILED OFF	RCS RM		0,1	
V94J4273C	R5 JET FAIL ON, LK, OFF		G SYS SUMM 1 G SYS SUMM 2	ON,LK, OFF, ∅	

Table B.4.110.3-1.(7). GAX Support Interface Table RCS Conv & Status					
MML NO. <sup>1</sup>	DESCRIPTION <sup>2</sup>	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V42P1112C	RCS FWD HE OX TANK PRESS-2	DSC F4		0-5	VDC
V91X5204X	RCS FWD HE OX TK P 2 COMMFAULT	FCOS		0,1	
V94P4320C	RCS FWD HE PRESS OX		G SYS SUMM 2	0,4000	PSIA
V94J4340C	RCS FWD HE PRESS OX LO/IO STATUS		G SYS SUMM 2	M,↓, ∅	
V42P1114C	RCS FWD HE FU TANK PRESS-2	DSC F2		0-5	VDC
V91X5217X	RCS FWD HE FU TK PRES 2 COMMFAULT	FCOS		0,1	
V94P4321C	RCS FWD HE PRESS FU		G SYS SUMM 2	0,4000	PSIA
V94J4341C	RCS FWD HE PRESS FU LO/IO STATUS		G SYS SUMM 2	M,↓, ∅	
V42P1210C	RCS FWD OX TANK OUT PRESS	DSC F2		0-5	VDC
V91X5225X	RCS FWD OX TANK OUT PRES COMMFAULT	FCOS		0,1	
V94P4322C	RCS FWD TK PRESS OX		G SYS SUMM 2	0,400	PSIA
V94J4342C	RCS FWD TK PRESS OX HI/LO/IO STATUS		G SYS SUMM 2 RCS QTY MON	M,↓,↑, ∅	
V42P1310C	RCS FWD FU TANK OUT PRESS	DSC F4		0-5	VDC
V91X5219X	RCS FWD FU TANK OUT PRES COMMFAULT	FCOS		0,1	
V94P4323C	RCS FWD TK PRESS FU		G SYS SUMM 2	0,400	PSIA
V94J4343C	RCS FWD TK PRESS FU HI/LO/IO STATUS		G SYS SUMM 2 RCS QTY MON	M,↓,↑, ∅	
V42P2112C*	RCS L AFT HE OX TANK PRESS-2*	DSC OL2		0-5	VDC
V91X5208X	RCS L AFT HE OX TK P-2 COMMFAULT*	FCOS		0,1	
V94P4324C	RCS L HE PRES OX		G SYS SUMM 2	0,4000	PSIA
V94X4344X	RCS L HE PRESS OX LO/IO STATUS		G SYS SUMM 2	M,↓, ∅	
V42P2114C*	RCS L AFT HE FU TANK PRESS-2*	DSC OL1		0-5	VDC

Table B.4.110.3-1.(7). GAX Support Interface Table RCS Conv & Status					
MML NO. <sup>1</sup>	DESCRIPTION <sup>2</sup>	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V91X5209X	RCS L AFT HE FU TK P-2 COMMFAULT*	FCOS		0,1	
V94P4325C	RCS L HE PRESS FU		G SYS SUMM 2	0,4000	PSIA
V94J4345C	RCS L HE PRESS FU LO/IO STATUS		G SYS SUMM 2	M,↓, ∅	
V42P2210C*	RCS L AFT OX TANK OUT PRESS*	DSC OL1		0-5	VDC
V91X5237X	RCS L AFT OX TANK OUT PRES COMFLT*	FCOS		0,1	
V94P4326C	RCS L TK PRESS OX		G SYS SUMM 2	0,400	PSIA
V94J4346C	RCS L TK PRESS OX HI/LO/IO STATUS		G SYS SUMM 2 RCS QTY MON	M,↓,↑, ∅	
V42P2310C*	RCS L AFT FU TANK OUT PRESS*	DSC OL2		0-5	VDC
V91X5231X	RCS L AFT FU TANK OUT PRES COMFLT*	FCOS		0,1	
V94P4327C	RCS L TK PRESS FU		G SYS SUMM 2	0,400	PSIA
V94J4347C	RCS L TK PRESS FU HI/LO/IO STATUS		G SYS SUMM 2 RCS QTY MON	M,↓,↑, ∅	
V42P3112C*	RCS R AFT HE OX TANK PRESS-2*	DSC OR2		0-5	VDC
V91X5212X	RCS R AFT HE OX TK P-2 COMMFAULT*	FCOS		0,1	
V94P4328C	RCS R HE PRESS OX		G SYS SUMM 2	0,4000	PSIA
V94J4348C	RCS R HE PRESS OX LO/IO STATUS		G SYS SUMM 2	M,↓, ∅	
V42P3114C*	RCS R AFT HE FU TANK PRESS-2*	DSC OR1		0-5	VDC
V91X5213X	RCS R AFT HE FU TK P-2 COMMFAULT*	FCOS		0,1	
V94P4329C	RCS R HE PRESS FU		G SYS SUMM 2	0,4000	PSIA
V94J4349C	RCS R HE PRESS FU LO/IO STATUS		G SYS SUMM 2	M,↓, ∅	
V42P3210C*	RCS R AFT OX TANK OUT PRESS*	DSC OR1		0-5	VDC
V91X5249X	RCS R AFT OX TANK OUT PRES COMFLT*	FCOS		0,1	
V94P4330C	RCS R TK PRESS OX		G SYS SUMM 2	0,400	PSIA

Table B.4.110.3-1.(7). GAX Support Interface Table RCS Conv & Status					
MML NO. <sup>1</sup>	DESCRIPTION <sup>2</sup>	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V94J4350C	RCS R TK PRESS OX HI/LO/IO STATUS		G SYS SUMM 2 RCS QTY MON	M,↓,↑, ⅈ	
V42P3310C*	RCS R AFT FU TANK OUT PRESS*	DSC OR2		0-5	VDC
V91X5243X	RCS R AFT FU TANK OUT PRES COMFLT*	FCOS		0,1	
V94P4331C	RCS R TK PRESS FU		G SYS SUMM 2	0,400	PSIA
V94J4351C	RCS R TK PRESS FU HI/LO/IO STATUS		G SYS SUMM 2 RCS QTY MON	M,↓,↑, ⅈ	
V90X2392X	RCS-FWD QUANTITY ALERT	RCS QTY MON		0,1	
V94J4360C	FWD RCS QTY FU IO/LK STATUS		G SYS SUMM 2		
V90X2392X	RCS-FWD QUANTITY ALERT	RCS QTY MON		0,1	
V90X2378X	RCS FWD FU LEAKAGE ALERT DISP	RCS QTY MON		0,1	
V90X2379X	RCS FWD OX LEAKAGE ALERT DISP	RCS QTY MON		0,1	
V94J4361C	FWD RCS QTY OX IO/LK STATUS		G SYS SUMM 2	↓, ⅈ	
V90X2393X	RCS-L QUANTITY ALERT	RCS QTY MON		0,1	
V90X2374X	RCS L FU LEAKAGE ALERT DISP	RCS QTY MON		0,1	
V94J4362C	L RCS QTY FU IO/LK STATUS		G SYS SUMM 2	↓, ⅈ	
V90X2393X	RCS-L QUANTITY ALERT	RCS QTY MON		0,1	
V90X2375X	RCS L OX LEAKAGE ALERT DISP	RCS QTY MON		0,1	
V94J4363C	L RCS QTY OX IO/LK STATUS		G SYS SUMM 2	↓, ⅈ	
V90X2394X	RCS-R QUANTITY ALERT	RCS QTY MON		0,1	
V90X2376X	RCS R FU LEAKAGE ALERT DISP	RCS QTY MON		0,1	

Table B.4.110.3-1.(7). GAX Support Interface Table RCS Conv & Status					
MML NO. <sup>1</sup>	DESCRIPTION <sup>2</sup>	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V94J4364C	R RCS QTY FU IO/LK STATUS		G SYS SUMM 2	↓,℘	
V90X2394X	RCS-R QUANTITY ALERT	RCS QTY MON		0,1	
V90X2377X	RCS R OX LEAKAGE ALERT DISP	RCS QTY MON		0,1	
V94X4365X	R RCS QTY OX IO/LK STATUS		G SYS SUMM 2	↓,℘	
V42P1212C	RCS-FWD OX MANF PRESS-1	DSC F4		0-5	VDC
V94P4852C	RCS FWD OX MANIF 1 PRESS		G SYS SUMM 2	0,1000	PSIA
V42P1312C	RCS-FWD FU MANF PRESS-1	DSC F4		0-5	VDC
V94P4856C	RCS FWD FU MANIF 1 PRESS		G SYS SUMM 2	0,1000	PSIA
V42P1214C	RCS-FWD OX MANF PRESS-2	DSC F4		0-5	VDC
V94P4853C	RCS FWD OX MANIF 2 PRESS		G SYS SUMM 2	0,1000	PSIA
V42P1314C	RCS-FWD FU MANF PRESS-2	DSC F4		0-5	VDC
V94P4857C	RCS FWD FU MANIF 2 PRESS		G SYS SUMM 2	0,1000	PSIA
V42P1216C	RCS-FWD OX MANF PRESS-3	DSC F2		0-5	VDC
V94P4854C	RCS FWD OX MANIF 3 PRESS		G SYS SUMM 2	0,1000	PSIA
V42P1316C	RCS-FWD FU MANF PRESS-3	DSC F2		0-5	VDC
V94P4858C	RCS FWD FU MANIF 3 PRESS		G SYS SUMM 2	0,1000	PSIA
V42P1218C	RCS-FWD OX MANF PRESS-4	DSC F2		0-5	VDC
V94P4855C	RCS FWD OX MANIF 4 PRESS		G SYS SUMM 2	0,1000	PSIA
V42P1318C	RCS-FWD FU MANF PRESS-4	DSC F2		0-5	VDC



Table B.4.110.3-1.(7). GAX Support Interface Table RCS Conv & Status					
MML NO. <sup>1</sup>	DESCRIPTION <sup>2</sup>	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V94P4859C	RCS FWD FU MANIF 4 PRESS		G SYS SUMM 2	0,1000	PSIA
V42P2212C	RCS-L AFT OX MANF PRESS-1	DSC OL1		0-5	VDC
V94P4770C	RCS L OX MANF 1 PRESS		G SYS SUMM 2	0-1000	PSIA
V42P2312C	RCS-L AFT FU MANF PRESS 1	DSC OL1		0-5	VDC
V94P4774C	RCS L FU MANF 1 PRESS		G SYS SUMM 2	0-1000	PSIA
V42P2214C	RCS-L AFT OX MANF PRESS 2	DSC OL1		0-5	VDC
V94P4771C	RCS L OX MANF 2 PRESS	DSC OL1	G SYS SUMM 2	0-1000	PSIA
V42P2314C	RCS-L AFT FU MANF PRESS 2			0-5	VDC
V94P4775C	RCS L FU MANF 2 PRESS		G SYS SUMM 2	0-1000	PSIA
V42P2216C	RCS-L AFT OX MANF PRESS-3	DSC OL2		0-5	VDC
V94P4772C	RCS L OX MANF 3 PRESS		G SYS SUMM 2	0-1000	PSIA
V42P2316C	RCS-L AFT FU MANF PRESS 3	DSC OL2		0-5	VDC
V94P4776C	RCS L FU MANF 3 PRESS		G SYS SUMM 2	0-1000	PSIA
V42P2218C	RCS-L AFT OX MANF PRESS 4	DSC OL2		0-5	VDC
V94P4773C	RCS L OX MANF 4 PRESS		G SYS SUMM 2	0-1000	PSIA
V42P2318C	RCS-L AFT FU MANF PRESS 4	DSC OL2		0-5	VDC
V94P4777C	RCS L FU MANF 4 PRESS		G SYS SUMM 2	0-1000	PSIA
V42P3212C	RCS-R AFT OX MANF PRESS 1	DSC OR1		0-5	VDC
V94P4778C	RCS R OX MANF 1 PRESS		G SYS SUMM 2	0-1000	PSIA
V42P3312C	RCS-R AFT FU MANF PRESS 1	DSC OR1		0-5	VDC
V94P4782C	RCS R FU MANF 1 PRESS		G SYS SUMM 2	0-1000	PSIA
V42P3214C	RCS-R AFT OX MANF PRESS 2	DSC OR1		0-5	VDC
V94P4779C	RCS R OX MANF 2 PRESS		G SYS SUMM 2	0-1000	PSIA
V42P3314C	RCS-R AFT FU MANF PRESS 2	DSC OR1		0-5	VDC
V94P4783C	RCS R FU MANF 2 PRESS		G SYS SUMM 2	0-1000	PSIA

Table B.4.110.3-1.(7). GAX Support Interface Table RCS Conv & Status					
MML NO. <sup>1</sup>	DESCRIPTION <sup>2</sup>	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V42P3216C	RCS-R AFT OX MANF PRESS 3	DSC OR2		0-5	VDC
V94P4780C	RCS R OX MANF 3 PRESS		G SYS SUMM 2	0-1000	PSIA
V42P3316C	RCS-R AFT FU MANF PRESS 3	DSC OR2		0-5	VDC
V94P4784C	RCS R FU MANF 3 PRESS		G SYS SUMM 2	0-1000	PSIA
V42P3218C	RCS-R AFT OX MANF PRESS 4	DSC OR2		0-5	VDC
V94P4781C	RCS R OX MANF 4 PRESS		G SYS SUMM 2	0-1000	PSIA
V42P3318C	RCS-R AFT FU MANF PRESS 4	DSC OR2		0-5	VDC
V94P4785C	RCS R FU MANF 4 PRESS		G SYS SUMM 2	0-1000	PSIA
V91X5180X	RCS F OX MAN IS VLV 1 CL COMFLT	FCOS		0,1	
V91X5181X	RCS F FU MAN IS VLV 1 CL COMFLT	FCOS		0,1	
V90X4435X	RCS MANF F1 RM DILEMMA FLAG	RCS RM		0,1	
V94J4300C	RCS F1 MANF ISLN VLV OP/CL IO STAT		G SYS SUMM 1 G SYS SUMM 2	M,?, ∅	
V91X5182X	RCS F OX MAN IS VLV 2 CL COMFLT	FCOS		0,1	
V91X5183X	RCS F FU MAN IS VLV 2 CL COMFLT	FCOS		0,1	
V90X4436X	RCS MANF F2 RM DILEMMA FLAG	RCS RM		0,1	
V94J4301C	RCS F2 MANF ISLN VLV OP/CL IO STAT		G SYS SUMM 1 G SYS SUMM 2	M,?, ∅	
V91X5184X	RCS F OX MAN IS VLV 3 CL COMFLT	FCOS		0,1	
V91X5185X	RCS F FU MAN IS VLV 3 CL COMFLT	FCOS		0,1	
V90X4437X	RCS MANF F3 RM DILEMMA FLAG	RCS RM		0,1	
V94J4302C	RCS F3 MANF ISLN VLV OP/CL IO STAT		G SYS SUMM 1 G SYS SUMM 2	M,?, ∅	
V91X5186X	RCS F OX MAN IS VLV 4 CL COMFLT	FCOS		0,1	

Table B.4.110.3-1.(7). GAX Support Interface Table RCS Conv & Status					
MML NO. <sup>1</sup>	DESCRIPTION <sup>2</sup>	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V91X5187X	RCS F FU MAN IS VLV 4 CL COMFLT	FCOS		0,1	
V90X4438X	RCS MANF F4 RM DILEMMA FLAG	RCS RM		0,1	
V94J4303C	RCS F4 MANF ISLN VLV OP/CL IO STAT		G SYS SUMM 1 G SYS SUMM 2	M,?, ∅	
V91X2584X	RCS F OX MAN IS VLV 5 CL COMFLT	FCOS		0,1	
V90X4439X	RCS MANF F5 RM DILEMMA FLAG	RCS RM		0,1	
V91X2585X	RCS F FU MAN IS VLV 5 CL COMFLT	FCOS		0,1	
V94J4541C	RCS F5 MANF ISLN VLV OP/CL IO STAT		G SYS SUMM 1 G SYS SUMM 2	M,?, ∅	
V91X5188X	RCS L OX MAN IS VLV 1 CL COMFLT	FCOS		0,1	
V91X5189X	RCS L FU MAN IS VLV 1 CL COMFLT	FCOS		0,1	
V90X4440X	RCS MANF L1 RM DILEMMA FLAG	RCS RM		0,1	
V94J4304C	RCS L1 MANF ISLN VLV OP/CL IO STAT		G SYS SUMM 1 G SYS SUMM 2	M,?, ∅	
V91X5190X	RCS L OX MAN IS VLV 2 CL COMFLT	FCOS		0,1	
V91X5191X	RCS L FU MAN IS VLV 2 CL COMFLT	FCOS		0,1	
V90X4441X	RCS MANF L2 RM DILEMMA FLAG	RCS RM		0,1	
V94J4305C	RCS L2 MANF ISLN VLV OP/CL IO STAT		G SYS SUMM 1 G SYS SUMM 2	M,?, ∅	
V91X5192X	RCS L OX MAN IS VLV 3 CL COMFLT	FCOS		0,1	
V91X5193X	RCS L FU MAN IS VLV 3 CL COMFLT	FCOS		0,1	
V90X4442X	RCS MANF L3 RM DILEMMA FLAG	RCS RM		0,1	
V94J4306C	RCS L3 MANF ISLN VLV OP/CL IO STAT		G SYS SUMM 1 G SYS SUMM 2	M,?, ∅	

Table B.4.110.3-1.(7). GAX Support Interface Table RCS Conv & Status					
MML NO. <sup>1</sup>	DESCRIPTION <sup>2</sup>	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V91X5194X	RCS L OX MAN IS VLV 4 CL COMFLT	FCOS		0,1	
V91X5195X	RCS L FU MAN IS VLV 4 CL COMFLT	FCOS		0,1	
V90X4443X	RCS MANF L4 RM DILEMMA FLAG	RCS RM		0,1	
V94J4307C	RCS L4 MANF ISLN VLV OP/CL IO STAT		G SYS SUMM 1 G SYS SUMM 2	M,?, ∅	
V91X2596X	RCS L OX MAN IS VLV 5 CL COMFLT	FCOS		0,1	
V91X2597X	RCS L FU MAN IS VLV 5 CL COMFLT	FCOS		0,1	
V90X4444X	RCS MANF L5 RM DILEMMA FLAG	RCS RM		0,1	
V94J4543C	RCS L5 MANF ISLN VLV OP/CL IO STAT		G SYS SUMM 1 G SYS SUMM 2	M,?, ∅	
V91X5196X	RCS R OX MAN IS VLV 1 CL COMFLT	FCOS		0,1	
V91X5197X	RCS R FU MAN IS VLV 1 CL COMFLT	FCOS		0,1	
V90X4445X	RCS MANF R1 RM DILEMMA FLAG	RCS RM		0,1	
V94J4308C	RCS R1 MANF ISLN VLV OP/CL IO STAT		G SYS SUMM 1 G SYS SUMM 2	M,?, ∅	
V91X5198X	RCS R OX MAN IS VLV 2 CL COMFLT	FCOS		0,1	
V91X5199X	RCS R FU MAN IS VLV 2 CL COMFLT	FCOS		0,1	
V90X4446X	RCS MANF R2 RM DILEMMA FLAG	RCS RM		0,1	
V94J4309C	RCS R2 MANF ISLN VLV OP/CL IO STAT		G SYS SUMM 1 G SYS SUMM 2	M,?, ∅	
V91X5200X	RCS R OX MAN IS VLV 3 CL COMFLT	FCOS		0,1	
V91X5201X	RCS R FU MAN IS VLV 3 CL COMFLT	FCOS		0,1	
V90X4447X	RCS MANF R3 RM DILEMMA FLAG	RCS RM		0,1	

Table B.4.110.3-1.(7). GAX Support Interface Table RCS Conv & Status					
MML NO. <sup>1</sup>	DESCRIPTION <sup>2</sup>	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V94J4310C	RCS R3 MANF ISLN VLV OP/CL IO STAT		G SYS SUMM 1 G SYS SUMM 2	M,?, ∅	
V91X5203X	RCS R OX MAN IS VLV 4 CL COMFLT	FCOS		0,1	
V91X5202X	RCS R FU MAN IS VLV 4 CL COMFLT	FCOS		0,1	
V90X4448X	RCS MANF R4 RM DILEMMA FLAG	RCS RM		0,1	
V94J4311C	RCS R4 MANF ISLN VLV OP/CL IO STAT		G SYS SUMM 1 G SYS SUMM 2		
V91X2598X	RCS R OX MAN IS VLV 5 CL COMFLT	FCOS		0,1	
V91X2599X	RCS R FU MAN IS VLV 5 CL COMFLT	FCOS		0,1	
V90X4449X	RCS MANF R5 RM DILEMMA FLAG	RCS RM		0,1	
V94J4545C	RCS R5 MANF ISLN VLV OP/CL IO STAT		G SYS SUMM 1 G SYS SUMM 2	M,?, ∅	

1. An MML NO. with a tenth character asterisk identifies the second path for a measurement signal that is dual routed (i.e., channelized on two flight critical MDMs).

2. An \* refers to the second routing of a dually routed parameter and the associated commfault.

Table B.4.110.4-1 GAX Annunciation Table

MML NO.	LVLB	NOMENCLATURE	SOURCE	OPS AVAIL	N F	ALRM		MSG ID	MAJOR	MESSAGE TEXT	MIN
						C L	I D				
V79X5100X	G24619	LH SRB ROCK ACTR A FAIL	ATVCD 1	1							
V79X5150X	G24627	RH SRB ROCK ACTR A FAIL	ATVCD 1	1							
V79X5101X	G24620	LH SRB TILT ACTR A FAIL	ATVCD 1	1							
V79X5151X	G24628	RH SRB TILT ACTR A FAIL	ATVCD 1	1							
V79X1170X	G24301	MPS ENG 1 P ACTR A FAIL	ATVCD 1	136							
V79X1270X	G24309	MPS ENG 2 P ACTR A FAIL	ATVCD 1	136							
V79X1370X	G24317	MPS ENG 3 P ACTR A FAIL	ATVCD 1	136							
V79X1171X	G24302	MPS ENG 1 Y ACTR A FAIL	ATVCD 1	136							
V79X1271X	G24310	MPS ENG 2 Y ACTR A FAIL	ATVCD 1	136							
V79X1371X	G24318	MPS ENG 3 Y ACTR A FAIL	ATVCD 1	136							
V79X3260X	G22716	L INBOARD ELEVON ACTR 1 FAIL	ASA 1	136							
V79X3265X	G22720	L OTBOARD ELEVON ACTR 1 FAIL	ASA 1	136							
V79X3270X	G22708	R INBOARD ELEVON ACTR 1 FAIL	ASA 1	136							
V79X3275X	G22712	R OTBOARD ELEVON ACTR 1 FAIL	ASA 1	136							
V79X3331X	G22700	RUDDER ACTR 1 FAIL	ASA 1	136							
V79X3336X	G22704	SPEEDBRAKE ACTR 1 FAIL	ASA 1	136							
V94X4387X	G47712	FCS CH 1 FL MSG		136			2	6	13101	FCS CH	1
V79X5105X	G24621	LH SRB ROCK ACTR B FAIL	ATVCD 2	1							
V79X5155X	G24629	RH SRB ROCK ACTR B FAIL	ATVCD 2	1							
V79X5106X	G24622	LH SRB TILT ACTR B FAIL	ATVCD 2	1							
V79X5156X	G24630	RH SRB TILT ACTR B FAIL	ATVCD 2	1							
V79X1173X	G24303	MPS ENG 1 P ACTR B FAIL	ATVCD 2	136							
V79X1273X	G24311	MPS ENG 2 P ACTR B FAIL	ATVCD 2	136							
V79X1373X	G24319	MPS ENG 3 P ACTR B FAIL	ATVCD 2	136							
V79X1174X	G24304	MPS ENG 1 Y ACTR B FAIL	ATVCD 2	136							
V79X1274X	G24312	MPS ENG 2 Y ACTR B FAIL	ATVCD 2	136							
V79X1374X	G24320	MPS ENG 3 Y ACTR B FAIL	ATVCD 2	136							
V79X3261X	G22717	L INBOARD ELEVON ACTR 2 FAIL	ASA 2	136							
V79X3266X	G22721	L OTBOARD ELEVON ACTR 2 FAIL	ASA 2	136							
V79X3271X	G22709	R INBOARD ELEVON ACTR 2 FAIL	ASA 2	136							
V79X3276X	G22713	R OTBOARD ELEVON ACTR 2 FAIL	ASA 2	136							
V79X3332X	G22701	RUDDER ACTR 2 FAIL	ASA 2	136							
V79X3337X	G22705	SPEEDBRAKE ACTR 2 FAIL	ASA 2	136							
V94X4392X	G47713	FCS CH 2 FL MSG		136			2	6	13102	FCS CH	2
V79X5110X	G24623	LH SRB ROCK ACTR C FAIL	ATVCD 3	1							
V79X5160X	G24631	RH SRB ROCK ACTR C FAIL	ATVCD 3	1							
V79X5111X	G24624	LH SRB TILT ACTR C FAIL	ATVCD 3	1							
V79X5161X	G24632	RH SRB TILT ACTR C FAIL	ATVCD 3	1							
V79X1176X	G24305	MPS ENG 1 P ACTR C FAIL	ATVCD 3	136							
V79X1276X	G24313	MPS ENG 2 P ACTR C FAIL	ATVCD 3	136							
V79X1376X	G24321	MPS ENG 3 P ACTR C FAIL	ATVCD 3	136							
V79X1177X	G24306	MPS ENG 1 Y ACTR C FAIL	ATVCD 3	136							
V79X1277X	G24314	MPS ENG 2 Y ACTR C FAIL	ATVCD 3	136							
V79X1377X	G24322	MPS ENG 3 Y ACTR C FAIL	ATVCD 3	136							
V79X3262X	G22718	L INBOARD ELEVON ACTR 3 FAIL	ASA 3	136							
V79X3267X	G22722	L OTBOARD ELEVON ACTR 3 FAIL	ASA 3	136							
V79X3272X	G22710	R INBOARD ELEVON ACTR 3 FAIL	ASA 3	136							
V79X3277X	G22714	R OTBOARD ELEVON ACTR 3 FAIL	ASA 3	136							
V79X3333X	G22702	RUDDER ACTR 3 FAIL	ASA 3	136							

Table B.4.110.4-1 GAX Annunciation Table

MML NO.	LVLB	NOMENCLATURE	SOURCE	OPS AVAIL	N F	ALRM		MSG ID	MAJOR	MESSAGE TEXT	MIN
						C L	I D				
V79X3338X	G22706	SPEEDBRAKE ACTR 3 FAIL	ASA 3	136							
V94X4396X	G47714	FCS CH 3 FL MSG		136			2	6	13103	FCS CH	3
V79X5115X	G24625	LH SRB ROCK ACTR D FAIL	ATVCD 4	1							
V79X5165X	G24633	RH SRB ROCK ACTR D FAIL	ATVCD 4	1							
V79X5116X	G24626	LH SRB TILT ACTR D FAIL	ATVCD 4	1							
V79X5166X	G24634	RH SRB TILT ACTR D FAIL	ATVCD 4	1							
V79X1178X	G24307	MPS ENG 1 P ACTR D FAIL	ATVCD 4	136							
V79X1278X	G24315	MPS ENG 2 P ACTR D FAIL	ATVCD 4	136							
V79X1378X	G24323	MPS ENG 3 P ACTR D FAIL	ATVCD 4	136							
V79X1179X	G24308	MPS ENG 1 Y ACTR D FAIL	ATVCD 4	136							
V79X1279X	G24316	MPS ENG 2 Y ACTR D FAIL	ATVCD 4	136							
V79X1379X	G24324	MPS ENG 3 Y ACTR D FAIL	ATVCD 4	136							
V79X3263X	G22719	L INBOARD ELEVON ACTR 4 FAIL	ASA 4	136							
V79X3268X	G22723	L OTBOARD ELEVON ACTR 4 FAIL	ASA 4	136							
V79X3273X	G22711	R INBOARD ELEVON ACTR 4 FAIL	ASA 4	136							
V79X3278X	G22715	R OTBOARD ELEVON ACTR 4 FAIL	ASA 4	136							
V79X3334X	G22703	RUDDER ACTR 4 FAIL	ASA 4	136							
V79X3339X	G22707	SPEEDBRAKE ACTR 4 FAIL	ASA 4	136							
V94X4399X	G47715	FCS CH 4 FL MSG		136			2	6	13104	FCS CH	4
V90X7799X	G34497	AFT THC POS X OUTPUT A FAIL	GNC SW RM	28							
V90X7790X	G34498	AFT THC NEG X OUTPUT A FAIL	GNC SW RM	28							
V90X7800X	G34499	AFT THC POS Y OUTPUT A FAIL	GNC SW RM	28							
V90X7791X	G34500	AFT THC NEG Y OUTPUT A FAIL	GNC SW RM	28							
V90X7801X	G44401	AFT THC POS Z OUTPUT A FAIL	GNC SW RM	28							
V90X7792X	G44402	AFT THC NEG Z OUTPUT A FAIL	GNC SW RM	28							
V90X7802X	G44403	AFT THC POS X OUTPUT B FAIL	GNC SW RM	28							
V90X7793X	G44404	AFT THC NEG X OUTPUT B FAIL	GNC SW RM	28							
V90X7803X	G44405	AFT THC POS Y OUTPUT B FAIL	GNC SW RM	28							
V90X7794X	G44406	AFT THC NEG Y OUTPUT B FAIL	GNC SW RM	28							
V90X7804X	G44407	AFT THC POS Z OUTPUT B FAIL	GNC SW RM	28							
V90X7795X	G44408	AFT THC NEG Z OUTPUT B FAIL	GNC SW RM	28							
V90X7805X	G44409	AFT THC POS X OUTPUT C FAIL	GNC SW RM	28							
V90X7796X	G44410	AFT THC NEG X OUTPUT C FAIL	GNC SW RM	28							
V90X7806X	G44411	AFT THC POS Y OUTPUT C FAIL	GNC SW RM	28							
V90X7797X	G44412	AFT THC NEG Y OUTPUT C FAIL	GNC SW RM	28							
V90X7807X	G44413	AFT THC POS Z OUTPUT C FAIL	GNC SW RM	28							
V90X7798X	G44414	AFT THC NEG Z OUTPUT C FAIL	GNC SW RM	28							
V94X4419X	G49041	A THC CH 1/2/3 FL/DLMA MSG		28			3		13206	SBTC/THC	A
V90X7894X	G44421	AFT THC POS X OUTPUT-DIS	GNC SW RM	28							
V90X7891X	G44422	AFT THC NEG X OUTPUT-DIS	GNC SW RM	28							
V90X7895X	G44423	AFT THC POS Y OUTPUT-DIS	GNC SW RM	28							
V90X7892X	G44424	AFT THC NEG Y OUTPUT-DIS	GNC SW RM	28							
V90X7896X	G44425	AFT THC POS Z OUTPUT-DIS	GNC SW RM	28							
V90X7893X	G44426	AFT THC NEG Z OUTPUT-DIS	GNC SW RM	28							
V94X4419X	G49041	A THC CH1/2/3 FL/DLMA MSG		28			3		13206	SBTC/THC	A
V90X8131X	G44415	FWD THC POS X OUTPUT-DIS	GNC SW RM	238							
V90X8128X	G44416	FWD THC NEG X OUTPUT-DIS	GNC SW RM	238							

Table B.4.110.4-1 GAX Annunciation Table

MML NO.	LVLB	NOMENCLATURE	SOURCE	OPS AVAIL	N F	ALRM		MSG ID	MAJOR	MESSAGE TEXT	MIN
						C L	I D				
V90X8132X	G44417	FWD THC POS Y OUTPUT-DIS	GNC SW RM	238							
V90X8129X	G44418	FWD THC NEG Y OUTPUT-DIS	GNC SW RM	238							
V90X8133X	G44419	FWD THC POS Z OUTPUT-DIS	GNC SW RM	238							
V90X8130X	G44420	FWD THC NEG Z OUTPUT-DIS	GNC SW RM	238							
V94X4403X	G49053	L SBTC/THC CH1/2/3 FL/DLMA MSG		238			3	13230		SBTC/THC	L
V90X6805X	G18307	LT SPEEDBRAKE COMMAND DISAGREE	SBTC FDIR	36							
V94X4403X	G49053	L SBTC/THC CH1/2/3 FL/DLMA MSG		36			3	13230		SBTC/THC	L
V90X6830X	G18301	LEFT SPEEDBRAKE COMMAND A FAIL	SBTC FDIR	36							
V90X6831X	G18302	LEFT SPEEDBRAKE COMMAND B FAIL	SBTC FDIR	36							
V90X6832X	G18303	LEFT SPEEDBRAKE COMMAND C FAIL	SBTC FDIR	36							
V94X4403X	G49053	L SBTC/THC CH1/2/3 FL/DLMA MSG		36			3	13230		SBTC/THC	L
V90X7829X	G34479	FWD THC POS X OUTPUT A FAIL	GNC SW RM	238							
V90X7820X	G34480	FWD THC NEG X OUTPUT A FAIL	GNC SW RM	238							
V90X7830X	G34481	FWD THC POS Y OUTPUT A FAIL	GNC SW RM	238							
V90X7821X	G34482	FWD THC NEG Y OUTPUT A FAIL	GNC SW RM	238							
V90X7831X	G34483	FWD THC POS Z OUTPUT A FAIL	GNC SW RM	238							
V90X7822X	G34484	FWD THC NEG Z OUTPUT A FAIL	GNC SW RM	238							
V90X7832X	G34485	FWD THC POS X OUTPUT B FAIL	GNC SW RM	238							
V90X7823X	G34486	FWD THC NEG X OUTPUT B FAIL	GNC SW RM	238							
V90X7833X	G34487	FWD THC POS Y OUTPUT B FAIL	GNC SW RM	238							
V90X7824X	G34488	FWD THC NEG Y OUTPUT B FAIL	GNC SW RM	238							
V90X7834X	G34489	FWD THC POS Z OUTPUT B FAIL	GNC SW RM	238							
V90X7825X	G34490	FWD THC NEG Z OUTPUT B FAIL	GNC SW RM	238							
V90X7835X	G34491	FWD THC POS X OUTPUT C FAIL	GNC SW RM	238							
V90X7826X	G34492	FWD THC NEG X OUTPUT C FAIL	GNC SW RM	238							
V90X7836X	G34493	FWD THC POS Y OUTPUT C FAIL	GNC SW RM	238							
V90X7827X	G34494	FWD THC NEG Y OUTPUT C FAIL	GNC SW RM	238							
V90X7837X	G34495	FWD THC POS Z OUTPUT C FAIL	GNC SW RM	238							
V90X7828X	G34496	FWD THC NEG Z OUTPUT C FAIL	GNC SW RM	238							
V94X4403X	G49053	L SBTC/THC CH1/2/3 FL/DLMA MSG		238			3	13230		SBTC/THC	L
V90X6905X	G18308	RT SPEEDBRAKE COMMAND DISAGREE	SBTC FDIR	36							
V90X6930X	G18304	RIGHT SPEEDBRAKE COMMAND A FL	SBTC FDIR	36							
V90X6931X	G18305	RIGHT SPEEDBRAKE COMMAND B FL	SBTC FDIR	36							
V90X6932X	G18306	RIGHT SPEEDBRAKE COMMAND C FL	SBTC FDIR	36							
V94X4404X	G49054	R SBTC/THC CH1/2/3 FL/DLMA MSG		36			3	13231		SBTC/THC	R
V90X6362X	G18007	AFT RHC 1 FAIL	RHC FDIR	28							
V90X6363X	G18008	AFT RHC 2 FAIL	RHC FDIR	28							
V90X6364X	G18009	AFT RHC 3 FAIL	RHC FDIR	28							
V94X4406X	G18025	A RHC CH 1,2,3 FL MSG		28			3	13306		RHC	A
V90X6205X	G18035	AFT RHC ROLL DISAGREE	RHC FDIR	28							
V90X6235X	G18034	AFT RHC PITCH DISAGREE	RHC FDIR	28							
V90X6265X	G18036	AFT RHC YAW DISAGREE	RHC FDIR	28							
V94X4412X	G47782	A RHC DLMA MSG		28			2	5 13306		RHC	A
V90X6201X	G18001	LEFT RHC 1 FAIL	RHC FDIR	12368							



Table B.4.110.4-1 GAX Annunciation Table

MML NO.	LVLB	NOMENCLATURE	SOURCE	OPS AVAIL	N F	ALRM		MSG ID	MAJOR	MESSAGE TEXT	MIN
						C L	I D				
V90X6231X	G18002	LEFT RHC 2 FAIL	RHC FDIR	12368							
V90X6261X	G18003	LEFT RHC 3 FAIL	RHC FDIR	12368							
V94X4407X	G47777	L RHC CH 1,2,3 FL MSG		12368			3	13330	RHC		L
V90X6005X	G18015	LEFT RHC ROLL DISAGREE	RHC FDIR	12368							
V90X6035X	G18013	LEFT RHC PITCH DISAGREE	RHC FDIR	12368							
V90X6065X	G18023	LEFT RHC YAW DISAGREE	RHC FDIR	12368							
V94X4411X	G47780	L RHC DLMA MSG		12368			2	4 13330	RHC		L
V90X6301X	G18004	RIGHT RHC 1 FAIL	RHC FDIR	12368							
V90X6331X	G18005	RIGHT RHC 2 FAIL	RHC FDIR	12368							
V90X6361X	G18006	RIGHT RHC 3 FAIL	RHC FDIR	12368							
V94X4408X	G47774	R RHC CH 1,2,3 FL MSG		12368			3	13331	RHC		R
V90X6105X	G18016	RIGHT RHC ROLL DISAGREE	RHC FDIR	12368							
V90X6135X	G18014	RIGHT RHC PITCH DISAGREE	RHC FDIR	12368							
V90X6165X	G18025	RIGHT RHC YAW DISAGREE	RHC FDIR	12368							
V94X4413X	G47781	R RHC DLMA MSG		12368			2	5 13331	RHC		R
V95H8010C		COMP LIB ELVN POS	ELPFB SOP	36							
V95H8110C		COMP RIB ELVN POS	ELPFB SOP	36							
V95H8060C	G08705	COMP LOB ELVN POS	ELPFB SOP	36							
V95H8160C	G08703	COMP ROB ELVN POS	ELPFB SOP	36							
V94X4416X	G46121	FCS POS SAT MSG		36			2	1 13442	FCS SAT		POS
V90P2516C	G14516	SEL LIB ELVN PRI DELTA PRESS	SF	36							
V90P2515C	G14517	SEL LOB ELVN PRI DELTA PRESS	SF	36							
V90P2518C	G14514	SEL RIB ELVN PRI DELTA PRESS	SF	36							
V90P2517C	G14515	SEL ROB ELVN PRI DELTA PRESS	SF	36							
V94X4417X	G46122	FCS HM EXCEED MSG		36			2	1 13443	FCS SAT		MOM
V90J6420C		BODY FLAP ALERT	BF CMD RM	136							
V94X4155X		BODY FLAP ALERT HOLD MSG		136			3	13537	BODY FLAP		HOLD
V90J6420C		BODY FLAP ALERT	BF CMD RM	136							
V94X4157X		BODY FLAP ALERT CYCLE MSG		136			3	13538	BODY FLAP		CYCL
V90J6420C		BODY FLAP ALERT	BF CMD RM	136							
V94X4158X		BODY FLAP ALERT FAIL MSG		136			3	13586	BODY FLAP		FAIL
V90X2601X	G14707	IMU 1 FAIL	IMU RM	12368							
V90X2701X	G14708	IMU 2 FAIL	IMU RM	12368							
V90X2801X	G14709	IMU 3 FAIL	IMU RM	12368							
V94X4714X		IMU 1/2/3 FL MSG		12368			3	13633	RM FAIL		IMU
V90X3101X	G16201	MSBLS 1 FAIL	MLS FDIR	36							
V90X3201X	G16202	MSBLS 2 FAIL	MLS FDIR	36							
V90X3301X	G16203	MSBLS 3 FAIL	MLS FDIR	36							
V94X4721X		MLS 1/2/3 FL MSG		36			3	13634	RM FAIL		MLS
V90X3608X		TACAN BEARING 1 FAIL	TAC RM	36							

Table B.4.110.4-1 GAX Annunciation Table

MML NO.	LVLB	NOMENCLATURE	SOURCE	OPS AVAIL	N F	ALRM		MSG ID	MAJOR	MESSAGE TEXT	MIN
						C L	I D				
V90X3708X		TACAN BEARING 2 FAIL	TAC RM	36							
V90X3808X		TACAN BEARING 3 FAIL	TAC RM	36							
V94X4724X		TAC 1/2/3 FL MSG		36			3	13636		RM FAIL	TAC
V90X3611X		TACAN RANGE 1 FAIL	TAC RM	36							
V90X3711X		TACAN RANGE 2 FAIL	TAC RM	36							
V90X3811X		TACAN RANGE 3 FAIL	TAC RM	36							
V94X4724X		TAC 1/2/3 FL MSG		36			3	13636		RM FAIL	TAC
V90X5001X	G15001	ADTA 1 FAIL	ADTA RM	36							
V90X5051X	G15002	ADTA 2 FAIL	ADTA RM	36							
V90X5101X	G15003	ADTA 3 FAIL	ADTA RM	36							
V90X5151X	G15004	ADTA 4 FAIL	ADTA RM	36							
V94X4737X		ADTA 1/2/3/4 FL MSG		36			3	7 13644		RM FAIL	ADTA
V90X5401X	G14494	ORB RGA 1 FAIL	RGA FDIR	136							
V90X5501X	G14495	ORB RGA 2 FAIL	RGA FDIR	136							
V90X5601X	G14496	ORB RGA 3 FAIL	RGA FDIR	136							
V90X5651X	G15318	ORB RGA 4 FAIL	RGA FDIR	136							
V90X5406X		ORB RGA 1 POWER FAIL	ORB RGA SMRD RM	136							
V90X5407X		ORB RGA 2 POWER FAIL	ORB RGA SMRD RM	136							
V90X5408X		ORB RGA 3 POWER FAIL	ORB RGA SMRD RM	136							
V90X5409X		ORB RGA 4 POWER FAIL	ORB RGA SMRD RM	136							
V94X4733X		RGA 1/2/3/4 FL MSG		136			3	13654		RM FAIL	RGA
V90X5701X	G46906	AA 1 FAIL	AA FDIR	136							
V90X5801X	G46907	AA 2 FAIL	AA FDIR	136							
V90X5901X	G46908	AA 3 FAIL	AA FDIR	136							
V90X5951X	G46909	AA 4 FAIL	AA FDIR	136							
V94X4729X		AA 1/2/3/4 FL MSG		136			3	13655		RM FAIL	ACC
V95X4283X	G50297	R RADAR ERROR FLAG	RR SOP	2							
V94X4711X		RR DATA VALID MSG		2			3	13700	G33	RNDZ RADAR	
V96X0054X		A/N GATE LATCHED TO NULL	LDG SOP	36							
V94X4812X		WOW DLMA MSG		36			3	13829		RM DLMA	WOW
V90X4450X		RCS MANF RM DILEMMA FLAG	RCS RM	12368							
V94X4314X		RCS MANF RM DILEMMA MSG		12368				13832		RM DLMA	MANF
V90X2552X	G14706	IMU DILEMMA INDICATOR	IMU RM	12368							
V94X4716X		IMU DLMA MSG		12368			2	2 13833		RM DLMA	IMU
V90X3035X	G14525	MSBLS ELEVATION DISAGREE	MLS FDIR	36							
V90X3065X	G16210	MSBLS RANGE DISAGREE	MLS FDIR	36							
V90X3005X	G14524	MSBLS AZIMUTH DISAGREE	MLS FDIR	36							
V94X4435X	G49068	MLS DLMA MSG		36			3	13834		RM DLMA	MLS
V90X6350X		HYD SYS 1 DISAGREE	HYD FDIR	136							

Table B.4.110.4-1 GAX Annunciation Table

MML NO.	LVLB	NOMENCLATURE	SOURCE	OPS AVAIL	N F	ALRM		MSG ID	MAJOR	MESSAGE TEXT	MIN
						C L	I D				
V90X6351X		HYD SYS 2 DISAGREE	HYD FDIR	136							
V90X6352X		HYD SYS 3 DISAGREE	HYD FDIR	136							
V94X4415X		HYD DILEMMA MSG		136			3	13835		RM DLMA	PRL
V90X3605X	G15904	TACAN DILEMMA	TAC RM	36							
V94X4725X		TAC DLMA MSG		36			3	13836		RM DLMA	TAC
V90X4840X		DELAYED ADTA DILEMMA FLAG	ADTA RM	36							
V94X4738X		ADTA DLMA MSG		36			2	7 13844		RM DLMA	ADTA
V90X5430X		ORB RGA PITCH RATE DISAGREE	RGA FDIR	136							
V90X5431X		ORB RGA YAW RATE DISAGREE	RGA FDIR	136							
V90X5429X		ORB RGA ROLL RATE DISAGREE	RGA FDIR	136							
V94X4791X		ORB RGA DLMA MSG		136			2	3 13854		RM DLMA	RGA
V90X5725X		AA NORMAL ACC DISAGREE	AA FDIR	136							
V90X5726X		AA LATERAL ACC DISAGREE	AA FDIR	136							
V94X4790X		AA DLMA MSG	AA FDIR	136			2	3 13855		RM DLMA	ACC
V71X2405X	G49202	IMU 1 PLATFORM TEMP SAFE	IMU 1	16283							
V71X2407X	G49205	IMU 1 CAPRI TEMP SAFE	IMU 1	16283							
V95X0023XA	C92153	IMU 1 FAILURE INDICATOR	IMU INIT- PROC	16283							
V94X4430X	G47688	IMU 1 TEMP/BITE MSG		16283			3	13901		IMU BITE/T	1
V71X3405X	G49203	IMU 2 PLATFORM TEMP SAFE	IMU 2	16283							
V71X3407X	G49206	IMU 2 CAPRI TEMP SAFE	IMU 2	16283							
V95X1023XA	C92154	IMU 2 FAILURE INDICATOR	IMU INIT- PROC	16283							
V94X4431X	G47689	IMU 2 TEMP/BITE MSG		16283			3	13902		IMU BITE/T	2
V71X4405X	G49204	IMU 3 PLATFORM TEMP SAFE	IMU 3	16283							
V71X4407X	G49207	IMU 3 CAPRI TEMP SAFE	IMU 3	16283							
V95X2023XA	C92155	IMU 3 FAILURE INDICATOR	IMU INIT- PROC	16283							
V94X4432X	G47690	IMU 3 TEMP/BITE MSG		16283			3	13903		IMU BITE/T	3
V95X7339X		ALARM REQUESTING TRANS T SING	ORB TGT	2							
V94X4379X		TRANS T SING MSG		2			3	14000		TGT DELTA T	
V90X3432X		ET SEP MANUAL DEFAULT	GNC SW RM	1							
V94X4539X		ET SEP-MANUAL MSG		1			3	14100		ET SEP-MAN	
V90X6525X		LH BODY FLAP DOWN SW DISAGREE	GNC SW RM	36							
V90X6515X		LH BODY FLAP UP SW DISAGREE	GNC SW RM	36							
V94X4820X		LH BODY FLAP SW MSG		36			3	14230		BODY FLAP SW L	
V90X6625X		RH BODY FLAP DOWN SW DISAGREE	GNC SW RM	36							
V90X6615X		RH BODY FLAP UP SW DISAGREE	GNC SW RM	36							
V94X4821X		RH BODY FLAP SW MSG		36			3	14231		BODY FLAP SW R	

Table B.4.110.4-1 GAX Annunciation Table

MML NO.	LVLB	NOMENCLATURE	SOURCE	OPS AVAIL	N F	ALRM		MSG ID	MAJOR	MESSAGE TEXT	MIN
						C L	I D				
V90X7255X		LH - PITCH TRIM SW DISAGREE	GNC SW RM	36							
V90X7245X		LH + PITCH TRIM DISAGREE	GNC SW RM	36							
V90X7235X		LH - ROLL TRIM SW DISAGREE	GNC SW RM	36							
V90X7225X		LH + ROLL TRIM SW DISAGREE	GNC SW RM	36							
V90X7275X		LH - YAW TRIM SW DISAGREE	GNC SW RM	36							
V90X7265X		LH + YAW TRIM SW DISAGREE	GNC SW RM	36							
V94X4822X		LH PNL TRIM SW MSG		36			3	14330		PNL TRIM	L
V90X7455X		RH - PITCH TRIM SW DISAGREE	GNC SW RM	36							
V90X7445X		RH + PITCH TRIM SW DISAGREE	GNC SW RM	36							
V90X7051X		RH - ROLL TRIM SW DISAGREE	GNC SW RM	36							
V90X7425X		RH + ROLL TRIM SW DISAGREE	GNC SW RM	36							
V90X7475X		RH - YAW TRIM SW DISAGREE	GNC SW RM	36							
V90X7465X		LH + YAW TRIM SW DISAGREE	GNC SW RM	36							
V94X4823X		RH PNL TRIM SW MSG		36			3	14331		PNL TRIM	R
V90X4451X		RCS PWR FAIL FLAG	RCS RM	12368							
V94X4313X		RCS PWR FAIL MSG		12368			3	14786		RCS PWR	FAIL
V90X3433X		AFT SENSE SW DEFAULT	GNC SW RM	2							
V94X4828X		AFT SENSE SW MSG		2			3	14800		SENSE SW	
V90X3446X		ME-1 SHUTDOWN SW DISAGREE	GNC SW RM	16							
V94X4110X		ME-1 SHUTDOWN SW MSG		16			3	14908		ME SHDN SW	C
V90X3447X		ME-2 SHUTDOWN SW DISAGREE	GNC SW RM	16							
V94X4111X		ME-2 SHUTDOWN SW MSG		16			3	14930		ME SHDN SW	L
V90X3448X		ME-3 SHUTDOWN SW DISAGREE	GNC SW RM	16							
V94X4112X		ME-3 SHUTDOWN SW MSG		16			3	14931		ME SHDN SW	R
V95X1202X	G47273	ME-1 COMMAND PATH FAIL FLAG	SSME SOP	16							
V94X4748X		ME-1 CMD PATH FL MSG		16			3	15008		MPS CMD	C
V95X1203X	G47274	ME-2 COMMAND PATH FAIL FLAG	SSME SOP	16							
V94X4749X		ME-2 CMD PATH FL MSG		16			3	15030		MPS CMD	L
V95X1204X	G47275	ME-3 COMMAND PATH FAIL FLAG	SSME SOP	16							
V94X4750X		ME-3 CMD PATH FL MSG		16			3	15031		MPS CMD	R
V90X3438X		ET SEP AUTO DEFAULT	GNC SW RM	16							
V94X4534X		ET SEP-AUTO MSG		16			3	15100		ET SEP-AUT	
V90X3441X		ENTRY ROLL MODE SW FAIL	GNC SW RM	36							
V94X4830X		ENTRY ROLL MODE SWITCH MSG		36			3	15200	G51	RL MODE SW	
V95X7331X		ALARM REQUESTING TPI_ELANG	ORB TGT	2							
V94X4832X		TPI_EL_ANG MSG		2			3	15300		TGT EL ANG	
V95X7330X		ALARM REQUESTING LAMB_TGT	ORB TGT	2							
V95X7332X		ALARM REQUESTING CW_ITER	ORB TGT	2							

Table B.4.110.4-1 GAX Annunciation Table

MML NO.	LVLB	NOMENCLATURE	SOURCE	OPS AVAIL	N F	ALRM		MSG ID	MAJOR	MESSAGE TEXT	MIN
						C L	I D				
V94X4829X		ITER LIM MSG		2			3	15400		TGT ITER	
V95X1150X V94X4745X	G46392	ME-1 FLT DATA PATH FAIL FLAG ME-1 FLT DATA PATH FL MSG	SSME SOP	16 16			3	15508		MPS DATA	C
V95X1151X V94X4746X	G46393	ME-2 FLT DATA PATH FAIL FLAG ME-2 FLT DATA PATH FL MSG	SSME SOP	16 16			3	15530		MPS DATA	L
V95X1152X V94X4747X	G46394	ME-3 FLT DATA PATH FAIL FLAG ME-3 FLT DATA PATH FL MSG	SSME SOP	16 16			3	15531		MPS DATA	R
V90X7677X	G19205	OMS L PITCH GIMBAL FAIL FLAG	OMS RM 6.35	123							
V90X7679X	G19207	OMS L YAW GIMBAL FAIL FLAG	OMS RM 6.35	123							
V94X4464X	G49035	OMS L GMBL FL MSG		123			2 12	15660		L OMS	GMBL
V43X4233X V43X4333X V94X4704X	G48453 G48454 G50218	OMS-L POD OX TANK LEVEL LOW OMS-L POD FU TANK LEVEL LOW OMS L TK LVL LO MSG	OMS HDWR OMS HDWR	12368 12368 12368			3	15661		L OMS	QTY
V90X8274X	G42617	LT OMS HE/VAPOR ISO VLV MISCOM	OMS FIRE- SEQ ORB OMS/ RCS CONN	1236 8							
V90X8274X	G42617	LT OMS HE/VAPOR ISO VOL MISCOM	ORB OMS/ RCS CONN	28							
V94X4756X		LT OMS HE/VAP 1S V MISCOMP MSG		12368			3	15662		L OMS	VLV
V94X4756X		LT OMS HE/VAP 1S V MISCOMP MSG		28			3	15662		L OMS	VLV
V90X7685X V94X4800X		OMS L CHAMB PRESS FAIL FLAG LT OMS PC TRANS FL MSG	OMS RM	1236 1236			2 13	15663		L OMS	PC
V43P4221C V94X4455X	G42800 G46006	OMS-L POD OX TANK ULLAGE PRES OMS L OX/FU TK P HI/LO MSG	DSC OL2	28 28	2		2 13	15665		L OMS	TK P
V43P4122C V43P4549C V43P4548C V94X4700X	G22741 G22752 G46182 G50216	OMS-L POD HE TANK PRESS 2 OMS-L ENG RGLTR OUT PRESS OMS-L ENG PNEU SUPPLY PRESS 2 OMS L PRESS MSG	DSC OL2 DSC OL1 DSC OL1	28 28 28 28	2 2 2		3	15665		L OMS	TK P
V43P4321C V94X4455X	G42801 G46006	OMS-L POD FU TANK ULLAGE PRES OMS L OX/FU TK P HI/LO MSG	DSC OL1	28 28			2 13	15665		L OMS	TK P
V90X7678X	G19206	OMS R PITCH GIMBAL FAIL FLAG	OMS RM, 6.35	123							
V90X7680X	G19208	OMS R YAW GIMBAL FAIL FLAG	OMS RM, 6.35	123							
V94X4465X V43X5233X	G49036 G48455	OMS R GMBL FL MSG OMS-R POD OX TANK LEVEL LOW	OMS HDWR	123 12368			2 12	15760		R OMS	GMBL

Table B.4.110.4-1 GAX Annunciation Table

MML NO.	LVLB	NOMENCLATURE	SOURCE	OPS AVAIL	N F	ALRM		MSG ID	MAJOR	MESSAGE TEXT	MIN
						C L	I D				
V43X5333X V94X4705X	G48456 G50221	OMS-R POD FU TANK LEVEL LOW OMS R TK LVL LO MSG	OMS HDWR	12368 12368				3	15761	R OMS	QTY
V90X8275X	G42616	RT OMS HE/VAPOR ISO VLV MISCOM	OMS FIRE- SEQ	1236							
V90X8275X	G42616	RT OMS HE/VAPOR ISO VLV MISCOM	ORB OMS/ RCS CONN	8							
V90X8275X	G42616	RT OMS HE/VAPOR ISO VLV MISCOM	ORB OMS/ RCS CONN	28							
V94X4757X		RT OMS HE/VAP ISO V MISCOM MSG		12368				3	15762	R OMS	VLV
V94X4757X		RT OMS HE/VAP ISO V MISCOM MSG		28				3	15762	R OMS	VLV
V90X7686X V94X4801X		OMS R CHAMB PRESS FAIL FLAG RT OMS PC TRANS FL MSG	OMS RM	1236 1236				2 14	15763	R OMS	PC
V43P5221C V94X4456X	G42802 G46007	OMS-R POD OX TANK ULLAGE PRES OMS R OX/FU TK P HI/LO MSG	DSC OR2	28 28	2			2 14	15765	R OMS	TK P
V43P5321C V94X4456X	G42803 G46007	OMS-R POD FU TANK ULLAGE PRES OMS R OX/FU TK P HI LO MSG	DSC OR1	28 28	2			2 14	15765	R OMS	TK P
V43P5122C V43P5549C V43P5548C V94X4701X	G22743 G22753 G46184 G50219	OMS-R POD HE TANK PRESS 2 OMS-R ENG RGLTR OUT PRESS OMS-R ENG PNEU SUPPLY PRESS 2 OMS R PRESS MSG	DSC OR2 DSC OR1 DSC OR1	28 28 28 28	2 2 2			3	15765	R OMS	TK P
V90X8531X	G48522	LT OMS PROP USED EXCEEDS LIMIT	OMS/RCS- QTY GAG	2							
V90X8532X	G48521	RT OMS PROP USED EXCEEDS LIMIT	OMS/RCS- QTY GAG	2							
V94X4754X		OMS PROP USED EXCEEDS MSG		2				3	15861	G23 OMS/RCS	QTY
V95X1194X V94X4742X	G47267	ME-1 ELEC LOCKUP MODE FLAG ME-1 ELEC LKUP MSG	SSME SOP	16 16				3	15908	MPS ELEC	C
V95X1195X V94X4743X	G47268	ME-2 ELEC LOCKUP MODE FLAG ME-2 ELEC LKUP MSG	SSME SOP	16 16				3	15930	MPS ELEC	L
V95X1196X V94X4744X	G47269	ME-3 ELEC LOCKUP MODE FLAG ME-3 ELEC LKUP MSG	SSME SOP	16 16				3	15931	MPS ELEC	R
V95X1198X V94X4739X	G47270	ME-1 HYD LOCKUP MODE FLAG ME-1 HYD LKUP MSG	SSME SOP	16 16				3	16008	MPS HYD	C
V95X1199X V94X4740X	G47271	ME-2 HYD LOCKUP MODE FLAG ME-2 HYD LKUP MSG	SSME SOP	16 16				3	16030	MPS HYD	L
V95X1200X V94X4741X	G47272	ME-3 HYD LOCKUP MODE FLAG ME-3 HYD LKUP MSG	SSME SOP	16 16				3	16031	MPS HYD	R

Table B.4.110.4-1 GAX Annunciation Table

MML NO.	LVLB	NOMENCLATURE	SOURCE	OPS AVAIL	N F	ALRM		MSG ID	MAJOR	MESSAGE TEXT	MIN
						C L	I D				
V95X1207X V94X4275X		MPS E1 FAIL FLAG SSME 1 FAIL MSG	SSME OPS	16 16				2 16108		SSME FAIL	C
V95X1208X V94X4276X		MPS E2 FAIL FLAG SSME 2 FAIL MSG	SSME OPS	16 16				2 16130		SSME FAIL	L
V95X1209X V94X4277X		MPS E3 FAIL FLAG SSME 3 FAIL MSG	SSME OPS	16 16				2 16131		SSME FAIL	R
V94X4769X V94X4786X		HIGH-G GAX HIGH-G MSG	E/L EV AN PROC	36 36				3 16200		HIGH G	
V93X5538X V94X4278X		GNC GROUND CHECKOUT ENABLE GNC GRD C/O IN PROGRESS MSG	UI	123 123				3 1634F		GNC GRD CK	ENA
V94X2062X V94X4383X		TAL TARGET ERROR INDICATOR TAL TARGET ERROR MSG	HORIZ SIT SPEC	1 1				3 1645E		TARGET ERR	TAL
V94X2063X V94X4384X		RTLS TARGET ERROR INDICATOR RTLS TARGET ERROR MSG	HORIZ SIT SPEC	16 16				3 1645F		TARGET ERR	RTLS
V42P1114C V42P1112C V94X4472X	G20425 G20428 G47679	RCS FWD HE FU TANK PRESS-2 RCS FWD HE OX TANK PRESS-2 RCS FWD HE P LO MSG	DSC F2 DSC F4	28 28 28	2 2			3 16564		F RCS	HE P
V42P1116C V42P1115C V94X4476X	G20431 G20434 G47681	RCS FWD FU TANK ULLAGE PRESS RCS FWD OX TANK ULLAGE PRESS RCS F FU/OX TK P HI/LO MSG	DSC F2 DSC F4	28 28 28	2 2			2 9 16565		F RCS	TK P
V90X2355X V90X2356X V94X4485X	G46410 G46409 G49094	RCS FWD FU LEAKAGE ALERT RCS FWD OX LEAKAGE ALERT RCS F FU/OX QTY LK MSG	RCS QTY- MON RCS QTY- MON	12368 12368 12368				2 9 16566		F RCS	LEAK
V90X4649X V90X4694X V90X4598X V90X4653X V90X4698X V90X4603X V90X4657X V90X4566X V90X4607X V94X4501X	G18901 G19015 G18939 G18905 G19019 G18943 G18909 G19023 G18947 G47731	JET F1F FAILED ON JET F1F LEAKING JET F1F FAILED OFF JET F2F FAILED ON JET F2F LEAKING JET F2F FAILED OFF JET F3F FAILED ON JET F3F LEAKING JET F3F FAILED OFF RCS F 1/2/3 F JET FL MSG	RCS RM RCS RM RCS RM RCS RM RCS RM RCS RM RCS RM RCS RM RCS RM	12368 12368 12368 12368 12368 12368 12368 12368 12368 12368				2 8 16568		F RCS	FJET
V90X4650X V90X4695X	G18902 G19016	JET F1L FAILED ON JET F1L LEAKING	RCS RM RCS RM	12368 12368							

Table B.4.110.4-1 GAX Annunciation Table

MML NO.	LVLB	NOMENCLATURE	SOURCE	OPS AVAIL	N F	ALRM		MSG ID	MAJOR	MESSAGE TEXT	MIN
						C L	I D				
V90X4599X	G18940	JET F1L FAILED OFF	RCS RM	12368							
V90X4658X	G18910	JET F3L FAILED ON	RCS RM	12368							
V90X4567X	G19024	JET F3L LEAKING	RCS RM	12368							
V90X4608X	G18948	JET F3L FAILED OFF	RCS RM	12368							
V90X4663X	G19029	JET F5L FAILED ON	RCS RM	28							
V90X4617X	G19031	JET F5L LEAKING	RCS RM	28							
V90X4613X	G19030	JET F5L FAILED OFF	RCS RM	28							
V94X4489X	G47718	RCS F 1/3/5 L JET FL MSG		12368			2	8	16569	F RCS	LJET
V90X4654X	G18906	JET F2R FAILED ON	RCS RM	12368							
V90X4699X	G19020	JET F2R LEAKING	RCS RM	12368							
V90X4604X	G18944	JET F2R FAILED OFF	RCS RM	12368							
V90X4661X	G18913	JET F4R FAILED ON	RCS RM	12368							
V90X4615X	G19027	JET F4R LEAKING	RCS RM	12368							
V90X4611X	G18951	JET F4R FAILED OFF	RCS RM	12368							
V90X4664X	G19032	JET F5R FAILED ON	RCS RM	28							
V90X4618X	G19034	JET F5R LEAKING	RCS RM	28							
V90X4614X	G19033	JET F5R FAILED OFF	RCS RM	28							
V94X4492X	G47721	RCS F 2/4/5 R JET FL MSG		12368			2	8	16570	F RCS	RJET
V90X4651X	G18903	JET F1U FAILED ON	RCS RM	12368							
V90X4696X	G19017	JET F1U LEAKING	RCS RM	12368							
V90X4601X	G18941	JET F1U FAILED OFF	RCS RM	12368							
V90X4655X	G18907	JET F2U FAILED ON	RCS RM	12368							
V90X4564X	G19021	JET F2U LEAKING	RCS RM	12368							
V90X4605X	G18945	JET F2U FAILED OFF	RCS RM	12368							
V90X4659X	G18911	JET F3U FAILED ON	RCS RM	12368							
V90X4568X	G19025	JET F3U LEAKING	RCS RM	12368							
V90X4609X	G18949	JET F3U FAILED OFF	RCS RM	12368							
V94X4495X	G47724	RCS F 1/2/3 U JET FL MSG		12368			2	8	16571	F RCS	UJET
V90X2392X		RCS-FWD QUANTITY ALERT	RCS QTY- MON	12368							
V94X4767X		RCS-F QTY ALERT MSG		12368			3		16573	F RCS	PVT
V90X4652X	G18904	JET F1D FAILED ON	RCS RM	12368							
V90X4697X	G19018	JET F1D LEAKING	RCS RM	12368							
V90X4602X	G18942	JET F1D FAILED OFF	RCS RM	12368							
V90X4656X	G18908	JET F2D FAILED ON	RCS RM	12368							
V90X4565X	G19022	JET F2D LEAKING	RCS RM	12368							
V90X4606X	G18946	JET F2D FAILED OFF	RCS RM	12368							
V90X4660X	G18912	JET F3D FAILED ON	RCS RM	12368							
V90X4569X	G19026	JET F3D LEAKING	RCS RM	12368							
V90X4610X	G18950	JET F3D FAILED OFF	RCS RM	12368							
V90X4662X	G18914	JET F4D FAILED ON	RCS RM	12368							
V90X4616X	G19028	JET F4D LEAKING	RCS RM	12368							
V90X4612X	G18952	JET F4D FAILED OFF	RCS RM	12368							
V94X4498X	G47727	RCS F 1/2/3/4 D JET FL MSG		12368			2	8	16577	F RCS	DJET
V42P2114C*	G20426	RCS-L AFT HE FU TK PRESS-2	DSC OL1	28		2					
V42P2112C*	G20429	RCS-L AFT HE OX TK PRESS-2	DSC OL2	28		2					



Table B.4.110.4-1 GAX Annunciation Table

MML NO.	LVLB	NOMENCLATURE	SOURCE	OPS AVAIL	N F	ALRM		MSG ID	MAJOR	MESSAGE TEXT	MIN
						C L	I D				
V94X4470X	G46312	RCS L HE P LO MSG		28			3	16664		L RCS	HE P
V42P2116C	G20432	RCS L AFT FU TANK ULLAGE PRESS	DSC OL2	28	2						
V42P2115C	G20435	RCS L AFT OX TANK ULLAGE PRESS	DSC OL1	28	2						
V94X4474X	G46014	RCS L FU/OX TK P HI/LO MSG		28			2 10	16665		L RCS	TK P
V90X2351X	G46412	RCS L AFT FU LEAKAGE ALERT	RCS QTY- MON	12368							
V90X2352X	G46411	RCS L AFT OX LEAKAGE ALERT	RCS QTY- MON	12368							
V94X4483X	G49095	RCS L FU/OX QTY LK MSG		12368			2 10	16666		L RCS	LEAK
V90X4625X	G18923	JET L2D FAILED ON	RCS RM	12368							
V90X4670X	G19067	JET L2D LEAKING	RCS RM	12368							
V90X4575X	G18961	JET L2D FAILED OFF	RCS RM	12368							
V90X4628X	G18925	JET L3D FAILED ON	RCS RM	12368							
V90X4673X	G19069	JET L3D LEAKING	RCS RM	12368							
V90X4578X	G18963	JET L3D FAILED OFF	RCS RM	12368							
V90X4631X	G18928	JET L4D FAILED ON	RCS RM	12368							
V90X4676X	G19072	JET L4D LEAKING	RCS RM	12368							
V90X4581X	G18966	JET L4D FAILED OFF	RCS RM	12368							
V90X4632X	G19038	JET L5D FAILED ON	RCS RM	28							
V90X4677X	G19040	JET L5D LEAKING	RCS RM	28							
V90X4582X	G18939	JET L5D FAILED OFF	RCS RM	28							
V94X4515X	G47745	RCS L 2/3/4/5 D JET FL MSG		12368			2 8	16667		L RCS	DJET
V90X4621X	G18919	JET L1L FAILED ON	RCS RM	12368							
V90X4666X	G19063	JET L1L LEAKING	RCS RM	12368							
V90X4571X	G18957	JET L1L FAILED OFF	RCS RM	12368							
V90X4623X	G18921	JET L2L FAILED ON	RCS RM	12368							
V90X4668X	G19065	JET L2L LEAKING	RCS RM	12368							
V90X4573X	G18959	JET L2L FAILED OFF	RCS RM	12368							
V90X4627X	G18924	JET L3L FAILED ON	RCS RM	12368							
V90X4672X	G19068	JET L3L LEAKING	RCS RM	12368							
V90X4577X	G18962	JET L3L FAILED OFF	RCS RM	12368							
V90X4629X	G18926	JET L4L FAILED ON	RCS RM	12368							
V90X4674X	G19070	JET L4L LEAKING	RCS RM	12368							
V90X4579X	G18964	JET L4L FAILED OFF	RCS RM	12368							
V90X4633X	G19035	JET L5L FAILED ON	RCS RM	28							
V90X4678X	G19037	JET L5L LEAKING	RCS RM	28							
V90X4583X	G19036	JET L5L FAILED OFF	RCS RM	28							
V94X4508X	G47738	RCS L 1/2/3/4/5 L JET FL MSG		12368			2 8	16669		L RCS	LJET
V90X4622X	G18920	JET L1U FAILED ON	RCS RM	12368							
V90X4667X	G19064	JET L1U LEAKING	RCS RM	12368							
V90X4572X	G18958	JET L1U FAILED OFF	RCS RM	12368							
V90X4624X	G18922	JET L2U FAILED ON	RCS RM	12368							
V90X4669X	G19066	JET L2U LEAKING	RCS RM	12368							
V90X4574X	G18960	JET L2U FAILED OFF	RCS RM	12368							
V90X4630X	G18927	JET L4U FAILED ON	RCS RM	12368							
V90X4675X	G19071	JET L4U LEAKING	RCS RM	12368							

Table B.4.110.4-1 GAX Annunciation Table

MML NO.	LVLB	NOMENCLATURE	SOURCE	OPS AVAIL	N F	ALRM		MSG ID	MAJOR	MESSAGE TEXT	MIN
						C L	I D				
V90X4580X	G18965	JET L4U FAILED OFF	RCS RM	12368							
V94X4511X	G47741	RCS L 1/2/4 U JET FL MSG		12368			2 8	16671	L RCS	UJET	
V90X4620X	G18915	JET L1A FAILED ON	RCS RM	12368							
V90X4665X	G19059	JET L1A LEAKING	RCS RM	12368							
V90X4570X	G18953	JET L1A FAILED OFF	RCS RM	12368							
V90X4626X	G18916	JET L3A FAILED ON	RCS RM	12368							
V90X4671X	G19060	JET L3A LEAKING	RCS RM	12368							
V90X4576X	G18954	JET L3A FAILED OFF	RCS RM	12368							
V94X4503X	G47733	RCS L 1/3 A JET FL MSG		12368			2 8	16672	L RCS	AJET	
V90X2393X		RCS-L QUANTITY ALERT	RCS QTY- MON	12368							
V94X4765X		RCS-L QTY ALERT MSG		12368			3	16673	L RCS	PVT	
V42P3114C*	G20427	RCS-R AFT HE FU TK PRESS-2	DSC OR1	28	2						
V42P3112C*	G20430	RCS-R AFT HE OX TK PRESS-2	DSC OR2	28	2						
V94X4471X	G46016	RCS R HE P LO MSG		28			3	16764	R RCS	HE P	
V42P3116C	G20433	RCS R AFT FU TANK ULLAGE PRESS	DSC OR2	28	2						
V42P3115C	G20436	RCS R AFT OX TANK ULLAGE PRESS	DSC OR1	28	2						
V94X4475X	G46015	RCS R FU/OX TK P HI/LO MSG		28			2 11	16765	R RCS	TK P	
V90X2353X	G46414	RCS R AFT FU LEAKAGE ALERT	RCS QTY- MON	12368							
V90X2354X	G46413	RCS R AFT OX LEAKAGE ALERT	RCS QTY- MON	12368							
V94X4484X	G49096	RCS R FU/OX QTY LK MSG		12368			2 11	16766	R RCS	LEAK	
V90X4639X	G18933	JET R2D FAILED ON	RCS RM	12368							
V90X4685X	G19077	JET R2D LEAKING	RCS RM	12368							
V90X4589X	G18971	JET R2D FAILED OFF	RCS RM	12368							
V90X4643X	G18935	JET R3D FAILED ON	RCS RM	12368							
V90X4688X	G19079	JET R3D LEAKING	RCS RM	12368							
V90X4592X	G18973	JET R3D FAILED OFF	RCS RM	12368							
V90X4646X	G18938	JET R4D FAILED ON	RCS RM	12368							
V90X4691X	G19082	JET R4D LEAKING	RCS RM	12368							
V90X4595X	G18976	JET R4D FAILED OFF	RCS RM	12368							
V90X4647X	G19044	JET R5D FAILED ON	RCS RM	28							
V90X4692X	G19046	JET R5D LEAKING	RCS RM	28							
V90X4596X	G19045	JET R5D FAILED OFF	RCS RM	28							
V94X4528X	G47758	RCS R 2/3/4/5 D JET FL MSG		12368			2 8	16767	R RCS	DJET	
V90X4635X	G18929	JET R1R FAILED ON	RCS RM	12368							
V90X4681X	G19073	JET R1R LEAKING	RCS RM	12368							
V90X4585X	G18967	JET R1R FAILED OFF	RCS RM	12368							
V90X4637X	G18931	JET R2R FAILED ON	RCS RM	12368							
V90X4683X	G19075	JET R2R LEAKING	RCS RM	12368							
V90X4587X	G18969	JET R2R FAILED OFF	RCS RM	12368							
V90X4642X	G18934	JET R3R FAILED ON	RCS RM	12368							
V90X4687X	G19078	JET R3R LEAKING	RCS RM	12368							

Table B.4.110.4-1 GAX Annunciation Table

MML NO.	LVLB	NOMENCLATURE	SOURCE	OPS AVAIL	N F	ALRM		MSG ID	MAJOR	MESSAGE TEXT	MIN
						C L	I D				
V90X4591X	G18972	JET R3R FAILED OFF	RCS RM	12368							
V90X4644X	G18936	JET R4R FAILED ON	RCS RM	12368							
V90X4689X	G19080	JET R4R LEAKING	RCS RM	12368							
V90X4593X	G18974	JET R4R FAILED OFF	RCS RM	12368							
V90X4648X	G19041	JET R5R FAILED ON	RCS RM	28							
V90X4693X	G19043	JET R5R LEAKING	RCS RM	28							
V90X4597X	G19042	JET R5R FAILED OFF	RCS RM	28							
V94X4521X	G47751	RCS R 1/2/3/4/5 R JET FL MSG		12368			2	8	16770	R RCS	RJET
V90X4636X	G18930	JET R1U FAILED ON	RCS RM	12368							
V90X4682X	G19074	JET R1U LEAKING	RCS RM	12368							
V90X4586X	G18966	JET R1U FAILED OFF	RCS RM	12368							
V90X4638X	G18932	JET R2U FAILED ON	RCS RM	12368							
V90X4684X	G19076	JET R2U LEAKING	RCS RM	12368							
V90X4588X	G18970	JET R2U FAILED OFF	RCS RM	12368							
V90X4645X	G18937	JET R4U FAILED ON	RCS RM	12368							
V90X4690X	G19081	JET R4U LEAKING	RCS RM	12368							
V90X4594X	G18975	JET R4U FAILED OFF	RCS RM	12368							
V94X4524X	G47754	RCS R 1/2/4 U JET FL MSG		12368			2	8	16771	R RCS	UJET
V90X4634X	G18917	JET R1A FAILED ON	RCS RM	12368							
V90X4679X	G19061	JET R1A LEAKING	RCS RM	12368							
V90X4584X	G18955	JET R1A FAILED OFF	RCS RM	12368							
V90X4641X	G18918	JET R3A FAILED ON	RCS RM	12368							
V90X4686X	G19062	JET R3A LEAKING	RCS RM	12368							
V90X4590X	G18956	JET R3A FAILED OFF	RCS RM	12368							
V94X4517X	G47747	RCS R 1/3 A JET FL MSG		12368			2	8	16772	R RCS	AJET
V90X2394X		RCS-R QUANTITY ALERT	RCS QTY- MON	12368							
V94X4766X		RCS-R QTY ALERT MSG		12368			3		16773	R RCS	PVT
V42P2310C*	G20438	RCS-L AFT FU TANK OUT PRESS	DSC OL2	28	2						
V42P2210C*	G20441	RCS-L AFT OX TANK OUT PRESS	DSC OL1	28	2						
V42T2300C	G20450	RCS-L AFT FU TANK TEMP 1	DSC OL1	28	2						
V42T2200C	G20453	RCS-L AFT OX TANK TEMP 1	DSC OL2	28	2						
V94X4530X	G47765	RCS L OUT P/TEMP HI/L0 MSG		28			3		16830	G23 RCS SYSTEM	L
V42P3310C*	G20439	RCS-R AFT FU TANK OUT PRESS	DSC OR2	28	2						
V42P3210C*	G20442	RCS-R AFT OX TANK OUT PRESS	DSC OR1	28	2						
V42T3300C	G20451	RCS-R AFT FU TANK TEMP 1	DSC OR1	28	2						
V42T3200C	G20454	RCS-R AFT OX TANK TEMP 1	DSC OR2	28	2						
V94X4531X	G47767	RCS R OUT P/TEMP HI/L0 MSG		28			3		16831	G23 RCS SYSTEM	R
V42P1310C	G20437	RCS-FWD FU TANK OUT PRESS	DSC F2	28	2						
V42P1210C	G20440	RCS-FWD OX TANK OUT PRESS	DSC F2	28	2						
V42T1300C	G20449	RCS-FWD FU TANK TEMP 1	DSC F4	28	2						
V42T1200C	G20452	RCS-FWD OX TANK TEMP 1	DSC F4	28	2						
V94X4535X	G47769	RCS F OUT P/TEMP HI/L0 MSG		28			3		16841	G23 RCS SYS	F
V90X4532X		JET L5D AVAILABLE	RCS RM	28							

Table B.4.110.4-1 GAX Annunciation Table

MML NO.	LVLB	NOMENCLATURE	SOURCE	OPS AVAIL	N F	ALRM		MSG ID	MAJOR	MESSAGE TEXT	MIN
						C L	I D				
V90X4546X		JET R5D AVAILABLE	RCS RM	28							
V90X4562X		JET F5L AVAILABLE	RCS RM	28							
V90X4563X		JET F5R AVAILABLE	RCS RM	28							
V90X4533X		JET L5L AVAILABLE	RCS RM	28							
V90X4547X		JET R5R AVAILABLE	RCS RM	28							
V94X4113X		DAP RECONFIGURATION MSG		28			3	16900		DAP RECONF	
V90X8746X		SPEED BRAKE CREW ALERT	E/L EV AN PROC	36							
V94X4375X		SPEED BRAKE MSG		36			3	17000		SPD BRK	
V94X4692X	G49001	MNVR TIME-30 SEC AND DAP NOT IN AUTO	UNIV PT- PROC	28							
V94X4758X		MNVR T-30 & DAP NOT IN AUT MSG		28			3	17100		SEL AUTO	
V90X8259X		ET AUTO SEP INHIBIT CREW ALERT	ET SEP	16							
V94X4538X		SEP INHIBIT FLAG MSG		16			3	17300		ET SEP-INH	
V90X0215XD	G28222	TAC R/OPT V/Y/EL EDIT HIST IND	OR/RDZ NV	2							
V90X0213XD	G28223	TAC AZ/OPT H/X/AZ EDIT HST IND	OR/RDZ NV	2							
V90X0223XC	G28219	BARO ALT/RR RNG EDIT HIST IND	OR/RDZ NV	2							
V90X0712XC	G50734	DRAG ALT/RR R DOT EDIT HST IND	OR/RDZ NV	2							
V94X4101X	G50913	ADTA/MLS/TAC/RR EDIT HIST MSG		2			3	17400		NAV EDIT	
V90X8748X		NAV EDIT TACAN CREW ALERT	E/L EV AN PROC	36							
V94X4376X		TACAN NAV EDIT MSG		36			3	17436		NAV EDIT	TAC
V90X8747X		NAV EDIT ALTITUDE CREW ALERT	E/L EV AN PROC	36							
V94X4377X		ALTITUDE NAV EDIT MSG		36			3	17495		NAV EDIT	ALT
V90X1105XB	G01805	MEP ALERT STATUS	GRTLS- TAEM GD	6							
V90X1105XA	G01805	MEP ALERT STATUS	TAEM GD	3							
V94X4760X		MEP ALERT MSG		36			3	17500		SW TO MEP	
V95X1623X		SSME REPOSITION STOP FLAG	LDG GEAR VLV CNTL	3							
V94X4279X		SSME REPOS FAILED MSG		3			3	17686		SSME REPOS	FAIL
V90X1131X		TAEM GUID DOWNMODE FLAG	TAEM GUID	36							
V94X4792X		TAEM GUID DOWNMODE MSG	GRTLSTMGD	36			3	18200		OTT ST IN	
V90X7776X		AFT ADI ERROR SWITCH INVALID	GNC SW RM	28							
V90X7777X		AFT ADI RATE SWITCH INVALID	GNC SW RM	28							
V90X7775X		AFT ADI ATT SELECT SW INVALID	GNC SW RM	28							
V94X4763X		A SW DEFAULT MSG		28			3	18606		DISPLAY SW	A
V96X2155X		LH ADI ERROR SWITCH INVALID	GNC SW RM	12368							
V96X2151X		LH ADI RATE SWITCH INVALID	GNC SW RM	12368							

Table B.4.110.4-1 GAX Annunciation Table

MML NO.	LVLB	NOMENCLATURE	SOURCE	OPS AVAIL	N F	ALRM		MSG ID	MAJOR	MESSAGE TEXT	MIN
						C L	I D				
V90X7178X		LH ADI ATT SELECT SW INVALID	GNC SW RM	12368							
V96X2175X		LH AIR DATA SWITCH INVALID	GNC SW RM	36							
V96X2113X		LH HSI MODE SWITCH INVALID	GNC SW RM	12368							
V96X2115X		LH HSI SOURCE SWITCH INVALID	GNC SW RM	12368							
V96X2117X		LH HSI TRANS SWITCH INVALID	GNC SW RM	12368							
V96X2195X		LH RADAR ALT SWITCH INVALID	GNC SW RM	36							
V94X4761X		L SW DEFAULT MSG		12368			3	18630		DISPLAY SW	L
V96X2255X		RH ADI ERROR SWITCH INVALID	GNC SW RM	12368							
V96X2251X		RH ADI RATE SWITCH INVALID	GNC SW RM	12368							
V90X7179X		RH ADI ATT SELECT INVALID	GNC SW RM	12368							
V96X2275X		RH AIR DATA SWITCH INVALID	GNC SW RM	36							
V96X2213X		RH HSI MODE SWITCH INVALID	GNC SW RM	12368							
V96X2215X		RH HSI SOURCE SWITCH INVALID	GNC SW RM	12368							
V96X2217X		RH HSI TRANS SWITCH INVALID	GNC SW RM	12368							
V96X2295X		RH RADAR ALT SWITCH INVALID	GNC SW RM	36							
V94X4762X		R SW DEFAULT MSG		12368			3	18631		DISPLAY SW	R
V90X8745X		ADTA PROBES DEPLOY CREW ALERT	E/L EV AN PROC	36							
V94X4378X		ADTA PROBES DEPLOY MSG		36			3	18700		PROBES	
V94X1253X	G50220	REF ROLL STATUS	ENTRY DIP	3							
V94X4703X		ROLL REF MSG		3			3	18900		ROLL REF	
V90X5794X		L RCS LEFT OX LOW PRESS ALERT	RCS REG SEQ	136							
V90X5795X		L RCS LEFT FU LOW PRESS ALERT	RCS REG SEQ	136							
V94X4316X		RCS LEFT RECONFIG MSG		136			2	19030		RCS XFEED	L
V90X5797X		R RCS RIGHT OX LOW PRESS ALERT	RCS REG SEQ	136							
V90X5798X		R RCS RIGHT FU LOW PRESS ALERT	RCS REG SEQ	136							
V94X4317X		RCS RIGHT RECONFIG MSG		136			2	19031		RCS XFEED	R
V94X1137X		NO GPS SEL FOR I-LOADED TIME GAX	GPS RCVR STATE PROC	12368							
V94X1048X		NO GPS UPDATE MSG		12368			3	19326		NO UPDATE	GPS
V94X0936X		GPS 2 RCVR FAIL IND	GPS SOP	12368							
V94X1049X		GPS RECEIVER 2 FAILED MSG		12368			3	19402	G55	GPS FAIL	2
V94X0935X		GPS 1 RCVR FAIL IND	GPS SOP	12368							
V94X6018X		GPS RECEIVER 1 FAILED MSG		12368			3	19401	G55	GPS FAIL	1
V94X0937X		GPS 3 RCVR FAIL IND	GPS SOP	12368							
V94X6019X		GPS RECEIVER 3 FAILED MSG		12368			3	19403	G55	GPS FAIL	3

Table B.4.110.4-1 GAX Annunciation Table

MML NO.	LVLB	NOMENCLATURE	SOURCE	OPS AVAIL	N F	ALRM		MSG ID	MAJOR	MESSAGE TEXT	MIN
						C L	I D				
V94X1161X		QA4 DILEMMA GPS 1/2/3 GAX	GPS RCVR STATE PROC	12368							
V94X6021X		GPS RECEIVER DILEMMA MSG		12368			3	13826		RM DLMA	GPS
V94X1158X		GPS 1 FAIL QA 1/3/4 CHK GAX	GPS RCVR STATE PROC	12368							
V94X6022X		GPS RECEIVER 1 QA FAIL MSG		12368			3	19501	G55	QA FL GPS	1
V94X1159X		GPS 2 FAIL QA 1/3/4 CHK GAX	GPS RCVR STATE PROC	12368							
V94X6023X		GPS RECEIVER 2 QA FAIL MSG		12368			3	19502	G55	QA FL GPS	2
V94X1160X		GPS 3 FAIL QA 1/3/4 CHK GAX	GPS RCVR STATE PROC	12368							
V94X6024X		GPS RECEIVER 3 QA FAIL MSG		12368			3	19503	G55	QA FL GPS	3
V94X6017X		GPS NAV EDIT GAX	GPS RCVR STATE PROC	12368							
V94X6099X		GPS OFF ALERT BELOW I-LOADED ALT	GPS RCVR STATE PROC	36							
V94X1050X		GPS NAV EDIT MSG		12368			3	17426		NAV EDIT	GPS
V96X0041XA		RHC DAP DNMODE	2-AX RHC SOP	36							
V96X0041XB		RHC DAP DNMODE	3-AX RHC SOP	13							
V96X0041XC		RHC DAP DNMODE	ORB 3-AX RHC SOP	28							
V94X0001X		RHC DNMODE MSG		12368			3	19211		DAP DNMODE	RHC

TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
AA_LAT_CF(1)	V91X3650X	AA 1 LATERAL ACCEL COMMFault	FCOS				79556D	
AA_LAT_CF(2)	V91X3660X	AA 2 LATERAL ACCEL COMMFault	FCOS				79556D	
AA_LAT_CF(3)	V91X3670X	AA 3 LATERAL ACCEL COMMFault	FCOS				79556D	
AA_LAT_CF(4)	V91X3680X	AA 4 LATERAL ACCEL COMMFault	FCOS				79556D	
AA_NOR_CF(1)	V91X3651X	AA 1 NORMAL ACCEL COMMFault	FCOS				79556D	
AA_NOR_CF(2)	V91X3661X	AA 2 NORMAL ACCEL COMMFault	FCOS				79556D	
AA_NOR_CF(3)	V91X3671X	AA 3 NORMAL ACCEL COMMFault	FCOS				79556D	
AA_NOR_CF(4)	V91X3681X	AA 4 NORMAL ACCEL COMMFault	FCOS				79556D	
ADTA_CF(1)	V91X3300X	ADTA 1 COMMFault	FCOS					
ADTA_CF(2)	V91X3330X	ADTA 2 COMMFault	FCOS					
ADTA_CF(3)	V91X3360X	ADTA 3 COMMFault	FCOS					
ADTA_CF(4)	V91X3390X	ADTA 4 COMMFault	FCOS					
ADTA_FAIL(1)	V90X5001X	ADTA 1 FAIL	ADTA RM		BD		93017G	*
ADTA_FAIL(2)	V90X5051X	ADTA 2 FAIL	ADTA RM		BD		93017G	*
ADTA_FAIL(3)	V90X5101X	ADTA 3 FAIL	ADTA RM		BD		93017G	*
ADTA_FAIL(4)	V90X5151X	ADTA 4 FAIL	ADTA RM		BD		93017G	*
ALARM_A	V95X7330XB	ALARM(A) REQUESTING "TGT ITER"	ORB TGT SPEC					
ALARM_B	V95X7331X	ALARM(B) REQUESTING "TGT EL ANG"	ORB TGT SPEC					
ALARM_C	V95X7332X	ALARM(C) REQUESTING "TGT ITER"	ORB TGT SPEC					
ALARM_D	V95X7339X	ALARM(D) REQUESTING "TGT DELTA T"	ORB TGT SPEC					
AUTO_ALERT	V94X4692X	MNVR TIME-30 SEC & DAP NOT IN AUTO	UNIV POINT PROC					
AVAILABLE_JET_AFT(07)	V90X4532X	JET L5D AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(08)	V90X4533X	JET L5L AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(15)	V90X4547X	JET R5R AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(16)	V90X4546X	JET R5D AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(11)	V90X4562X	JET F5L AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(12)	V90X4563X	JET F5R AVAILABLE	RCS RM		BD		93017G	*
BFAVRT	V90J6420C	BODY FLAP ALERT	BF CMD RM		VAR			
BRGFAIL(1)	V90X3608X	TACAN BEARING 1 FAIL	TACAN RM		BD		93017G	*
BRGFAIL(2)	V90X3708X	TACAN BEARING 2 FAIL	TACAN RM		BD		93017G	*
BRGFAIL(3)	V90X3808X	TACAN BEARING 3 FAIL	TACAN RM		BD		93017G	*
CREW_DESELECT_RCVR(1)	V93X1205XA	DESELECT GPS 1 RCVR CMD	GPS STATUS DISP		BD		92817C	
CREW_DESELECT_RCVR(1)	V93X1205XB	DESELECT GPS 1 RCVR CMD	HORIZ SIT DISP		BD		92817C	
CREW_DESELECT_RCVR(1)	V93X1205XC	DESELECT GPS 1 RCVR CMD	REL NAV DISP		BD		92817C	
CREW_DESELECT_RCVR(2)	V93X1206XA	DESELECT GPS 2 RCVR CMD	GPS STATUS DISP		BD		92817C	
CREW_DESELECT_RCVR(2)	V93X1206XB	DESELECT GPS 2 RCVR CMD	HORIZ SIT DISP		BD		92817C	
CREW_DESELECT_RCVR(2)	V93X1206XC	DESELECT GPS 2 RCVR CMD	REL NAV DISP		BD		92817C	
CREW_DESELECT_RCVR(3)	V93X1207XA	DESELECT GPS 3 RCVR CMD	GPS STATUS DISP		BD		92817C	
CREW_DESELECT_RCVR(3)	V93X1207XB	DESELECT GPS 3 RCVR CMD	HORIZ SIT DISP		BD		92817C	
CREW_DESELECT_RCVR(3)	V93X1207XC	DESELECT GPS 3 RCVR CMD	REL NAV DISP		BD		92817C	
DAP_ALERT	V96X0041XA	RHC DAP DNMODE	2-AX RHC SOP		BD		90704F	
DAP_ALERT	V96X0041XB	RHC DAP DNMODE	3-AX RHC SOP		BD		90704F	
DAP_ALERT	V96X0041XC	RHC DAP DNMODE	ORB 3-AX RHC SOP		BD		90704F	
DELIBOFB	V95H8010C	COMP LIB ELEVON POS	ELVN PFB SOP	DEG	BSS			
DELOBOFB	V95H8060C	COMP LOB ELEVON POS	ELVN PFB SOP	DEG	BSS			
DERIBOFB	V95H8110C	COMP RIB ELEVON POS	ELVN PFB SOP	DEG	BSS		92230F	

TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&amp;C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
DEROBOFB	V95H8160C	COMP ROB ELEVON POS	ELVN PFB SOP	DEG	BSS			
DISP_EDIT(1)	V90X0213XB	TAC AZ/OPTICS H/X/AZ EDIT HIST IND	PRELAND NAV				93017G	*
DISP_EDIT(1)	V90X0213XC	TAC AZ/OPTICS H/X/AZ EDIT HIST IND	ENT NAV				93017G	*
DISP_EDIT(1)	V90X0213XD	TAC AZ/OPTICS H/X/AZ EDIT HIST IND	ORB/RND NAV				93017G	*
DISP_EDIT(2)	V90X0215XB	TAC R/OPTICS V/Y/EL EDIT HIST IND	PRELAND NAV				93017G	*
DISP_EDIT(2)	V90X0215XC	TAC R/OPTICS V/Y/EL EDIT HIST IND	ENT NAV				93017G	*
DISP_EDIT(2)	V90X0215XD	TAC R/OPTICS V/Y/EL EDIT HIST IND	ORB/RND NAV				93017G	*
DISP_EDIT(3)	V90X0223XB	BARO ALT/RR RNG EDIT HIST IND	PRELAND NAV				93017G	*
DISP_EDIT(3)	V90X0223XD	BARO ALT/RR RNG EDIT HIST IND	ORB/RND NAV				93017G	*
DISP_EDIT(4)	V90X0712XA	DRAG ALT/RR R DOT EDIT HIST IND	ENT NAV					
DISP_EDIT(4)	V90X0712XD	DRAG ALT/RR R DOT EDIT HIST IND	ORB/RND NAV				93017G	*
DISP_EDIT(5)	V90X0218XA	MSBLS AZ/SHAFT RATE EDIT HIST IND	PRELAND NAV				93017G	*
DISP_EDIT(6)	V90X0219XA	MSBLS R/TRUN RATE EDIT HIST IND	PRELAND NAV				93017G	*
DISP_EDIT(7)	V90X0220XA	MSBLS EL EDIT HIST IND	PRELAND NAV				93017G	*
D_DILEMMA	V90X4840X	DELAYED ADTA DILEMA FLAG	ADTA RM		BD		93017G	*
FAILLHRHC1	V90X6201X	LEFT RHC 1 FAIL	RHC FDIR		BD		93017G	*
FAILLHRHC2	V90X6231X	LEFT RHC 2 FAIL	RHC FDIR		BD		93017G	*
FAILLHRHC3	V90X6261X	LEFT RHC 3 FAIL	RHC FDIR		BD		93017G	*
FAILMSBLS1	V90X3101X	MSBLS 1 FAIL	MSBLS FDIR		BD		93017G	*
FAILMSBLS2	V90X3201X	MSBLS 2 FAIL	MSBLS FDIR		BD		93017G	*
FAILMSBLS3	V90X3301X	MSBLS 3 FAIL	MSBLS FDIR		BD		93017G	*
FAILRHRHC1	V90X6301X	RIGHT RHC 1 FAIL	RHC FDIR		BD		93017G	*
FAILRHRHC2	V90X6331X	RIGHT RHC 2 FAIL	RHC FDIR		BD		93017G	*
FAILRHRHC3	V90X6361X	RIGHT RHC 3 FAIL	RHC FDIR		BD		93017G	*
GPS_COMMFAULT(1)	V91X0015X	FF1 GPS1 COMMFAULT	FCOS		BD		92067D	
GPS_COMMFAULT(2)	V91X0016X	FF2 GPS2 COMMFAULT	FCOS		BD		92067D	
GPS_COMMFAULT(3)	V91X0017X	FF3 GPS3 COMMFAULT	FCOS		BD		92067D	
GPS_DILEMMA_ANNUN_GAX	V94X1161X	QA4 DILEMMA GPS 1/2/3 GAX	GPS RCVR STATE PROC		BD		92067D	
GPS_DISP_DILEMMA(1)	V94X0022X	GPS 1 DISPLAY DILEMMA FLAG	GPS RCVR STATE PROC		BD		92208C	
GPS_DISP_DILEMMA(2)	V94X0023X	GPS 2 DISPLAY DILEMMA FLAG	GPS RCVR STATE PROC		BD		92208C	
GPS_DISP_DILEMMA(3)	V94X0024X	GPS 3 DISPLAY DILEMMA FLAG	GPS RCVR STATE PROC		BD		92208C	
GPS_FAIL_QA_GAX(1)	V94X1158X	GPS 1 FAIL QA 1/3/4 CHK GAX	GPS RCVR STATE PROC		BD		92369B	
GPS_FAIL_QA_GAX(2)	V94X1159X	GPS 2 FAIL QA 1/3/4 CHK GAX	GPS RCVR STATE PROC		BD		92369B	
GPS_FAIL_QA_GAX(3)	V94X1160X	GPS 3 FAIL QA 1/3/4 CHK GAX	GPS RCVR STATE PROC		BD		92369B	
GPS_NAV_EDIT_ALT_GAX	V94X6099X	GPS OFF ALERT BELOW I-LOADED ALT	GPS RCVR STATE PROC		BD		92067D	
GPS_NAV_EDIT_GAX	V94X6017X	GPS NAV EDIT GAX	GPS RCVR STATE PROC		BD		92067D	
GPS_OFF_ALERT_GAX	V94X1137X	NO GPS SEL FOR I-LOADED TIME GAX	GPS RCVR STATE PROC		BD		91051K	
HI_G_GAX	V94X4769X	HIGH G GAX FLAG	E/L EV AN PROC					
IMU_1_DES/C_SEL_1	V93X6711XA	IMU 1 SEL/DES CMD	IMU ALIGN DISP		BD		93017G	*
IMU_1_DES/C_SEL_1	V93X6711XB	IMU 1 SEL/DES CMD	OVERRIDE DISP		BD		93017G	*
IMU_1_FAIL	V90X2601X	IMU 1 FAIL	IMU RM		BD		93017G	*
IMU_2_DES/C_SEL_2	V93X6712XA	IMU 2 SEL/DES CMD	IMU ALIGN DISP		BD		93017G	*
IMU_2_DES/C_SEL_2	V93X6712XB	IMU 2 SEL/DES CMD	OVERRIDE DISP		BD		93017G	*
IMU_2_FAIL	V90X2701X	IMU 2 FAIL	IMU RM		BD		93017G	*
IMU_3_DES/C_SEL_3	V93X6713XA	IMU 3 SEL/DES CMD	IMU ALIGN DISP		BD		93017G	*
IMU_3_DES/C_SEL_3	V93X6713XB	IMU 3 SEL/DES CMD	OVERRIDE DISP		BD		93017G	*



TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
IMU_3_FAIL	V90X2801X	IMU 3 FAIL	IMU RM		BD		93017G	*
IMU_CF(1)	V91X3101X	IMU 1 COMMFAULT	FCOS				92354	
IMU_CF(2)	V91X3131X	IMU 2 COMMFAULT	FCOS				92354	
IMU_CF(3)	V91X3161X	IMU 3 COMMFAULT	FCOS				92354	
IMU_DILEMMA	V90X2552X	IMU DILEMMA INDICATOR	IMU RM		BD		93017G	*
IMU_FAIL_IND(1)	V95X0023XA	IMU 1 FAILURE INDICATOR	IMU INT PROC				93017G	*
IMU_FAIL_IND(2)	V95X1023XA	IMU 2 FAILURE INDICATOR	IMU INT PROC				93017G	*
IMU_FAIL_IND(3)	V95X2023XA	IMU 3 FAILURE INDICATOR	IMU INT PROC				93017G	*
LIB_CF(1)	V91X7010X	LIB ELEVON 1 COMMFAULT	FCOS				79556D	
LIB_CF(2)	V91X7011X	LIB ELEVON 2 COMMFAULT	FCOS				79556D	
LIB_CF(3)	V91X7012X	LIB ELEVON 3 COMMFAULT	FCOS				79556D	
LIB_CF(4)	V91X7013X	LIB ELEVON 4 COMMFAULT	FCOS				79556D	
LOB_CF(1)	V91X7060X	LOB ELEVON 1 COMMFAULT	FCOS				79556D	
LOB_CF(2)	V91X7061X	LOB ELEVON 2 COMMFAULT	FCOS				79556D	
LOB_CF(3)	V91X7062X	LOB ELEVON 3 COMMFAULT	FCOS				79556D	
LOB_CF(4)	V91X7063X	LOB ELEVON 4 COMMFAULT	FCOS				79556D	
LOMS_FUTKP_CF	V91X5172X	OMS L POD FU TK ULLAGE P COMMFAULT	FCOS				90897D	
LOMS_HETKP_CF(2)	V91X5170X	OMS L POD HE TK PRESS 2 COMMFAULT	FCOS					
LOMS_OXTKP_CF	V91X5174X	OMS L POD OX TK ULLAGE P COMMFAULT	FCOS				90897D	
LOMS_REGP_CF	V91X5176X	OMS L ENG REG OUT PRESS COMMFAULT	FCOS					
LRCS_FUOXF_CF	V91X5237X	RCS L AFT OX TANK OUT PRES COM FLT	FCOS					
LRCS_FUTKP_CF	V91X5231X	RCS L AFT FU TANK OUT PRES COM FLT	FCOS					
LRCS_FUTK_TEMP_CF	V91X5233X	RCS L AFT FU TK TEMP 1 COMMFAULT	FCOS				90897D	
LRCS_HEFUP_CF(2)	V91X5209X	RCS L AFT HE FU TK P 2 COMMFAULT	FCOS					
LRCS_HEOXF_CF(2)	V91X5208X	RCS L AFT HE OX TK P 2 COMMFAULT	FCOS					
LRCS_OXTK_TEMP_CF	V91X5239X	RCS L AFT OX TK TEMP 1 COMMFAULT	FCOS				90897D	
LRCS_TKFUP_CF(2)	V91X5211X	RCS L AFT FU TK ULLAGE P COMMFAULT	FCOS				90897D	
LRCS_TKOXP_CF(2)	V91X5210X	RCS L AFT OX TK ULLAGE P COMMFAULT	FCOS				90897D	
LRHCP_CF(1)	V91X6525X	LH RHC PITCH CMD A COMMFAULT	FCOS					
LRHCP_CF(2)	V91X6526X	LH RHC PITCH CMD B COMMFAULT	FCOS					
LRHCP_CF(3)	V91X6527X	LH RHC PITCH CMD C COMMFAULT	FCOS					
LRHCR_CF(1)	V91X6500X	LH RHC ROLL CMD A COMMFAULT	FCOS					
LRHCR_CF(2)	V91X6501X	LH RHC ROLL CMD B COMMFAULT	FCOS					
LRHCR_CF(3)	V91X6502X	LH RHC ROLL CMD C COMMFAULT	FCOS					
LRHCY_CF(1)	V91X6540X	LH RHC YAW CMD A COMMFAULT	FCOS					
LRHCY_CF(2)	V91X6541X	LH RHC YAW CMD B COMMFAULT	FCOS					
LRHCY_CF(3)	V91X6542X	LH RHC YAW CMD C COMMFAULT	FCOS					
LSBTC_CF(1)	V91X6800X	LH SBTC CMD A COMMFAULT	FCOS		BD			
LSBTC_CF(2)	V91X6801X	LH SBTC CMD B COMMFAULT	FCOS		BD			
LSBTC_CF(3)	V91X6802X	LH SBTC CMD C COMMFAULT	FCOS		BD			
LSBTC_D	V90X6805X	LEFT SPEEDBRAKE CMD DISAGREE	SBTC FDIR		BD		93017G	*
ME1_FAIL_SHUTDOWN	V95X1207X	MPS E1 FAIL FLAG	SSME OPS		BD		93017G	*
ME2_FAIL_SHUTDOWN	V95X1208X	MPS E2 FAIL FLAG	SSME OPS		BD		93017G	*
ME3_FAIL_SHUTDOWN	V95X1209X	MPS E3 FAIL FLAG	SSME OPS		BD		93017G	*
MECO_CMD	V90X8569XA	MECO COMMAND FLAG	SSME OPS		BD		93017G	*
MEPALERT	V90X1105XA	MEP ALERT STATUS	TAEM GUID				93017G	*

TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&amp;C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
MEPALERT	V90X1105XB	MEP ALERT STATUS	GRTLS TAEM GUID				93017G	*
ME_CMD_PATH_FAIL(1)	V95X1202X	ME-1 COMMAND PATH FAIL FLAG	SSME SOP		BD		93017G	*
ME_CMD_PATH_FAIL(2)	V95X1203X	ME-2 COMMAND PATH FAIL FLAG	SSME SOP		BD		93017G	*
ME_CMD_PATH_FAIL(3)	V95X1204X	ME-3 COMMAND PATH FAIL FLAG	SSME SOP		BD		93017G	*
ME_ELEC_LOCKUP(1)	V95X1194X	ME-1 ELECTRONIC LOCKUP MODE FLAG	SSME SOP					
ME_ELEC_LOCKUP(2)	V95X1195X	ME-2 ELECTRONIC LOCKUP MODE FLAG	SSME SOP					
ME_ELEC_LOCKUP(3)	V95X1196X	ME-3 ELECTRONIC LOCKUP MODE FLAG	SSME SOP					
ME_FLT_DATA_PATH_FAIL(1)	V95X1150X	ME-1 FLIGHT DATA PATH FAIL FLAG	SSME SOP				90243C	
ME_FLT_DATA_PATH_FAIL(2)	V95X1151X	ME-2 FLIGHT DATA PATH FAIL FLAG	SSME SOP				90243C	
ME_FLT_DATA_PATH_FAIL(3)	V95X1152X	ME-3 FLIGHT DATA PATH FAIL FLAG	SSME SOP				90243C	
ME_HYD_LOCKUP(1)	V95X1198X	ME-1 HYDRAULIC LOCKUP MODE FLAG	SSME SOP					
ME_HYD_LOCKUP(2)	V95X1199X	ME-2 HYDRAULIC LOCKUP MODE FLAG	SSME SOP					
ME_HYD_LOCKUP(3)	V95X1200X	ME-3 HYDRAULIC LOCKUP MODE FLAG	SSME SOP					
MSBAZIMDG(1)	V95X6124X	MSBLS 1 AZIMUTH LOCKED ON	MSBLS SOP				92297B	
MSBAZIMDG(2)	V95X6224X	MSBLS 2 AZIMUTH LOCKED ON	MSBLS SOP				92297B	
MSBAZIMDG(3)	V95X6324X	MSBLS 3 AZIMUTH LOCKED ON	MSBLS SOP				92297B	
MSBAZIM_D	V90X3005X	MSBLS AZIMUTH DISAGREE	MSBLS FDIR		BD		93017G	*
MSBELEVDG(1)	V95X6144X	MSBLS 1 ELEVATION LOCKED ON	MSBLS SOP				92297B	
MSBELEVDG(2)	V95X6244X	MSBLS 2 ELEVATION LOCKED ON	MSBLS SOP				92297B	
MSBELEVDG(3)	V95X6344X	MSBLS 3 ELEVATION LOCKED ON	MSBLS SOP				92297B	
MSBELEV_D	V90X3035X	MSBLS ELEVATION DISAGREE	MSBLS FDIR		BD		93017G	*
MSBLS_CF(1)	V91X3550X	MSBLS 1 COMMFault	FCOS					
MSBLS_CF(2)	V91X3560X	MSBLS 2 COMMFault	FCOS					
MSBLS_CF(3)	V91X3570X	MSBLS 3 COMMFault	FCOS					
MSBRANGDG(1)	V95X6104X	MSBLS 1 RANGE LOCKED ON	MSBLS SOP				92297B	
MSBRANGDG(2)	V95X6204X	MSBLS 2 RANGE LOCKED ON	MSBLS SOP				92297B	
MSBRANGDG(3)	V95X6304X	MSBLS 3 RANGE LOCKED ON	MSBLS SOP				92297B	
MSBRANGE_D	V90X3065X	MSBLS RANGE DISAGREE	MSBLS FDIR		BD		93017G	*
NAV_ALT_ALERT	V90X8747X	NAV EDIT ALTITUDE CREW ALERT	E/L EV AN PROC					
NAV_TAC_ALERT	V90X8748X	NAV EDIT TACAN CREW ALERT	E/L EV AN PROC					
OHALERT	V90X1131XA	TAEM GUID DOWNMODE FLAG	TAEM GUID				90881A	
OHALERT	V90X1131XB	TAEM GUID DOWNMODE FLAG	GRTLS TAEM GUID				90881A	
OMSL_PITCH_FAIL	V90X7677XA	OMS L PITCH GIMBAL FAIL FLAG	OMS RM		BD		93017G	*
OMSL_PITCH_FAIL	V90X7677XB	OMS L PITCH GIMBAL FAIL FLAG	XXXXX MNVR DISP		BD		93017G	*
OMSL_YAW_FAIL	V90X7679XA	OMS L YAW GIMBAL FAIL FLAG	OMS RM		BD		93017G	*
OMSL_YAW_FAIL	V90X7679XB	OMS L YAW GIMBAL FAIL FLAG	XXXXX MNVR DISP		BD		93017G	*
OMSR_PITCH_FAIL	V90X7678XA	OMS R PITCH GIMBAL FAIL FLAG	OMS RM		BD		93017G	*
OMSR_PITCH_FAIL	V90X7678XB	OMS R PITCH GIMBAL FAIL FLAG	XXXXX MNVR DISP		BD		93017G	*
OMSR_YAW_FAIL	V90X7680XA	OMS R YAW GIMBAL FAIL FLAG	OMS RM		BD		93017G	*
OMSR_YAW_FAIL	V90X7680XB	OMS R YAW GIMBAL FAIL FLAG	XXXXX MNVR DISP		BD		93017G	*
OMS_L_ON_CMD_IND	V90X8271X	OMS-L ON CMD IND	OMS FIRE SEQ				90120B	
OMS_R_ON_CMD_IND	V90X8272X	OMS-R ON CMD IND	OMS FIRE SEQ				90120B	
PROBE_ALERT	V90X8745X	ADTA PROBES DEPLOY CREW ALERT	E/L EV AN PROC					
QBAR/QBAR_AD	V95P3011C	GN&C DYNAMIC PRESSURE	ADTA SOP	LBF/FT2	SPL		93017G	*
RCS_FFU_MIV_CL_CF(1)	V91X5181X	RCS F FU MAN IS VLV 1 CL COM FLT	FCOS					
RCS_FFU_MIV_CL_CF(2)	V91X5183X	RCS F FU MAN IS VLV 2 CL COM FLT	FCOS					

TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
RCS_FFU_MIV_CL_CF(3)	V91X5185X	RCS F FU MAN IS VLV 3 CL COM FLT	FCOS					
RCS_FFU_MIV_CL_CF(4)	V91X5187X	RCS F FU MAN IS VLV 4 CL COM FLT	FCOS					
RCS_FFU_MIV_CL_CF(5)	V91X2585X	RCS F FU MAN IS VLV 5 CL COM FLT	FCOS					
RCS_FOX_MIV_CL_CF(1)	V91X5180X	RCS F OX MAN IS VLV 1 CL COM FLT	FCOS					
RCS_FOX_MIV_CL_CF(2)	V91X5182X	RCS F OX MAN IS VLV 2 CL COM FLT	FCOS					
RCS_FOX_MIV_CL_CF(3)	V91X5184X	RCS F OX MAN IS VLV 3 CL COM FLT	FCOS					
RCS_FOX_MIV_CL_CF(4)	V91X5186X	RCS F OX MAN IS VLV 4 CL COM FLT	FCOS					
RCS_FOX_MIV_CL_CF(5)	V91X2584X	RCS F OX MAN IS VLV 5 CL COM FLT	FCOS					
RCS_HEOX_TEMP_CF	V91X5251X	RCS R AFT OX TK TEMP 1 COMMFAULT	FCOS				90897D	
RCS_LFU_MIV_CL_CF(1)	V91X5189X	RCS L FU MAN IS VLV 1 CL COM FLT	FCOS					
RCS_LFU_MIV_CL_CF(2)	V91X5191X	RCS L FU MAN IS VLV 2 CL COM FLT	FCOS					
RCS_LFU_MIV_CL_CF(3)	V91X5193X	RCS L FU MAN IS VLV 3 CL COM FLT	FCOS					
RCS_LFU_MIV_CL_CF(4)	V91X5195X	RCS L FU MAN IS VLV 4 CL COM FLT	FCOS					
RCS_LFU_MIV_CL_CF(5)	V91X2597X	RCS L FU MAN IS VLV 5 CL COM FLT	FCOS					
RCS_LOX_MIV_CL_CF(1)	V91X5188X	RCS L OX MAN IS VLV 1 CL COM FLT	FCOS					
RCS_LOX_MIV_CL_CF(2)	V91X5190X	RCS L OX MAN IS VLV 2 CL COM FLT	FCOS					
RCS_LOX_MIV_CL_CF(3)	V91X5192X	RCS L OX MAN IS VLV 3 CL COM FLT	FCOS					
RCS_LOX_MIV_CL_CF(4)	V91X5194X	RCS L OX MAN IS VLV 4 CL COM FLT	FCOS					
RCS_LOX_MIV_CL_CF(5)	V91X2596X	RCS L OX MAN IS VLV 5 CL COM FLT	FCOS					
RCS_RFU_MIV_CL_CF(1)	V91X5197X	RCS R FU MAN IS VLV 1 CL COM FLT	FCOS					
RCS_RFU_MIV_CL_CF(2)	V91X5199X	RCS R FU MAN IS VLV 2 CL COM FLT	FCOS					
RCS_RFU_MIV_CL_CF(3)	V91X5201X	RCS R FU MAN IS VLV 3 CL COM FLT	FCOS					
RCS_RFU_MIV_CL_CF(4)	V91X5202X	RCS R FU MAN IS VLV 4 CL COM FLT	FCOS					
RCS_RFU_MIV_CL_CF(5)	V91X2599X	RCS R FU MAN IS VLV 5 CL COM FLT	FCOS					
RCS_ROX_MIV_CL_CF(1)	V91X5196X	RCS R OX MAN IS VLV 1 CL COM FLT	FCOS					
RCS_ROX_MIV_CL_CF(2)	V91X5198X	RCS R OX MAN IS VLV 2 CL COM FLT	FCOS					
RCS_ROX_MIV_CL_CF(3)	V91X5200X	RCS R OX MAN IS VLV 3 CL COM FLT	FCOS					
RCS_ROX_MIV_CL_CF(4)	V91X5203X	RCS R OX MAN IS VLV 4 CL COM FLT	FCOS					
RCS_ROX_MIV_CL_CF(5)	V91X2598X	RCS R OX MAN IS VLV 5 CL COM FLT	FCOS					
RCVR_FAIL(1)	V94X0935X	GPS 1 RCVR FAIL IND	GPS SOP		BD		92067D	
RCVR_FAIL(2)	V94X0936X	GPS 2 RCVR FAIL IND	GPS SOP		BD		92069B	
RCVR_FAIL(3)	V94X0937X	GPS 3 RCVR FAIL IND	GPS SOP		BD		92067D	
REF_ROL_STAT	V94X1253X	REF ROLL STATUS	ENT DIP		BD			
RGA_PIT_CF(1)	V91X3701X	RGA 1 PITCH COMMFAULT	FCOS				79556D	
RGA_PIT_CF(2)	V91X3731X	RGA 2 PITCH COMMFAULT	FCOS				79556D	
RGA_PIT_CF(3)	V91X3761X	RGA 3 PITCH COMMFAULT	FCOS				79556D	
RGA_PIT_CF(4)	V91X3791X	RGA 4 PITCH COMMFAULT	FCOS				79556D	
RGA_ROLL_CF(1)	V91X3700X	RGA 1 ROLL COMMFAULT	FCOS				79556D	
RGA_ROLL_CF(2)	V91X3730X	RGA 2 ROLL COMMFAULT	FCOS				79556D	
RGA_ROLL_CF(3)	V91X3760X	RGA 3 ROLL COMMFAULT	FCOS				79556D	
RGA_ROLL_CF(4)	V91X3790X	RGA 4 ROLL COMMFAULT	FCOS				79556D	
RGA_YAW_CF(1)	V91X3702X	RGA 1 YAW COMMFAULT	FCOS				79556D	
RGA_YAW_CF(2)	V91X3732X	RGA 2 YAW COMMFAULT	FCOS				79556D	
RGA_YAW_CF(3)	V91X3762X	RGA 3 YAW COMMFAULT	FCOS				79556D	
RGA_YAW_CF(4)	V91X3792X	RGA 4 YAW COMMFAULT	FCOS				79556D	
RIB_CF(1)	V91X7110X	RIB ELEVON 1 COMMFAULT	FCOS				79556D	

TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&amp;C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
RIB_CF(2)	V91X7111X	RIB ELEVON 2 COMMFault	FCOS				79556D	
RIB_CF(3)	V91X7112X	RIB ELEVON 3 COMMFault	FCOS				79556D	
RIB_CF(4)	V91X7113X	RIB ELEVON 4 COMMFault	FCOS				79556D	
RNGFAIL(1)	V90X3611X	TACAN RANGE 1 FAIL	TACAN RM		BD		93017G	*
RNGFAIL(2)	V90X3711X	TACAN RANGE 2 FAIL	TACAN RM		BD		93017G	*
RNGFAIL(3)	V90X3811X	TACAN RANGE 3 FAIL	TACAN RM		BD		93017G	*
ROB_CF(1)	V91X7160X	ROB ELEVON 1 COMMFault	FCOS				79556D	
ROB_CF(2)	V91X7161X	ROB ELEVON 2 COMMFault	FCOS				79556D	
ROB_CF(3)	V91X7162X	ROB ELEVON 3 COMMFault	FCOS				79556D	
ROB_CF(4)	V91X7163X	ROB ELEVON 4 COMMFault	FCOS				79556D	
ROMS_FUTKP_CF	V91X5173X	OMS R POD FU TK ULLAGE P COMMFault	FCOS				90897D	
ROMS_HETKP_CF(2)	V91X5171X	OMS R POD HE TK PRESS 2 COMMFault	FCOS					
ROMS_OXTKP_CF	V91X5175X	OMS R POD OX TK ULLAGE P COMMFault	FCOS				90897D	
ROMS_REGP_CF	V91X5177X	OMS R ENG REG OUT PRESS COMMFault	FCOS					
RRCS_FUOXF_CF	V91X5249X	RCS R AFT OX TANK OUT PRES COM FLT	FCOS					
RRCS_FUTKP_CF	V91X5243X	RCS R AFT FU TANK OUT PRES COM FLT	FCOS					
RRCS_FUTK_TEMP_CF	V91X5245X	RCS R AFT FU TK TEMP 1 COMMFault	FCOS				90897D	
RRCS_HEFUP_CF(2)	V91X5213X	RCS R AFT HE FU TK P 2 COMMFault	FCOS					
RRCS_HEOXP_CF(2)	V91X5212X	RCS R AFT HE OX TK P 2 COMMFault	FCOS					
RRCS_TKFUP_CF(2)	V91X5215X	RCS R AFT FU TK ULLAGE P COMMFault	FCOS				90897D	
RRCS_TKOXP_CF(2)	V91X5214X	RCS R AFT OX TK ULLAGE P COMMFault	FCOS				90897D	
RRHCP_CF(1)	V91X6575X	RH RHC PITCH CMD A COMMFault	FCOS					
RRHCP_CF(2)	V91X6576X	RH RHC PITCH CMD B COMMFault	FCOS					
RRHCP_CF(3)	V91X6577X	RH RHC PITCH CMD C COMMFault	FCOS					
RRHCR_CF(1)	V91X6550X	RH RHC ROLL CMD A COMMFault	FCOS					
RRHCR_CF(2)	V91X6551X	RH RHC ROLL CMD B COMMFault	FCOS					
RRHCR_CF(3)	V91X6552X	RH RHC ROLL CMD C COMMFault	FCOS					
RRHCY_CF(1)	V91X6590X	RH RHC YAW CMD A COMMFault	FCOS					
RRHCY_CF(2)	V91X6591X	RH RHC YAW CMD B COMMFault	FCOS					
RRHCY_CF(3)	V91X6592X	RH RHC YAW CMD C COMMFault	FCOS					
RR_VALID	V95X4283X	R RADAR ERROR FLAG	RR SOP					
RSBTC_CF(1)	V91X6850X	RH SBTC CMD A COMMFault	FCOS		BD			
RSBTC_CF(2)	V91X6851X	RH SBTC CMD B COMMFault	FCOS		BD			
RSBTC_CF(3)	V91X6852X	RH SBTC CMD C COMMFault	FCOS		BD			
RSBTC_D	V90X6905X	RIGHT SPEEDBRAKE CMD DISAGREE	SBTC FDIR		BD		93017G	*
RTLS_TGT_ERR	V94X2463X	RTLS TARGET ERROR INDICATOR	HORIZ SIT SPEC					
RUD_CF(1)	V91X3851X	RUDDER 1 COMMFault	FCOS				79556D	
RUD_CF(2)	V91X3852X	RUDDER 2 COMMFault	FCOS				79556D	
RUD_CF(3)	V91X3853X	RUDDER 3 COMMFault	FCOS				79556D	
RUD_CF(4)	V91X3854X	RUDDER 4 COMMFault	FCOS				79556D	
SB_CF(1)	V91X3801X	SPEEDBRAKE 1 COMMFault	FCOS				79556D	
SB_CF(2)	V91X3802X	SPEEDBRAKE 2 COMMFault	FCOS				79556D	
SB_CF(3)	V91X3803X	SPEEDBRAKE 3 COMMFault	FCOS				79556D	
SB_CF(4)	V91X3804X	SPEEDBRAKE 4 COMMFault	FCOS				79556D	
SPD_BRK_ALERT	V90X8746X	SPEEDBRAKE CREW ALERT	E/L EV AN PROC					
SSME_REPOS_STOP	V95X1623X	SSME REPOSITION STOP FLAG	LDG GEAR VLV CNTL				89991E	

TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
TACANDIL	V90X3605X	TACAN DILEMMA	TACAN RM					
TACAN_FAIL(1)	V90X3601X	TACAN 1 FAIL	TACAN RM					
TACAN_FAIL(2)	V90X3701X	TACAN 2 FAIL	TACAN RM					
TACAN_FAIL(3)	V90X3801X	TACAN 3 FAIL	TACAN RM					
TAC_STIP	V95X5006X	TACAN SELF TEST IN PROGRESS	TACAN SOP		BD			
TAL_TGT_ERR	V94X2462X	TAL TARGET ERROR INDICATOR	HORIZ SIT SPEC					
TBRG_CMLK(1)	V95X5141XA	TACAN 1 BEAR COMFAULT/LOCKON FLAG	TACAN SOP				93017G	*
TBRG_CMLK(2)	V95X5241XA	TACAN 2 BEAR COMFAULT/LOCKON FLAG	TACAN SOP				93017G	*
TBRG_CMLK(3)	V95X5341XA	TACAN 3 BEAR COMFAULT/LOCKON FLAG	TACAN SOP				93017G	*
TRNG_CMLK(1)	V95X5140XA	TACAN 1 RANGE COMFAULT/LOCKON FLAG	TACAN SOP				93017G	*
TRNG_CMLK(2)	V95X5240XA	TACAN 2 RANGE COMFAULT/LOCKON FLAG	TACAN SOP				93017G	*
TRNG_CMLK(3)	V95X5340XA	TACAN 3 RANGE COMFAULT/LOCKON FLAG	TACAN SOP				93017G	*
WOWLON_IND	V96X0050X	WEIGHT ON MAIN WHEELS INDICATOR	LANDING SOP		BD		93017G	*
WOW_DLMA	V96X0054X	A/N GATE LATCHED TO NULL	LANDING SOP					
	V42P1112C	RCS FWD HE OX TANK PRESS-2	DSC F4	PSIA	AMU		93017G	*
	V42P1114C	RCS FWD HE FU TANK PRESS-2	DSC F2	PSIA	AMU		93017G	*
	V42P1210C	RCS FWD OX TANK OUT PRESS	DSC F2	PSIA	AMU		93017G	*
	V42P1212C	RCS-FWD OX MANF PRESS-1	DSC F4		AMU		93017G	*
	V42P1214C	RCS-FWD OX MANF PRESS-2	DSC F4	PSIA	AMU		93017G	*
	V42P1216C	RCS-FWD OX MANF PRESS-3	DSC F2		AMU		93017G	*
	V42P1218C	RCS-FWD OX MANF PRESS-4	DSC F2	PSIA	AMU		93017G	*
	V42P1310C	RCS FWD FU TANK OUT PRESS	DSC F4	PSIA	AMU		93017G	*
	V42P1312C	RCS-FWD FU MANF PRESS-1	DSC F4		AMU		93017G	*
	V42P1314C	RCS-FWD FU MANF PRESS-2	DSC F4	PSIA	AMU		93017G	*
	V42P1316C	RCS-FWD FU MANF PRESS-3	DSC F2		AMU		93017G	*
	V42P1318C	RCS-FWD FU MANF PRESS-4	DSC F2	PSIA	AMU		93017G	*
	V42P2112C*	RCS L AFT HE OX TANK PRESS-2	DSC OL2	PSIA	AMU		89464G	
	V42P2114C*	RCS L AFT HE FU TANK PRESS-2	DSC OL1	PSIA	AMU		89464G	
	V42P2210C*	RCS L AFT OX TANK OUT PRESS	DSC OL1	PSIA	AMU		89464G	
	V42P2212C	RCS-L AFT OX MANF PRESS-1	DSC OL1	VDC	AMU		93017G	*
	V42P2214C	RCS-L AFT OX MANF PRESS 2	DSC OL1	VDC	AMU		93017G	*
	V42P2216C	RCS-L AFT OX MANF PRESS-3	DSC OL2	VDC	AMU		93017G	*
	V42P2218C	RCS-L AFT OX MANF PRESS 4	DSC OL2	VDC	AMU		93017G	*
	V42P2310C*	RCS L AFT FU TANK OUT PRESS	DSC OL2	PSIA	AMU		89464G	
	V42P2312C	RCS-L AFT FU MANF PRESS 1	DSC OL1	VDC	AMU		93017G	*
	V42P2314C	RCS-L AFT FU MANF PRESS 2	DSC OL1	VDC	AMU		93017G	*
	V42P2316C	RCS-L AFT FU MANF PRESS 3	DSC OL2	VDC	AMU		93017G	*
	V42P2318C	RCS-L AFT FU MANF PRESS 4	DSC OL2	VDC	AMU		93017G	*
	V42P3112C*	RCS R AFT HE OX TANK PRESS-2	DSC OR2	PSIA	AMU		89464G	
	V42P3114C*	RCS R AFT HE FU TANK PRESS-2	DSC OR1	PSIA	AMU		89464G	
	V42P3210C*	RCS R AFT OX TANK OUT PRESS	DSC OR1	PSIA	AMU		89464G	
	V42P3212C	RCS-R AFT OX MANF PRESS 1	DSC OR1	VDC	AMU		93017G	*
	V42P3214C	RCS-R AFT OX MANF PRESS 2	DSC OR1	VDC	AMU		93017G	*
	V42P3216C	RCS-R AFT OX MANF PRESS 3	DSC OR2	VDC	AMU		93017G	*
	V42P3218C	RCS-R AFT OX MANF PRESS 4	DSC OR2	VDC	AMU		93017G	*
	V42P3310C*	RCS R AFT FU TANK OUT PRESS	DSC OR2	PSIA	AMU		89464G	

TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&amp;C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V42P3312C	RCS-R AFT FU MANF PRESS 1	DSC OR1	VDC	AMU		93017G	*
	V42P3314C	RCS-R AFT FU MANF PRESS 2	DSC OR1	VDC	AMU		93017G	*
	V42P3316C	RCS-R AFT FU MANF PRESS 3	DSC OR2	VDC	AMU		93017G	*
	V42P3318C	RCS-R AFT FU MANF PRESS 4	DSC OR2	VDC	AMU		93017G	*
	V42T1200C	RCS FWD OX TANK TEMP-1	DSC F4	DEGF	AMU		93017G	*
	V42T1300C	RCS FWD FU TANK TEMP-1	DSC F2	DEGF	AMU		93017G	*
	V42T2200C	RCS L AFT OX TANK TEMP-1	DSC OL2	DEGF	AMU		93017G	*
	V42T2300C	RCS L AFT FU TANK TEMP-1	DSC OL1	DEGF	AMU		93017G	*
	V42T3200C	RCS R AFT OX TANK TEMP-1	DSC OR2	DEGF	AMU		93017G	*
	V42T3300C	RCS R AFT FU TANK TEMP-1	DSC OR1	DEGF	AMU		93017G	*
	V43H4655C	OMS-L ENG BI-PROP VLV 1 POSN OP	DSC OL2	VDC	AMU		93017G	*
	V43H4656C	OMS-L ENG BI-PROP VLV 2 POSN OP	DSC OL2	VDC	AMU		93017G	*
	V43H5655C	OMS-R ENG BI-PROP VLV 1 POSN OP	DSC OR2	VDC	AMU		93017G	*
	V43H5656C	OMS-R ENG BI-PROP VLV 2 POSN OP	DSC OR2	VDC	AMU		93017G	*
	V43P4122C	OMS-L POD HE TANK PRESS 2	DSC OL2	AMU	AMU		93017G	*
	V43P4221C	OMS-L POD OXDZR TANK ULLAGE PRESS	DSC OL2	AMU	AMU		93017G	*
	V43P4321C	OMS-L POD FUEL TANK ULLAGE PRESS	DSC OL1	AMU	AMU		93017G	*
	V43P4548C	OMS-L ENG PNEU SUPPLY PRESS 2	DSC OL1	AMU	AMU		93017G	*
	V43P4549C	OMS-L ENG RGLTR OUT PRESS	DSC OL1	AMU	AMU		93017G	*
	V43P4645C	OMS-L ENG OX INLET PRESS	DSC OL1	PSIA	AMU		93017G	*
	V43P4646C	OMS-L ENG FU INLET PRESS	DSC OL2	PSIA	AMU		93017G	*
	V43P5122C	OMS-R POD HE TANK PRESS 2	DSC OR2	AMU	AMU		93017G	*
	V43P5221C	OMS-R POD OXDZR TANK ULLAGE PRESS	DSC OR2	AMU	AMU		93017G	*
	V43P5321C	OMS-R POD FU TANK ULLAGE PRESS	DSC OR1	AMU	AMU		93017G	*
	V43P5548C	OMS-R ENG PNEU SUPPLY PRESS 2	DSC OR1	AMU	AMU		93017G	*
	V43P5549C	OMS-R ENG RGLTR OUT PRESS	DSC OR1	AMU	AMU		93017G	*
	V43P5645C	OMS-R ENG OX INLET PRESSURE	DSC OR1	PSIA	AMU		93017G	*
	V43P5646C	OMS-R ENG FU INLET PRESSURE	DSC OR2	PSIA	AMU		93017G	*
	V43Q4232C	OMS-L POD OX AFT COMPARTMENT QTY	HDWR	AMU	AMU		93017G	*
	V43Q4332C	OMS-L POD FU AFT COMPARTMENT QTY	HDWR	AMU	AMU		93017G	*
	V43Q5232C	OMS-R POD OX AFT COMPARTMENT QTY	HDWR	AMU	AMU		93017G	*
	V43Q5332C	OMS-R POD FU AFT COMPARTMENT QTY	HDWR	AMU	AMU		93017G	*
	V43T4111C	OMS-L POD HE TANK TEMP-UPPER	DSC OL1	AMU	AMU		93017G	*
	V43T5111C	OMS-R POD HE TANK TEMP UPPER	DSC OR1	AMU	AMU		93017G	*
	V43X4233X	OMS-L POD OX TANK LEVEL LOW	HDWR	BD	AMU		93017G	*
	V43X4333X	OMS-L POD FU TANK LEVEL LOW	HDWR	BD	AMU		93017G	*
	V43X5233X	OMS-R POD OX TANK LEVEL LOW	HDWR	BD	AMU		93017G	*
	V43X5333X	OMS-R POD FU TANK LEVEL LOW	HDWR	BD	AMU		93017G	*
	V79X1170X	MPS ENG 1 P ACTR A FAIL	ATVC 1	BD	AMU		93017G	*
	V79X1171X	MPS ENG 1 Y ACTR A FAIL	ATVC 1	BD	AMU		93017G	*
	V79X1173X	MPS ENG 1 P ACTR B FAIL	ATVC 2	BD	AMU		93017G	*
	V79X1174X	MPS ENG 1 Y ACTR B FAIL	ATVC 2	BD	AMU		93017G	*
	V79X1176X	MPS ENG 1 P ACTR C FAIL	ATVC 3	BD	AMU		93017G	*
	V79X1177X	MPS ENG 1 Y ACTR C FAIL	ATVC 3	BD	AMU		93017G	*
	V79X1178X	MPS ENG 1 P ACTR D FAIL	ATVC 4	BD	AMU		93017G	*
	V79X1179X	MPS ENG 1 Y ACTR D FAIL	ATVC 4	BD	AMU		93017G	*

TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V79X1270X	MPS ENG 2 P ACTR A FAIL	ATVC 1		BD		93017G	*
	V79X1271X	MPS ENG 2 Y ACTR A FAIL	ATVC 1		BD		93017G	*
	V79X1273X	MPS ENG 2 P ACTR B FAIL	ATVC 2		BD		93017G	*
	V79X1274X	MPS ENG 2 Y ACTR B FAIL	ATVC 2		BD		93017G	*
	V79X1276X	MPS ENG 2 P ACTR C FAIL	ATVC 3		BD		93017G	*
	V79X1277X	MPS ENG 2 Y ACTR C FAIL	ATVC 3		BD		93017G	*
	V79X1278X	MPS ENG 2 P ACTR D FAIL	ATVC 4		BD		93017G	*
	V79X1279X	MPS ENG 2 Y ACTR D FAIL	ATVC 4		BD		93017G	*
	V79X1370X	MPS ENG 3 P ACTR A FAIL	ATVC 1		BD		93017G	*
	V79X1371X	MPS ENG 3 Y ACTR A FAIL	ATVC 1		BD		93017G	*
	V79X1373X	MPS ENG 3 P ACTR B FAIL	ATVC 2		BD		93017G	*
	V79X1374X	MPS ENG 3 Y ACTR B FAIL	ATVC 2		BD		93017G	*
	V79X1376X	MPS ENG 3 P ACTR C FAIL	ATVC 3		BD		93017G	*
	V79X1377X	MPS ENG 3 Y ACTR C FAIL	ATVC 3		BD		93017G	*
	V79X1378X	MPS ENG 3 P ACTR D FAIL	ATVC 4		BD		93017G	*
	V79X1379X	MPS ENG 3 Y ACTR D FAIL	ATVC 4		BD		93017G	*
	V79X3260X	L INBOARD ELEVON ACTR 1 FAIL	ASA 1		BD		93017G	*
	V79X3261X	L INBOARD ELEVON ACTR 2 FAIL	ASA 2		BD		93017G	*
	V79X3262X	L INBOARD ELEVON ACTR 3 FAIL	ASA 3		BD		93017G	*
	V79X3263X	L INBOARD ELEVON ACTR 4 FAIL	ASA 4		BD		93017G	*
	V79X3265X	L OTBOARD ELEVON ACTR 1 FAIL	ASA 1		BD		93017G	*
	V79X3266X	L OTBOARD ELEVON ACTR 2 FAIL	ASA 2		BD		93017G	*
	V79X3267X	L OTBOARD ELEVON ACTR 3 FAIL	ASA 3		BD		93017G	*
	V79X3268X	L OTBOARD ELEVON ACTR 4 FAIL	ASA 4		BD		93017G	*
	V79X3270X	R INBOARD ELEVON ACTR 1 FAIL	ASA 1		BD		93017G	*
	V79X3271X	R INBOARD ELEVON ACTR 2 FAIL	ASA 2		BD		93017G	*
	V79X3272X	R INBOARD ELEVON ACTR 3 FAIL	ASA 3		BD		93017G	*
	V79X3273X	R INBOARD ELEVON ACTR 4 FAIL	ASA 4		BD		93017G	*
	V79X3275X	R OTBOARD ELEVON ACTR 1 FAIL	ASA 1		BD		93017G	*
	V79X3276X	R OTBOARD ELEVON ACTR 2 FAIL	ASA 2		BD		93017G	*
	V79X3277X	R OTBOARD ELEVON ACTR 3 FAIL	ASA 3		BD		93017G	*
	V79X3278X	R OTBOARD ELEVON ACTR 4 FAIL	ASA 4		BD		93017G	*
	V79X3331X	RUDDER ACTR 1 FAIL OUTPUT	ASA 1		BD		93017G	*
	V79X3332X	RUDDER ACTR 2 FAIL OUTPUT	ASA 2		BD		93017G	*
	V79X3333X	RUDDER ACTR 3 FAIL OUTPUT	ASA 3		BD		93017G	*
	V79X3334X	RUDDER ACTR 4 FAIL OUTPUT	ASA 4		BD		93017G	*
	V79X3336X	SPEED BRAKE ACTR 1 FAIL	ASA 1		BD		93017G	*
	V79X3337X	SPEED BRAKE ACTR 2 FAIL	ASA 2		BD		93017G	*
	V79X3338X	SPEED BRAKE ACTR 3 FAIL	ASA 3		BD		93017G	*
	V79X3339X	SPEED BRAKE ACTR 4 FAIL	ASA 4		BD		93017G	*
	V79X5100X	LH SRB ROCK ACTR A FAIL	ATVC 1		BD		93017G	*
	V79X5101X	LH SRB TILT ACTR A FAIL	ATVC 1		BD		93017G	*
	V79X5105X	LH SRB ROCK ACTR B FAIL	ATVC 2		BD		93017G	*
	V79X5106X	LH SRB TILT ACTR B FAIL	ATVC 2		BD		93017G	*
	V79X5110X	LH SRB ROCK ACTR C FAIL	ATVC 3		BD		93017G	*
	V79X5111X	LH SRB TILT ACTR C FAIL	ATVC 3		BD		93017G	*

TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&amp;C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V79X5115X	LH SRB ROCK ACTR D FAIL	ATVC 4		BD		93017G	*
	V79X5116X	LH SRB TILT ACTR D FAIL	ATVC 4		BD		93017G	*
	V79X5150X	RH SRB ROCK ACTR A FAIL	ATVC 1		BD		93017G	*
	V79X5151X	RH SRB TILT ACTR A FAIL	ATVC 1		BD		93017G	*
	V79X5155X	RH SRB ROCK ACTR B FAIL	ATVC 2		BD		93017G	*
	V79X5156X	RH SRB TILT ACTR B FAIL	ATVC 2		BD		93017G	*
	V79X5160X	RH SRB ROCK ACTR C FAIL	ATVC 3		BD		93017G	*
	V79X5161X	RH SRB TILT ACTR C FAIL	ATVC 3		BD		93017G	*
	V79X5165X	RH SRB ROCK ACTR D FAIL	ATVC 4		BD		93017G	*
	V79X5166X	RH SRB TILT ACTR D FAIL	ATVC 4		BD		93017G	*
	V90P2515C	SELECTED LOB ELVN PRI DELTA PRESS	SF	VDC	SPL		93017G	*
	V90P2516C	SELECTED LIB ELVN PRI DELTA PRESS	SF	VDC	SPL		93017G	*
	V90P2517C	SELECTED ROB ELVN PRI DELTA PRESS	SF	VDC	SPL		93017G	*
	V90P2518C	SELECTED RIB ELVN PRI DELTA PRESS	SF	VDC	SPL		93017G	*
	V90X2351X	RCS L AFT FU LEAKAGE ALERT	RCS QTY MON					
	V90X2352X	RCS L AFT OX LEAKAGE ALERT	RCS QTY MON					
	V90X2353X	RCS R AFT FU LEAKAGE ALERT	RCS QTY MON					
	V90X2354X	RCS R AFT OX LEAKAGE ALERT	RCS QTY MON					
	V90X2355X	RCS FWD FU LEAKAGE ALERT	RCS QTY MON					
	V90X2356X	RCS FWD OX LEAKAGE ALERT	RCS QTY MON					
	V90X2374X	RCS L FU LEAKAGE ALERT DISP	RCS QTY MON					
	V90X2375X	RCS L OX LEAKAGE ALERT DISP	RCS QTY MON					
	V90X2376X	RCS R FU LEAKAGE ALERT DISP	RCS QTY MON					
	V90X2377X	RCS R OX LEAKAGE ALERT DISP	RCS QTY MON					
	V90X2378X	RCS FWD FU LEAKAGE ALERT DISP	RCS QTY MON					
	V90X2379X	RCS FWD OX LEAKAGE ALERT DISP	RCS QTY MON					
	V90X2392X	RCS-FWD QUANTITY ALERT	RCS QTY MON					
	V90X2393X	RCS-L QUANTITY ALERT	RCS QTY MON					
	V90X2394X	RCS-R QUANTITY ALERT	RCS QTY MON					
	V90X3432X	ET SEP MANUAL DEFAULT	GN&C SW RM					
	V90X3433X	AFT SENSE DEFAULT	GN&C SW RM					
	V90X3438X	ET SEP AUTO DEFAULT	GN&C SW RM					
	V90X3441X	ENTRY ROLL MODE SW FAIL	GN&C SW RM					
	V90X3446X	ME-1 SHUTDOWN SW DISAGREE	GN&C SW RM					
	V90X3447X	ME-2 SHUTDOWN SW DISAGREE	GN&C SW RM					
	V90X3448X	ME-3 SHUTDOWN SW DISAGREE	GN&C SW RM					
	V90X4435X	RCS MANF F1 RM DILEMMA FLAG	RCS RM					
	V90X4436X	RCS MANF F2 RM DILEMMA FLAG	RCS RM					
	V90X4437X	RCS MANF F3 RM DILEMMA FLAG	RCS RM					
	V90X4438X	RCS MANF F4 RM DILEMMA FLAG	RCS RM					
	V90X4439X	RCS MANF F5 RM DILEMMA FLAG	RCS RM					
	V90X4440X	RCS MANF L1 RM DILEMMA FLAG	RCS RM					
	V90X4441X	RCS MANF L2 RM DILEMMA FLAG	RCS RM					
	V90X4442X	RCS MANF L3 RM DILEMMA FLAG	RCS RM					
	V90X4443X	RCS MANF L4 RM DILEMMA FLAG	RCS RM					
	V90X4444X	RCS MANF L5 RM DILEMMA FLAG	RCS RM					



TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V90X4445X	RCS MANF R1 RM DILEMMA FLAG	RCS RM					
	V90X4446X	RCS MANF R2 RM DILEMMA FLAG	RCS RM					
	V90X4447X	RCS MANF R3 RM DILEMMA FLAG	RCS RM					
	V90X4448X	RCS MANF R4 RM DILEMMA FLAG	RCS RM					
	V90X4449X	RCS MANF R5 RM DILEMMA FLAG	RCS RM					
	V90X4450X	RCS MANF RM DILEMMA FLAG	RCS RM					
	V90X4451X	RCS PWR FAIL FLAG	RCS RM					
	V90X4564X	JET F2U LEAKING	RCS RM		BD		93017G	*
	V90X4565X	JET F2D LEAKING	RCS RM		BD		93017G	*
	V90X4566X	JET F3F LEAKING	RCS RM		BD		93017G	*
	V90X4567X	JET F3L LEAKING	RCS RM		BD		93017G	*
	V90X4568X	JET F3U LEAKING	RCS RM		BD		93017G	*
	V90X4569X	JET F3D LEAKING	RCS RM		BD		93017G	*
	V90X4570X	JET L1A FAILED OFF	RCS RM		BD		93017G	*
	V90X4571X	JET L1L FAILED OFF	RCS RM		BD		93017G	*
	V90X4572X	JET L1U FAILED OFF	RCS RM		BD		93017G	*
	V90X4573X	JET L2L FAILED OFF	RCS RM		BD		93017G	*
	V90X4574X	JET L2U FAILED OFF	RCS RM		BD		93017G	*
	V90X4575X	JET L2D FAILED OFF	RCS RM		BD		93017G	*
	V90X4576X	JET L3A FAILED OFF	RCS RM		BD		93017G	*
	V90X4577X	JET L3L FAILED OFF	RCS RM		BD		93017G	*
	V90X4578X	JET L3D FAILED OFF	RCS RM		BD		93017G	*
	V90X4579X	JET L4L FAILED OFF	RCS RM		BD		93017G	*
	V90X4580X	JET L4U FAILED OFF	RCS RM		BD		93017G	*
	V90X4581X	JET L4D FAILED OFF	RCS RM		BD		93017G	*
	V90X4582X	JET L5D FAILED OFF	RCS RM		BD		93017G	*
	V90X4583X	JET L5L FAILED OFF	RCS RM		BD		93017G	*
	V90X4584X	JET R1A FAILED OFF	RCS RM		BD		93017G	*
	V90X4585X	JET R1R FAILED OFF	RCS RM		BD		93017G	*
	V90X4586X	JET R1U FAILED OFF	RCS RM		BD		93017G	*
	V90X4587X	JET R2R FAILED OFF	RCS RM		BD		93017G	*
	V90X4588X	JET R2U FAILED OFF	RCS RM		BD		93017G	*
	V90X4589X	JET R2D FAILED OFF	RCS RM		BD		93017G	*
	V90X4590X	JET R3A FAILED OFF	RCS RM		BD		93017G	*
	V90X4591X	JET R3R FAILED OFF	RCS RM		BD		93017G	*
	V90X4592X	JET R3D FAILED OFF	RCS RM		BD		93017G	*
	V90X4593X	JET R4R FAILED OFF	RCS RM		BD		93017G	*
	V90X4594X	JET R4U FAILED OFF	RCS RM		BD		93017G	*
	V90X4595X	JET R4D FAILED OFF	RCS RM		BD		93017G	*
	V90X4596X	JET R5D FAILED OFF	RCS RM		BD		93017G	*
	V90X4597X	JET R5R FAILED OFF	RCS RM		BD		93017G	*
	V90X4598X	JET F1F FAILED OFF	RCS RM		BD		93017G	*
	V90X4599X	JET F1L FAILED OFF	RCS RM		BD		93017G	*
	V90X4601X	JET F1U FAILED OFF	RCS RM		BD		93017G	*
	V90X4602X	JET F1D FAILED OFF	RCS RM		BD		93017G	*
	V90X4603X	JET F2F FAILED OFF	RCS RM		BD		93017G	*

TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&amp;C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V90X4604X	JET F2R FAILED OFF	RCS RM		BD		93017G	*
	V90X4605X	JET F2U FAILED OFF	RCS RM		BD		93017G	*
	V90X4606X	JET F2D FAILED OFF	RCS RM		BD		93017G	*
	V90X4607X	JET F3F FAILED OFF	RCS RM		BD		93017G	*
	V90X4608X	JET F3L FAILED OFF	RCS RM		BD		93017G	*
	V90X4609X	JET F3U FAILED OFF	RCS RM		BD		93017G	*
	V90X4610X	JET F3D FAILED OFF	RCS RM		BD		93017G	*
	V90X4611X	JET F4R FAILED OFF	RCS RM		BD		93017G	*
	V90X4612X	JET F4D FAILED OFF	RCS RM		BD		93017G	*
	V90X4613X	JET F5L FAILED OFF	RCS RM		BD		93017G	*
	V90X4614X	JET F5R FAILED OFF	RCS RM		BD		93017G	*
	V90X4615X	JET F4R LEAKING	RCS RM		BD		93017G	*
	V90X4616X	JET F4D LEAKING	RCS RM		BD		93017G	*
	V90X4617X	JET F5L LEAKING	RCS RM		BD		93017G	*
	V90X4618X	JET F5R LEAKING	RCS RM		BD		93017G	*
	V90X4620X	JET L1A FAILED ON	RCS RM		BD		93017G	*
	V90X4621X	JET L1L FAILED ON	RCS RM		BD		93017G	*
	V90X4622X	JET L1U FAILED ON	RCS RM		BD		93017G	*
	V90X4623X	JET L2L FAILED ON	RCS RM		BD		93017G	*
	V90X4624X	JET L2U FAILED ON	RCS RM		BD		93017G	*
	V90X4625X	JET L2D FAILED ON	RCS RM		BD		93017G	*
	V90X4626X	JET L3A FAILED ON	RCS RM		BD		93017G	*
	V90X4627X	JET L3L FAILED ON	RCS RM		BD		93017G	*
	V90X4628X	JET L3D FAILED ON	RCS RM		BD		93017G	*
	V90X4629X	JET L4L FAILED ON	RCS RM		BD		93017G	*
	V90X4630X	JET L4U FAILED ON	RCS RM		BD		93017G	*
	V90X4631X	JET L4D FAILED ON	RCS RM		BD		93017G	*
	V90X4632X	JET L5D FAILED ON	RCS RM		BD		93017G	*
	V90X4633X	JET L5L FAILED ON	RCS RM		BD		93017G	*
	V90X4634X	JET R1A FAILED ON	RCS RM		BD		93017G	*
	V90X4635X	JET R1R FAILED ON	RCS RM		BD		93017G	*
	V90X4636X	JET R1U FAILED ON	RCS RM		BD		93017G	*
	V90X4637X	JET R2R FAILED ON	RCS RM		BD		93017G	*
	V90X4638X	JET R2U FAILED ON	RCS RM		BD		93017G	*
	V90X4639X	JET R2D FAILED ON	RCS RM		BD		93017G	*
	V90X4641X	JET R3A FAILED ON	RCS RM		BD		93017G	*
	V90X4642X	JET R3R FAILED ON	RCS RM		BD		93017G	*
	V90X4643X	JET R3D FAILED ON	RCS RM		BD		93017G	*
	V90X4644X	JET R4R FAILED ON	RCS RM		BD		93017G	*
	V90X4645X	JET R4U FAILED ON	RCS RM		BD		93017G	*
	V90X4646X	JET R4D FAILED ON	RCS RM		BD		93017G	*
	V90X4647X	JET R5D FAILED ON	RCS RM		BD		93017G	*
	V90X4648X	JET R5R FAILED ON	RCS RM		BD		93017G	*
	V90X4649X	JET F1F FAILED ON	RCS RM		BD		93017G	*
	V90X4650X	JET F1L FAILED ON	RCS RM		BD		93017G	*
	V90X4651X	JET F1U FAILED ON	RCS RM		BD		93017G	*

TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V90X4652X	JET F1D FAILED ON	RCS RM		BD		93017G	*
	V90X4653X	JET F2F FAILED ON	RCS RM		BD		93017G	*
	V90X4654X	JET F2R FAILED ON	RCS RM		BD		93017G	*
	V90X4655X	JET F2U FAILED ON	RCS RM		BD		93017G	*
	V90X4656X	JET F2D FAILED ON	RCS RM		BD		93017G	*
	V90X4657X	JET F3F FAILED ON	RCS RM		BD		93017G	*
	V90X4658X	JET F3L FAILED ON	RCS RM		BD		93017G	*
	V90X4659X	JET F3U FAILED ON	RCS RM		BD		93017G	*
	V90X4660X	JET F3D FAILED ON	RCS RM		BD		93017G	*
	V90X4661X	JET F4R FAILED ON	RCS RM		BD		93017G	*
	V90X4662X	JET F4D FAILED ON	RCS RM		BD		93017G	*
	V90X4663X	JET F5L FAILED ON	RCS RM		BD		93017G	*
	V90X4664X	JET F5R FAILED ON	RCS RM		BD		93017G	*
	V90X4665X	JET L1A LEAKING	RCS RM		BD		93017G	*
	V90X4666X	JET L1L LEAKING	RCS RM		BD		93017G	*
	V90X4667X	JET L1U LEAKING	RCS RM		BD		93017G	*
	V90X4668X	JET L2L LEAKING	RCS RM		BD		93017G	*
	V90X4669X	JET L2U LEAKING	RCS RM		BD		93017G	*
	V90X4670X	JET L2D LEAKING	RCS RM		BD		93017G	*
	V90X4671X	JET L3A LEAKING	RCS RM		BD		93017G	*
	V90X4672X	JET L3L LEAKING	RCS RM		BD		93017G	*
	V90X4673X	JET L3D LEAKING	RCS RM		BD		93017G	*
	V90X4674X	JET L4L LEAKING	RCS RM		BD		93017G	*
	V90X4675X	JET L4U LEAKING	RCS RM		BD		93017G	*
	V90X4676X	JET L4D LEAKING	RCS RM		BD		93017G	*
	V90X4677X	JET L5D LEAKING	RCS RM		BD		93017G	*
	V90X4678X	JET L5L LEAKING	RCS RM		BD		93017G	*
	V90X4679X	JET R1A LEAKING	RCS RM		BD		93017G	*
	V90X4681X	JET R1R LEAKING	RCS RM		BD		93017G	*
	V90X4682X	JET R1U LEAKING	RCS RM		BD		93017G	*
	V90X4683X	JET R2R LEAKING	RCS RM		BD		93017G	*
	V90X4684X	JET R2U LEAKING	RCS RM		BD		93017G	*
	V90X4685X	JET R2D LEAKING	RCS RM		BD		93017G	*
	V90X4686X	JET R3A LEAKING	RCS RM		BD		93017G	*
	V90X4687X	JET R3R LEAKING	RCS RM		BD		93017G	*
	V90X4688X	JET R3D LEAKING	RCS RM		BD		93017G	*
	V90X4689X	JET R4R LEAKING	RCS RM		BD		93017G	*
	V90X4690X	JET R4U LEAKING	RCS RM		BD		93017G	*
	V90X4691X	JET R4D LEAKING	RCS RM		BD		93017G	*
	V90X4692X	JET R5D LEAKING	RCS RM		BD		93017G	*
	V90X4693X	JET R5R LEAKING	RCS RM		BD		93017G	*
	V90X4694X	JET F1F LEAKING	RCS RM		BD		93017G	*
	V90X4695X	JET F1L LEAKING	RCS RM		BD		93017G	*
	V90X4696X	JET F1U LEAKING	RCS RM		BD		93017G	*
	V90X4697X	JET F1D LEAKING	RCS RM		BD		93017G	*
	V90X4698X	JET F2F LEAKING	RCS RM		BD		93017G	*

TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&amp;C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V90X4699X	JET F2R LEAKING	RCS RM		BD		93017G	*
	V90X5401X	ORB RGA 1 FAIL	ORB RG FDIR		BD		79901D	
	V90X5406X	ORB RGA 1 POWER FAIL	ORB RGA SMRD RM	EVENT	BD		93017G	*
	V90X5407X	ORB RGA 2 POWER FAIL	ORB RGA SMRD RM	EVENT	BD		93017G	*
	V90X5408X	ORB RGA 3 POWER FAIL	ORB RGA SMRD RM	EVENT	BD		93017G	*
	V90X5409X	ORB RGA 4 POWER FAIL	ORB RGA SMRD RM	EVENT	BD		93017G	*
	V90X5429X	ORB RGA ROLL RATE DISAGREE	ORB RG FDIR				92354	
	V90X5430X	ORB RGA PITCH RATE DISAGREE	ORB RG FDIR				92354	
	V90X5431X	ORB RGA YAW RATE DISAGREE	ORB RG FDIR				92354	
	V90X5501X	ORB RGA 2 FAIL	ORB RG FDIR		BD		79901D	
	V90X5601X	ORB RGA 3 FAIL	ORB RG FDIR		BD		79901D	
	V90X5651X	ORB RGA 4 FAIL	ORB RG FDIR		BD		79901D	
	V90X5701X	AA 1 FAIL	AA FDIR		BD		79901D	
	V90X5725X	AA NORMAL ACC DISAGREE	AA FDIR				92354	
	V90X5726X	AA LATERAL ACC DISAGREE	AA FDIR				92354	
	V90X5794X	LRCS OX LOW PRESS ALERT	RCS REG SEQ		BD		79964F	
	V90X5795X	LRCS FU LOW PRESS ALERT	RCS REG SEQ		BD		79964F	
	V90X5797X	RRCS OX LOW PRESS ALERT	RCS REG SEQ		BD		79964F	
	V90X5798X	RRCS FU LOW PRESS ALERT	RCS REG SEQ		BD		79964F	
	V90X5801X	AA 2 FAIL	AA FDIR		BD		79901D	
	V90X5901X	AA 3 FAIL	AA FDIR		BD		79901D	
	V90X5951X	AA 4 FAIL	AA FDIR		BD		79901D	
	V90X6005X	LEFT RHC ROLL DISAGREE	RHC FDIR					
	V90X6035X	LEFT RHC PITCH DISAGREE	RHC FDIR					
	V90X6065X	LEFT RHC YAW DISAGREE	RHC FDIR					
	V90X6105X	RIGHT RHC ROLL DISAGREE	RHC FDIR					
	V90X6135X	RIGHT RHC PITCH DISAGREE	RHC FDIR					
	V90X6165X	RIGHT RHC YAW DISAGREE	RHC FDIR					
	V90X6205X	AFT RHC ROLL DISAGREE	RHC FDIR					
	V90X6235X	AFT RHC PITCH DISAGREE	RHC FDIR		BD		93017G	*
	V90X6265X	AFT RHC YAW DISAGREE	RHC FDIR					
	V90X6350X	HYD SYS 1 DISAGREE	HYD SYS FDIR				92354	
	V90X6351X	HYD SYS 2 DISAGREE	HYD SYS FDIR				92354	
	V90X6352X	HYD SYS 3 DISAGREE	HYD SYS FDIR				92354	
	V90X6362X	AFT RHC 1 FAIL	RHC FDIR					
	V90X6363X	AFT RHC 2 FAIL	RHC FDIR					
	V90X6364X	AFT RHC 3 FAIL	RHC FDIR					
	V90X6515X	LH BODY FLAP UP SW DISAGREE	GN&C SW RM		BD		93017G	*
	V90X6525X	LH BODY FLAP DOWN SW DISAGREE	GN&C SW RM		BD		93017G	*
	V90X6615X	RH BODY FLAP UP SW DISAGREE	GN&C SW RM		BD		93017G	*
	V90X6625X	RH BODY FLAP DOWN SW DISAGREE	GN&C SW RM		BD		93017G	*
	V90X6830X	LEFT SPEEDBRAKE COMMAND A FAIL	SBTC FDIR		BD		93017G	*
	V90X6831X	LEFT SPEEDBRAKE COMMAND B FAIL	SBTC FDIR		BD		93017G	*
	V90X6832X	LEFT SPEEDBRAKE COMMAND C FAIL	SBTC FDIR		BD		93017G	*
	V90X6930X	RIGHT SPEEDBRAKE COMMAND A FAIL	SBTC FDIR		BD		93017G	*
	V90X6931X	RIGHT SPEEDBRAKE COMMAND B FAIL	SBTC FDIR		BD		93017G	*

TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V90X6932X	RIGHT SPEEDBRAKE COMMAND C FAIL	SBTC FDIR		BD		93017G	*
	V90X7051X	RH - ROLL TRIM SW DISAGREE	GN&C SW RM		BD		93017G	*
	V90X7178X	LH ADI ATTITUDE SELECT SW INVALID	GN&C SW RM					
	V90X7179X	RH ADI ATTITUDE SELECT SW INVALID	GN&C SW RM					
	V90X7225X	LH + ROLL TRIM SW DISAGREE	GN&C SW RM		BD		93017G	*
	V90X7235X	LH - ROLL TRIM SW DISAGREE	GN&C SW RM		BD		93017G	*
	V90X7245X	LH + PITCH TRIM SW DISAGREE	GN&C SW RM		BD		93017G	*
	V90X7255X	LH - PITCH TRIM SW DISAGREE	GN&C SW RM		BD		93017G	*
	V90X7265X	LH + YAW TRIM SW DISAGREE	GN&C SW RM		BD		93017G	*
	V90X7275X	LH - YAW TRIM SW DISAGREE	GN&C SW RM		BD		93017G	*
	V90X7425X	RH + ROLL TRIM SW DISAGREE	GN&C SW RM		BD		93017G	*
	V90X7445X	RH + PITCH TRIM SW DISAGREE	GN&C SW RM		BD		93017G	*
	V90X7455X	RH - PITCH TRIM SW DISAGREE	GN&C SW RM		BD		93017G	*
	V90X7465X	RH + YAW TRIM SW DISAGREE	GN&C SW RM		BD		93017G	*
	V90X7475X	RH - YAW TRIM SW DISAGREE	GN&C SW RM		BD		93017G	*
	V90X7685X	OMS L CHAMB PRESS FAIL FLAG	OMS RM					
	V90X7686X	OMS R CHAMB PRESS FAIL FLAG	OMS RM					
	V90X7775X	AFT ADI ATTITUDE SELECT SW INVALID	GN&C SW RM					
	V90X7776X	AFT ADI ERROR SWITCH INVALID	GN&C SW RM					
	V90X7777X	AFT ADI RATE SWITCH INVALID	GN&C SW RM					
	V90X7790X	AFT THC NEG X OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7791X	AFT THC NEG Y OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7792X	AFT THC NEG Z OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7793X	AFT THC NEG X OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7794X	AFT THC NEG Y OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7795X	AFT THC NEG Z OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7796X	AFT THC NEG X OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7797X	AFT THC NEG Y OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7798X	AFT THC NEG Z OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7799X	AFT THC POS X OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7800X	AFT THC POS Y OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7801X	AFT THC POS Z OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7802X	AFT THC POS X OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7803X	AFT THC POS Y OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7804X	AFT THC POS Z OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7805X	AFT THC POS X OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7806X	AFT THC POS Y OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7807X	AFT THC POS Z OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7820X	FWD THC NEG X OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7821X	FWD THC NEG Y OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7822X	FWD THC NEG Z OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7823X	FWD THC NEG X OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7824X	FWD THC NEG Y OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7825X	FWD THC NEG Z OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7826X	FWD THC NEG X OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7827X	FWD THC NEG Y OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*

TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&amp;C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V90X7828X	FWD THC NEG Z OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7829X	FWD THC POS X OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7830X	FWD THC POS Y OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7831X	FWD THC POS Z OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7832X	FWD THC POS X OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7833X	FWD THC POS Y OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7834X	FWD THC POS Z OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7835X	FWD THC POS X OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7836X	FWD THC POS Y OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7837X	FWD THC POS Z OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7891X	AFT THC NEG X OUTPUT-DIS	GN&C SW RM					
	V90X7892X	AFT THC NEG Y OUTPUT-DIS	GN&C SW RM					
	V90X7893X	AFT THC NEG Z OUTPUT-DIS	GN&C SW RM					
	V90X7894X	AFT THC POS X OUTPUT-DIS	GN&C SW RM					
	V90X7895X	AFT THC POS Y OUTPUT-DIS	GN&C SW RM					
	V90X7896X	AFT THC POS Z OUTPUT-DIS	GN&C SW RM					
	V90X8128X	FWD THC NEG X OUTPUT-DIS	GN&C SW RM					
	V90X8129X	FWD THC NEG Y OUTPUT-DIS	GN&C SW RM					
	V90X8130X	FWD THC NEG Z OUTPUT-DIS	GN&C SW RM					
	V90X8131X	FWD THC POS X OUTPUT-DIS	GN&C SW RM					
	V90X8132X	FWD THC POS Y OUTPUT-DIS	GN&C SW RM					
	V90X8133X	FWD THC POS Z OUTPUT-DIS	GN&C SW RM					
	V90X8259X	ET AUTO SEP INHIBIT CREW ALERT	ET SEP SEQ		BD		93017G	*
	V90X8274X	LT OMS HE/VAPOR ISO VLV MISCOM	ORB OMS/RCS CONN					
	V90X8275X	RT OMS HE/VAPOR ISO VLV MISCOM	ORB OMS/RCS CONN					
	V91X2015X	FA 1 MDM FAIL	FCOS		BD			
	V91X2016X	FA 2 MDM FAIL	FCOS		BD			
	V91X2017X	FA 3 MDM FAIL	FCOS		BD			
	V91X2283X	FF1 INPUT PROM SEG 1,2 STATUS(MFE)	FCOS		BD			
	V91X2284X	FF2 INPUT PROM SEG 1,2 STATUS(MFE)	FCOS		BD			
	V91X2285X	FF3 INPUT PROM SEG 1,2 STATUS(MFE)	FCOS		BD			
	V91X2287X	FF4 INPUT PROM SEG 1,2 STATUS(MFE)	FCOS		BD			
	V91X2470X	LH SRB ROCK ACTR A COMMFault	FCOS					
	V91X2471X	LH SRB TILT ACTR A COMMFault	FCOS					
	V91X2472X	LH SRB ROCK ACTR B COMMFault	FCOS					
	V91X2473X	LH SRB TILT ACTR B COMMFault	FCOS					
	V91X2474X	LH SRB ROCK ACTR C COMMFault	FCOS					
	V91X2475X	LH SRB TILT ACTR C COMMFault	FCOS					
	V91X2476X	LH SRB ROCK ACTR D COMMFault	FCOS					
	V91X2477X	LH SRB TILT ACTR D COMMFault	FCOS					
	V91X2478X	RH SRB ROCK ACTR A COMMFault	FCOS					
	V91X2479X	RH SRB TILT ACTR A COMMFault	FCOS					
	V91X2480X	RH SRB ROCK ACTR B COMMFault	FCOS					
	V91X2481X	RH SRB TILT ACTR B COMMFault	FCOS					
	V91X2482X	RH SRB ROCK ACTR C COMMFault	FCOS					
	V91X2483X	RH SRB TILT ACTR C COMMFault	FCOS					

TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V91X2484X	RH SRB ROCK ACTR D	COMMFault	FCOS				
	V91X2485X	RH SRB TILT ACTR D	COMMFault	FCOS				
	V91X2544X	MPS ENG 1 P ACTR A	COMMFault	FCOS			79556D	
	V91X2545X	MPS ENG 1 Y ACTR A	COMMFault	FCOS			79556D	
	V91X2546X	MPS ENG 1 P ACTR B	COMMFault	FCOS			79556D	
	V91X2547X	MPS ENG 1 Y ACTR B	COMMFault	FCOS			79556D	
	V91X2548X	MPS ENG 1 P ACTR C	COMMFault	FCOS			79556D	
	V91X2549X	MPS ENG 1 Y ACTR C	COMMFault	FCOS			79556D	
	V91X2550X	MPS ENG 1 P ACTR D	COMMFault	FCOS			79556D	
	V91X2551X	MPS ENG 1 Y ACTR D	COMMFault	FCOS			79556D	
	V91X2552X	MPS ENG 2 P ACTR A	COMMFault	FCOS			79556D	
	V91X2553X	MPS ENG 2 Y ACTR A	COMMFault	FCOS			79556D	
	V91X2554X	MPS ENG 2 P ACTR B	COMMFault	FCOS			79556D	
	V91X2555X	MPS ENG 2 Y ACTR B	COMMFault	FCOS			79556D	
	V91X2556X	MPS ENG 2 P ACTR C	COMMFault	FCOS			79556D	
	V91X2557X	MPS ENG 2 Y ACTR C	COMMFault	FCOS			79556D	
	V91X2558X	MPS ENG 2 P ACTR D	COMMFault	FCOS			79556D	
	V91X2559X	MPS ENG 2 Y ACTR D	COMMFault	FCOS			79556D	
	V91X2560X	MPS ENG 3 P ACTR A	COMMFault	FCOS			79556D	
	V91X2561X	MPS ENG 3 Y ACTR A	COMMFault	FCOS			79556D	
	V91X2562X	MPS ENG 3 P ACTR B	COMMFault	FCOS			79556D	
	V91X2563X	MPS ENG 3 Y ACTR B	COMMFault	FCOS			79556D	
	V91X2564X	MPS ENG 3 P ACTR C	COMMFault	FCOS			79556D	
	V91X2565X	MPS ENG 3 Y ACTR C	COMMFault	FCOS			79556D	
	V91X2566X	MPS ENG 3 P ACTR D	COMMFault	FCOS			79556D	
	V91X2567X	MPS ENG 3 Y ACTR D	COMMFault	FCOS			79556D	
	V91X2577X	OMS-L POD OX AFT QTY	COMMFault	FCOS				
	V91X2578X	OMS-R POD OX AFT QTY	COMMFault	FCOS				
	V91X2579X	OMS-L POD FU AFT QTY	COMMFault	FCOS				
	V91X2580X	OMS-R POD FU AFT QTY	COMMFault	FCOS				
	V91X2603X	OMS ENG OX INLET PRESS LEFT	CF	FCOS		BD		
	V91X2604X	OMS ENG FU INLET PRESS LEFT	CF	FCOS		BD		
	V91X2606X	OMS ENG OX INLET PRESS RIGHT	CF	FCOS		BD		
	V91X2607X	OMS ENG FU INLET PRESS RIGHT	CF	FCOS		BD		
	V91X2627X	OMS-L POD OX TK LEVEL LOW	CF	FCOS				
	V91X2628X	OMS-R POD OX TK LEVEL LOW	CF	FCOS				
	V91X2629X	OMS-L POD FU TK LEVEL LOW	CF	FCOS				
	V91X2630X	OMS-R POD FU TK LEVEL LOW	CF	FCOS				
	V91X2841X	FA1 INPUT PROM SEG 1,2	STATUS(MFE)	SYS S/W			93017G	*
	V91X2842X	FA2 INPUT PROM SEG 1,2	STATUS(MFE)	SYS S/W			93017G	*
	V91X2843X	FA3 INPUT PROM SEG 1,2	STATUS(MFE)	SYS S/W			93017G	*
	V91X2844X	FA4 INPUT PROM SEG 1,2	STATUS(MFE)	SYS S/W			93017G	*
	V91X5204X	RCS FWD HE OX TK P 2	COMMFault	FCOS				
	V91X5206X	RCS FWD OX TK ULLAGE P	COMMFault	FCOS				
	V91X5207X	RCS FWD FU TK ULLAGE P	COMMFault	FCOS				
	V91X5216X	RCS FWD HE FU TK PRES 1	COMMFault	FCOS			90897D	

TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&amp;C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V91X5217X	RCS FWD HE FU TK PRES 2 COMMFAULT	FCOS				90897D	
	V91X5219X	RCS FWD FU TANK OUT PRES COMMFAULT	FCOS				90897D	
	V91X5221X	RCS FWD FU TK TEMP 1 COMMFAULT	FCOS				90897D	
	V91X5225X	RCS FWD OX TANK OUT PRES COMMFAULT	FCOS				90897D	
	V91X5227X	RCS FWD OX TK TEMP 1 COMMFAULT	FCOS				90897D	
	V91X6600X	AFT THC POS X OUTPUT-A COMMFAULT	FCOS					
	V91X6601X	AFT THC POS Y OUTPUT-A COMMFAULT	FCOS					
	V91X6602X	AFT THC POS Z OUTPUT-A COMMFAULT	FCOS					
	V91X6604X	AFT THC POS X OUTPUT-B COMMFAULT	FCOS					
	V91X6605X	AFT THC POS Y OUTPUT-B COMMFAULT	FCOS					
	V91X6606X	AFT THC POS Z OUTPUT-B COMMFAULT	FCOS					
	V91X6608X	AFT THC POS X OUTPUT-C COMMFAULT	FCOS					
	V91X6609X	AFT THC POS Y OUTPUT-C COMMFAULT	FCOS					
	V91X6610X	AFT THC POS Z OUTPUT-C COMMFAULT	FCOS					
	V91X6615X	AFT THC NEG X OUTPUT-A COMMFAULT	FCOS					
	V91X6616X	AFT THC NEG Y OUTPUT-A COMMFAULT	FCOS					
	V91X6617X	AFT THC NEG Z OUTPUT-A COMMFAULT	FCOS					
	V91X6619X	AFT THC NEG X OUTPUT-B COMMFAULT	FCOS					
	V91X6620X	AFT THC NEG Y OUTPUT-B COMMFAULT	FCOS					
	V91X6621X	AFT THC NEG Z OUTPUT-B COMMFAULT	FCOS					
	V91X6623X	AFT THC NEG X OUTPUT-C COMMFAULT	FCOS					
	V91X6624X	AFT THC NEG Y OUTPUT-C COMMFAULT	FCOS					
	V91X6625X	AFT THC NEG Z OUTPUT-C COMMFAULT	FCOS					
	V91X6644X	FWD THC NEG X OUTPUT-A COMMFAULT	FCOS					
	V91X6645X	FWD THC NEG Y OUTPUT-A COMMFAULT	FCOS					
	V91X6646X	FWD THC NEG Z OUTPUT-A COMMFAULT	FCOS					
	V91X6647X	FWD THC NEG X OUTPUT-B COMMFAULT	FCOS					
	V91X6648X	FWD THC NEG Y OUTPUT-B COMMFAULT	FCOS					
	V91X6649X	FWD THC NEG Z OUTPUT-B COMMFAULT	FCOS					
	V91X6650X	FWD THC NEG X OUTPUT-C COMMFAULT	FCOS					
	V91X6651X	FWD THC NEG Y OUTPUT-C COMMFAULT	FCOS					
	V91X6652X	FWD THC NEG Z OUTPUT-C COMMFAULT	FCOS					
	V91X6653X	FWD THC POS X OUTPUT-A COMMFAULT	FCOS					
	V91X6654X	FWD THC POS Y OUTPUT-A COMMFAULT	FCOS					
	V91X6655X	FWD THC POS Z OUTPUT-A COMMFAULT	FCOS					
	V91X6656X	FWD THC POS X OUTPUT-B COMMFAULT	FCOS					
	V91X6657X	FWD THC POS Y OUTPUT-B COMMFAULT	FCOS					
	V91X6658X	FWD THC POS Z OUTPUT-B COMMFAULT	FCOS					
	V91X6659X	FWD THC POS X OUTPUT-C COMMFAULT	FCOS					
	V91X6660X	FWD THC POS Y OUTPUT-C COMMFAULT	FCOS					
	V91X6661X	FWD THC POS Z OUTPUT-C COMMFAULT	FCOS					
	V91X7772X	AFT RHC YAW CMD-A COMMFAULT	FCOS					
	V91X7778X	AFT RHC PITCH CMD-B COMMFAULT	FCOS					
	V91X7780X	AFT RHC YAW CMD-B COMMFAULT	FCOS					
	V91X7782X	AFT RHC PITCH CMD-A COMMFAULT	FCOS					
	V91X7783X	AFT RHC ROLL CMD-B COMMFAULT	FCOS					



TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V91X7784X	AFT RHC PITCH CMD-C COMMFAULT	FCOS					
	V91X7788X	AFT RHC ROLL CMD-C COMMFAULT	FCOS					
	V91X7791X	AFT RHC YAW CMD-C COMMFAULT	FCOS					
	V91X7792X	AFT RHC ROLL CMD-A COMMFAULT	FCOS					
	V93X4201XA	LH RHC 1 DES CMD	RM ORB DISP				93017G	*
	V93X4201XB	LH RHC 1 DES CMD	RM/CNTLR DISP				93017G	*
	V93X4203XA	LH RHC 2 DES CMD	RM ORB DISP				93017G	*
	V93X4203XB	LH RHC 2 DES CMD	RM/CNTLR DISP				93017G	*
	V93X4205XA	LH RHC 3 DES CMD	RM ORB DISP				93017G	*
	V93X4205XB	LH RHC 3 DES CMD	RM/CNTLR DISP				93017G	*
	V93X4207XA	FWD THC X,Y,Z OUT DES A	RM ORB DISP				93017G	*
	V93X4207XB	FWD THC X,Y,Z OUT DES A	RM/CNTLR DISP				93017G	*
	V93X4208XA	FWD THC X,Y,Z OUT DES B	RM ORB DISP				93017G	*
	V93X4208XB	FWD THC X,Y,Z OUT DES B	RM/CNTLR DISP				93017G	*
	V93X4209XA	FWD THC X,Y,Z OUT DES C	RM ORB DISP				93017G	*
	V93X4209XB	FWD THC X,Y,Z OUT DES C	RM/CNTLR DISP				93017G	*
	V93X4211X	LH SPD BRK 1 DES CMD	RM/CNTLR DISP		BD		93017G	*
	V93X4213X	LH SPD BRK 2 DES CMD	RM/CNTLR DISP		BD		93017G	*
	V93X4215X	LH SPD BRK 3 DES CMD	RM/CNTLR DISP		BD		93017G	*
	V93X4231XA	RH RHC 1 DES CMD	RM ORB DISP				93017G	*
	V93X4231XB	RH RHC 1 DES CMD	RM/CNTLR DISP				93017G	*
	V93X4233XA	RH RHC 2 DES CMD	RM ORB DISP				93017G	*
	V93X4233XB	RH RHC 2 DES CMD	RM/CNTLR DISP				93017G	*
	V93X4235XA	RH RHC 3 DES CMD	RM ORB DISP				93017G	*
	V93X4235XB	RH RHC 3 DES CMD	RM/CNTLR DISP				93017G	*
	V93X4237XA	AFT THC X,Y,Z OUT DES A	RM ORB DISP				93017G	*
	V93X4237XB	AFT THC X,Y,Z OUT DES A	RM/CNTLR DISP				93017G	*
	V93X4238XA	AFT THC X,Y,Z OUT DES B	RM ORB DISP				93017G	*
	V93X4238XB	AFT THC X,Y,Z OUT DES B	RM/CNTLR DISP				93017G	*
	V93X4239XA	AFT THC X,Y,Z OUT DES C	RM ORB DISP				93017G	*
	V93X4239XB	AFT THC X,Y,Z OUT DES C	RM/CNTLR DISP				93017G	*
	V93X4241X	RH SPD BRK 1 DES CMD	RM/CNTLR DISP		BD		93017G	*
	V93X4243X	RH SPD BRK 2 DES CMD	RM/CNTLR DISP		BD		93017G	*
	V93X4245X	RH SPD BRK 3 DES CMD	RM/CNTLR DISP		BD		93017G	*
	V93X4296XA	AFT RHC 1 DES CMD	RM ORB DISP				93017G	*
	V93X4296XB	AFT RHC 1 DES CMD	RM/CNTLR DISP				93017G	*
	V93X4297XA	AFT RHC 2 DES CMD	RM ORB DISP				93017G	*
	V93X4297XB	AFT RHC 2 DES CMD	RM/CNTLR DISP				93017G	*
	V93X4298XA	AFT RHC 3 DES CMD	RM ORB DISP				93017G	*
	V93X4298XB	AFT RHC 3 DES CMD	RM/CNTLR DISP				93017G	*
	V93X4411XA	TACAN 1 DES CMD	HORIZ SIT DISP				93017G	*
	V93X4411XB	TACAN 1 DES CMD	SENSOR SELF TEST DISP				93017G	*
	V93X4413XA	TACAN 2 DES CMD	HORIZ SIT DISP				93017G	*
	V93X4413XB	TACAN 2 DES CMD	SENSOR SELF TEST DISP				93017G	*
	V93X4415XA	TACAN 3 DES CMD	HORIZ SIT DISP				93017G	*
	V93X4415XB	TACAN 3 DES CMD	SENSOR SELF TEST DISP				93017G	*

TABLE B.4.110-5. INPUT FUNCTIONAL PARAMETERS FOR GN&amp;C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V93X4421X	MSBLS 1 DES CMD	SENSOR SELF TEST DISP		BD		93017G	*
	V93X4423X	MSBLS 2 DES CMD	SENSOR SELF TEST DISP		BD		93017G	*
	V93X4425X	MSBLS 3 DES CMD	SENSOR SELF TEST DISP		BD		93017G	*
	V93X4435XB	AA 1 DES CMD/FAIL	SENSOR SELF TEST DISP				93017G	*
	V93X4436XB	AA 2 DES CMD/FAIL	SENSOR SELF TEST DISP				93017G	*
	V93X4437XB	AA 3 DES CMD/FAIL	SENSOR SELF TEST DISP				93017G	*
	V93X4438XB	AA 4 DES CMD/FAIL	SENSOR SELF TEST DISP				93017G	*
	V93X4516XB	RGA 1 DES CMD/FAIL	SENSOR SELF TEST DISP	EVENT	BD		93017G	*
	V93X4518XB	RGA 2 DES CMD/FAIL	SENSOR SELF TEST DISP	EVENT	BD		93017G	*
	V93X4520XB	RGA 3 DES CMD/FAIL	SENSOR SELF TEST DISP	EVENT	BD		93017G	*
	V93X4522XB	RGA 4 DES CMD/FAIL	SENSOR SELF TEST DISP	EVENT	BD		93017G	*
	V93X4571XA	ADTA 1 DES CMD	SENSOR SELF TEST DISP				93017G	*
	V93X4571XB	ADTA 1 DES CMD	OVERRIDE DISP				93017G	*
	V93X4573XA	ADTA 2 DES CMD	SENSOR SELF TEST DISP				93017G	*
	V93X4573XB	ADTA 2 DES CMD	OVERRIDE DISP				93017G	*
	V93X4575XA	ADTA 3 DES CMD	SENSOR SELF TEST DISP				93017G	*
	V93X4575XB	ADTA 3 DES CMD	OVERRIDE DISP				93017G	*
	V93X4577XA	ADTA 4 DES CMD	SENSOR SELF TEST DISP				93017G	*
	V93X4577XB	ADTA 4 DES CMD	OVERRIDE DISP				93017G	*
	V93X5538X	GNC GROUND CHECKOUT ENABLE	UI		BD		93017G	*
	V93X6961X	SURF DRIVE ON/OFF CMD	XXXXX MNVR DISP		BD			
	V96X2113X	LH HSI MODE SWITCH INVALID	GN&C SW RM					
	V96X2115X	LH HSI SOURCE SWITCH INVALID	GN&C SW RM					
	V96X2117X	LH HSI TRANS SWITCH INVALID	GN&C SW RM					
	V96X2151X	LH ADI RATE SWITCH INVALID	GN&C SW RM					
	V96X2155X	LH ADI ERROR SWITCH INVALID	GN&C SW RM					
	V96X2175X	LH AIR DATA SWITCH INVALID	GN&C SW RM					
	V96X2195X	LH RADAR ALT SWITCH INVALID	GN&C SW RM					
	V96X2213X	RH HSI MODE SWITCH INVALID	GN&C SW RM					
	V96X2215X	RH HSI SOURCE SWITCH INVALID	GN&C SW RM					
	V96X2217X	RH HSI TRANS SWITCH INVALID	GN&C SW RM					
	V96X2251X	RH ADI RATE SWITCH INVALID	GN&C SW RM					
	V96X2255X	RH ADI ERROR SWITCH INVALID	GN&C SW RM					
	V96X2275X	RH AIR DATA SWITCH INVALID	GN&C SW RM					
	V96X2295X	RH RADAR ALT SWITCH INVALID	GN&C SW RM					

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE B.4.110-6. OUTPUT FUNCTIONAL PARAMETERS FROM GN&C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
BODY_FLAP_CYCL	V94X4157X	BODY FLAP ALERT CYCLE MSG	UI				92157	
BODY_FLAP_FAIL	V94X4158X	BODY FLAP ALERT FAIL MSG	UI				92157	
BODY_FLAP_HOLD	V94X4155X	BODY FLAP ALERT HOLD MSG	UI				92157	
BODY_FLAP_SW_L	V94X4820X	LH BODY FLAP SW MSG	UI				92157	
BODY_FLAP_SW_R	V94X4821X	RH BODY FLAP SW MSG	UI				92157	
DAP_RECONF	V94X4113X	DAP RECONFIGURATION MSG	UI		BD		92157	
DISPLAY_SW_A	V94X4763X	A SW DEFAULT MSG	UI				92157	
DISPLAY_SW_L	V94X4761X	L SW DEFAULT MSG	UI				92157	
DISPLAY_SW_R	V94X4762X	R SW DEFAULT MSG	UI				92157	
ET_SEP-AUT	V94X4534X	ET SEP-AUTO MSG	UI				92157	
ET_SEP-INH	V94X4538X	SEP INHIBIT FLAG MSG	UI				92157	
ET_SEP-MAN	V94X4539X	ET SEP-MANUAL MSG	UI				92157	
FCS_CH_1	V94X4387X	FCS CH 1 FL MSG	UI				92157	
FCS_CH_2	V94X4392X	FCS CH 2 FL MSG	UI				92157	
FCS_CH_3	V94X4396X	FCS CH 3 FL MSG	UI				92157	
FCS_CH_4	V94X4399X	FCS CH 4 FL MSG	UI				92157	
FCS_SAT_MOM	V94X4417X	FCS HM EXCEED MSG	UI				92157	
FCS_SAT_POS	V94X4416X	FCS POSITION SAT MSG	UI				92230F	
F_RCS_DJET	V94X4498X	RCS F 1/2/3/4 D JET FL MSG	UI				92157	
F_RCS_FJET	V94X4501X	RCS F 1/2/3 F JET FL MSG	UI				92157	
F_RCS_HE_P	V94X4472X	RCS FWD HE P LO MSG	UI				92157	
F_RCS_LEAK	V94X4485X	RCS F FU/OX QTY LK MSG	UI				92157	
F_RCS_LJET	V94X4489X	RCS F 1/3/5 L JET FL MSG	UI				92157	
F_RCS_PVT	V94X4767X	RCS-F QTY ALERT MSG	UI				92157	
F_RCS_RJET	V94X4492X	RCS F 2/4/5 R JET FL MSG	UI				92157	
F_RCS_TK_P	V94X4476X	RCS F FU/OX TK P HI/LO MSG	UI				92157	
F_RCS_UJET	V94X4495X	RCS F 1/2/3 U JET FL MSG	UI				92157	
G23_OMS/RCS_QTY	V94X4754X	OMS PROP USED EXCEEDS MSG	UI				92157	
G23_RCS_SYSTEM_L	V94X4530X	RCS L OUT P TEMP HI/LO MSG	UI				92157	
G23_RCS_SYSTEM_R	V94X4531X	RCS R OUT P TEMP HI/LO MSG	UI				92157	
G23_RCS_SYS_F	V94X4535X	RCS FWD OUT P/TEMP HI/LO MSG	UI				92157	
HIGH_G	V94X4786X	HIGH G MSG	UI				92157	
IMU_BITE/T1	V94X4430X	IMU 1 TEMP/BITE MSG	UI				92157	
IMU_BITE/T2	V94X4431X	IMU 2 TEMP/BITE MSG	UI				92157	
IMU_BITE/T3	V94X4432X	IMU 3 TEMP/BITE MSG	UI				92157	
L_OMS_GMBL	V94X4464X	OMS L GMBL FL MSG	UI				92157	
L_OMS_PC	V94X4800X	LT OMS PC TRANS FL MSG	UI				92157	
L_OMS_QTY	V94X4704X	OMS L TK LVL LOW MSG	UI				92157	
L_OMS_TK_P	V94X4455X	OMS L OX/FU TK P HI/LO MSG	UI				92157	
L_OMS_TK_P	V94X4700X	OMS L PRESS MSG	UI				92157	
L_OMS_VLV	V94X4756X	LT OMS HE/VAP IS V MISCMP MSG	UI				92157	
L_RCS_AJET	V94X4503X	RCS L 1/3 A JET FL MSG	UI				92157	
L_RCS_DJET	V94X4515X	RCS L 2/3/4/5 D JET FL MSG	UI				92157	
L_RCS_HE_P	V94X4470X	RCS L HE P LO MSG	UI				92157	
L_RCS_LEAK	V94X4483X	RCS L FU/OX QTY LK MSG	UI				92157	
L_RCS_LJET	V94X4508X	RCS L 1/2/3/4/5 L JET FL MSG	UI				92157	

TABLE B.4.110-6. OUTPUT FUNCTIONAL PARAMETERS FROM GN&amp;C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
L_RCS_PVT	V94X4765X	RCS-L QTY ALERT MSG	UI				92157	
L_RCS_TK_P	V94X4474X	RCS L FU/OX TK P HI/LO MSG	UI				92157	
L_RCS_UJET	V94X4511X	RCS L 1/2/4 U JET FL MSG	UI				92157	
ME_SHDN_SW_C	V94X4110X	ME-1 SHUTDOWN SW MSG	UI				92157	
ME_SHDN_SW_L	V94X4111X	ME-2 SHUTDOWN SW MSG	UI				92157	
ME_SHDN_SW_R	V94X4112X	ME-3 SHUTDOWN SW MSG	UI				92157	
MPS_CMD_C	V94X4748X	ME-1 CMD PATH FL MSG	UI				92157	
MPS_CMD_L	V94X4749X	ME-2 CMD PATH FL MSG	UI				92157	
MPS_CMD_R	V94X4750X	ME-3 CMD PATH FL MSG	UI				92157	
MPS_DATA_C	V94X4745X	ME-1 FLT DATA PATH FL MSG	UI				92157	
MPS_DATA_L	V94X4746X	ME-2 FLT DATA PATH FL MSG	UI				92157	
MPS_DATA_R	V94X4747X	ME-3 FLT DATA PATH FL MSG	UI				92157	
MPS_ELEC_C	V94X4742X	ME-1 ELEC LKUP MSG	UI				92157	
MPS_ELEC_L	V94X4743X	ME-2 ELEC LKUP MSG	UI				92157	
MPS_ELEC_R	V94X4744X	ME-3 ELEC LKUP MSG	UI				92157	
MPS_HYD_C	V94X4739X	ME-1 HYD LKUP MSG	UI				92157	
MPS_HYD_L	V94X4740X	ME-2 HYD LKUP MSG	UI				92157	
MPS_HYD_R	V94X4741X	ME-3 HYD LKUP MSG	UI				92157	
NAV_EDIT	V94X4101X	ADTA/MLS/TAC/RR EDIT HIST MSG	UI				92157	
NAV_EDIT_ALT	V94X4377X	ALTITUDE NAV EDIT MSG	UI				92157	
NAV_EDIT_TAC	V94X4376X	TACAN NAV EDIT MSG	UI				92157	
PNL_TRIM_L	V94X4822X	LH PNL TRIM SW MSG	UI				92157	
PNL_TRIM_R	V94X4823X	RH PNL TRIM SW MSG	UI				92157	
PROBES	V94X4378X	PROBES DEPLOY MSG	UI				92157	
RCS_PWR_FAIL	V94X4313X	RCS PWR FAIL MSG	UI				92157	
RCS_XFEED_L	V94X4316X	RCS LEFT RECONFIG MSG	UI		BD		92157	
RCS_XFEED_R	V94X4317X	RCS RIGHT RECONFIG MSG	UI		BD		92157	
RHC_A	V94X4406X	A RHC CH 1,2,3 FL MSG	UI				92157	
RHC_A	V94X4412X	A RHC DLMA MSG	UI				92157	
RHC_DNMODE_MSG	V94X0001X	RHC DNMODE MSG	UI				90704F	
RHC_L	V94X4407X	L RHC CH 1,2,3 FL MSG	UI				92157	
RHC_L	V94X4411X	L RHC DLMA MSG	UI				92157	
RHC_R	V94X4408X	R RHC CH 1,2,3 FL MSG	UI				92157	
RHC_R	V94X4413X	R RHC DLMA MSG	UI				92157	
RM_DLMA_ACC	V94X4790X	AA DLMA MSG	UI				92157	
RM_DLMA_ADTA	V94X4738X	ADTA DLMA MSG	UI				92157	
RM_DLMA_IMU	V94X4716X	IMU DLMA MSG	UI				92157	
RM_DLMA_MANF	V94X4314X	RCS MANF RM DILEMMA MSG	UI				92157	
RM_DLMA_MLS	V94X4435X	MSBLS DLMA MSG	UI				92157	
RM_DLMA_PRL	V94X4415X	HYD DILEMMA MSG	UI				92157	
RM_DLMA_RGA	V94X4791X	ORB RGA DLMA MSG	UI				92157	
RM_DLMA_TAC	V94X4725X	TAC DLMA MSG	UI				92157	
RM_DLMA_WOW	V94X4812X	WOW DLMA MSG	UI				92157	
RM_FAIL_ACC	V94X4729X	AA 1,2,3,4 FL MSG	UI				92157	
RM_FAIL_ADTA	V94X4737X	ADTA 1,2,3,4 FL MSG	UI				92157	
RM_FAIL_IMU	V94X4714X	IMU 1,2,3 FL MSG	UI				92157	

TABLE B.4.110-6. OUTPUT FUNCTIONAL PARAMETERS FROM GN&C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
RM_FAIL_MLS	V94X4721X	MLS 1,2,3 FL MSG	UI				92157	
RM_FAIL_RGA	V94X4733X	RGA 1,2,3,4 FL MSG	UI				92157	
RM_FAIL_TAC	V94X4724X	TAC 1,2,3 FL MSG	UI				92157	
RNDZ_RADAR	V94X4711X	RR DATA VALID MSG	UI				92157	
ROLL_REF	V94X4703X	ROLL REF MSG	UI				92157	
R_OMS_GMBL	V94X4465X	OMS R GMBL FL MSG	UI				92157	
R_OMS_PC	V94X4801X	RT OMS PC TRANS FL MSG	UI				92157	
R_OMS_QTY	V94X4705X	OMS R TK LVL LOW MSG	UI				92157	
R_OMS_TK_P	V94X4456X	OMS R OX/FU TK P HI/LO MSG	UI				92157	
R_OMS_TK_P	V94X4701X	OMS R PRESS MSG	UI				92157	
R_OMS_VLV	V94X4757X	RT OMS HE/VAP IS V MISCOMP MSG	UI				92157	
R_RCS_AJET	V94X4517X	RCS R 1/3 A JET FL MSG	UI				92157	
R_RCS_DJET	V94X4528X	RCS R 2/3/4/5 D JET FL MSG	UI				92157	
R_RCS_HE_P	V94X4471X	RCS R HE P LO MSG	UI				92157	
R_RCS_LEAK	V94X4484X	RCS R FU/OX QTY LK MSG	UI				92157	
R_RCS_PVT	V94X4766X	RCS-R QTY ALERT MSG	UI				92157	
R_RCS_RJET	V94X4521X	RCS R 1/2/3/4/5 R JET FL MSG	UI				92157	
R_RCS_TK_P	V94X4475X	RCS R FU/OX TK P HI/LO MSG	UI				92157	
R_RCS_UJET	V94X4524X	RCS R 1/2/4 U JET FL MSG	UI				92157	
SBTC/THC_A	V94X4419X	A THC CH 1,2,3 FL/DLMA MSG	UI				92157	
SBTC/THC_L	V94X4403X	L SBTC/THC CH 1,2,3 FL/DLMA MSG	UI				92157	
SBTC/THC_R	V94X4404X	R SBTC/THC CH 1,2,3 FL/DLMA MSG	UI				92157	
SEL_AUTO	V94X4758X	MNVR T-30 & DAP NOT IN AUTO MSG	UI				92157	
SENSE_SW	V94X4828X	AFT SENSE SW MSG	UI				92157	
SPD_BRK	V94X4375X	SPEEDBRAKE MSG	UI				92157	
SSME_FAIL_C	V94X4275X	SSME-1 FAIL MSG	UI				92157	
SSME_FAIL_L	V94X4276X	SSME-2 FAIL MSG	UI				92157	
SSME_FAIL_R	V94X4277X	SSME-3 FAIL MSG	UI				92157	
SSME_REPOS_FAIL	V94X4279X	SSME REPOS FAILED MSG	UI		BD		89991E	
SW_TO_NEP	V94X4760X	MEP ALERT MSG	UI				92157	
TARGET_ERR_RTLS	V94X4384X	RTLS TARGET ERROR MSG	UI				92157	
TARGET_ERR_TAL	V94X4383X	TAL TARGET ERROR MSG	UI				92157	
TBT_DELTA_T	V94X4379X	TRANS T SING MSG	UI				92157	
V94J4135C		LIB HI/LO SATURATION STATUS	GNC	SYS	SUMM1	DISP		VAR
V94J4136C		LOB HI/LO SATURATION STATUS	GNC	SYS	SUMM1	DISP		VAR
V94J4137C		RIB HI/LO SATURATION STATUS	GNC	SYS	SUMM1	DISP		VAR
V94J4138C		ROB HI/LO SATURATION STATUS	GNC	SYS	SUMM1	DISP		VAR
V94J4140C		L RHC CH 1 I/O, FAIL STATUS	GNC	SYS	SUMM1	DISP		VAR
V94J4141C		L RHC CH 2 I/O, FAIL STATUS	GNC	SYS	SUMM1	DISP		VAR
V94J4142C		L RHC CH 3 I/O, FAIL STATUS	GNC	SYS	SUMM1	DISP		VAR
V94J4143C		R RHC CH 1 I/O, FAIL STATUS	GNC	SYS	SUMM1	DISP		VAR
V94J4144C		R RHC CH 2 I/O, FAIL STATUS	GNC	SYS	SUMM1	DISP		VAR
V94J4145C		R RHC CH 3 I/O, FAIL STATUS	GNC	SYS	SUMM1	DISP		VAR
V94J4146C		L SBTC CH 1 I/O, FAIL STATUS	GNC	SYS	SUMM1	DISP		VAR
V94J4147C		L SBTC CH 2 I/O, FAIL STATUS	GNC	SYS	SUMM1	DISP		VAR
V94J4148C		L SBTC CH 3 I/O, FAIL STATUS	GNC	SYS	SUMM1	DISP		VAR

TABLE B.4.110-6. OUTPUT FUNCTIONAL PARAMETERS FROM GN&amp;C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V94J4149C	R SBTC CH 1 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4150C	R SBTC CH 2 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4151C	R SBTC CH 3 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4160C	IMU 1 I/O, FAIL STATUS	GNC SYS SUMM1 DISP IMU ALIGN DISP OVERRIDE DISP		VAR			
	V94J4161C	IMU 2 I/O, FAIL STATUS	GNC SYS SUMM1 DISP IMU ALIGN DISP OVERRIDE DISP		VAR			
	V94J4162C	IMU 3 I/O, FAIL STATUS	GNC SYS SUMM1 DISP IMU ALIGN DISP OVERRIDE DISP		VAR			
	V94J4165C	AA 1 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4166C	AA 2 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4167C	AA 3 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4168C	AA 4 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4180C	RGA 1 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4181C	RGA 2 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4182C	RGA 3 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4183C	RGA 4 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4190C	TACAN 1 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4191C	TACAN 2 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4192C	TACAN 3 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4193C	MSBLS 1 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4194C	MSBLS 2 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4195C	MSBLS 3 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4200C	ADTA 1 I/O, FAIL STATUS	GNC SYS SUMM1 DISP OVERRIDE DISP		VAR			
	V94J4201C	ADTA 2 I/O, FAIL STATUS	GNC SYS SUMM1 DISP OVERRIDE DISP		VAR			
	V94J4202C	ADTA 3 I/O, FAIL STATUS	GNC SYS SUMM1 DISP OVERRIDE DISP		VAR			
	V94J4203C	ADTA 4 I/O, FAIL STATUS	GNC SYS SUMM1 DISP OVERRIDE DISP		VAR			
	V94J4210C	FCS CH 1 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR		92230F	
	V94J4211C	FCS CH 2 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR		92230F	
	V94J4212C	FCS CH 3 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR		92230F	
	V94J4213C	FCS CH 4 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR		92230F	
	V94J4240C	OMS HE TK PRESS L LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4241C	OMS HE TK PRESS R LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4242C	OMS FU TK PRESS L HI/LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4243C	OMS FU TK PRESS R HI/LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4244C	OMS OX TK PRESS L HI/LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4245C	OMS OX TK PRESS R HI/LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4250C	OMS N2 REG PRESS L HI/LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4251C	OMS N2 REG PRESS R HI/LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			

TABLE B.4.110-6. OUTPUT FUNCTIONAL PARAMETERS FROM GN&C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V94J4260C	F1 JET FAIL ON,LK,OFF	GNC SYS SUMM1 DISP		VAR			
	V94J4261C	F2 JET FAIL ON,LK,OFF	GNC SYS SUMM2 DISP		VAR			
	V94J4262C	F3 JET FAIL ON,LK,OFF	GNC SYS SUMM1 DISP		VAR			
	V94J4263C	F4 JET FAIL ON,LK,OFF	GNC SYS SUMM2 DISP		VAR			
	V94J4264C	L1 JET FAIL ON,LK,OFF	GNC SYS SUMM1 DISP		VAR			
	V94J4265C	L2 JET FAIL ON,LK,OFF	GNC SYS SUMM2 DISP		VAR			
	V94J4266C	L3 JET FAIL ON,LK,OFF	GNC SYS SUMM1 DISP		VAR			
	V94J4267C	L4 JET FAIL ON,LK,OFF	GNC SYS SUMM2 DISP		VAR			
	V94J4268C	R1 JET FAIL ON,LK,OFF	GNC SYS SUMM1 DISP		VAR			
	V94J4269C	R2 JET FAIL ON,LK,OFF	GNC SYS SUMM2 DISP		VAR			
	V94J4270C	R3 JET FAIL ON,LK,OFF	GNC SYS SUMM1 DISP		VAR			
	V94J4271C	R4 JET FAIL ON,LK,OFF	GNC SYS SUMM2 DISP		VAR			
	V94J4272C	F5 JET FAIL ON,LK,OFF	GNC SYS SUMM1 DISP		VAR			
	V94J4273C	R5 JET FAIL ON,LK,OFF	GNC SYS SUMM2 DISP		VAR			
	V94J4274C	L5 JET FAIL ON,LK,OFF	GNC SYS SUMM1 DISP		VAR			
	V94J4300C	RCS F1 MANF ISLN VLV OP/CL IO STAT	GNC SYS SUMM2 DISP		VAR		92230F	
	V94J4301C	RCS F2 MANF ISLN VLV OP/CL IO STAT	GNC SYS SUMM1 DISP		VAR			
	V94J4302C	RCS F3 MANF ISLN VLV OP/CL IO STAT	GNC SYS SUMM2 DISP		VAR			
	V94J4303C	RCS F4 MANF ISLN VLV OP/CL IO STAT	GNC SYS SUMM1 DISP		VAR			
	V94J4304C	RCS L1 MANF ISLN VLV OP/CL IO STAT	GNC SYS SUMM2 DISP		VAR			
	V94J4305C	RCS L2 MANF ISLN VLV OP/CL IO STAT	GNC SYS SUMM1 DISP		VAR			
	V94J4306C	RCS L3 MANF ISLN VLV OP/CL IO STAT	GNC SYS SUMM2 DISP		VAR			
	V94J4307C	RCS L4 MANF ISLN VLV OP/CL IO STAT	GNC SYS SUMM1 DISP		VAR			

TABLE B.4.110-6. OUTPUT FUNCTIONAL PARAMETERS FROM GN&amp;C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V94J4308C	RCS R1 MANF ISLN VLV OP/CL IO STAT	GNC SYS SUMM1 DISP		VAR			
			GNC SYS SUMM2 DISP					
	V94J4309C	RCS R2 MANF ISLN VLV OP/CL IO STAT	GNC SYS SUMM1 DISP		VAR			
			GNC SYS SUMM2 DISP					
	V94J4310C	RCS R3 MANF ISLN VLV OP/CL IO STAT	GNC SYS SUMM1 DISP		VAR			
			GNC SYS SUMM2 DISP					
	V94J4311C	RCS R4 MANF ISLN VLV OP/CL IO STAT	GNC SYS SUMM1 DISP		VAR			
			GNC SYS SUMM2 DISP					
	V94J4340C	RCS FWD HE PRESS OX LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4341C	RCS FWD HE PRESS FU LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4342C	RCS FWD TK PRESS OX HI/LO/IO STAT	GNC SYS SUMM2 DISP		VAR			
			RCS QTY MON					
	V94J4343C	RCS FWD TK PRESS FU HI/LO/IO STAT	GNC SYS SUMM2 DISP		VAR			
			RCS QTY MON					
	V94J4344C	RCS L HE PRESS OX LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4345C	RCS L HE PRESS FU LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4346C	RCS L TK PRESS OX HI/LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
			RCS QTY MON					
	V94J4347C	RCS L TK PRESS FU HI/LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
			RCS QTY MON					
	V94J4348C	RCS R HE PRESS OX LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4349C	RCS R HE PRESS FU LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4350C	RCS R TK PRESS OX HI/LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
			RCS QTY MON					
	V94J4351C	RCS R TK PRESS FU HI/LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
			RCS QTY MON					
	V94J4360C	FWD RCS QTY FU IO/LK STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4361C	FWD RCS QTY OX IO/LK STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4362C	L RCS QTY FU IO/LK STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4363C	L RCS QTY OX IO/LK STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4364C	R RCS QTY FU IO/LK STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4365C	R RCS QTY OX IO/LK STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4541C	RCS F5 MANF ISLN VLV OP/CL IO STAT	GNC SYS SUMM1 DISP		VAR			
			GNC SYS SUMM2 DISP					
	V94J4543C	RCS L5 MANF ISLN VLV OP/CL IO STAT	GNC SYS SUMM1 DISP		VAR			
			GNC SYS SUMM2 DISP					
	V94J4545C	RCS R5 MANF ISLN VLV OP/CL IO STAT	GNC SYS SUMM1 DISP		VAR			
			GNC SYS SUMM2 DISP					
	V94J4590C	AFT RHC CH 1 I/O,FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4591C	AFT RHC CH 2 I/O,FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4592C	AFT RHC CH 3 I/O,FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4593C	FWD THC 1 I/O,FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4594C	FWD THC 2 I/O,FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4595C	FWD THC 3 I/O,FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4596C	AFT THC 1 I/O,FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4597C	AFT THC 2 I/O,FAIL STATUS	GNC SYS SUMM1 DISP		VAR			



TABLE B.4.110-6. OUTPUT FUNCTIONAL PARAMETERS FROM GN&C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V94J4598C	AFT THC 3 I/O,FAIL STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4633C	OMS-L AFT OX QTY LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4634C	OMS-R AFT OX QTY LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4635C	OMS-L AFT FU QTY LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4636C	OMS-R AFT FU QTY LO/IO STATUS	GNC SYS SUMM2 DISP		VAR			
	V94J4643C	OMS R ENG PNEU PRESS 2 LO/IO STAT	GNC SYS SUMM2 DISP		VAR			
	V94J4644C	OMS L ENG PNEU PRESS 2 LO/IO STAT	GNC SYS SUMM2 DISP		VAR			
	V94J4676C	LOB HINGE MOMENT EXCEED STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4677C	LIB HINGE MOMENT EXCEED STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4678C	RIB HINGE MOMENT EXCEED STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J4679C	ROB HINGE MOMENT EXCEED STATUS	GNC SYS SUMM1 DISP		VAR			
	V94J6001C	GPS 1 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR		92067D	
	V94J6002C	GPS 2 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR		92067D	
	V94J6003C	GPS 3 I/O, FAIL STATUS	GNC SYS SUMM1 DISP		VAR		92067D	
	V94P4220C	OMS HE TK PRESS L	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4221C	OMS HE TK PRESS R	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4222C	OMS FU TK PRESS L	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4223C	OMS FU TK PRESS R	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4224C	OMS OX TK PRESS L	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4225C	OMS OX TK PRESS R	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4230C	OMS N2 REG PRESS L	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4231C	OMS N2 REG PRESS R	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4320C	RCS FWD HE PRESS OX	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4321C	RCS FWD HE PRESS FU	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4322C	RCS FWD TK PRESS OX	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4323C	RCS FWD TK PRESS FU	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4324C	RCS L HE PRESS OX	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4325C	RCS L HE PRESS FU	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4326C	RCS L TK PRESS OX	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4327C	RCS L TK PRESS FU	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4328C	RCS R HE PRESS OX	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4329C	RCS R HE PRESS FU	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4330C	RCS R TK PRESS OX	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4331C	RCS R TK PRESS FU	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4604C	OMS ENG PNEU PRESS 2 LEFT	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4605C	OMS ENG PNEU PRESS 2 RIGHT	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4639C	OMS ENG OX INLET PRESS LEFT	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4640C	OMS ENG OX INLET PRESS RIGHT	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4641C	OMS ENG FU INLET PRESS LEFT	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4642C	OMS ENG FU INLET PRESS RIGHT	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4770C	RCS L OX MANF 1 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4771C	RCS L OX MANF 2 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4772C	RCS L OX MANF 3 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4773C	RCS L OX MANF 4 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4774C	RCS L FU MANF 1 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
	V94P4775C	RCS L FU MANF 2 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			

TABLE B.4.110-6. OUTPUT FUNCTIONAL PARAMETERS FROM GN&C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
V94P4776C	RCS L	FU MANF 3 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
V94P4777C	RCS L	FU MANF 4 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
V94P4778C	RCS R	OX MANF 1 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
V94P4779C	RCS R	OX MANF 2 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
V94P4780C	RCS R	OX MANF 3 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
V94P4781C	RCS R	OX MANF 4 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
V94P4782C	RCS R	FU MANF 1 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
V94P4783C	RCS R	FU MANF 2 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
V94P4784C	RCS R	FU MANF 3 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
V94P4785C	RCS R	FU MANF 4 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
V94P4852C	RCS FWD	OX MANIF 1 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
V94P4853C	RCS FWD	OX MANIF 2 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
V94P4854C	RCS FWD	OX MANIF 3 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
V94P4855C	RCS FWD	OX MANIF 4 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
V94P4856C	RCS FWD	FU MANIF 1 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
V94P4857C	RCS FWD	FU MANIF 2 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
V94P4858C	RCS FWD	FU MANIF 3 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
V94P4859C	RCS FWD	FU MANIF 4 PRESS	GNC SYS SUMM2 DISP	PSIA	VAR			
V94Q4629C	OMS-L	AFT OX QTY PERCENT DISP	GNC SYS SUMM2 DISP	PCT	VAR			
V94Q4630C	OMS-R	AFT OX QTY PERCENT DISP	GNC SYS SUMM2 DISP	PCT	VAR			
V94Q4631C	OMS-L	AFT FU QTY PERCENT DISP	GNC SYS SUMM2 DISP	PCT	VAR			
V94Q4632C	OMS-R	AFT FU QTY PERCENT DISP	GNC SYS SUMM2 DISP	PCT	VAR			
V94Q4645C	OMS L	ENG BI-PROP VLV 1 POS PCT OP	GNC SYS SUMM2 DISP	PCT	VAR			
V94Q4646C	OMS R	ENG BI-PROP VLV 1 POS PCT OP	GNC SYS SUMM2 DISP	PCT	VAR			
V94Q4647C	OMS L	ENG BI-PROP VLV 2 POS PCT OP	GNC SYS SUMM2 DISP	PCT	VAR			
V94Q4648C	OMS R	ENG BI-PROP VLV 2 POS PCT OP	GNC SYS SUMM2 DISP	PCT	VAR			
V94U4125C	LT	OTBD ELVN HINGE MOM PCT	GNC SYS SUMM1 DISP	PCT	VAR			
V94U4126C	LT	INBD ELVN HINGE MOM PCT	GNC SYS SUMM1 DISP	PCT	VAR			
V94U4127C	RT	OTBD ELVN HINGE MOM PCT	GNC SYS SUMM1 DISP	PCT	VAR			
V94U4128C	RT	INBD ELVN HINGE MOM PCT	GNC SYS SUMM1 DISP	PCT	VAR			
V94X1048X		NO GPS UPDATE MESSAGE	UI		BD		91051K	
V94X1049X		GPS RECEIVER 2 FAILED MSG	UI		BD		91051K	
V94X1050X		GPS NAV EDIT MSG	UI		BD		91051K	
V94X4278X		GNC GRD C/O IN PROGRESS MSG	UI		BD		90023A	
V94X4829X		TGT ITER LIM MSG	UI					
V94X4830X		ENTRY ROLL MODE SWITCH MSG	UI					
V94X4832X		TGT EL ANG MSG	UI					
V94X6018X		GPS RECEIVER 1 FAILED MSG	UI		BD		92067D	
V94X6019X		GPS RECEIVER 3 FAILED MSG	UI		BD		92067D	
V94X6021X		GPS RECEIVER DILEMMA MSG	UI		BD		92067D	
V94X6022X		GPS RECEIVER 1 QA FAIL MSG	UI		BD		92067D	
V94X6023X		GPS RECEIVER 2 QA FAIL MSG	UI		BD		92067D	
V94X6024X		GPS RECEIVER 3 QA FAIL MSG	UI		BD		92067D	

TABLE B.4.110-6. OUTPUT FUNCTIONAL PARAMETERS FROM GN&C ANNUNCIATION INTERFACE (G4.110)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
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**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
 (HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

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TABLE B.4.110-7. GN&C ANNUNCIATION INTERFACE (G4.110) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.4.110-8. GN&amp;C ANNUNCIATION INTERFACE (G4.110) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
HM_EXCEED ELEVON HINGE MOM EXCEED LIMIT	V97U6814C	00	+8.00000	E+01 PCT	F	S	C	G4.110	79967G	
HM_SF ELEVON HNG MOM SCALE FACTOR	V97U6815C	00	+1.9335	E+01 PCT/VDC	F	S	A	G4.110	79967G	
L_OMS_VLV1_POS_BIAS	V96U8579C	00	-8.74	E+00 PCT	F	S	C	G4.110	79967G	
L_OMS_VLV1_POS_SF	V96U8578C	00	+2.376	E+01 PCT/VDC	F	S	A	G4.110	79967G	
L_OMS_VLV2_POS_BIAS	V96U8581C	00	-8.74	E+00 PCT	F	S	C	G4.110	79967G	
L_OMS_VLV2_POS_SF	V96U8580C	00	+2.376	E+01 PCT/VDC	F	S	A	G4.110	79967G	
NF_LIM NOISE FILTER OUT OF LIMIT COUNTER	V97U6835C	00	+2	ND	I	S	P	G4.110	79967G	
OMS_AFTQTY_SF	V99U7434C	00	+6.02	E+00 PCT/VDC	F	S	A	G4.110	79967G	
OMS_HETKP_LO OMS HE TK PRESS LO LIMIT	V97U6840C	00	+1.500	E+03 LBS/IN**2 ABS	F	S	C	G4.110	79967G	
OMS_HETKP_SF OMS HE TK PRESS SCALE FACTOR	V97U6841C	00	+1.00000	E+03 (LBS/IN**2)/VDC	F	S	A	G4.110	79967G	
OMS_INP_SF OMS FU/OX INLET PRESS SCALE FACTOR	V97U6844C	00	+8.00000	E+01 (LBS/IN**2)/VDC	F	S	A	G4.110	79967G	
OMS_PNEUP_LO OMS PNEU SUPPLY PRESS LO LIMIT	V97U6846C	00	+1.200	E+03 LBS/IN**2 ABS	F	S	C	G4.110	79967G	
OMS_PNEUP_SF OMS PNEU SUPPLY PRESS SCALE FACTOR	V97U6845C	00	+1.00000	E+03 (LBS/IN**2)/VDC	F	S	A	G4.110	79967G	
OMS_REGP_HI OMS REG PRESS HI LIMIT	V97U6847C	00	+4.34000	E+02 LBS/IN**2 ABS	F	S	C	G4.110	79967G	
OMS_REGP_LO OMS REG PRESS LO LIMIT	V97U6848C	00	+2.99000	E+02 LBS/IN**2 ABS	F	S	C	G4.110	79967G	
OMS_REGP_SF OMS REG PRESS SCALE FACTOR	V97U6849C	00	+1.00000	E+02 (LBS/IN**2)/VDC	F	S	A	G4.110	79967G	
OMS_ULLP_HI OMS FU/OX TK ULLAGE PRESS HI LIMIT	V97U6852C	00	+2.84000	E+02 LBS/IN**2 ABS	F	S	P	G4.110	79967G	
OMS_ULLP_LO OMS FU/OX TK ULLAGE PRESS LO LIMIT	V97U6853C	00	+2.34	E+02 LBS/IN**2 ABS	F	S	C	G4.110	79967G	
OMS_ULLP_SF OMS FU/OX TK ULL PRES SCALE FACTOR	V97U6854C	00	+8.00000	E+01 (LBS/IN**2)/VDC	F	S	A	G4.110	79967G	
POS_SAT_HI ELEVON POSN SAT HI LIMIT	V97U6856C	00	+1.2	E+01 DEG	F	S	C	G4.110	79967G	
POS_SAT_LO ELEVON POSN SAT LO LIMIT	V97U6857C	00	-1.5	E+01 DEG	F	S	C	G4.110	79967G	
RCS_FWD_FU_TKTEMP_HI RCS FWD FU TK TEMP HI LIMIT	V97U8745C	00	+9.00000	E+01 DEG F	F	S	P	G4.110	90450D	
RCS_FWD_FU_TKTEMP_LO RCS FWD FU TK TEMP LO LIMIT	V97U8746C	00	+5.00000	E+01 DEG F	F	S	P	G4.110	90450D	

TABLE B.4.110-8. GN&C ANNUNCIATION INTERFACE (G4.110) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
RCS_FWD_OX_TKTEMP_HI RCS FWD OX TK TEMP HI LIMIT	V97U8743C	00	+9.00000	E+01 DEG F	F	S	P	G4.110	90450D	
RCS_FWD_OX_TKTEMP_LO RCS FWD OX TK TEMP LO LIMIT	V97U8744C	00	+5.00000	E+01 DEG F	F	S	P	G4.110	90450D	
RCS_HETKP_LO RCS FU/OX HE TK PRESS LO LIMIT	V97U6864C	00	+5.00000	E+02 LBS/IN**2 ABS	F	S	C	G4.110 G5.16	79967G	
RCS_HETKP_SF RCS FU/OX HE TK PRESS SCALE FACTOR	V97U6865C	00	+8.00000	E+02 (LBS/IN**2)/VDC	F	S	C	G4.110 G5.16	79967G	
RCS_L_FU_TKTEMP_HI RCS L FU TK TEMP HI LIMIT	V97U8749C	00	+1.00000	E+02 DEG F	F	S	P	G4.110	90450D	
RCS_L_FU_TKTEMP_LO RCS L FU TK TEMP LO LIMIT	V97U8750C	00	+5.00000	E+01 DEG F	F	S	P	G4.110	90450D	
RCS_L_OX_TKTEMP_HI RCS L OX TK TEMP HI LIMIT	V97U8747C	00	+1.00000	E+02 DEG F	F	S	P	G4.110	90450D	
RCS_L_OX_TKTEMP_LO RCS LO OX TK TEMP LO LIMIT	V97U8748C	00	+5.00000	E+01 DEG F	F	S	P	G4.110	90450D	
RCS_MANFP_SF RCS FU/OX MANIF P 1/2, 3/4/5 SF	V97U6869C	00	+2.00000	E+02 (LBS/IN**2)/VDC	F	S	A	G4.110 G5.16	79967G	
RCS_OUTP_HI RCS FU/OX TK OUT PRESS HI LIMIT	V97U6870C	00	+3.0	E+02 LBS/IN**2 ABS	F	S	P	G4.110 G5.16	79967G	
RCS_OUTP_LO RCS FU/OX TK OUT PRESS LO LIMIT	V97U6871C	00	+2.2	E+02 LBS/IN**2 ABS	F	S	P	G4.110 G5.16	79967G	
RCS_OUTP_SF RCS FU/OX TK OUT PRESS SC FACTOR	V97U6872C	00	+8.00000	E+01 (LBS/IN**2)/VDC	F	S	P	G4.110 G5.16	79967G	
RCS_R_FU_TKTEMP_HI RCS R FU TK TEMP HI LIMIT	V97U8753C	00	+1.00000	E+02 DEG F	F	S	P	G4.110	90450D	
RCS_R_FU_TKTEMP_LO RCS R FU TK TEMP LO LIMIT	V97U8754C	00	+5.00000	E+01 DEG F	F	S	P	G4.110	90450D	
RCS_R_OX_TKTEMP_HI RCS R OX TK TEMP HI LIMIT	V97U8751C	00	+1.00000	E+02 DEG F	F	S	P	G4.110	90450D	
RCS_R_OX_TKTEMP_LO RCS R OX TK TEMP LO LIMIT	V97U8752C	00	+5.00000	E+01 DEG F	F	S	P	G4.110	90450D	
RCS_TKTEMP_SF RCS FU/OX TK TEMP SCALE FACTOR	V97U6875C	00	+3.20000	E+01 DEG F/VDC	F	S	P	G4.110 G5.16	79967G	
RCS_ULLP_HI RCS FU/OX TK ULLAGE PRESS HI LIMIT	V97U6876C	00	+3.12000	E+02 LBS/IN**2 ABS	F	S	C	G4.110 G5.16	79967G	
RCS_ULLP_LO RCS FU/OX TK ULLAGE PRESS LO LIMIT	V97U6877C	00	+2.00000	E+02 LBS/IN**2 ABS	F	S	C	G4.110 G5.16	79967G	
RCS_ULLP_SF RCS FU/OX TK ULL PRESS SC FACTOR	V97U6878C	00	+8.00000	E+01 (LBS/IN**2)/VDC	F	S	C	G4.110 G5.16	79967G	
R_OMS_VLV1_POS_BIAS	V96U8583C	00	-8.74	E+00 PCT	F	S	C	G4.110	79967G	
R_OMS_VLV1_POS_SF	V96U8582C	00	+2.376	E+01 PCT/VDC	F	S	A	G4.110	79967G	
R_OMS_VLV2_POS_BIAS	V96U8585C	00	-8.74	E+00 PCT	F	S	C	G4.110	79967G	

TABLE B.4.110-8. GN&amp;C ANNUNCIATION INTERFACE (G4.110) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
R_OMS_VLV2_POS_SF	V96U8584C	00	+2.376	E+01 PCT/VDC	F	S	A	G4.110	79967G	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**



TABLE B.4.110-9. GN&C ANNUNCIATION INTERFACE (G4.110) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

#### **B.4.112 GUIDANCE, NAVIGATION AND CONTROL/ANNUNCIATION INTERFACE SUPPORT (GAX) - (BFS)**

The GAX principal function shall accept data from other GN&C functions and perform support processing required to convert this data into suitable format for CRT display. This principal function shall also provide annunciation processing for those parameters listed in B.4.112.1 GN&C CRT messages, and the GN&C caution and warning processing.

The GAX principal function processing shall continue across the ascent (OPS 1), entry (OPS 3) and RTLS (OPS 6) operational sequences. GCUROPS (CUR\_OPS from BECUI) shall be used by GAX to determine the current OPS. The GAX requirements text has been partitioned to support the individual displays to assist OPS computer load estimates. The GN&C displays which are supported by GAX are as follows:

- 4.112 GNC SYSTEM SUMMARY 1 & 2 (OPS 1, 3, 6)

Both GNC System Summary 1 and 2 displays shall support the entry, ascent, and RTLS flight phases.

The fixed formats for each of these displays are shown in sections 4.2.12 and 4.2.18. The display support processing interfaces are shown in Table B.4.112.2-1, where the display function destinations are GNC System Summary 1 and GNC System Summary 2. The correlation between these two display functions and the two CRT displays listed above is provided in Tables 4.2.12-2 and 4.2.18-2, where each of the GAX outputs may be traced to the individual displays as required. The output display indicators are defined to be either logical or integer, but for requirements purposes the range is defined by the symbol to be displayed and the design is left to the discretion of the programmer.

The annunciation processing portion of the GAX principal function shall provide any support required to generate the GN&C caution and warning lights, alerts, and CRT messages. These requirements are defined in paragraph B.4.112.1.1 ANNUNCIATION/C&W/MESSAGES.

Any I-Load constant parameters required by BFS GAX shall be defined in Table B.4.112-7 BFS I-LOADS UPDATE with flight values defined in the STS Flight Initialization Load (JSC-19350).

Any K-Load constant parameters and associated values required by BFS GAX shall be defined in Table B.4.112-8 BFS K-LOADS UPDATE.

Paragraph B.4.112.1.5 contains the equations common to several functions of the GAX principal function. This section is referenced when required by the associated functions of GAX.

#### **B.4.112.1 GNC SYSTEM SUMMARY 1 & 2 SUPPORT PROCESSING**

The GAX principal function shall provide processing required to support the GNC system Summary 1 & 2 displays. This display shall support the Ascent, Entry and RTLS flight phases. The various types of GN&C support processing for this display are:

- Hinge Moment Conversion and Status
- Elevon Position Saturation Status
- Aileron and Body Flap Position Conversion
- FCS SRB/MPS/AERO Channel Status
- MPS Pressure and Temperature Conversion and Status
- MPS Pneumatic System Conversion and Status
- Data Processing System MDM Status
- NAV SENSOR status
- OMS Conversion and Status
- OMS Engine Valve Conversion
- OMS Engine Inlet Pressure Conversion
- OMS N2 Pressure Valve Conversion
- OMS Fuel Injector Temperature Conversion
- OMS Aft Quantity Conversion and Status
- RCS Conversion and Status
- RCS Manifold Isolation Valve Status

The requirements for these support functions are defined in the following paragraphs:

##### Hinge Moment Conversion and Status

This function shall display the converted (PSI to percent of maximum allowed) elevon (LIB, LOB, RIB, ROB) primary delta pressures as elevon hinge moment. The hinge moment shall be limited between -99 and +99 percent for display. The pressures shall be converted as defined in the Conversion Processing portion of Paragraph B.4.112.1.5.

This function shall also determine the status associated with each of these pressures. The elevon hinge moment shall be tested against a high limit only.

The limit check processing is defined in Paragraph B.4.112.1.3. Any I-Load scale factor and limit check constant parameters required for the conversion and/or limit checking processes are defined in Table B.4.112-7 with flight values defined in the STS Flight Initialization Load (JSC-19350). Any K-Load scale factor and limit check constant parameters and associated values required for the conversion and/or limit checking processes are defined in Table B.4.112-8.

The hinge moment display status shall be determined as follows:

XXX Hinge Mom Limit Status	XXX Hinge Mom Display Status Ind
“exceed” limit	↑
“within” limit	(blank)

where XXX = LIB,LOB,RIB,ROB.

Elevon Position Saturation Status

The function shall determine the elevon (LIB, LOB, RIB, ROB) surface position saturation status. The elevon position saturation status shall be generated by checking the individual elevon positions against both a high and low limit. The limit check processing is defined in Paragraph B.4.112.1.3. Any I-Load limit check constant parameters required for the limit checking processes are defined in Table B.4.112-7 with flight values defined in the STS Flight Initialization Load (JSC-19350). Any K-Load limit check constant parameters and associated values required for the limit checking processes are defined in Table B.4.112-8.

The display elevon position saturation status shall be determined as follows:

XXX Position Sat Status	XXX Sat Display Status
“below” limit	↓
“exceed” limit	↑
“within” limit	(blank)

where XXX = LIB,LOB,RIB,ROB.

Aileron and Body Flap Position Conversion

This function shall display the converted (DEG to percent) body flap position. The conversion processing is as follows:

$$BDY\_FLAP = 100 \times \frac{(FLAP - DBFMIN)}{(DBFMAX - DBFMIN)}$$

where FLAP is limited to the range DBFMIN = -11.71 deg to DBFMAX = +22.55 deg.

This function shall also display the converted AILERON position in degrees as derived from the four compensated ELEVON PFB's as follows:

$$AIL = \frac{(ELEVLIB + ELEVLOB)}{4} - \frac{(ELEVRIB + ELEVROB)}{4}$$

The aileron position is limited and the output aileron position parameter shall be generated as follows:

- If AIL < -5 deg, set AIL = -5
- If AIL > +5 deg, set AIL = +5

FCS SRB/MPS/AERO Channel Status

This function shall generate the flight control system channel status. This status is dependent on the SRB rock and tilt actuators, elevons, speedbrake, and rudder aerosurfaces, and main engine pitch and yaw actuators and shall be determined as follows:

O U T P U T S	FCS "X" I/O, Fail Display Status Ind	M	↓	(blank)
I N P U T S	MDM "Y", PROM SEQ 3-10 Commfault	Fault	Good —(and)—	Good —(and)—
	FCS CH "X" Fail (Parent WD 1)	—	Fail —(or)—	Good —(and)—
	FCS CH "X" Fail (Parent WD 2)	—	Fail	Good

where "X" = 1,2,3 or 4 "Y" = 1,2,3 or 4

For each channel “X”, FCS CH processing shall “OR” the first eight bits (bits 0–7) of the respective two parent words together. Detection of a TRUE condition indicating an actuator failure shall display a downarrow and message/annunciation output (ref. Table B.4.112.3–1).

Only the actuator bits pertinent for a particular OPS shall be checked.

In OPS 1, all actuator fail bits are available for status checking.

For OPS 3, only the elevons, speedbrake, and rudder aerosurface bits are pertinent for status checking.

For OPS 6, the elevons, speedbrake, and rudder aerosurfaces and main engine pitch and yaw actuators are checked.

MPS Pressure/Temperature Conversion and Status

This function shall display the converted (VDC to PSIA) main engine 1,2 and 3 helium tank pressure and helium regulator pressure, A&B, and the fuel manifold pressure, oxidizer manifold pressure, fuel external tank pressure (in PSIA), oxidizer ET tank pressure (in PSIG), GH2 outlet pressure (in PSIA), GO2 outlet temperature (in Deg F), and main propulsion system pneumatic valve helium supply (tank), regulator outlet and accumulator pressures (in PSIA). This function shall also determine the status associated with each of these parameters. These parameters shall be converted as defined in the conversion processing portion of Paragraph B.4.112.1.5. The parameters shall be tested against a low and/or high limit as required.

Display support and limit sensing/annunciation processing shall be provided as follows:

He Tk P – Low limit check	OPS 1 and OPS 6
He Reg P A&B – Low and High limit check	OPS 1, OPS 3 and OPS 6
LH2 Manf P – High limit check	OPS 1 and OPS 6
LO2 Manf P – High Limit check	OPS 1 and OPS 6
LH2 ET ULL P – Low and high limit check *	OPS 1 and OPS 6
LO2 ET ULL P – Low and high limit check *	OPS 1 and OPS 6
GH2 OUT P – Low limit check *	OPS 1 and OPS 6
GO2 OUT T – Low limit check *	OPS 1 and OPS 6
MPS PNEU VLV HE (TANK) P – Low limit check *	OPS 1 and OPS 6
MPS PNEU VLV HE REG OUT P – Low and high limit check *	OPS 1, OPS 3 and OPS 6
MPS PNEU HE ACUM P – Low limit check *	OPS 1 and OPS 6

\* Unique annunciation processing for these parameters is defined in Section B.4.112.1.4.

The limit check processing is defined in Paragraph B.4.112.1.3. Any I–Load scale factor and limit check constant parameters required for the conversion and/or limit checking processes are defined in Table B.4.112–7 with flight values defined in the STS Flight Initialization Load (JSC–19350). Any K–Load scale factor and limit check constant parameters and associated values required for the conversion and/or limit checking processes are defined in Table B.4.112–8.

The displayed MPS main engine He Tk pressure, external tank ullage pressure, regulator pressure and manifold pressure status indicators are dependent on the BOS commfault and associated GAX limit check status of the input parameter. If a communication failure condition occurs, the limit check processing for the corresponding parameter shall be discontinued until the commfault is cleared. These indicators shall be determined as follows:

MPS "VDC" XY Commfault	MPS "PSIA" XY Limit Status	MPS XY Display Status Ind
FAULT	—	M
GOOD	"exceeds" limit	↑
GOOD	"below" limit	↓
GOOD	"within" limit	(blank)

where X = L, C, R for HE TK P, and HE REG P, or LH2, LO2 for MANF P.  
Y = A, B for HE REG P

and

"VDC" Commfault represents the communication failure associated with the input hardware signal.

"PSIA" Limit Status represents the limit check status of the converted hardware signal.

The helium tank pressure is not checked against an upper limit and thus never "exceeds" limit. The LO2 manifold pressure is not tested against a lower limit and thus shall never drop "below" limit.

The displayed MPS ET ullage pressure status indicators are dependent on the limit check status and shall be determined as follows:

MPS ET ULL P "XY" COMMFAULT	MPS ET ULL P "PSIA/PSIG XY" LIMIT STATUS	MPS ET ULL P "XY" DISPLAY STATUS IND
FAULT	—	M
GOOD	"exceeds" limit	↑
GOOD	"below" limit	↓
GOOD	"within" limit	(blank)

where X = LH2, LO2  
Y = 1, 2 or 3

and

"PSIA/PSIG" Limit Status represents the limit check status of the converted hardware signal.

"M" will be driven, along with a static display of the last valid pressure only in the event of the transducer commfaulting.

The displayed MPS pneumatic valve helium supply pressure (TK), regulator outlet pressure (REG) and accumulator pressure (ACUM), GH2 outlet pressure (GH2 OUT P) and GO2 outlet temperature (GO2 OUT T) status indicators are dependent on the BOS commfault and associated GAX limit check status of each input parameter. If a communications failure condition occurs, the limit check processing for the corresponding parameter is not required until the commfault is cleared. These indicators shall be determined as follows:

MPS "VDC" X COMMFAULT	MPS "PSIA/DEG F" X LIMIT STATUS	MPS X DISPLAY STATUS IND
FAULT	—	M
GOOD	"exceeds" limit	↑
GOOD	"below" limit	↓
GOOD	"within" limit	(blank)

where X = TK, REG, ACUM for Pneumatic Helium System pressure parameters, or L, C, R for GH2 (OUT P) and GO2 (OUT T).

and

"VDC" Commfault represents the communication failure associated with the input hardware signal.

"PSIA/DEG F" Limit Status represents the limit check status of the converted hardware signal.

The pneumatic valve helium supply pressure, accumulator pressure, GH2 outlet pressure and GO2 outlet temperature are not checked against an upper limit and thus never "exceeds" limit.



Data Processing System MDM Status

This function shall generate the failure indicators for each data path (MDM FF 1-4, MDM FA 1-4, and PL 1, 2). The DPS display status shall be determined as follows:

O U T P U T S	MDM "X" DISPLAY STATUS IND	M	↓	(BLANK)
I N P U T S	BFS MDM PRE-ENGAGE STATUS	FAULT	GOOD —(AND)—	GOOD —(AND)—
	MDM "X" FAIL	—	FAIL	GOOD

where "X" IS FF 1-4, FA 1-4, or PL 1,2.

NOTE: BFS MDM Pre-Engage Status will drive an "M" if the BFS is not tracking the PASS for FF 1-4 & FA 1-4.

NAV SENSOR Status

This function shall display the status indicators for the following NAV sensors:

- IMU
- TACAN
- GPS
- ADTA

The IMU status indicator is defined as follows:

IMU "X" FAIL IND	IMU "X" DISPLAY STATUS
FAIL	↓
GOOD	(Blank)

where "X" is 1,2 or 3

The TACAN status indicators are defined as follows:

O U T P U T S	TACAN "X" DISPLAY STATUS IND	↓	(BLANK)
	TAC "X" RNG FAIL STATUS	FAIL —(OR)—	GOOD —(AND)—
I N P U T	TAC "X" BRNG FAIL STATUS	FAIL	GOOD

where "X" is 1, 2, or 3

The GPS status indicators are defined as follows:

O U T P U T S	GPS "X" DISPLAY STATUS IND	M	↓	↓	(BLANK)
	GPS "X" STATUS	1	3	NOT 1 OR 3 —(AND)—	NOT 1 OR 3 —(AND)—
I N P U T S	GPS "X" DESELECT	—	—	ON	OFF

where "X" is 1, 2, or 3

The ADTA status indicators are defined as follows:

ADTA "X" FAIL IND	ADTA "X" DISPLAY STATUS
FAIL	↓
GOOD	(Blank)

where "X" is 1,2,3 or 4

### OMS Conversion and Status

This function shall display the converted (VDC to PSIA) left and right OMS helium tank pressure, fuel tank pressure, oxidizer tank pressure, N2 tank pressure, and N2 regulator pressure. This function shall also determine the status associated with each of these parameters. The fuel and oxidizer inlet pressure for the left and right OMS pods shall be converted (VDC to PSIA) for display. The OMS engine valves 1 and 2 shall be converted (VDC to PCT) for display. The L & R OMS FU injector temperatures shall be converted (VDC to DEG F) for display. These pressures and temperatures shall be converted as defined in the conversion processing portion of Paragraph B.4.112.1.5. The pressures and temperatures shall be tested against a high and/or low limit as required.

- Inlet P – Conversion and CF check
- He Tk P – Low Limit Check
- Fu Tk P – Low and High Limit Check
- Ox Tk P – Low and High Limit Check
- N2 Tk P – Low Limit Check
- N2 Reg P – Low and High Limit Check
- ENG VLV Posn – Conversion and CF check
- N2 P VLV Posn – Conversion and CF check
- FU INJ T – Conversion and High Limit check

The limit check processing is defined in Paragraph B.4.112.1.5. Any I-Load scale factor and limit check constant parameters required for the conversion and/or limit checking processes are defined in Table B.4.112-7 with flight values defined in the STS Flight Initialization Load (JSC-19350). Any K-Load scale factor and limit check constant parameters and associated values required for the conversion and/or limit checking processes are defined in Table B.4.112-8.

The displayed OMS pressure and temperature status indicators are dependent on the BOS commfaults and associated GAX limit check status of the input parameter. If a communication failure condition occurs, the limit check processing for the corresponding parameter shall be discontinued until the commfault is cleared. These indicators shall be determined as follows:

OMS “VDC” X Y Commfault	OMS “PSIA” or ‘DEG F’ X Y Limit Status	OMS X Y Displayed Status Ind
FAULT	—	M
GOOD	“exceeds” limit	↑
GOOD	“below” limit	↓
GOOD	“within” limit	(blank)

where X = left, right  
 Y = He Tk P, Ox Tk P, Fu Tk P, N2 Tk P, N2 Reg P, Inlet P, N2 P VLV,  
 ENG VLV 1 and 2, and FU INJ T.

‘DEG F’ Limit Status represents the limit check status of the converted hardware signal.

‘PSIA’ Limit Status represents the limit check status of the converted hardware signal.

“VDC” commfault represents the communication failure associated with the hardware input.

The helium tank pressures and the N2 tank pressures are not checked against an upper limit and thus shall never “exceed” limit.

The Inlet P, N2 P VLV and ENG VLV 1 and 2 are not checked against an upper or lower limit but only for the existence of a communication failure associated with the hardware input signal.

The L & R OMS FU INJ T are not checked against a lower limit and thus shall never “exceed” limit.

OMS Engine Valve Conversion

This function shall display the converted (VDC to percent open) engine valve 1 and 2 positions for the left and right OMS engines. These parameters shall be converted as defined in the conversion processing portion of Paragraph B.4.112.1.5.

Any I-Load scale factor constant parameters required for the conversion processes are defined in Table B.4.112-7 with flight values defined in the STS Flight Initialization Load (JSC-19350). Any K-Load scale factor constant parameters and associated values required for the conversion processes are defined in Table B.4.112-8.

OMS Engine Inlet Pressure Conversion

This function shall display the converted (VDC to PSIA) left and right OMS engine fuel inlet pressure and oxidizer inlet pressure. These parameters shall be converted as defined in the conversion processing portion of Paragraph B.4.112.1.5. The K-Load scale factor constant values are defined in Table B.4.112-8.

OMS N2 Pressure Valve Conversion

This function shall display the converted OPEN/CLOSE discretes for the left and right N2 P valves as “OP” for open and “CL” for close.

OMS Fuel Injector Temperature Conversion

This function shall display the converted (VDC to DEG F) left and right OMS fuel injector temperatures. These parameters shall be converted as defined in the conversion processing portion of Paragraph B.4.112.1.5. The K-Load scale factor and bias constants are defined in Table B.4.112-8.

AFT OMS Quantity Conversion and Status

This function shall display the converted (VDC to percent) left and right OMS aft fuel quantity and aft oxidizer quantity. These parameters shall be converted as defined in the conversion processing portion of Paragraph B.4.112.1.5. Any I-Load scale factor constant parameters required for the conversion processes are defined in Table B.4.112-7 with flight values defined in the STS Flight Initialization Load (JSC-19350). Any K-Load scale factor constant parameters and associated values required for the conversion processes are defined in Table B.4.112-8.

The displayed OMS aft quantity status indicators are dependent on the BOS commfaults.

These indicators shall be determined as follows:

OMS AFT QTY X Y COMMFAULT	OMS AFT QTY X Y Displayed Status IND
Fault	M
Good	(blank)

where X = left, right  
Y = Fuel, Oxidizer

and the commfault represents the communication failure associated with the hardware quantity input signal.

RCS Conversion and Status

This function shall display the converted (VDC to PSIA) forward, left and right RCS manifold pressures. The manifold pressures are not limit checked, and only communication failures are checked for status. The pressures shall be converted as defined in the conversion processing portion of paragraph B.4.112.1.5.

Manf P – Conversion & CF Check

OMS X Y 'VDC' COMMFAULT	RCS X Y Displayed Status IND
Fault	M
Good	(blank)

where X = left, right, forward  
 Y = 1, 2, 3 or 4 for forward, left or right

RCS Manifold Isolation Valve Status

This function shall generate the forward, left, and right manifold isolation valve OP/CL I/O status indicators for display. The I/O status is dependent on the commfaults for the fuel and oxidizer isolation valve closed discrettes as follows:

INPUTS		OUTPUT
RCS OX "XX" IS VLV CL Commfault	RCS FU "XX" IS VLV CL Commfault	RCS "XX" IS VLV OP/CL Display Status Indicator
Fault (or)	Fault	M
Good (and)	Good	(blank)

where "XX" = F1, F2, F3, F4, L1, L2, L3, L4, R1, R2, R3, R4.

**B.4.112.1.1 BFS ANNUNCIATION/C&W/MESSAGES**

The GAX principal function shall provide the following BFS GN&C CRT messages and corresponding annunciation information to systems software. The detailed processing required to drive the BFS CRT messages, C&W lights, and alerts is defined in the following paragraphs:

The BFS GAX support interface table, B.4.112.2-1, provides a direct means of tracing interfaces from the hardware/software inputs to the GN&C system summary displays. The table is formatted to show the exact combination of input signals necessary to generate an output. The table is further categorized as follows: Hinge moment conversion and status, elevon position saturation status, aileron and body flap position conversion, FCS channel status, MPS conversion and status, DPS MDM status, NAV sensor status, OMS conversion and status, RCS conversion & status and RCS manifold ISOL valve status.

Table B.4.112.3-1 provides the detailed interfaces required to support the BFS annunciation. This table includes all BFS messages regardless of whether the processing is performed by GAX, SEQ, etc. This table is formatted such that the inputs required and corresponding message/annunciation output are grouped by message ID. All outputs are sent to system software for subsequent annunciation. In order to

output a message when distinct but related failure conditions occur, a message/annunciation output may be driven by multiple unique inputs. Wherever a fault condition has been annunciated for a unique input, the annunciation processing for a unique input shall be reenabled whenever the fault condition is removed.

A subset of the input parameters driving the message/annunciation requirements also support the display processing portion of the GAX principal function. For requirements purposes, the interfaces required for annunciation processing have been formatted in Table B.4.112.3-1 to show the exact combination of input signals necessary to generate an output.

Any I-Load scale factor, bias and limit check constant parameters required for the conversion and/or limit checking processes are defined in Table B.4.112-7 with flight values defined in the STS Flight Initialization Load (JSC-19350). Any K-Load scale factor, bias and limit check constant parameters and associated values required for the conversion and/or limit checking processes are defined in Table B.4.112-8.

The types of message processing required are defined in the following paragraphs:

#### **B.4.112.1.2 BFS DIRECT ANNUNCIATION PROCESSING**

This category of BFS annunciation requires no special processing. The input referenced directly drives the CRT message and corresponding annunciation. A subset of message/annunciation outputs may be driven by multiple unique input signals. In this case, the signals which drive a message/annunciation output are grouped together and listed directly preceding the message/annunciation output. Each input interface shall be processed individually. However, each group of input signals that drives the same message/annunciation output shall be processed as a set prior to processing another message/annunciation signal.

The discrete signals input directly from the hardware each have an associated communication failure signal. Should a commfault condition occur, the limit check annunciation corresponding to the signal shall be discontinued until the commfault condition is cleared.

The interfaces and complete message description and corresponding annunciation is defined in Table B.4.112.3-1.

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The messages pertaining to this category are referenced below by their unique message IDs:

<u>MSG ID</u>		<u>MSG ID</u>		<u>MSG ID</u>	
000	228	253	281	331	373
001	229	254	282	332	376
004	230	255	283	333	480
005	235	256	284	334	496
008	236	257	285	335	844
009	237	258	286	337	845
019	238	260	287	338	846
023	240	261	288	339	847
024	241	264	289	341	
025	242	267	291	342	
026	243	268	295	343	
027	244	269	299	345	
037	245	270	307	346	
038	246	271	308	347	
039	247	272	310	349	
044	248	274	311	350	
224	249	276	315	351	
225	250	277	328	366	
226	251	278	329	368	
227	252	280	330	372	



**B.4.112.1.3 BFS LIMIT CHECK ANNUNCIATION PROCESSING**

This category of BFS messages requires limit check processing to determine out-of-limits conditions. However, should a communication failure occur, the limit check processing for the associated parameter shall be discontinued until the commfault is cleared. This prevents out-of-limit failure annunciation due to commfault conditions. A subset of the messages/annunciation outputs may be driven by multiple unique input signals. In this case, the signals which drive the message/annunciation are grouped together and listed directly preceding the message/annunciation output. Every interface shall be processed individually. However, each group of signals that drive the same message/annunciation shall be processed as a set prior to processing another message/annunciation output. The limit check equations are defined in Paragraph B.4.112.1.5. Any I-Load limit check constant parameters required for the limit checking processes are defined in Table B.4.112-7 with flight values defined in the STS Flight Initialization Load (JSC-19350). Any K-Load limit check constant parameters and associated values required for the limit checking processes are defined in Table B.4.112-8.

Each input parameter shall be subject to a noise filter count of 2 to avoid false annunciation for transient conditions. The noise filter processing requirements are defined in paragraph B.4.112.1.5. This table is formatted such that the inputs required are listed sequentially by message ID.

The message/annunciation parameters pertaining to this category are referenced below by their unique message IDs:

<u>MSG ID</u>	<u>MSG ID</u>	<u>MSG ID</u>	<u>MSG ID</u>	<u>MSG ID</u>	<u>MSG ID</u>	<u>MSG ID</u>	<u>MSG ID</u>
002	062	096	131	171	200	324	468
006	064	097	135	175	201	326	469
010	065	100	139	176	202	352	470
014	066	101	140	177	204	367	484
015	068	104	141	178	205	380	488
017	069	105	142	180	206	381	492
018	072	106	143	181	211	382	500
021	076	108	145	182	212	384	504
022	078	109	146	184	213	385	508
029	080	110	147	185	214	386	
030	081	112	148	186	216	400	
031	084	113	152	188	217	401	
032	085	114	153	189	218	448	
040	086	116	154	190	220	449	
052	088	117	155	192	221	460	
056	089	118	156	193	222	461	
057	090	120	160	194	303	462	
058	092	121	161	196	319	464	
060	093	122	162	197	320	465	
061	094	127	166	198	322	466	

**B.4.112.1.4 BFS UNIQUE ANNUNCIATION PROCESSING**

The unique annunciation processing function shall provide the special processing requirements for those annunciations which are exceptions to the previously defined annunciation.

- Msg (014, 015) FCS Saturation–Position/Hinge Moment

During hydraulic thermal conditioning, the inputs which drive these messages/annunciation outputs require a different type of processing as follows:

During major modes 301, 302, and 303 when the SURF DRIVE ON/OFF CMD (V93X6961X) is set (i.e., ON), output of the FCS SAT POS (014) and FCS SAT MOM (015) message and annunciation shall be inhibited.

- Msg (014) FCS Saturation–Position

FCS SAT POS (014) message and annunciation shall be inhibited in MM602, when QBAR is less than 20 PSF or in MM's 305 and 603, when the weight on main wheels indicator, WOWLON\_IND, is set ON.

- Msg (319) ET FU/OX Ullage Pressure High/Low

The low limit check processing on the ET Ullage Pressures for fuel and oxidizer shall not be performed and the output of the MPS LH2/O2 ULL (319) message and annunciation shall be inhibited prior to transition to MM 102 or whenever AS33\_MECO\_CONFIRMED (EVENT AS33) or AB36\_MECO\_CONFIRMED (EVENT AB36) is set (i.e., ON).

- MPS Pneumatic Valve Helium

Supply (TK) Pressure Low	Msg (460)
Regulator Outlet (REG) Pressure High/Low	Msg (461)
Accumulator (ACUM) Pressure Low	Msg (462)

Whenever AS32\_MECO\_CMD (EVENT AS32) or AB35\_MECO\_CMD (EVENT AB35) is set (i.e., ON), the Low and/or High limit check processing on the MPS PNEU HE TK, and ACUM pressures shall be terminated and output of the MPS PNEU P TK (460), and MPS PNEU P ACUM (462) messages and annunciations shall be inhibited.

- MPS Gaseous Hydrogen Outlet Pressure

Center	Msg (464)
Left	Msg (465)
Right	Msg (466)

- MPS Gaseous Oxygen Outlet Temperature

Center	Msg (468)
Left	Msg (469)
Right	Msg (470)

The low limit check processing on the MPS GH2 Outlet Pressure and MPS GO2 Outlet Temperature shall not be performed and output of the MPS H2 OUT P (464, 465, 466) and MPS O2 OUT T (468, 469, 470) messages and annunciations shall be inhibited prior to transition to MM 102 or whenever AS32\_MECO\_CMD (Event AS32) or AB35\_MECO\_CMD (Event AB35) is set (i.e., ON).

- Msg (307) ADTA/DRAG/TAC/GPS EDIT HIST MSG

This message and annunciation shall be inhibited whenever TAEM Guidance terminates as indicated by the GUIDANCE variable TG\_END being SET.

The input parameters and the message/annunciation outputs are defined in Table B.4.112.3-1.

#### **B.4.112.1.5 BFS GAX COMMON PROCESSING**

The GAX principal function requires special processing equations which are common to multiple subsystems. To eliminate repetition of these common equation types, they have been grouped into the following paragraphs and referenced when required by associated functions of GAX.

- CONVERSION EQUATIONS

(1)  $CONV = (SCALE\_FACTOR) (VDC)$

(2)  $CONV = BIAS + (SCALE\_FACTOR) (VDC)$

(3)  $CONV = BIAS + (SCALE\_FACTOR) (VDC) + (2ND\_ORDER\_COEFF) (VDC^2)$

where VDC represents the input signal from the appropriate hardware.  
SCALE\_FACTOR represents the corresponding slope of the conversion equation.  
BIAS (when required) represents the additive term needed when 0 VDC does not equal 0 engineering units (i.e., the zero-crossing).  
2ND\_ORDER\_COEFF represents the second order coefficient of the conversion equation.  
CONV represents the input hardware signal converted to engineering units.

The conversion K-load constants associated with the input signals are defined in Table B.4.112-8.

- LOW LIMIT CHECK EQUATION

IF  $CONV < LOWER\ LIMIT$

Then: CONV status = below limit

Else: CONV status = within limit

where CONV represents the input hardware signal converted to engineering units.  
CONV status represents the limit check status associated with the converted input signal.

LOWER LIMIT represents the low limit check constant value associated with the converted input signal.

Any I-Load limit check constant parameters required for the limit checking processes are defined in Table B.4.112-7 with flight values defined in the STS Flight Initialization Load (JSC-19350). Any K-Load limit check constant parameters and associated values required for the limit checking processes are defined in Table B.4.112-8. Although the limit check constant values and associated limit check processing have been defined in engineering units for requirements purposes, the programmer shall have the flexibility to perform the equivalent limit check on the unconverted hardware input signal in VDC.

- LOW AND HIGH LIMIT CHECK EQUATION

If  $CONV < LOWER\ LIMIT$

Then: CONV status = below limit

Else: If  $CONV > UPPER\ LIMIT$

Then: CONV status = exceed limit

Else: CONV status = within limit.

where CONV, CONV status, and LOWER LIMIT are as defined above.

UPPER LIMIT represents the upper limit check constant value associated with the converted input signal.

Any I-Load limit check constant parameters required for the limit checking processes are defined in Table B.4.112-7 with flight values defined in the STS Flight Initialization Load (JSC-19350). Any K-Load limit check constant parameters and associated values required for the limit checking processes are defined in Table B.4.112-8. Although the limit check constant values and associated limit check processing have been defined in engineering units for requirements purposes, the programmer shall have the flexibility to perform the equivalent limit check on the unconverted hardware input signal in VDC.

- FALSE ALARM AVOIDANCE NOISE FILTER

If a parameter has been out of limits for two consecutive cycles, that parameter shall be defined to be out-of-limit. The fault annunciation for that parameter shall be enabled. A parameter fault annunciation so enabled shall not be enabled again until the out-of-limit count has been reinitialized and the parameter has again been out of limits two consecutive times. The in and out-of-limits count shall be reinitialized if the parameter value has been within limits two consecutive times. This count shall also be initialized to the initially loaded (IPL) state (i.e. reset) whenever BFS is moded to OPS 0 from OPS 1 or OPS 3.

**B.4.112.2 BFS GAX Interface Support Functions**

Table B.4.112-5	Input Functional Parameters (not supported)
Table B.4.112-6	Output Functional Parameters (no supported)
Table B.4.112-7	I-Loads
Table B.4.112-8	K-Loads
Table B.4.112-9	Constants N/A

Table B.4.112.2-1.(1). GAX Support Interface Table Hinge Moment Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
D90P2515	MID VALUE OF LOB ELEVON DELTA PRESSURE	ELVN_ DELTAP_ FB_HIP		+/-3000	PSI
*D94U4125/ (V94U4125C)	LOB ELVN HINGE MOM PCT		G SYS SUMM 1	+/-99	PCT
*S94U4125/ (V94X4676X)	LOB HINGE MOM EXCEED STATUS		G SYS SUMM 1	↑, ∅	
D90P2516	MID VALUE OF LIB ELEVON DELTA PRESSURE	ELVN_ DELTAP_ FB_HIP		+/-3000	PSI
*D94U4126/ (V94U4126C)	LIB ELVN HINGE MOM PCT		G SYS SUMM 1	+/-99	PCT
*S94U4126/ (V94X4677X)	LIB HINGE MOM EXCEED STATUS		G SYS SUMM 1	↑, ∅	
D90P2517	MID VALUE OF ROB ELEVON DELTA PRESSURE	ELVN_ DELTAP_ FB_HIP		+/-3000	PSI
*D94U4127/ (V94U4127C)	ROB ELVN HINGE MOM PCT		G SYS SUMM 1	+/-99	PCT
*S94U4127/ (V94X4679X)	ROB HINGE MOM EXCEED STATUS		G SYS SUMM 1	↑, ∅	
D90P2518	MID VALUE OF RIB ELEVON DELTA PRESSURE	ELVN_ DELTAP_ FB_HIP		+/-3000	PSI
*D94U4128/ (V94U4128C)	RIB ELVN HINGE MOM PCT		G SYS SUMM 1	+/-99	PCT
*S94U4128/ (V94X4678X)	RIB HINGE MOM EXCEED STATUS		G SYS SUMM 1	↑, ∅	

Table B.4.112.2-1.(2). GAX Support Interface Table Elevon Position Saturation Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
ELEV LIB  *S90H7505/ (V94J4135C)	COMP L INBD ELEVON PFB  LIB HI/LO SATURATION STATUS	ELVN_PFB_ HIP	  G SYS SUMM 1	-36.5 TO +21.5  ↑,↓,↯	DEG
ELEV LOB  *S90H7525/ (V94J4136C)	COMP L OUTBD ELEVON PFB  LOB HI/LO SATURATION STATUS	ELVN_PFB_ HIP	  G SYS SUMM 1	-36.5 TO +21.5  ↑,↓,↯	DEG
ELEV RIB  *S90H7555/ (V94J4137C)	COMP R INBD ELEVON PFB  RIB HI/LO SATURATION STATUS	ELVN_PFB_ HIP	  G SYS SUMM 1	-36.5 TO +21.5  ↑,↓,↯	DEG
ELEV ROB  *S90H7575/ (V94J4138C)	COMP R OUTBD ELEVON PFB  ROB HI/LO SATURATION STATUS	ELVN_PFB_ HIP	  G SYS SUMM 1	-36.5 TO +21.5  ↑,↓,↯	DEG

Table B.4.112.2-1.(3). GAX Support Interface Table Aileron And Body Flap Position Conversion					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
DBFOFB (FLAP)  *D90H6410/ (V96H2047C)	COMP BF PFB  BODY FLAP POSN PCT	BF_PFB_ HIP	  G SYS SUMM 1	-11.71 TO +22.55  0-100	DEG  PCT
ELEV LIB	COMP LIB ELEV PFB	ELVN_PFB_ HIP	G SYS SUMM 1	-36.5 TO +21.5	DEG
ELEV LOB	COMP LOB ELEV PFB	ELVN_PFB_ HIP		-36.5 TO +21.5	DEG
ELEV RIB	COMP RIB ELEV PFB	ELVN_PFB_ HIP		-36.5 TO +21.5	DEG
ELEV ROB	COMP ROB ELEV PFB	ELVN_PFB_ HIP		-36.5 TO +21.5	DEG
*D96H2045/ (V96H2045C)	AILERON POSITION			+5 TO - 5	DEG

Table B.4.112.2-1.(4) GAX Support Interface Table FCS Channel Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V72M8693P	FCS CH 1 FAIL ( PARENT WD 1)	BOS		0-1	
V72M8700P	FCS CH 1 AIL (PARENT WD 2)	BOS		0-1	
V98X0841X	MDM FA 1 PROM SEQ 3-10 COMMFAULT	BOS		0,1	
*S94J4210/ (V94J4210C)	FCS CH 1 I/O FAIL STATUS		G SYS SUMM 1	M,↓,ℵ	
V72M8717P	FCS CH 2 FAIL (PARENT WD 1)	BOS		0-1	
V72M8720P	FCS CH 2 FAIL (PARENT WD 2)	BOS		0-1	
V98X0842X	MDM FA 2 PROM SEQ 3-10 COMMFAULT	BOS		0,1	
*S94J4211/ (V94J4211C)	FCS CH 2 I/O FAIL STATUS		G SYS SUMM 1	M,↓,ℵ	
V72M8737P	FCS CH 3 FAIL (PARENT WD 1)	BOS		0-1	
V72M8740P	FCS CH 3 FAIL (PARENT WD 2)	BOS		0-1	
V98X0843X	MDM FA 3 PROM SEQ 3-10 COMMFAULT	BOS		0,1	
*S94J4212/ (V94J4212C)	FCS CH 3 I/O FAIL STATUS		G SYS SUMM 1	M,↓,ℵ	
V72M8757P	FCS CH 4 FAIL (PARENT WD 1)	BOS		0-1	
V72M8760P	FCS CH 4 FAIL (PARENT WD 2)	BOS		0-1	
V98X0844X	MDM FA 4 PROM SEQ 3-10 COMMFAULT	BOS		0,1	
*S94J4213/ (V94J4213C)	FCS CH 4 I/O FAIL STATUS		G SYS SUMM 1	M,↓,ℵ	



Table B.4.112.2-1.(5). GAX Support Interface Table MPS Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V41P1150C	MPS ENG 1 HELIUM SUPPLY PRESS	HDWR		0-5	VDC
V98X0893X	MDM FA 1 PROM SEQ 1-2 COMMFAULT	BOS		0,1	
*D41P1150/ (V94P4554C)	SSME HE TK PRESS 1		G SYS SUMM 1	0-5000	PSIA
*S41P1150/ (V94J4614C)	SSME HE TK PRESS 1 LOW/IO STATUS		G SYS SUMM 1	M,↓,ℳ	
V41P1250C	MPS ENG 2 HELIUM SUPPLY PRESS	HDWR		0-5	VDC
V98X0894X	MDM FA 2 PROM SEQ 1-2 COMMFAULT	BOS		0,1	
*D41P1250/ (V94P4555C)	SSME HE TK PRESS 2		G SYS SUMM 1	0-5000	PSIA
*S41P1250/ (V94J4615C)	SSME HE TK PRESS 2 LOW/IO STATUS		G SYS SUMM 1	M,↓,ℳ	
V41P1350C	MPS ENG 3 HELIUM SUPPLY PRESS	HDWR		0-5	VDC
V98X0895X	MDM FA 3, PROM SEQ 1-2 COMMFAULT	BOS		0,1	
*D41P1350/ (V94P4556C)	SSME HE TK PRESS 3 HIP		G SYS SUMM 1	0-5000	PSIA
*S41P1350/ (V94J4616C)	SSME HE TK PRESS 3 LO/IO STATUS		G SYS SUMM 1	M,↓,ℳ	
V98X4755X	AS33_MECO_CONFIRMED	B/U EVENT CONTRLR		0,1	
V98X3689X	AB36_MECO_CONFIRMED	B/U EVENT CONTRLR		0,1	
V98X0893X	MDM FA 1, PROM SEQ 1-2 COMMFAULT	BOS		0,1	
T41P1700C	ET LH2 ULL PRESS NO.1	HDWR		0-5	VDC
*D41P1700C/ (V94P4834C)	CENTER ET LH2 ULL PRESS		G SYS SUMM 1	12-52	PSIA
*S41P1700C/ (V94J4837C)	CENTER ET LH2 ULL PRESS HI/LO/IO STATUS		G SYS SUMM 1	M,↑,↓,ℳ	

Table B.4.112.2-1.(5). GAX Support Interface Table MPS Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V98X4755X	AS33_MECO_CONFIRMED	B/U EVENT CONTRLR		0,1	
V98X3689X	AB36_MECO_CONFIRMED	B/U EVENT CONTRLR		0,1	
V98X0894X	MDM FA 2, PROM SEQ 1-2 COMMFAULT	BOS		0,1	
T41P1701C *D41P1701C/ (V94P4835C) *S41P1701C/ (V94J4838C)	ET LH2 ULL PRESS NO.2 LEFT ET LH2 ULL PRESS  LEFT ET LH2 ULL PRESS HI/LO/IO STATUS	HDWR	G SYS SUMM 1  G SYS SUMM 1	0-5 12-52  M,↑,↓,↯	VDC PSIA
V98X4755X	AS33_MECO_CONFIRMED	B/U EVENT CONTRLR		0,1	
V98X3689X	AB36_MECO_CONFIRMED	B/U EVENT CONTRLR		0,1	
V98X0895X	MDM FA 3, PROM SEQ 1-2 COMMFAULT	BOS		0,1	
T41P1702C *D41P1702C/ (V94P4836C) *S41P1702C/ (V94J4839C)	ET LH2 ULL PRESS NO.3 RIGHT ET LH2 ULL PRESS  RIGHT ET LH2 ULL PRESS HI/LO/IO STATUS	HDWR	G SYS SUMM 1  G SYS SUMM 1	0-5 12-52  M,↑,↓,↯	VDC PSIA
V98X4755X	AS33_MECO_CONFIRMED	B/U EVENT CONTRLR		0,1	
V98X3689X	AB36_MECO_CONFIRMED	B/U EVENT CONTRLR		0,1	
V98X0893X	MDM FA 1, PROM SEQ 1-2 COMMFAULT	BOS		0,1	
T41P1750C *D41P1750C/ (V94P4840C) *S41P1750C/ (V94J4843C)	ET LO2 ULL PRESS NO.1 CENTER ET LO2 ULL PRESS  CENTER ET LO2 ULL PRESS HI/LO/IO STATUS	HDWR	G SYS SUMM 1  G SYS SUMM 1	0-5 0-30  M,↑,↓,↯	VDC PSIG

Table B.4.112.2-1.(5). GAX Support Interface Table MPS Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V98X4755X	AS33_MECO_CONFIRMED	B/U EVENT CONTRLR		0,1	
V98X3689X	AB36_MECO_CONFIRMED	B/U EVENT CONTRLR		0,1	
V98X0894X	MDM FA 2, PROM SEQ 1-2 COMMFAULT	BOS		0,1	
T41P1751C *D41P1751C/ (V94P4841C) *S41P1751C/ (V94J4844C)	ET LO2 ULL PRESS NO.2 LEFT ET LO2 ULL PRESS  LEFT ET LO2 ULL PRESS HI/LO/IO STATUS	HDWR	G SYS SUMM 1  G SYS SUMM 1	0-5 0-30  M,↑,↓,℄	VDC PSIG
V98X4755X	AS33_MECO_CONFIRMED	B/U EVENT CONTRLR		0,1	
V98X3689X	AB36_MECO_CONFIRMED	B/U EVENT CONTRLR		0,1	
V98X0895X	MDM FA 3, PROM SEQ 1-2 COMMFAULT	BOS		0,1	
T41P1752C *D41P1752C/ (V94P4842C) *S41P1752C/ (V94J4845C)	ET LO2 ULL PRESS NO.3 RIGHT ET LO2 ULL PRESS  RIGHT ET LO2 ULL PRESS HI/LO/IO STATUS	HDWR	G SYS SUMM 1  G SYS SUMM 1	0-5 0-30  M,↑,↓,℄	VDC PSIG
V41P1433C V98X0893X	MPS LH2 ENG MANF PRES MDM FA 1 PROM SEQ 1-2 COMMFAULT	HDWR BOS		0-5 0,1	VDC
*D41P1433/ (V94P4563C) *S41P1433/ (V94J4620C)	SSME FU MANF PRESS  SSME FU MANF PRESS HI/IO STATUS		G SYS SUMM 1  G SYS SUMM 1	0-100  M,↑,℄	PSIG
V41P1533C V98X0894X	MPS LO2 ENG MANF PRESS MDM FA 2, PROM SEQ 1-2 COMMFAULT	HDWR BOS		0-5 0,1	VDC
*D41P1533/ (V94P4564C) *S41P1533/ (V94J4621C)	SSME OXID MANF PRESS  SSME OXID MANF PRESS HI/IO STATUS		G SYS SUMM 1  G SYS SUMM 1	0-300  M,↑,℄	PSIA

Table B.4.112.2-1.(5). GAX Support Interface Table MPS Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V41P1354C	MPS ENG NO. 3 HE REGLTR OUTLET PRESS	HDWR		0-5	VDC
V98X0895X	MDM FA 3, PROM SEQ 1-2 COMMFAULT	BOS		0,1	
*D41P1354/ (V94P4559C)	SSME NO. 3 HE REGLTR OUTLET PRESS		G SYS SUMM 1	0-1000	PSIA
*S41P1354/ (V94J4619C)	SSME NO. 3 HE REGLTR OUTLET PRESS HI/IO STATUS		G SYS SUMM 1	M,↑,↓	
V41P1154A	MPS ENG NO. 1 HE REGLTR OUTLET PRESS A	HDWR		0-5	VDC
DATSTAT +8, BIT 27	MDM OF 1 DATA GROUP 1A COMMFAULT	BOS		0,1	
*D41P1154A/ (V94P4557C)	SSME NO. 1 HE REGLTR OUTLET PRESS A		G SYS SUMM 1	0-1000	PSIA
*S41P1154A/ (V94J4617C)	SSME NO. 1 HE REGLTR OUTLET PRESS A HI/LO/IO STATUS		G SYS SUMM 1	M,↑,↓,↔	
V41P1153A	MPS ENG NO. 1 HE REGLTR OUTLET PRESS B	HDWR		0-5	VDC
DATSTAT +8, BIT 27	MDM OA 1 DATA GROUP 1A COMMFAULT	BOS		0,1	
*D41P1153A/ (V94P4565C)	SSME NO. 1 HE REGLTR OUTLET PRESS B		G SYS SUMM 1	0-1000	PSIA
*S41P1153A/ (V94J4601C)	SSME NO. 1 HE REGLTR OUTLET PRESS B HI/LO/IO STATUS		G SYS SUMM 1	M,↑,↓,↔	
V41P1254A	MPS ENG NO. 2 HE REGLTR OUTLET PRESS A	HDWR		0-5	VDC
DATSTAT +8, BIT 27	MDM OF 1 DATA GROUP 1A COMMFAULT	BOS		0,1	
*D41P1254A/ (V94P4558C)	SSME NO. 2 HE REGLTR OUTLET PRESS A		G SYS SUMM 1	0-1000	PSIA
*S41P1254A/ (V94J4618C)	SSME NO. 2 HE REGLTR OUTLET PRESS A HI/LO/IO STATUS		G SYS SUMM 1	M,↑,↓,↔	

Table B.4.112.2-1.(5). GAX Support Interface Table MPS Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V41P1253A	MPS ENG NO. 2 HE REGLTR OUTLET PRESS B	HDWR		0-5	VDC
DATSTAT +8, BIT 27	MDM OA 1 DATA GROUP 1A COMMFAULT	BOS		0,1	
*D41P1253A/ (V94P4566C)	SSME NO. 2 HE REGLTR OUTLET PRESS B		G SYS SUMM 1	0-1000	PSIA
*S41P1253A/ (V94J4602C)	SSME NO. 2 HE REGLTR OUTLET PRESS B HI/LO/ IO STATUS		G SYS SUMM 1	M,↑,↓,↯	
V41P1354A	MPS ENG NO. 3 HE REGLTR OUTLET PRESS A	HDWR		0-5	VDC
DATSTAT +8, BIT 27	MDM OF 1 DATA GROUP 1A COMMFAULT	BOS		0,1	
*D41P1354A/ (V94P4559C)	SSME NO. 3 HE REGLTR OUTLET PRESS A		G SYS SUMM 1	0-1000	PSIA
*S41P1354A/ (V94J4619C)	SSME NO. 3 HE REGLTR OUTLET PRESS A HI/LO/IO STATUS		G SYS SUMM 1	M,↑,↓,↯	
V41P1353A	MPS ENG NO. 3 HE REGLTR OUTLET PRESS B	HDWR		0-5	VDC
DATSTAT +8, BIT 27	MDM OA01 DATA GROUP 1A COMMFAULT	BOS		0,1	
*D41P1353A/ (V94P4567C)	SSME NO. 3 HE REGLTR OUTLET PRESS B		G SYS SUMM 1	0-1000	PSIA
*S41P1353A/ (V94J4603C)	SSME NO. 3 HE REGLTR OUTLET PRESS B HI/LO/ IO STATUS		G SYS SUMM 1	M,↑,↓,↯	
V98X3545X	AS32_MECO_CMD	B/U EVENT CONTRLR		0,1	
V98X3688X	AB35_MECO_CMD	B/U EVENT CONTRLR		0,1	
DATSTAT +8, BIT 18	MDM OA01 DATA GROUP 1A COMMFAULT	BOS		0,1	
V41P1600A	MPS PNEU VLV HE SUPPLY PRESS	HDWR		0-5	VDC
*D41P1600/ (V94P4352C)	MPS PNEU HE TANK PRESS		G SYS SUMM 1	0-5000	PSIA
*S41P1600/ (V94J4355C)	MPS PNEU HE TK PRESS LO/IO STATUS		G SYS SUMM 1	M,↓,↯	

Table B.4.112.2-1.(5). GAX Support Interface Table MPS Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V98X3545X	AS32_MECO_CMD	B/U EVENT CONTRLR		0,1	
V98X3688X	AB35_MECO_CMD	B/U EVENT CONTRLR		0,1	
DATSTAT +8, BIT 18	MDM OA01 DATA GROUP 1A COMMFAULT	BOS		0,1	
V41P1605A	MPS PNEU VLV HE REG OUTLET PRESS	HDWR		0-5	VDC
*D41P1605/ (V94P4353C)	MPS PNEU HE REG PRESS		G SYS SUMM 1	0-5000	PSIA
*S41P1605/ (V94J4356C)	MPS PNEU HE REG P HI/LO/IO STATUS		G SYS SUMM 1	M,↑,↓,∅	
V98X3545X	AS32_MECO_CMD	B/U EVENT CONTRLR		0,1	
V98X3688X	AB35_MECO_CMD	B/U EVENT CONTRLR		0,1	
DATSTAT +8, BIT 16	MDM OA02 DATA GROUP 1A COMMFAULT	BOS		0,1	
V41P1650A	MPS PNEU ACCUMULATOR PRESSURE	HDWR		0-5	VDC
*D41P1650/ (V94P4354C)	MPS PNEU HE ACUM PRESS		G SYS SUMM 1	0-1000	PSIA
*S41P1650/ (V94J4357C)	MPS PNEU HE ACUM P LO/IO STATUS		G SYS SUMM 1	M,↓,∅	
V98X3545X	AS32_MECO_CMD	B/U EVENT CONTRLR		0,1	
V98X3688X	AB35_MECO_CMD	B/U EVENT CONTRLR		0,1	
DATSTAT +8, BIT 18	MDM OA01 DATA GROUP 1A COMMFAULT	BOS		0,1	
V41P1160A	MPS E1 GH2 PRESS OUTLET PRESS	HDWR		0-5	VDC
*D41P1160/ (V94P5002C)	MPS GH2 OUTLET PRESS 1		G SYS SUMM 1	0-5000	PSIA
*S41P1160/ (V94J5013C)	MPS GH2 OUT P1 LO/IO STATUS		G SYS SUMM 1	M,↓,∅	

Table B.4.112.2-1.(5). GAX Support Interface Table MPS Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V98X3545X	AS32_MECO_CMD	B/U EVENT CONTRLR		0,1	
V98X3688X	AB35_MECO_CMD	B/U EVENT CONTRLR		0,1	
DATSTAT +8, BIT 16	MDM OA02 DATA GROUP 1A COMMFAULT	BOS		0,1	
V41P1260A	MPS E2 GH2 PRESS OUTLET PRESS	HDWR		0-5	VDC
*D41P1260/ (V94P5003C)	MPS GH2 OUTLET PRESS 2		G SYS SUMM 1	0-5000	PSIA
*S41P1260/ (V94J5014C)	MPS GH2 OUT P2 LO/IO STATUS		G SYS SUMM 1	M,↓,∅	
V98X3545X	AS32_MECO_CMD	B/U EVENT CONTRLR		0,1	
V98X3688X	AB35_MECO_CMD	B/U EVENT CONTRLR		0,1	
DATSTAT +8, BIT 17	MDM OA03 DATA GROUP 1A COMMFAULT	BOS		0,1	
V41P1360A	MPS E3 GH2 PRESS OUTLET PRESS	HDWR		0-5	VDC
*D41P1360/ (V94P5004C)	MPS GH2 OUTLET PRESS 3		G SYS SUMM 1	0-5000	PSIA
*S41P1360/ (V94J5015C)	MPS GH2 OUT P3 LO/IO STATUS		G SYS SUMM 1	M,↓,∅	
V98X3545X	AS32_MECO_CMD	B/U EVENT CONTRLR		0,1	
V98X3688X	AB35_MECO_CMD	B/U EVENT CONTRLR		0,1	
DATSTAT +8, BIT 18	MDM OA01 DATA GROUP 1A COMMFAULT	BOS		0,1	
V41T1171A	MPS E1 GO2 PRESS OUTLET TEMP	HDWR		0-5	VDC
*D41T1171/ (V94T5007C)	MPS GO2 OUTLET TEMP 1		G SYS SUMM 1	-250 – + 1000	DEG F
*S41T1171/ (V94J5017C)	MPS GO2 OUT T1 LO/IO STATUS		G SYS SUMM 1	M,↓,∅	

Table B.4.112.2-1.(5). GAX Support Interface Table MPS Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V98X3545X	AS32_MECO_CMD	B/U EVENT CONTRLR		0,1	
V98X3688X	AB35_MECO_CMD	B/U EVENT CONTRLR		0,1	
DATSTAT +8, BIT 16	MDM OA02 DATA GROUP 1A COMMFAULT	BOS		0,1	
V41T1271A	MPS E2 GO2 PRESS OUTLET TEMP	HDWR		0-5	VDC
*D41T1271/ (V94T5008C)	MPS GO2 OUTLET TEMP 2		G SYS SUMM 1	-250 – + 1000	DEG F
*S41T1271/ (V94J5018C)	MPS GO2 OUT T2 LO/IO STATUS		G SYS SUMM 1	M,↓,∅	
V98X3545X	AS32_MECO_CMD	B/U EVENT CONTRLR		0,1	
V98X3688X	AB35_MECO_CMD	B/U EVENT CONTRLR		0,1	
DATSTAT +8, BIT 17	MDM OA03 DATA GROUP 1A COMMFAULT	BOS		0,1	
V41T1371A	MPS E3 GO2 PRESS OUTLET TEMP	HDWR		0-5	VDC
*D41T1371/ (V94T5009C)	MPS GO2 OUTLET TEMP 3		G SYS SUMM 1	-250 – + 1000	DEG F
*S41T1371/ (V94J5019C)	MPS GO2 OUT T3 LO/IO STATUS		G SYS SUMM 1	M,↓,∅	



Table B.4.112.2-1.(6). GAX Support Interface Table DPS MDM Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
SCORE BF STATE V98X0951X *S91X2013/ (V91X2013X)	BFS TRACKING PASS FLAG BFS ENGAGED STATE RETURN WD FF3 FF3 MDM FAIL	BOS BOS BOS	   G SYS SUMM 1	0,1 0,1 0,1 M,↓,∅	
SCORE BF STATE V98X0952X *S91X2014/ (V91X2014X)	BFS TRACKING PASS FLAG BFS ENGAGED STATE RETURN WD FF4 FF4 MDM FAIL	BOS BOS BOS	   G SYS SUMM 1	0,1 0,1 0,1 M,↓,∅	
SCORE BF STATE V98X0949X *S91X2011/ (V91X2011X)	BFS TRACKING PASS FLAG BFS ENGAGED STATE RETURN WD FF1 FF1 MDM FAIL	BOS BOS BOS	   G SYS SUMM 1	0,1 0,1 0,1 M,↓,∅	
SCORE BF STATE V98X0950X *S91X2012/ (V91X2012X)	BFS TRACKING PASS FLAG BFS ENGAGED STATE RETURN WD FF2 FF2 MDM FAIL	BOS BOS BOS	   G SYS SUMM 1	0,1 0,1 0,1 M,↓,∅	
SCORE BF STATE V98X0953X *S91X2015/ (V91X2015X)	BFS TRACKING PASS FLAG BFS ENGAGED STATE RETURN WD FA1 FA1 MDM FAIL	BOS BOS BOS	   G SYS SUMM 1	0,1 0,1 0,1 M,↓,∅	
SCORE BF STATE V98X0954X *S91X2016/ (V91X2016X)	BFS TRACKING PASS FLAG BFS ENGAGED STATE RETURN WD FA2 FA2 MDM FAIL	BOS BOS BOS	   G SYS SUMM 1	0,1 0,1 0,1 M,↓,∅	
SCORE BF STATE V98X0955X *S91X2017/ (V91X2017X)	BFS TRACKING PASS FLAG BFS ENGAGED STATE RETURN WD FA3 FA3 MDM FAIL	BOS BOS BOS	   G SYS SUMM 1	0,1 0,1 0,1 M,↓,∅	

Table B.4.112.2-1.(6). GAX Support Interface Table DPS MDM Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
SCORE	BFS TRACKING PASS FLAG	BOS		0,1	
BF STATE	BFS ENGAGED STATE	BOS		0,1	
V98X0956X	RETURN WD FA4	BOS		0,1	
*S91X2018/ (V91X2018X)	FA4 MDM FAIL		G SYS SUMM 1	M,↓,∅	
V98X0961X	PAYLOAD 1B PF1	BOS		0,1	
*S91X2019/ (V91X2019X)	PL1 MDM FAIL		G SYS SUMM 1	↓,∅	
V98X0965X	PAYLOAD 1B PF2	BOS		0,1	
*S91X2020/ (V91X2020X)	PL2 MDM FAIL		G SYS SUMM 1	↓,∅	

Table B.4.112.2-1.(7). GAX Support Interface Table NAV Sensor Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
B94J4160 S94J4160/ (V94J4160C)	IMU 1 FAIL INDICATE IMU 1 STATUS	IMU_HIP	G SYS SUMM 1	0,1 ↓,℘	
B94J4161 S94J4161/ (V94J4161C)	IMU 2 FAIL INDICATE IMU 2 STATUS	IMU_HIP	G SYS SUMM 1	0,1 ↓,℘	
B94J4162 *S94J4162/ (V94J4162C)	IMU 3 FAIL INDICATE IMU 3 STATUS	IMU_HIP	G SYS SUMM 1	0,1 ↓,℘	
B94J4190 B94J41A0 *S94J4190/ (V94J4190C)	TAC 1 RNG FAIL IND TAC 1 BRNG FAIL IND TAC 1 STATUS	TACAN_HIP TACAN_HIP	G SYS SUMM 1	0,1 0,1 ↓,℘	
B94J4191 B94J41A1 *S94J4191/ (V94J4191C)	TAC 2 RNG FAIL IND TAC 2 BRNG FAIL IND TAC 2 STATUS	TACAN_HIP TACAN_HIP	G SYS SUMM 1	0,1 0,1 ↓,℘	
B94J4192 B94J41A2 *S94J4192/ (V94J4192C)	TAC 3 RNG FAIL IND TAC 3 BRNG FAIL IND TAC 3 STATUS	TACAN_HIP TACAN_HIP	G SYS SUMM 1	0,1 0,1 ↓,℘	
B98X4881 *S98X4881/ (V98X4881X)	ADTA 1 FAIL IND ADTA 1 FAIL STATUS	ADTA_HIP	G SYS SUMM 1	0,1 ↓,℘	
B98X4882 *S98X4882/ (V98X4882X)	ADTA 2 FAIL IND ADTA 2 FAIL STATUS	ADTA_HIP	G SYS SUMM 1	0,1 ↓,℘	
B98X4883 *S98X4883/ (V98X4883X)	ADTA 3 FAIL IND ADTA 3 FAIL STATUS	ADTA_HIP	G SYS SUMM 1	0,1 ↓,℘	
B98X4884 *S98X4884/ (V98X4884X)	ADTA 4 FAIL IND ADTA 4 FAIL STATUS	ADTA_HIP	G SYS SUMM 1	0,1 ↓,℘	
B94J4196 B98X0089 *S94J4196/ (V94J4196C)	GPS 1 STATUS IND GPS 1 DESELECT IND GPS 1 DISPLAY STATUS	GPS_INPUT_ HIP GPS1DES (Note 1)	G SYS SUMM 1	0,1,2,3,4, 5 0,1 M,↓,℘	

Table B.4.112.2-1.(7). GAX Support Interface Table NAV Sensor Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
B94J4197	GPS 2 STATUS IND	GPS_INPUT_ HIP		0,1,2,3,4, 5	
B98X0623	GPS 2 DESELECT IND	GPS2DES (Note 1)		0,1	
*S94J4197/ (V94J4197C)	GPS 2 DISPLAY STATUS		G SYS SUMM 1	M,↓,♠	
B94J4198	GPS 3 STATUS IND	GPS_INPUT_ HIP		0,1,2,3,4, 5	
B98X0664	GPS 3 DESELECT IND	GPS3DES (Note 1)		0,1	
*S94J4198/ (V94J4198C)	GPS 3 DISPLAY STATUS		G SYS SUMM 1	M,↓,♠	

Note 1: GPS1DES, GPS2DES, and GPS3DES are assembly variables that contain the deselect status of each receiver (1 = deselected), and have 4 sources of input: BFS GPS STATUS DISPLAY, BFS HORIZ SIT DISPLAY, PASS GPS STATUS DISPLAY (by DK Listen), or PASS HORIZ SIT DISPLAY (by DK Listen).

Table B.4.112.2-1.(8). GAX Support Interface Table OMS Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V43P4122C	OMS-L POD HE TANK PRESS 2	HDWR		0-5	VDC
V98X0895X	MDM FA 3, PROM SEQ 1-2 COMMFAULT	BOS		0,1	
*D43P4122/ (V94P4220C)	OMS HE TK PRESS L HIP		G SYS SUMM 2	0-5000	PSIA
*S43P4122/ (V94J4240C)	OMS HE TK PRESS L LO/IO STATUS		G SYS SUMM 2	M,↓,♠	
V43P4646C	OMS-L ENG FU INLET PRESS	HDWR		0-5	VDC
V98X0895X	MDM FA 3, PROM SEQ 1-2 COMMFAULT	BOS		0,1	
*D94P4641/ (V94P4641C)	OMS ENG FU INLET PRESS LEFT		G SYS SUMM 2	0-400	PSIA
*S91X2604/ (V91X2604X)	OMS ENG FU INLET PRESS LEFT STATUS		G SYS SUMM 2	M,♠	
V43H4655C	OMS-L BI-PROP VLV 1 POSN	HDWR		0-5	VDC
V98X0895X	MDM FA 3, PROM SEQ 1-2 COMMFAULT	BOS		0,1	
*D94Q4645/ (V94Q4645C)	OMS L ENG BI-PROP VLV 1 POSN		G SYS SUMM 2	0-100	PCT

Table B.4.112.2-1.(8). GAX Support Interface Table OMS Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
*S91X5112/ (V91X5112X)	OMS-L BI-PROP VLV 1 POSN STATUS		G SYS SUMM 2	M,ℳ	
V43H4656C V98X0895X	OMS-L BI-PROP VLV 2 POSN MDM FA 3 FROM SEQ 1-2 COMMFALT	HDWR BOS		0-5 0,1	VDC
*D94Q4647/ (V94Q4647C)	OMS L ENG BI-PROP VLV 2 POSN		G SYS SUMM 2	0-100	PCT
*S91X5114/ (V91X5114X)	OMS- BI-PROP VLV 2 POSN STATUS		G SYS SUMM 2	M,ℳ	
V72M8741P V98X0843X	MDM FA 3 DSCR IN CD 11 CH 01 MDM FA 3 PROM SEQ 3-10 COMMFALT	BOS BOS		0,1 0,1	
*L43X4552/ (V43X4552X)	OMS-L ENG PRESS VLV POSN		G SYS SUMM 2	OP,CL	
*S91X5110/ (V91X5110X)	OMS-L ENG PRESS VLV POSN STATUS		G SYS SUMM 2	M,ℳ	
V43P4548C V98X0895X	OMS-L ENG PNEU SUPPLY PRESS 2 MDM FA 3 PROM SEQ 1-2 COMMFALT	HDWR BOS		0-5 0,1	VDC
*D43P4548/ (V94P4604C)	OMS ENG PNEU PRESS 2 LEFT		G SYS SUMM 2	0-5000	PSIA
*S43P4548/ (V94J4644C)	OMS-L ENG PNEU PRESS 2 LO/IO STATUS		G SYS SUMM 2	M,↓,ℳ	
V43P5122C V98X0896X	OMS-R POD HE TANK PRESS MDM FA 4 PROM SEQ 1-2 COMMFALT	HDWR BOS		0-5 0,1	VDC
*D43P5122/ (V94P4221C)	OMS HE TK PRESS R		G SYS SUMM 2	0-5000	PSIA
*S43P5122/ (V94J4241C)	OMS HE TK PRESS R LO/IO STATUS		G SYS SUMM 2	M,↓,ℳ	
V43P5646C V98X0896X	OMS-R ENG FU INLET PRESS MDM FA 4 PROM SEQ 1-2 COMMFALT	HDWR BOS		0-5 0,1	VDC
*D94P4642/ (V94P4642C)	OMS ENG FU INLET PRESS RIGHT		G SYS SUMM 2	0-400	PSIA
*S91X2607/ (V91X2607X)	OMS ENG FU INLET PRESS RIGHT STATUS		G SYS SUMM 2	M,ℳ	
V43H5655C	OMS-R BI-PROP VLV 1 POSN	HDWR		0-5	VDC

Table B.4.112.2-1.(8). GAX Support Interface Table OMS Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V98X0896X  *D94Q4646/ (V94Q4646C)  *S91X5113/ (V91X5113X)	MDM FA 4 PROM SEQ 1-2 COMMFAULT  OMS R ENG BI-PROP VLV 1 POSN  OMS-R BI-PROP VLV 1 POSN STATUS	BOS	  G SYS SUMM 2  G SYS SUMM 2	0,1  0-100  M,∅	  PCT
V43H5656C  V98X0896X  *D94Q4648/ (V94Q4648C)  *S91X5115/ (V91X5115X)	OMS-R BI-PROP VLV 2 POSN  MDM FA 4 PROM SEQ 1-2 COMMFAULT  OMS R ENG BI-PROP VLV 2 POSN  OMS-R BI-PROP VLV 2 POSN STATUS	HDWR  BOS	  G SYS SUMM 2  G SYS SUMM 2	0-5  0,1  0-100  M,∅	VDC  PCT
V72M8761P  V98X0844X  *L43X5552/ (V43X5552X)  *S91X5111/ (V91X5111X)	MDM FA 4 DSCR IN CD11 CH 01  MDM FA 4 PROM SEQ 3-10 COMMFAULT  OMS-R ENG PRESS VLV POSN  OMS-R ENG PRESS VLV POSN STATUS	BOS  BOS	  G SYS SUMM 2  G SYS SUMM 2	0,1  0,1  OP,CL  M,∅	
V48P5548C  V98X0894X  *D43P5548/ (V94P4605C)  *S43P5548/ (V94J4643C)	OMS-R ENG PNEU SUPPLY PRESS 2  MDM FA 2 PROM SEQ 1-2 COMMFAULT  OMS ENG PNEU PRESS 2 RIGHT  OMS-R ENG PNEU PRESS 2 LO/IO STATUS	HDWR  BOS	  G SYS SUMM 2  G SYS SUMM 2	0-5  0,1  0-5000  M,↓,∅	VDC  PSIA
V43P4321C  V98X0893X  *D43P4321/ (V94P4222C)  *S43P4321/ (V94J4242C)	OMS-L POD FU TANK ULLAGE PRESS  MDM FA 1 PROM SEQ 1-2 COMMFAULT  OMS FU TK PRESS L  OMS FU TK PRESS L HI/LO/IO STATUS	HDWR  BOS	  G SYS SUMM 2  G SYS SUMM 2	0-5  0,1  0-400  M,↓,↑,∅	VDC  PSIA
V43P5321C  V98X0894X	OMS-R POD FU TANK ULLAGE PRESS  MDM FA 2 PROM SEQ 1-2 COMMFAULT	HDWR  BOS	  G SYS SUMM 2	0-5  0,1	VDC

Table B.4.112.2-1.(8). GAX Support Interface Table OMS Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
*D43P5321/ (V94P4223C)	OMS FU TK PRESS R		G SYS SUMM 2	0-400	PSIA
*S43P5321/ (V94J4243C)	OMS FU TK PRESS R HI/LO/IO STATUS		G SYS SUMM 2	M,↓,↑,∅	
V43P4221C	OMS L POD OXID TANK ULLAGE PRESS	HDWR		0-5	VDC
V98X0894X	MDM FA 2 PROM SEQ 1-2 COMMFAULT	BOS		0,1	
*D43P4221/ (V94P4224C)	OMS OX TK PRESS L		G SYS SUMM 2	0-400	PSIA
*S43P4221/ (V94J4244C)	OMS OX TK PRESS L HI/LO/IO STATUS		G SYS SUMM 2	M,↓,↑,∅	
V43P5221C	OMS R POD OXID TANK ULLAGE PRESS	HDWR		0-5	VDC
V98X0893X	MDM FA 1 PROM SEQ 1-2 COMMFAULT	BOS		0,1	
*D43P5221/ (V94P4225C)	OMS OX TK PRESS R		G SYS SUMM 2	0-400	PSIA
*S43P5221/ (V94J4245C)	OMS OX TK PRESS R HI/LO/IO STATUS		G SYS SUMM 2	M,↓,↑,∅	
V43P4549C	OMS L ENG REGLTR OUT PRESS	HDWR		0-5	VDC
V98X0893X	MDM FA 1 PROM SEQ 1-2 COMMFAULT	BOS		0,1	
*D43P4549/ (V94P4230C)	OMS N2 REG PRESS L		G SYS SUMM 2	0-500	PSIA
*S43P4549/ (V94J4250C)	OMS N2 REG PRESS L HI/LO/IO STATUS		G SYS SUMM 2	M,↓,↑,∅	
V43P5549C	OMS R ENG REGLTR OUT PRESS	HDWR		0-5	VDC
V98X0894X	MDM FA 2 PROM SEQ 1-2 COMMFAULT	BOS		0,1	
*D43P5549/ (V94P4231C)	OMS N2 REG PRESS R		G SYS SUMM 2	0-500	PSIA
*S43P5549/ (V94J4251C)	OMS N2 REG PRESS R HI/LO/IO STATUS		G SYS SUMM 2	M,↓,↑,∅	
V43P4645C	OMS-L ENG OX INLET PRESS	HDWR		0-5	VDC
V98X0893X	MDM FA 1 FROM SEQ 1-2 COMMFAULT	BOS		0,1	
*D94P4639/ (V94P4639C)	OMS ENG OX INLET PRESS LEFT		G SYS SUMM 2	0-400	PSIA

Table B.4.112.2-1.(8). GAX Support Interface Table OMS Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
*S91X2603/ (V91X2603X)	OMS ENG OX INLET PRESS LEFT STATUS		G SYS SUMM 2	M, Ъ	
V43P5645C V98X0894X	OMS-R ENG OX INLET PRESS MDM FA 2 PROM SEQ 1-2 COMMFAULT	HDWR BOS		0-5 0,1	VDC
*D94P4640/ (V94P4640C)	OMS ENG OX INLET PRESS RIGHT		G SYS SUMM 2	0-400	PSIA
*S91X2606/ (V91X2606X)	OMS ENG OX INLET PRESS RIGHT STATUS		G SYS SUMM 2	M, Ъ	
V43T4643A DATSTAT WD8 BIT 27	OMS-L ENG FU INJ TEMP MDM OA 1, DATA GROUP 1A COMMFAULT	HDWR BOS		0-5 0,1	VDC
*D43T4643/ (V94T4252C)	OMS L ENG FUEL INJ TEMP		G SYS SUMM 2	-75 TO +300	DEG F
*S43T4643/ (V94J4254C)	OMS L ENG FUEL INJ TEMP HI/IO STATUS		G SYS SUMM 2	M, ↑, Ъ	
V43T5643A DATSTAT WD8 BIT 27	OMS-R ENG FU INJ TEMP MDM OA 2, DATA GROUP 1A COMMFAULT	HDWR BOS		0-5 0,1	VDC
*D43T5643/ (V94T4253C)	OMS R ENG FUEL INJ TEMP		G SYS SUMM 2	-75 TO +300	DEG F
*S43T5643/ (V94J4255C)	OMS R ENG FUEL INJ TEMP HI/IO STATUS		G SYS SUMM 2	M, ↑, Ъ	
V43Q4232C V98X0895X	OMS-L POD OX AFT COMPARTMENT QTY MDM FA 3, PROM SEQ 1-2 COMMFAULT	HDWR BOS		0-5 0,1	VDC
*D43Q4232C (V94Q4629C)	OMS-L AFT OX QTY PERCENT DISP		G SYS SUMM 2	0,30.1	PCT
*S43Q4232C (V94J4633C)	OMS-L AFT OX QTY IO STATUS		G SYS SUMM 2	M, Ъ	
V43Q4332C V98X0895X	OMS-L POD FU AFT COMPARTMENT QTY MDM FA 3, PROM SEQ 1-2 COMMFAULT	HDWR BOS		0-5 0,1	VDC
*D43Q4332C (V94Q4631C)	OMS-L AFT FU QTY PERCENT DISP		G SYS SUMM 2	0,30.1	PCT
*S43Q4332C (V94J4635C)	OMS-L AFT FU QTY IO STATUS		G SYS SUMM 2	M, Ъ	



Table B.4.112.2-1.(8). GAX Support Interface Table OMS Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V43Q5232C	OMS-L POD OX AFT COMPARTMENT QTY	HDWR		0-5	VDC
V98X0894X	MDM FA 2, PROM SEQ 1-2 COMMFAULT	BOS		0,1	
*D43Q5232C (V94Q4630C)	OMS-R AFT OX QTY PERCENT DISP		G SYS SUMM 2	0,30.1	PCT
*S43Q5232C (V94J4634C)	OMS-R AFT OX QTY IO STATUS		G SYS SUMM 2	M,ℓ	
V43Q5332C	OMS-L POD FU AFT COMPARTMENT QTY	OMS HDWR		0-5	VDC
V98X0894X	MDM FA 2, PROM SEQ 1-2 COMMFAULT	BOS		0,1	
*D43Q5332C (V94Q4632C)	OMS-R AFT FU QTY PERCENT DISP		G SYS SUMM 2	0,30.1	PCT
*S43Q5332C (V94J4636C)	OMS-R AFT FU QTY IO STATUS		G SYS SUMM 2	M,ℓ	

Table B.4.112.2-1.(9). GAX Support Interface Table RCS Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V42P1212C V98X0861X V94P4852C V91X2283X	F OX MANF 1 P MDM FF 1 PROM SEQ 1-2 COMMFAULT RCS FWD OX MANF 1 PRESS RCS FWD OX MANF 1 P STATUS	HDWR BOS	  G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC  PSIA
V42P1312C V98X0861X V94P4856C V91X2283X	F FU MANF 1 P MDM FF 1 PROM SEQ 1-2 COMMFAULT RCS FWD FU MANF 1 PRESS RCS FWD FU MANF 1 P STATUS	HDWR BOS	  G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC  PSIA
V42P1214C V98X0862X V94P4853C V91X2284X	F OX MANF 2 P MDM FF 2 PROM SEQ 1-2 COMMFAULT RCS FWD OX MANF 2 PRESS RCS FWD OX MANF 2 P STATUS	HDWR BOS	  G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC  PSIA
V42P1314C V98X0862X V94P4857C V91X2284X	F FU MANF 2 P MDM FF 2 PROM SEQ 1-2 COMMFAULT RCS FWD FU MANF 2 PRESS RCS FWD FU MANF 2 P STATUS	HDWR BOS	  G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC  PSIA
V42P1216C V98X0864X V94P4854C V91X2287X	F OX MANF 3 P MDM FF 4 PROM SEQ 1-2 COMMFAULT RCS FWD OX MANF 3 PRESS RCS FWD OX MANF 3 P STATUS	HDWR BOS	  G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC  PSIA
V42P1316C V98X0864X V94P4858C V91X2287X	F FU MANF 3 P MDM FF 4 PROM SEQ 1-2 COMMFAULT RCS FWD FU MANF 3 PRESS RCS FWD FU MANF 3 P STATUS	HDWR BOS	  G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC  PSIA

Table B.4.112.2-1.(9). GAX Support Interface Table RCS Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V42P1218C V98X0863X V94P4855C V91X2285X	F OX MANF 4 P MDM FF 3 PROM SEQ 1-2 COMMFault RCS FWD OX MANF 4 PRESS RCS FWD OX MANF 4 P STATUS	HDWR BOS	G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC PSIA
V42P1318C V98X0863X V94P4859C V91X2285X	F FU MANF 4 P MDM FF 3 PROM SEQ 1-2 COMMFault RCS FWD FU MANF 4 PRESS RCS FWD FU MANF 4 P STATUS	HDWR BOS	G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC PSIA
V42P2212C V98X0893X *D42P2212/ (V94P4770C) *S42P2212/ (V91X5252X)	RCS-L AFT OX MANF PRESS 1 MDM FA 1 PROM SEQ 1-2 COMMFault RCS L OX MANF P 1 RCS L OX MANF P 1 STATUS	HDWR BOS	G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC PSIA
V42P2312C V98X0893X *D42P2312/ (V94P4774C) *S42P2312/ (V91X5256X)	RCS-L AFT FU MANF PRESS 1 MDM FA 1 PROM SEQ 1-2 COMMFault RCS L FU MANF P 1 RCS L FU MANF P 1 STATUS	HDWR BOS	G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC PSIA
V42P2214C V98X0895X *D42P2214/ (V94P4771C) *S42P2214/ (V91X5253X)	RCS-L AFT OX MANF PRESS 2 MDM FA 3 PROM SEQ 1-2 COMMFault RCS-L OX MANF P 2 RCS L OX MANF P 2 STATUS	HDWR BOS	G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC PSIA
V42P2314C V98X0895X *D42P2314/ (V94P4775C) *S42P2314/ (V91X5257X)	RCS-L AFT FU MANF PRESS 2 MDM FA 3 PROM SEQ 1-2 COMMFault RCS-L FU MANF P 2 RCS-L FU MANF P 2 STATUS	HDWR BOS	G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC PSIA

Table B.4.112.2-1.(9). GAX Support Interface Table RCS Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V42P2216C V98X0894X  *D42P2216/ (V94P4772C) *S42P2216/ (V91X5254X)	RCS-L AFT OX MANF PRESS 3 MDM FA 2 PROM SEQ 1-2 COMMFAULT RCS L OX MANF P 3 RCS L OX MANF P 3 STATUS	HDWR BOS	  G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC  PSIA
V42P2316C V98X0894X  *D42P2316/ (V94P4776C) *S42P2316/ (V91X5258X)	RCS-L AFT FU MANF PRESS 3 MDM FA 2 PROM SEQ 1-2 COMMFAULT RCS L FU MANF P 3 RCS L FU MANF P 3 STATUS	HDWR BOS	  G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC  PSIA
V42P2218C V98X0896X  *D42P2218/ (V94P4773C) *S42P2218/ (V91X5255X)	RCS-L AFT OX MANF PRESS 4 MDM FA 4 PROM SEQ 1-2 COMMFAULT RCS L OX MANF P 4 RCS L OX MANF P 4 STATUS	HDWR BOS	  G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC  PSIA
V42P2318C V98X0896X  *D42P2318/ (V94P4777C) *S42P2318/ (V91X5259X)	RCS-L AFT FU MANF PRESS 4 MDM FA 4 PROM SEQ 1-2 COMMFAULT RCS L FU MANF P 4 RCS L FU MANF P 4 STATUS	HDWR BOS	  G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC  PSIA
V42P3212C V98X0893X  *D42P3212/ (V94P4778C) *S42P3212/ (V91X5260X)	RCS-R AFT OX MANF MDM FA 1 PROM SEQ 1-2 COMMFAULT RCS R OX MANF P 1 RCS R OX MANF P 1 STATUS	HDWR BOS	  G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC  PSIA

Table B.4.112.2-1.(9). GAX Support Interface Table RCS Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V42P3312C V98X0893X  *D42P3312/ (V94P4782C) *S42P3312/ (V91X5264X)	RCS-R AFT FU MANF PRESS 1 MDM FA 1 PROM SEQ 1-2 COMMFAULT RCS R FU MANF P 1 RCS R FU MANF P 1 STATUS	HDWR BOS	  G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC  PSIA
V42P3214C V98X0895X  *D42P3214/ (V94P4779C) *S42P3214/ (V91X5261X)	RCS-R AFT OX MANF PRESS 2 MDM FA 3 PROM SEQ 1-2 COMMFAULT RCS R OX MANF P 2 RCS R OX MANF P 2 STATUS	HDWR BOS	  G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC  PSIA
V42P3314C V98X0895X  *D42P3314/ (V94P4783C) *S42P3314/ (V91X5265X)	RCS-R AFT FU MANF PRESS 2 MDM FA 3 PROM SEQ 1-2 COMMFAULT RCS R FU MANF P 2 RCS R FU MANF P 2 STATUS	HDWR BOS	  G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC  PSIA
V42P3216C V98X0894X  *D42P3216/ (V94P4780C) *S42P3216/ (V91X5262X)	RCS-R AFT OX MANF PRESS 3 MDM FA 2 PROM SEQ 1-2 COMMFAULT RCS R OX MANF P 3 RCS R OX MANF P 3 STATUS	HDWR BOS	  G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC  PSIA
V42P3316C V98X0894X  *D42P3316/ (V94P4784C) *S42P3316/ (V91X5266X)	RCS-R AFT FU MANF PRESS 3 MDM FA 2 PROM SEQ 1-2 COMMFAULT RCS R FU MANF P 3 RCS R FU MANF P 3 STATUS	HDWR BOS	  G SYS SUMM 2 G SYS SUMM 2	0-5 0,1 0-1000 M,ℓ	VDC  PSIA

Table B.4.112.2-1.(9). GAX Support Interface Table RCS Conversion And Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V42P3218C V98X0896X	RCS-R AFT OX MANF PRESS 4 MDM FA 4 PROM SEQ 1-2 COMMFault	HDWR BOS		0-5 0,1	VDC
*D42P3218/ (V94P4781C)	RCS R OX MANF P 4		G SYS SUMM 2	0-1000	PSIA
*S42P3218/ (V91X5263X)	RCS R OX MANF P 4 STATUS		G SYS SUMM 2	M,ℓ	
V42P3318C V98X0896X	RCS-R AFT FU MANF PRESS 4 MDM FA 4 PROM SEQ 1-2 COMMFault	HDWR BOS		0-5 0,1	VDC
*D42P3318/ (V94P4785C)	RCS R FU MANF P 4		G SYS SUMM 2	0-1000	PSIA
*S42P3318/ (V91X5267X)	RCS R FU MANF P 4 STATUS		G SYS SUMM 2	M,ℓ	

Table B.4.112.2-1.(10). GAX Support Interface Table RCS Manifold Isol Valve Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V98X0845X	MDM FF 1 PROM SEQ 2-6 COMMFault	BOS		0,1	
*S94J4300/ (V94J4300C)	RCS MANF F 1 VALVE STATUS		G SYS SUMM 2	M,ℓ	
V98X0846X	MDM FF 2 PROM SEQ 2-6 COMMFault	BOS		0,1	
*S94J4301/ (V94J4301C)	RCS MANF F 2 VALVE STATUS		G SYS SUMM 2	M,ℓ	
V98X0847X	MDM FF 3 PROM SEQ 2-6 COMMFault	BOS		0,1	
*S94J4302/ (V94J4302C)	RCS MANF F 3 VALVE STATUS		G SYS SUMM 2	M,ℓ	
V98X0848X	MDM FF 4 PROM SEQ 2-6 COMMFault	BOS		0,1	
*S94J4303/ (V94J4303C)	RCS MANF F 4 VALVE STATUS		G SYS SUMM 2	M,ℓ	
V98X0841X	MDM FA 1 PROM SEQ 3-10 COMMFault	BOS		0,1	
*S94J4304/ (V94J4304C)	RCS MANF L 1 VALVE STATUS		G SYS SUMM 2	M,ℓ	
*S94J4308/ (V94J4308C)	RCS MANF R 1 VALVE STATUS		G SYS SUMM 2	M,ℓ	

Table B.4.112.2-1.(10). GAX Support Interface Table RCS Manifold Isol Valve Status					
BFS (*) No./(MML)	DESCRIPTION	INPUT SOURCE	OUTPUT DEST	RANGE	UNITS
V98X0842X  *S94J4306/ (V94J4306C) *S94J4310/ (V94J4310C)	MDM FA 2 PROM SEQ 3-10 COMMFAULT RCS MANF L 3 VALVE STATUS RCS MANF R 3 VALVE STATUS	BOS	 G SYS SUMM 2 G SYS SUMM 2	0,1 M,ℓ M,ℓ	
V98X0843X  *S94J4305/ (V94J4305C) *S94J4309/ (V94J4309C)	MDM FA 3 PROM SEQ 3-10 COMMFAULT RCS MANF L 2 VALVE STATUS RCS MANF R 2 VALVE STATUS	BOS	 G SYS SUMM 2 G SYS SUMM 2	0,1 M,ℓ M,ℓ	
V98X0844X  *S94J4307/ (V94J4307C) *S94J4311/ (V94J4311C)	MDM FA 4 PROM SEQ 3-10 COMMFAULT RCS MANF L 4 VALVE STATUS RCS MANF R 4 VALVE STATUS	BOS	 G SYS SUMM 2 G SYS SUMM 2	0,1 M,ℓ M,ℓ	

Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE MAJOR	TEXT	MIN
L94X4260*	F1 JET DISPLAY STATUS	RCSPMHIP	136					
L94X4261*	F2 JET DISPLAY STATUS	RCSPMHIP	136					
L94X4262*	F3 JET DISPLAY STATUS	RCSPMHIP	136					
L94X4263*	F4 JET DISPLAY STATUS	RCSPMHIP	136					
V98X4400X*	RCS F JET FL MSG	GAX	136	2	000	F RCS		JET
V90X2355X*	RCS FWD FU LEAKAGE ALERT	RCS QTY	136					
V90X2356X*	RCS FWD OX,LEAKAGE ALERT	RCS QTY	136					
V98X4401X*	RCS F FU/OX,QTY LK MSG	SEQ	136	2	001	F RCS		LEAK
V42P1115C	RCS FWD OX,TANK ULLAGE PRESS	HDWR	136					
V42P1116C	RCS FWD FU TANK ULLAGE PRESS	HDWR	136					
V98X4402X	RCS F FU/OX,TK P HI/LO MSG	SEQ	136	2	002	F RCS		TK P
L94X4264*	L1 JET DISPLAY STATUS	RCSPMHIP	136					
L94X4265*	L2 JET DISPLAY STATUS	RCSPMHIP	136					
L94X4266*	L3 JET DISPLAY STATUS	RCSPMHIP	136					
L94X4267*	L4 JET DISPLAY STATUS	RCSPMHIP	136					
V98X4404X	RCS L JET FL MSG	GAX	136	2	004	L RCS		JET
V90X2351X	RCS L AFT FU LEAKAGE ALERT	RCS QTY	136					
V90X2352X	RCS L AFT OX,LEAKAGE ALERT	RCS QTY	136					
V98X4405X	RCS L FU/OX,QTY LK MSG	SEQ	136	2	005	L RCS		LEAK
V42P2115C	RCS L AFT OX,TANK ULLAGE PRESS	HDWR	136					
V42P2116C	RCS L AFT FU TANK ULLAGE PRESS	HDWR	136					
V98X4406X	RCS L FU/OX,TK P HI/LO MSG	SEQ	136	2	006	L RCS		TK P
L94X4268*	R1 JET DISPLAY STATUS	RCSPMHIP	136					
L94X4269*	R2 JET DISPLAY STATUS	RCSPMHIP	136					
L94X4270*	R3 JET DISPLAY STATUS	RCSPMHIP	136					
L94X4271*	R4 JET DISPLAY STATUS	RCSPMHIP	136					
V98X4408X	RCS R JET FL MSG	GAX	136	2	008	R RCS		JET
V90X2353X	RCS R AFT FU LEAKAGE ALERT	RCS QTY	136					
V90X2354X	RCS R AFT OX,LEAKAGE ALERT	RCS QTY	136					
V98X4409X	RCS R FU/OX,QTY LK MSG	SEQ	136	2	009	R RCS		LEAK
V42P3115C	RCS R AFT OX,TANK ULLAGE PRESS	HDWR	136					
V42P3116C	RCS R AFT FU TANK ULLAGE PRESS	HDWR	136					
V98X4410X	RCS R FU/OX,TK P HI/LO MSG	SEQ	136	2	010	R RCS		TK P
D95H8010*	COMP LIB ELEVON POS	ELPFBHIP	36					
D95H8060*	COMP LOB ELEVON POS	ELPFBHIP	36					
D95H8110*	COMP RIB ELEVON POS	ELPFBHIP	36					
D95H8160*	COMP ROB ELEVON POS	ELPFBHIP	36					
V98X4414X	FCS POS SAT MSG	GAX	36	2	014	FCS SAT		POS



Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE MAJOR	TEXT	MIN
D90P2515*	MID-VALUE LOB ELVN DELTA PRESS	ELDFBHIP	36					
D90P2516*	MID-VALUE LIB ELVN DELTA PRESS	ELDFBHIP	36					
D90P2517*	MID-VALUE ROB ELVN DELTA PRESS	ELDFBHIP	36					
D90P2518*	MID-VALUE RIB ELVN DELTA PRESS	ELDFBHIP	36					
V98X4415X	FCS MOM EXCEED MSG	GAX	36	2	015	FCS SAT		MOM
V43P4649C	OMS-L ENG CHAMBER PRESS	HDWR	136					
V98X4417X	OMS L CHAMBER PRESS FL MSG-CL2	SEQ	136	2	017	L OMS		PC
V43P4221C	OMS-L POD OXDZR TANK ULLAGE PRESS	HDWR	13					
V43P4321C	OMS-L POD FUEL TANK ULLAGE PRESS	HDWR	13					
V98X4418X	OMS L OX/FU TK P HIGH/LOW MSG	GAX	13	2	018	L OMS		TK P
B90X7677*	OMS L PITCH GIMBAL FAIL FLAG	OMSFDHIP	13					
B90X7679*	OMS L YAW GIMBAL FAIL FLAG	OMSFDHIP	13					
V98X4419X	OMS L GIMBAL FL MSG	GAX	13	2	019	L OMS		GMBL
V43P5649C	OMS-R ENG CHAMBER PRESS	HDWR	136					
V98X4421X	OMS R CHAMBER PRESS FL MSG-CL2	SEQ	136	2	021	R OMS		PC
V43P5221C	OMS-R POD OXDZR TANK ULLAGE PRESS	HDWR	13					
V43P5321C	OMS-R POD FU TANK ULLAGE PRESS	HDWR	13					
V98X4422X	OMS R OX/FU TK P HIGH/LOW MSG	GAX	13	2	022	R OMS		TK P
B90X7678*	OMS R PITCH GIMBAL FAIL FLAG	OMSFDHIP	13					
B90X7680*	OMS R YAW GIMBAL FAIL FLAG	OMSFDHIP	13					
V98X4423X	OMS R GIMBAL FL MSG	GAX	13	2	023	R OMS		GMBL
V79X3260X	L INBOARD ELEVON ACTR 1 FAIL	HDWR	136					
V79X3265X	L OTBOARD ELEVON ACTR 1 FAIL	HDWR	136					
V79X3270X	R INBOARD ELEVON ACTR 1 FAIL	HDWR	136					
V79X3275X	R OTBOARD ELEVON ACTR 1 FAIL	HDWR	136					
V79X3331X	RUDDER ACTR 1 FAIL OUTPUT	HDWR	136					
V79X3336X	SPEED BRAKE ACTR 1 FAIL	HDWR	136					
V79X1170X	MPS ENG 1 P ACTR A FAIL	HDWR	16					
V79X1171X	MPS ENG 1 Y ACTR A FAIL	HDWR	16					
V79X1270X	MPS ENG 2 P ACTR A FAIL	HDWR	16					
V79X1271X	MPS ENG 2 Y ACTR A FAIL	HDWR	16					
V79X1370X	MPS ENG 3 P ACTR A FAIL	HDWR	16					
V79X1371X	MPS ENG 3 Y ACTR A FAIL	HDWR	16					
V79X5100X	LH SRB ROCK ACTR A FAIL	HDWR	1					
V79X5101X	LH SRB TILT ACTR A FAIL	HDWR	1					
V79X5150X	RH SRB ROCK ACTR A FAIL	HDWR	1					
V79X5151X	RH SRB TILT ACTR A FAIL	HDWR	1					
V98X4424X	FCS CH 1 FL MSG	GAX	136	2	024	FCS CH		1

Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE TEXT MAJOR	TEXT	MIN
V79X3261X	L INBOARD ELEVON ACTR 2 FAIL	HDWR	136					
V79X3266X	L OTBOARD ELEVON ACTR 2 FAIL	HDWR	136					
V79X3271X	R INBOARD ELEVON ACTR 2 FAIL	HDWR	136					
V79X3276X	R OTBOARD ELEVON ACTR 2 FAIL	HDWR	136					
V79X3332X	RUDDER ACTR 2 FAIL OUTPUT	HDWR	136					
V79X3337X	SPEED BRAKE ACTR 2 FAIL	HDWR	136					
V79X1173X	MPS ENG 1 P ACTR B FAIL	HDWR	16					
V79X1174X	MPS ENG 1 Y ACTR B FAIL	HDWR	16					
V79X1273X	MPS ENG 2 P ACTR B FAIL	HDWR	16					
V79X1274X	MPS ENG 2 Y ACTR B FAIL	HDWR	16					
V79X1373X	MPS ENG 3 P ACTR B FAIL	HDWR	16					
V79X1374X	MPS ENG 3 Y ACTR B FAIL	HDWR	16					
V79X5105X	LH SRB ROCK ACTR B FAIL	HDWR	1					
V79X5106X	LH SRB TILT ACTR B FAIL	HDWR	1					
V79X5155X	RH SRB ROCK ACTR B FAIL	HDWR	1					
V79X5156X	RH SRB TILT ACTR B FAIL	HDWR	1					
V98X4425X	FCS CH 2 FL MSG	GAX	136	2	025	FCS CH		2
V79X3262X	L INBOARD ELEVON ACTR 3 FAIL	HDWR	136					
V79X3267X	L OTBOARD ELEVON ACTR 3 FAIL	HDWR	136					
V79X3272X	R INBOARD ELEVON ACTR 3 FAIL	HDWR	136					
V79X3277X	R OTBOARD ELEVON ACTR 3 FAIL	HDWR	136					
V79X3333X	RUDDER ACTR 3 FAIL OUTPUT	HDWR	136					
V79X3338X	SPEED BRAKE ACTR 3 FAIL	HDWR	136					
V79X1176X	MPS ENG 1 P ACTR C FAIL	HDWR	16					
V79X1177X	MPS ENG 1 Y ACTR C FAIL	HDWR	16					
V79X1276X	MPS ENG 2 P ACTR C FAIL	HDWR	16					
V79X1277X	MPS ENG 2 Y ACTR C FAIL	HDWR	16					
V79X1376X	MPS ENG 3 P ACTR C FAIL	HDWR	16					
V79X1377X	MPS ENG 3 Y ACTR C FAIL	HDWR	16					
V79X5110X	LH SRB ROCK ACTR C FAIL	HDWR	1					
V79X5111X	LH SRB TILT ACTR C FAIL	HDWR	1					
V79X5160X	RH SRB ROCK ACTR C FAIL	HDWR	1					
V79X5161X	RH SRB TILT ACTR C FAIL	HDWR	1					
V98X4426X	FCS CH 3 FL MSG	GAX	136	2	026	FCS CH		3

Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE TEXT MAJOR	TEXT	MIN
V79X3263X	L INBOARD ELEVON ACTR 4 FAIL	HDWR	136					
V79X3268X	L OTBOARD ELEVON ACTR 4 FAIL	HDWR	136					
V79X3273X	R INBOARD ELEVON ACTR 4 FAIL	HDWR	136					
V79X3278X	R OTBOARD ELEVON ACTR 4 FAIL	HDWR	136					
V79X3334X	RUDDER ACTR 4 FAIL OUTPUT	HDWR	136					
V79X3339X	SPEED BRAKE ACTR 4 FAIL	HDWR	136					
V79X1178X	MPS ENG 1 P ACTR D FAIL	HDWR	16					
V79X1179X	MPS ENG 1 Y ACTR D FAIL	HDWR	16					
V79X1278X	MPS ENG 2 P ACTR D FAIL	HDWR	16					
V79X1279X	MPS ENG 2 Y ACTR D FAIL	HDWR	16					
V79X1378X	MPS ENG 3 P ACTR D FAIL	HDWR	16					
V79X1379X	MPS ENG 3 Y ACTR D FAIL	HDWR	16					
V79X5115X	LH SRB ROCK ACTR D FAIL	HDWR	1					
V79X5116X	LH SRB TILT ACTR D FAIL	HDWR	1					
V79X5165X	RH SRB ROCK ACTR D FAIL	HDWR	1					
V79X5166X	RH SRB TILT ACTR D FAIL	HDWR	1					
V98X4427X	FCS CH 4 FL MSG	GAX	136	2	027	FCS CH		4
V41P1250C	MPS E2 HE SUPPLY BOTTLE PRESS	HDWR	16					
V98X4429X	MPS 2 HE TK LOW MSG-CL2	GAX	16	2	029	MPS HE P		L
V41P1350C	MPS E3 HE SUPPLY BOTTLE PRESS	HDWR	16					
V98X4430X	MPS 3 HE TK LOW MSG-CL2	GAX	16	2	030	MPS HE P		R
V41P1150C	MPS E1 HE SUPPLY BOTTLE PRESS	HDWR	16					
V98X4431X	MPS 1 HE TK LOW MSG-CL2	GAX	16	2	031	MPS HE P		C
V41P1433C	MPS LH2 17IN FEED MANF DISC PRESS	HDWR	16					
V41P1533C	MPS LO2 17IN FEED MANF DISC PRESS	HDWR	16					
V98X4432X	MPS FU/OX MANF P HIGH/LOW MSG	GAX	16	2	032	MPS LH2/O2	MANF	
V95X1208X	MPS E2 FAIL FLAG	SEQ	16					
V98X4978X	SSME 2 FAIL MSG/BU		16	2	037	SSME FAIL		L
V95X1209X	MPS E3 FAIL FLAG	SEQ	16					
V98X4979X	SSME 3 FAIL MSG/BU		16	2	038	SSME FAIL		R
V95X1207X	MPS E1 FAIL FLAG	SEQ	16					
V98X4977X	SSME 1 FAIL MSG/BU		16	2	039	SSME FAIL		C
@ V98X4440X	206 PAYLOAD ALERT MSG CL 2	PYLD	0136	2	040	206 PL CL 2		
B90X0194*	PASS TO BFS QSMM50 XFER FAIL	IMUHIP	13					
V98X0457X	PASS TO BFS XFER FL MSG-CL2	GAX	13	2	044	RM FAIL		XFER

Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE TEXT MAJOR	MIN
V62Q0590A	SMOKE DET CONC N LEFT-FLIGHT DECK	HDWR	0136				
V62Q0591A	SMOKE DET CONC N RIGHT-FLIGHT DECK	HDWR	0136				
V62Q0595A	SMOKE DET CONC N RTN AIR-CAB HX	HDWR	0136				
V62Q0608A	SMOKE DETECTOR CONC N A-AV BAY 2	HDWR	0136				
V62Q0609A	SMOKE DETECTOR CONC N B-AV BAY 2	HDWR	0136				
V62Q0618A	SMOKE DETECTOR CONC N A-AV BAY 1	HDWR	0136				
V62Q0619A	SMOKE DETECTOR CONC N B-AV BAY 1	HDWR	0136				
V62Q0628A	SMOKE DETECTOR CONC N A-AV BAY 3	HDWR	0136				
V62Q0629A	SMOKE DETECTOR CONC N B-AV BAY 3	HDWR	0136				
V98X4766X	SMOKE DETECTOR CONC N HIGH MSG	SM	0136	2	052	SM1 SMOKE ALRM	
V46R0135A	APU 1 TURBINE SPEED	HDWR	0136				
V98X4456X	APU 1 HIGH SPEED FL MSG-CL2	SM	0136	2	056	SM2 APU SPD HI	1
V98X4460X	APU 1 LOW SPEED FL MSG	SM	0136	2	060	SM2 APU SPD LO	1
V98X4604X	APU 1 HIGH SPEED FL MSG-CL3	SM	0136	3	204	SM2 APU SPD HI	1
V98X4608X	APU 1 COOL DOWN FL MSG	SM	0136	3	484	APU 1 COOL	DOWN
V46R0235A	APU 2 TURBINE SPEED	HDWR	0136				
V98X4457X	APU 2 HIGH SPEED FL MSG-CL2	SM	0136	2	057	SM2 APU SPD HI	2
V98X4461X	APU 2 LOW SPEED FL MSG	SM	0136	2	061	SM2 APU SPD LO	2
V98X4605X	APU 2 HIGH SPEED FL MSG-CL3	SM	0136	3	205	SM2 APU SPD HI	2
V98X4609X	APU 2 COOL DOWN FL MSG	SM	0136	3	488	APU 2 COOL	DOWN
V46R0335A	APU 3 TURBINE SPEED	HDWR	0136				
V98X4458X	APU 3 HIGH SPEED FL MSG-CL2	SM	0136	2	058	SM2 APU SPD HI	3
V98X4462X	APU 3 LOW SPEED FL MSG	SM	0136	2	062	SM2 APU SPD LO	3
V98X4606X	APU 3 HIGH SPEED FL MSG-CL3	SM	0136	3	206	SM2 APU SPD HI	3
V98X4610X	APU 3 COOL DOWN FL MSG	SM	0136	3	492	APU 3 COOL	DOWN
V61R2553A	SYS 1 N2 FLOWRATE	HDWR	0136				
V61R2554A	SYS 2 N2 FLOWRATE	HDWR	0136				
V98X4464X	CABIN N2 FLOWRATE FL MSG	SM	0136	2	064	SM1 CABIN	N2
V61R2105A	SYS 1 O2 FLOWRATE	HDWR	0136				
V61R2205A	SYS 2 O2 FLOWRATE	HDWR	0136				
V98X4465X	CABIN O2 FLOWRATE FL MSG	SM	0136	2	065	SM1 CABIN	O2
V61P2556A	CABIN FAN DELTA PRESS	HDWR	0136				
V98X4466X	CABIN FAN DELTA PRESS FL MSG	SM	0136	2	066	SM1 CABIN	FAN
V61P2405A	CABIN PRESS	HDWR	0136				
V98X4468X	CABIN PRESSURE FL MSG	SM	0136	2	068	SM1 CABIN	PRES
V61P2511A	O2 PARTIAL PRESSURE-A	HDWR	0136				
V61P2513A	O2 PARTIAL PRESSURE-B	HDWR	0136				
V98X4469X	CABIN O2 PARTIAL PRESS FL MSG	SM	0136	2	069	SM1 CABIN	PPO2

Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE TEXT MAJOR	TEXT	MIN
V45P2110A	PRSD H2 TK 1 HTR CONTROL PRESS	HDWR	0136					
V45P2210A	PRSD H2 TK 2 HTR CONTROL PRESS	HDWR	0136					
V45P2310A	PRSD H2 TK 3 HTR CONT PRESS (MBK)	HDWR	0136					
V45P2410A	PRSD H2 TK 4 HTR CONT PRESS (MBK)	HDWR	0136					
V45P2510A	PRSD H2 TK 5 HTR CONT PRESS	HDWR	0136					
V98X4472X	CRYO H2 TK HTR CNTL PRESS FL MSG	SM	0136	2	072	SM2 CRYO H2		PRES
V45P1110A	PRSD O2 TK 1 HTR CONTROL PRESS	HDWR	0136					
V45P1210A	PRSD O2 TK 2 HTR CONTROL PRESS	HDWR	0136					
V45P1310A	PRSD O2 TK 3 HTR CONT PRESS (MBK)	HDWR	0136					
V45P1410A	PRSD O2 TK 4 HTR CONT PRESS (MBK)	HDWR	0136					
V45P1510A	PRSD O2 TK 5 HTR CONT PRESS	HDWR	0136					
V98X4476X	CRYO O2 TK HTR CNTL PRESS FL MSG	SM	0136	2	076	SM2 CRYO O2		PRES
V45T1107A	PRSD O2 TK 1 HTR ASSY 1 TEMP	HDWR	0136					
V45T1109A	PRSD O2 TK 1 HTR ASSY 2 TEMP	HDWR	0136					
V45T1207A	PRSD O2 TK 2 HTR ASSY 1 TEMP	HDWR	0136					
V45T1209A	PRSD O2 TK 2 HTR ASSY 2 TEMP	HDWR	0136					
V45T1307A	PRSD O2 TK 3 HTR ASSY 1 TEMP (MBK)	HDWR	0136					
V45T1309A	PRSD O2 TK 3 HTR ASSY 2 TEMP (MBK)	HDWR	0136					
V45T1407A	PRSD O2 TK 4 HTR ASSY 1 TEMP (MBK)	HDWR	0136					
V45T1409A	PRSD O2 TK 4 HTR ASSY 2 TEMP (MBK)	HDWR	0136					
V45T1507A	PRSD O2 TK 5 HTR ASSY 1 TEMP	HDWR	0136					
V45T1509A	PRSD O2 TK 5 HTR ASSY 2 TEMP	HDWR	0136					
V98X4478X	CRYO O2 TK HTR ASSY TEMP FL MSG	SM	0136	2	078	SM2 CRYO O2		HTR
V63T1207A	FCL 1 EVAP OUT TEMP	HDWR	0136					
V98X4480X	FCL 1 EVAP OUT TEMP FL MSG	SM	0136	2	080	SM2 EVAP OUT T		1
V63T1407A	FCL 2 EVAP OUT TEMP	HDWR	0136					
V98X4481X	FCL 2 EVAP OUT TEMP FL MSG	SM	0136	2	081	SM2 EVAP OUT T		2
V45X0143E	FUEL CELL NO 1 COOLANT PUMP STATUS	HDWR	0136					
V98X4484X	FC 1 COOLANT PUMP FL MSG	SM	0136	2	084	SM1 FC PUMP		1
V45X0243E	FUEL CELL NO 2 COOLANT PUMP STATUS	HDWR	0136					
V98X4485X	FC 2 COOLANT PUMP FL MSG	SM	0136	2	085	SM1 FC PUMP		2
V45X0343E	FUEL CELL NO 3 COOLANT PUMP STATUS	HDWR	0136					
V98X4486X	FC 3 COOLANT PUMP FL MSG	SM	0136	2	086	SM1 FC PUMP		3
V45X1150E	PRSD FCP 1 O2 REAC VLV-OPEN	HDWR	0136					
V45X2150E	PRSD FCP 1 H2 REAC VLV-OPEN	HDWR	0136					
V98X4488X	FC 1 REAC VLV-OPEN FL MSG	SM	0136	2	088	SM1 FC REAC		1
V45X1155E	PRSD FCP 2 O2 REAC VLV-OPEN	HDWR	0136					
V45X2155E	PRSD FCP 2 H2 REAC VLV-OPEN	HDWR	0136					
V98X4489X	FC 2 REAC VLV-OPEN FL MSG	SM	0136	2	089	SM1 FC REAC		2

Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE TEXT MAJOR	MIN
V45X1160E	PRSD FCP 3 O2 REAC VLV-OPEN	HDWR	0136				
V45X2160E	PRSD FCP 3 H2 REAC VLV-OPEN	HDWR	0136				
V98X4490X	FC 3 REAC VLV-OPEN FL MSG	SM	0136	2	090	SM1 FC REAC	3
V45T0120A	FUEL CELL NO 1 STACK COOL OUT TEMP	HDWR	0136				
V98X4492X	FC 1 STACK TEMP FL MSG-CL2	SM	0136	2	092	SM1 FC STACK T	1
V98X4576X	FC 1 STACK TEMP FL MSG-CL3	SM	0136	3	176	SM1 FC STACK T	1
V45T0220A	FUEL CELL NO 2 STACK COOL OUT TEMP	HDWR	0136				
V98X4493X	FC 2 STACK TEMP FL MSG-CL2	SM	0136	2	093	SM1 FC STACK T	2
V98X4577X	FC 2 STACK TEMP FL MSG-CL3	SM	0136	3	177	SM1 FC STACK T	2
V45T0320A	FUEL CELL NO 3 STACK COOL OUT TEMP	HDWR	0136				
V98X4494X	FC 3 STACK TEMP FL MSG-CL2	SM	0136	2	094	SM1 FC STACK T	3
V98X4578X	FC 3 STACK TEMP FL MSG-CL3	SM	0136	3	178	SM1 FC STACK T	3
V63R1100A	FCL 1 INTERCHANGER FLOWRATE	HDWR	0136				
V98X4496X	FCL 1 INTERCHANGER FLOWRATE FL MSG	SM	0136	2	096	SM2 FREON FLOW	1
V63R1300A	FCL 2 INTERCHANGER FLOWRATE	HDWR	0136				
V98X4497X	FCL 2 INTERCHANGER FLOWRATE FL MSG	SM	0136	2	097	SM2 FREON FLOW	2
V61P2600A	H2O LOOP 1 PUMP OUTLET PRESS	HDWR	0136				
V98X4500X	H2O LOOP 1 PUMP PRESS FL MSG	SM	0136	2	100	SM2 H2O PUMP P	1
V61P2700A	H2O LOOP 2 PUMP OUTLET PRESS	HDWR	0136				
V98X4501X	H2O LOOP 2 PUMP PRESS FL MSG	SM	0136	2	101	SM2 H2O PUMP P	2
V58P0115A	HYDR SYS 1 SUPPLY PRESS B	HDWR	0136				
V98X4504X	HYDR SYS 1 PRESS FL MSG	SM	0136	2	104	SM2 HYD PRESS	1
V58P0215A	HYDR SYS 2 SUPPLY PRESS B	HDWR	0136				
V98X4505X	HYDR SYS 2 PRESS FL MSG	SM	0136	2	105	SM2 HYD PRESS	2
V58P0315A	HYDR SYS 3 SUPPLY PRESS B	HDWR	0136				
V98X4506X	HYDR SYS 3 PRESS FL MSG	SM	0136	2	106	SM2 HYD PRESS	3
V76V0100A	MAIN BUS A VOLTAGE	HDWR	0136				
V98X4508X	MAIN BUS A VOLTAGE FL MSG-CL2	SM	0136	2	108	SM1 MAIN BUS V	A
V98X4600X	MAIN BUS A VOLTAGE FL MSG-CL3	SM	0136	3	200	SM1 MAIN BUS V	A
V76V0200A	MAIN BUS B VOLTAGE	HDWR	0136				
V98X4509X	MAIN BUS B VOLTAGE FL MSG-CL2	SM	0136	2	109	SM1 MAIN BUS V	B
V98X4601X	MAIN BUS B VOLTAGE FL MSG-CL3	SM	0136	3	201	SM1 MAIN BUS V	B
V76V0300A	MAIN BUS C VOLTAGE	HDWR	0136				
V98X4510X	MAIN BUS C VOLTAGE FL MSG-CL2	SM	0136	2	110	SM1 MAIN BUS V	C
V98X4602X	MAIN BUS C VOLTAGE FL MSG-CL3	SM	0136	3	202	SM1 MAIN BUS V	C
V76X1506E	AC BUS 1 OVERLOAD	HDWR	0136				
V98X4512X	AC BUS 1 OVERLOAD FL MSG	SM	0136	2	112	SM1 AC OVLD	1

Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE TEXT MAJOR	TEXT	MIN
V76X1606E	AC BUS 2 OVERLOAD	HDWR	0136					
V98X4513X	AC BUS 2 OVERLOAD FL MSG	SM	0136	2	113	SM1 AC OVLD		2
V76X1706E	AC BUS 3 OVERLOAD	HDWR	0136					
V98X4514X	AC BUS 3 OVERLOAD FL MSG	SM	0136	2	114	SM1 AC OVLD		3
V76V1500A	AC BUS 1 PHASE A VOLT	HDWR	0136					
V76V1501A	AC BUS 1 PHASE B VOLT	HDWR	0136					
V76V1502A	AC BUS 1 PHASE C VOLT	HDWR	0136					
V98X4516X	AC BUS 1 VOLTAGE FL MSG	SM	0136	2	116	SM1 AC VOLTS		1
V76V1600A	AC BUS 2 PHASE A VOLT	HDWR	0136					
V76V1601A	AC BUS 2 PHASE B VOLT	HDWR	0136					
V76V1602A	AC BUS 2 PHASE C VOLT	HDWR	0136					
V98X4517X	AC BUS 2 VOLTAGE FL MSG	SM	0136	2	117	SM1 AC VOLTS		2
V76V1700A	AC BUS 3 PHASE A VOLT	HDWR	0136					
V76V1701A	AC BUS 3 PHASE B VOLT	HDWR	0136					
V76V1702A	AC BUS 3 PHASE C VOLT	HDWR	0136					
V98X4518X	AC BUS 3 VOLTAGE FL MSG	SM	0136	2	118	SM1 AC VOLTS		3
V46T0140A	APU 1 TURBINE EXHAUST TEMP NO 2	HDWR	0136					
V46T0150A	APU 1 GEARBOX LUBE OIL RETURN TEMP	HDWR	0136					
V98X4520X	APU 1 TEMP FL MSG	SM	0136	2	120	SM2 APU TEMP		1
V46T0240A	APU 2 TURBINE EXHAUST TEMP NO 2	HDWR	0136					
V46T0250A	APU 2 GEARBOX LUBE OIL RETURN TEMP	HDWR	0136					
V98X4521X	APU 2 TEMP FL MSG	SM	0136	2	121	SM2 APU TEMP		2
V46T0340A	APU 3 TURBINE EXHAUST TEMP NO 2	HDWR	0136					
V46T0350A	APU 3 GEARBOX LUBE OIL RETURN TEMP	HDWR	0136					
V98X4522X	APU 3 TEMP FL MSG	SM	0136	2	122	SM2 APU TEMP		3
V61T2645A	AVNS BAY 1 OUTLET AIR TEMP	HDWR	0136					
V61T2650A	AVNS BAY 2 OUTLET AIR TEMP	HDWR	0136					
V61T2661A	AVNS BAY 3 OUTLET AIR TEMP	HDWR	0136					
V98X4527X	AV BAY OUTLET AIR TEMP FL MSG	SM	0136	2	127	SM2 AV BAY	TEMP	
V42P1112C	RCS FWD HE OX TANK PRESS-2	HDWR	136					
V42P1114C	RCS FWD HE FU TANK PRESS-2	HDWR	136					
V98X4531X	RCS FWD HE P LOW MSG	SEQ	136	3	131	F RCS	HE P	
V42P2112C	RCS L AFT HE OX TANK PRESS-2	HDWR	136					
V42P2114C	RCS L AFT HE FU TANK PRESS-2	HDWR	136					
V98X4535X	RCS L HE P LOW MSG	SEQ	136	3	135	L RCS	HE P	
V42P3112C	RCS R AFT HE OX TANK PRESS-2	HDWR	136					
V42P3114C	RCS R AFT HE FU TANK PRESS-2	HDWR	136					
V98X4539X	RCS R HE P LOW MSG	SEQ	136	3	139	R RCS	HE P	

Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE TEXT MAJOR	TEXT	MIN
V51P0571A	MLG LH INBD TIRE PRESS 1	HDWR	36					
V51P0573A	MLG LH INBD TIRE PRESS 2	HDWR	36					
V98X4544X	MLG LH INBD TIRE PRESS FL MSG	SM	36	3	140	SM0 TIRE PRESS	L	IB
V51P0570A	MLG LH OUTBD TIRE PRESS 1	HDWR	36					
V51P0572A	MLG LH OUTBD TIRE PRESS 2	HDWR	36					
V98X4543X	MLG LH OUTBD TIRE PRESS FL MSG	SM	36	3	141	SM0 TIRE PRESS	L	OB
V51P0471A	MLG RH INBD TIRE PRESS 1	HDWR	36					
V51P0473A	MLG RH INBD TIRE PRESS 2	HDWR	36					
V98X4542X	MLG RH INBD TIRE PRESS FL MSG	SM	36	3	142	SM0 TIRE PRESS	R	IB
V51P0470A	MLG RH OUTBD TIRE PRESS 1	HDWR	36					
V51P0472A	MLG RH OUTBD TIRE PRESS 2	HDWR	36					
V98X4541X	MLG RH OUTBD TIRE PRESS FL MSG	SM	36	3	143	SM0 TIRE PRESS	R	OB
V98P4998C	SSME HE TK PRESS 2 CHG RATE	SEQ	16					
V98X4545X	MPS 2 HE P/PDOT MSG-CL3	SEQ	16	3	145	MPS HE P	L	
V41P1254A	MPS E2 REG A HE OUTLET PRESS	HDWR	136					
V41P1253A	MPS E2 REG B HE OUTLET PRESS	HDWR	136					
V98X4545X	MPS 2 HE P/PDOT MSG-CL3	GAX	136	3	145	MPS HE P	L	
V98P4999C	SSME HE TK PRESS 3 CHG RATE	SEQ	16					
V98X4546X	MPS 3 HE P/PDOT MSG-CL3	SEQ	16	3	146	MPS HE P	R	
V41P1354A	MPS E3 REG A HE OUTLET PRESS	HDWR	136					
V41P1353A	MPS E3 REG B HE OUTLET PRESS	HDWR	136					
V98X4546X	MPS 3 HE P/PDOT MSG-CL3	GAX	136	3	146	MPS HE P	R	
V98P4997C	SSME HE TK PRESS 1 CHG RATE	SEQ	16					
V98X4547X	MPS 1 HE P/PDOT MSG-CL3	SEQ	16	3	147	MPS HE P	C	
V41P1154A	MPS E1 REG A HE OUTLET PRESS	HDWR	136					
V41P1153A	MPS E1 REG B HE OUTLET PRESS	HDWR	136					
V98X4547X	MPS 1 HE P/PDOT MSG-CL3	GAX	136	3	147	MPS HE P	C	



Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE TEXT MAJOR	TEXT	MIN
V42T2304A	RCS-L AFT HOUSING THERM SW TEMP 1	HDWR	13					
V42T3304A	RCS-R AFT HOUSING THERM SW TEMP 1	HDWR	13					
V43T4216A	OMS-L POD OXDZR ENG INLET TEMP	HDWR	13					
V43T4642A	OMS L ENG FU FEEDLINE TEMP	HDWR	13					
V43T4701A	OMS-L POD RCS HSG VERNIER CMPT T 1	HDWR	13					
V43T4704A	OMS-L POD OX DRAIN PNL TEMP 1	HDWR	13					
V43T4705A	OMS-L POD OX DRAIN PNL TEMP 2	HDWR	13					
V43T4707A	OMS-L POD ENG SERVICE PNL TEMP	HDWR	13					
V43T5216A	OMS-R POD OXDZR ENG INLET TEMP	HDWR	13					
V43T5642A	OMS R ENG FU FEEDLINE TEMP	HDWR	13					
V43T5701A	OMS-R POD RCS HSG VERNIER CMPT T 1	HDWR	13					
V43T5704A	OMS-R POD OX DRAIN PNL TEMP 1	HDWR	13					
V43T5705A	OMS-R POD OX DRAIN PNL TEMP 2	HDWR	13					
V43T5707A	OMS-R POD ENG SERVICE PNL TEMP	HDWR	13					
V43T6236A	OMS-AFT FUSLG LOW PT OX DRN LN T-L	HDWR	13					
V43T6237A	OMS-AFT FUSLG LOW PT OX DRN LN T-R	HDWR	13					
V98X4548X	THERMAL PROPELLANT FL MSG	SM	13	3	148	SM0 THRM PRPLT		

Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE TEXT MAJOR	TEXT	MIN
V46T0104A	APU 1 FUEL LINE TEMP NO 2	HDWR	0136					
V46T0108A	APU 1 FUEL LINE TEMP NO 1	HDWR	0136					
V46T0112A	APU 1 FUEL PUMP DISCHARGE TEMP	HDWR	0136					
V46T0128A	APU 1 FUEL LINE TEMP NO 3	HDWR	0136					
V46T0183A	APU 1 FUEL TEST LINE TEMP 1	HDWR	0136					
V46T0184A	APU 1 FUEL SERVICE LINE TEMP	HDWR	0136					
V46T0186A	APU 1 FUEL PUMP DRAIN LINE TEMP 1	HDWR	0136					
V46T0204A	APU 2 FUEL LINE TEMP NO 2	HDWR	0136					
V46T0208A	APU 2 FUEL LINE TEMP NO 1	HDWR	0136					
V46T0212A	APU 2 FUEL PUMP DISCHARGE TEMP	HDWR	0136					
V46T0228A	APU 2 FUEL LINE TEMP NO 3	HDWR	0136					
V46T0283A	APU 2 FUEL TEST LINE TEMP 1	HDWR	0136					
V46T0284A	APU 2 FUEL SERVICE LINE TEMP	HDWR	0136					
V46T0286A	APU 2 FUEL PUMP DRAIN LINE TEMP 1	HDWR	0136					
V46T0304A	APU 3 FUEL LINE TEMP NO 2	HDWR	0136					
V46T0308A	APU 3 FUEL LINE TEMP NO 1	HDWR	0136					
V46T0312A	APU 3 FUEL PUMP DISCHARGE TEMP	HDWR	0136					
V46T0328A	APU 3 FUEL LINE TEMP NO 3	HDWR	0136					
V46T0383A	APU 3 FUEL TEST LINE TEMP 1	HDWR	0136					
V46T0384A	APU 3 FUEL SERVICE LINE TEMP	HDWR	0136					
V46T0386A	APU 3 FUEL PUMP DRAIN LINE TEMP 1	HDWR	0136					
V46T0122A	APU 1 GAS GENERATOR BED TEMP	HDWR	0136					
V46T0222A	APU 2 GAS GENERATOR BED TEMP	HDWR	0136					
V46T0322A	APU 3 GAS GENERATOR BED TEMP	HDWR	0136					
V46T0170A	APU 1 F/P DRN LN TEMP 2	HDWR	0136					
V46T0270A	APU 2 F/P DRN LN TEMP 2	HDWR	0136					
V46T0370A	APU 3 F/P DRN LN TEMP 2	HDWR	0136					
V46T0174A	APU 1 INJECTOR TUBE TEMP	HDWR	0136					
V46T0274A	APU 2 INJECTOR TUBE TEMP	HDWR	0136					
V46T0374A	APU 3 INJECTOR TUBE TEMP	HDWR	0136					
V46T0501A	APU H2O LINE TEMP NO 1	HDWR	0136					
V46T0502A	APU H2O LINE TEMP NO 2	HDWR	0136					
V46T0503A	APU H2O LINE TEMP NO 3	HDWR	0136					
V98X4552X	APU THERMAL FL MSG	SM	0136	3	152	SM0 THRM		APU
V46T1171A	APU 1 GGVM SUPPLY LINE TEMP	HDWR	0136					
V46T1271A	APU 2 GGVM SUPPLY LINE TEMP	HDWR	0136					
V46T1371A	APU 3 GGVM SUPPLY LINE TEMP	HDWR	0136					
V98X4552X	APU THERMAL FL MSG	SM	0136	3	152	SM0 THRM		APU
V63Q1130A	FCL 1 ACCUMULATOR QUANTITY	HDWR	0136					
V63Q1330A	FCL 2 ACCUMULATOR QUANTITY	HDWR	0136					
V63T1208A	FCL 1 RAD OUTLET TEMP	HDWR	0136					
V63T1408A	FCL 2 RAD OUTLET TEMP	HDWR	0136					
V98X4553X	FREON THERMAL FL MSG	SM	0136	3	153	SM0 THRM		FRN
V62P0430A	POTABLE H2O STORAGE INLET PRESS	HDWR	13					
V98X4554X	H2O THERMAL FL MSG	SM	13	3	154	SM0 THRM		H2O

Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE TEXT MAJOR	TEXT	MIN
V63T1801A	FLASH EVAP TOPPING DUCT TEMP-HTR D	HDWR	13					
V63T1802A	FLASH EVAP TOPPING DUCT TEMP-HTR E	HDWR	13					
V63T1820A	FLASH EVAP HI LOAD DUCT TEMP-HTR A	HDWR	13					
V63T1821A	FLASH EVAP HI LOAD DUCT TEMP-HTR B	HDWR	13					
V63T1870A	FLASH EVAPORATOR H2O FDLN TEMP 1-L	HDWR	13					
V63T1871A	FLASH EVAPORATOR H2O FDLN TEMP 1-R	HDWR	13					
V63T1872A	FLASH EVAPORATOR H2O FDLN TEMP 2-L	HDWR	13					
V63T1873A	FLASH EVAPORATOR H2O FDLN TEMP 2-R	HDWR	13					
V63T1874A	FLASH EVAPORATOR H2O FDLN TEMP 3-L	HDWR	13					
V63T1875A	FLASH EVAPORATOR H2O FDLN TEMP 3-R	HDWR	13					
V63T1876A	FLASH EVAPORATOR H2O FDLN TEMP 4-L	HDWR	13					
V63T1877A	FLASH EVAPORATOR H2O FDLN TEMP 4-R	HDWR	13					
V63T1878A	FLASH EVAP TOPPING NOZ LH T-HTR I	HDWR	13					
V63T1879A	FLASH EVAP TOPPING NOZ RH T-HTR G	HDWR	13					
V63T1890A	FLASH EVAP HI LOAD NOZ TEMP-HTR C	HDWR	13					
V98X4555X	FLASH EVAPORATOR THERMAL FL MSG	SM	13	3	155	SM0 THRM		EVAP
V58T0162A	HYDR SYS 1 H2O BLR TEMP NO 1	HDWR	13					
V58T0262A	HYDR SYS 2 H2O BLR TEMP NO 1	HDWR	13					
V58T0362A	HYDR SYS 3 H2O BLR TEMP NO 1	HDWR	13					
V98X4556X	HYD THERMAL FL MSG	SM	13	3	156	SM0 THRM		HYD
V72Q6001V	APU 1 FUEL TNK QTY	SM	0136					
V46P0190A	APU 1 FUEL PUMP DRAIN LINE PRESS 1	HDWR	0136					
V46P0153A	APU 1 GEARBOX LUBE OIL OUT PRESS	HDWR	0136					
V46T0154A	APU 1 GEARBOX LUBE OIL OUT TEMP	HDWR	0136					
V98X4560X	APU 1 FL MSG	SM	0136	3	160	SM2 APU		1
V72Q6002V	APU 2 FUEL TNK QTY	SM	0136					
V46P0290A	APU 2 FUEL PUMP DRAIN LINE PRESS 1	HDWR	0136					
V46P0253A	APU 2 GEARBOX LUBE OIL OUT PRESS	HDWR	0136					
V46T0254A	APU 2 GEARBOX LUBE OIL OUT TEMP	HDWR	0136					
V98X4561X	APU 2 FL MSG	SM	0136	3	161	SM2 APU		2
V72Q6003V	APU 3 FUEL TNK QTY	SM	0136					
V46P0390A	APU 3 FUEL PUMP DRAIN LINE PRESS 1	HDWR	0136					
V46P0353A	APU 3 GEARBOX LUBE OIL OUT PRESS	HDWR	0136					
V46T0354A	APU 3 GEARBOX LUBE OIL OUT TEMP	HDWR	0136					
V98X4562X	APU 3 FL MSG	SM	0136	3	162	SM2 APU		3
V61P2642A	AVIONICS BAY 1 DELTA PRESS	HDWR	0136					
V61P2647A	AVIONICS BAY 2 DELTA PRESS	HDWR	0136					
V61P2658A	AVIONICS BAY 3 DELTA PRESS	HDWR	0136					
V98X4566X	AV BAY DELTA PRESS FL MSG	SM	0136	3	166	SM2 AV BAY		FAN
V61P2869A	IMU DELTA PRESS	HDWR	0136					
V98X4769X	CABIN IMU FAN DELTA PRESS FL MSG	SM	0136	3	171	SM1 CABIN		IMU

Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE TEXT MAJOR	TEXT	MIN
V76V0120A	CONTROL BUS AB1 VOLTAGE	HDWR	0136					
V76V0121A	CONTROL BUS AB2 VOLTAGE	HDWR	0136					
V76V0122A	CONTROL BUS AB3 VOLTAGE	HDWR	0136					
V76V0220A	CONTROL BUS BC1 VOLTAGE	HDWR	0136					
V76V0221A	CONTROL BUS BC2 VOLTAGE	HDWR	0136					
V76V0222A	CONTROL BUS BC3 VOLTAGE	HDWR	0136					
V76V0320A	CONTROL BUS CA1 VOLTAGE	HDWR	0136					
V76V0321A	CONTROL BUS CA2 VOLTAGE	HDWR	0136					
V76V0322A	CONTROL BUS CA3 VOLTAGE	HDWR	0136					
V76V0130A	ESS BUS 1BC VOLTAGE	HDWR	0136					
V76V0230A	ESS BUS 2CA VOLTAGE	HDWR	0136					
V76V0330A	ESS BUS 3AB VOLTAGE	HDWR	0136					
V98X4575X	CNTL/ESS BUS VOLTAGE FL MSG	SM	0136	3	175	SM1 CNTL/ESS V		
V45V0100A	FUEL CELL NO 1 VOLTAGE	HDWR	0136					
V98X4580X	FC 1 VOLTAGE FL MSG	SM	0136	3	180	SM1 DC VOLT FC	1	
V45V0200A	FUEL CELL NO 2 VOLTAGE	HDWR	0136					
V98X4581X	FC 2 VOLTAGE FL MSG	SM	0136	3	181	SM1 DC VOLT FC	2	
V45V0300A	FUEL CELL NO 3 VOLTAGE	HDWR	0136					
V98X4582X	FC 3 VOLTAGE FL MSG	SM	0136	3	182	SM1 DC VOLT FC	3	
V45C0101A	FUEL CELL NO 1 CURRENT	HDWR	0136					
V98X4584X	FC 1 CURRENT FL MSG	SM	0136	3	184	SM1 FC AMPS	1	
V45C0201A	FUEL CELL NO 2 CURRENT	HDWR	0136					
V98X4585X	FC 2 CURRENT FL MSG	SM	0136	3	185	SM1 FC AMPS	2	
V45C0301A	FUEL CELL NO 3 CURRENT	HDWR	0136					
V98X4586X	FC 3 CURRENT FL MSG	SM	0136	3	186	SM1 FC AMPS	3	
V58Q0102A	HYDR PWR SYS 1 RSVR FLUID VOLUME	HDWR	0136					
V98X4588X	HYDR PWR 1 RSVR VOLUME FL MSG	SM	0136	3	188	SM2 HYD QTY	1	
V58Q0202A	HYDR PWR SYS 2 RSVR FLUID VOLUME	HDWR	0136					
V98X4589X	HYDR PWR 2 RSVR VOLUME FL MSG	SM	0136	3	189	SM2 HYD QTY	2	
V58Q0302A	HYDR PWR SYS 3 RSVR FLUID VOLUME	HDWR	0136					
V98X4590X	HYDR PWR 3 RSVR VOLUME FL MSG	SM	0136	3	190	SM2 HYD QTY	3	
V58T0101A	HYDR PWR SYS 1 RSVR FLUID TEMP	HDWR	0136					
V98X4592X	HYDR PWR 1 RSVR TEMP FL MSG	SM	0136	3	192	SM2 HYD RSVR T	1	
V58T0201A	HYDR PWR SYS 2 RSVR FLUID TEMP	HDWR	0136					
V98X4593X	HYDR PWR 2 RSVR TEMP FL MSG	SM	0136	3	193	SM2 HYD RSVR T	2	
V58T0301A	HYDR PWR SYS 3 RSVR FLUID TEMP	HDWR	0136					
V98X4594X	HYDR PWR 3 RSVR TEMP FL MSG	SM	0136	3	194	SM2 HYD RSVR T	3	

Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE TEXT MAJOR	TEXT	MIN
V72Q6040V V98X4596X	HYDR SYS 1 H2O BLR FLUID QTY CMPT HYDR 1 W/B QTY FL MSG	SM SM	0136 0136					
				3	196	SM2 W/B QTY		1
V72Q6042V V98X4597X	HYDR SYS 2 H2O BLR FLUID QTY CMPT HYDR 2 W/B QTY FL MSG	SM SM	0136 0136					
				3	197	SM2 W/B QTY		2
V72Q6044V V98X4598X	HYDR SYS 3 H2O BLR FLUID QTY CMPT HYDR 3 W/B QTY FL MSG	SM SM	0136 0136					
				3	198	SM2 W/B QTY		3
V90X8259X V98X4611X	ET AUTO SEP/INHIBIT CREW ALERT ET AUTO SEP-INH MSG	SEQ SEQ	16 16					
				3	211	ET SEP-INH		
V58P0167A V98X4612X	HYD SYS 1 GNC ACCUM PRESS HYD 1 ACC P FL MSG	HDWR SM	0136 0136					
				3	212	SM2 HYD ACUM P		1
V58P0267A V98X4613X	HYD SYS 2 GNC ACCUM PRESS HYD 2 ACC P FL MSG	HDWR SM	0136 0136					
				3	213	SM2 HYD ACUM P		2
V58P0367A V98X4614X	HYD SYS 3 GNC ACCUM PRESS HYD 3 ACC P FL MSG	HDWR SM	0136 0136					
				3	214	SM2 HYD ACUM P		3
V45P0147A V98X4616X	FUEL CELL 1 COOLANT PRESSURE FC 1 COOLANT PRESS FL MSG	HDWR SM	0136 0136					
				3	216	SM1 FC COOL P		1
V45P0247A V98X4617X	FUEL CELL 2 COOLANT PRESSURE FC 2 COOLANT PRESS FL MSG	HDWR SM	0136 0136					
				3	217	SM1 FC COOL P		2
V45P0347A V98X4618X	FUEL CELL 3 COOLANT PRESSURE FC 3 COOLANT PRESS FL MSG	HDWR SM	0136 0136					
				3	218	SM1 FC COOL P		3
V45T0130A V98X4620X	FUEL CELL NO 1 CONDENSER EXIT TEMP FC 1 COND EXIT TEMP FL MSG	HDWR SM	0136 0136					
				3	220	SM1 FC EXIT T		1
V45T0230A V98X4621X	FUEL CELL NO 2 CONDENSER EXIT TEMP FC 2 COND EXIT TEMP FL MSG	HDWR SM	0136 0136					
				3	221	SM1 FC EXIT T		2
V45T0330A V98X4622X	FUEL CELL NO 3 CONDENSER EXIT TEMP FC 3 COND EXIT TEMP FL MSG	HDWR SM	0136 0136					
				3	222	SM1 FC EXIT T		3
V98X4624X	FF1 INPUT PROM SEQ 1,2 BYPASS	BOS	136	3	224	BCE STRG 1		A
V98X4625X	FF2 INPUT PROM SEQ 1,2 BYPASS	BOS	136	3	225	BCE STRG 2		A
V98X4626X	FF3 INPUT PROM SEQ 1,2 BYPASS	BOS	136	3	226	BCE STRG 3		A
V98X4627X	FF4 INPUT PROM SEQ 1,2 BYPASS	BOS	136	3	227	BCE STRG 4		A
V98X4628X	FF1 TACAN/RA BYPASS FL MSG	BOS	136	3	228	BCE STRG 1	TAC	
V98X4629X	FF2 TACAN/RA BYPASS FL MSG	BOS	136	3	229	BCE STRG 2	TAC	

Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE TEXT MAJOR	MIN
V98X4630X	FF3 TACAN/RA BYPASS FL MSG	BOS	136	3	230	BCE STRG 3	TAC
V94X1253X V98X4635X	REF ROLL STATUS ROLL REF MSG-CL3	DOP 2 DOP 2	3	3	235	ROLL REF	
V98X4636X	FF1 IMU BYPASS FL MSG	BOS	136	3	236	BCE STRG 1	IMU
V98X4637X	FF2 IMU BYPASS FL MSG	BOS	136	3	237	BCE STRG 2	IMU
V98X4638X	FF3 IMU BYPASS FL MSG	BOS	136	3	238	BCE STRG 3	IMU
V98X4640X	FA1 INPUT PROM SEQS 3,10 BYPASS	BOS	136	3	240	BCE STRG 1	D
V98X4641X	FA2 INPUT PROM SEQS 3,10 BYPASS	BOS	136	3	241	BCE STRG 2	D
V98X4642X	FA3 INPUT PROM SEQS 3,10 BYPASS	BOS	136	3	242	BCE STRG 3	D
V98X4643X	FA4 INPUT PROM SEQS 3,10 BYPASS	BOS	136	3	243	BCE STRG 4	D
V98X4644X	FF1 INPUT PROM SEQS 2,6 BYPASS	BOS	136	3	244	BCE STRG 1	B
V98X4645X	FF2 INPUT PROM SEQS 2,6 BYPASS	BOS	136	3	245	BCE STRG 2	B
V98X4646X	FF3 INPUT PROM SEQS 2,6 BYPASS	BOS	136	3	246	BCE STRG 3	B
V98X4647X	FF4 INPUT PROM SEQS 2,6 BYPASS	BOS	136	3	247	BCE STRG 4	B
V98X4648X	FF1 ADTA BYPASS MSG	BOS	136	3	248	BCE STRG 1	ADTA
V98X4649X	FF2 ADTA BYPASS MSG	BOS	136	3	249	BCE STRG 2	ADTA
V98X4650X	FF3 ADTA BYPASS MSG	BOS	136	3	250	BCE STRG 3	ADTA
V98X4651X	FF4 ADTA BYPASS MSG	BOS	136	3	251	BCE STRG 4	ADTA
V98X4652X	FA1 INPUT PROM SEQS 1~2 BYPASS	BOS	136	3	252	BCE STRG 1	C
V98X4653X	FA2 INPUT PROM SEQS 1~2 BYPASS	BOS	136	3	253	BCE STRG 2	C
V98X4654X	FA3 INPUT PROM SEQS 1~2 BYPASS	BOS	136	3	254	BCE STRG 3	C
V98X4655X	FA4 INPUT PROM SEQS 1~2 BYPASS	BOS	136	3	255	BCE STRG 4	C
V98X4656X	FF1 MTU BYPASS MSG	BOS	136	3	256	BCE STRG 1	MTU
V98X4657X	FF2 MTU BYPASS MSG	BOS	136	3	257	BCE STRG 2	MTU
V98X4658X	FF3 MTU BYPASS MSG	BOS	136	3	258	BCE STRG 3	MTU
V98X4660X	PL 1 I/O ERROR MSG	BOS	136	3	260	I/O ERROR	PL1

Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MAJOR	MESSAGE TEXT	MIN
V98X4673X	I/O ERR FLEX MDM/FLEX PAIR MSG-BFS	BOS	136	3	261		I/O ERROR	FLEX
V98X4664X	PL 2 I/O ERROR MSG	BOS	136	3	264		I/O ERROR	PL2
V98X4174X	PCMMU I/O ERROR FL MSG	BOS	136	3	267		I/O ERROR	PCM
V98X4668X	FF1/FA1 FAIL SYNC ON MSG	BOS	136	3	268		BCE STRG 1	PASS
V98X4669X	FF2/FA2 FAIL SYNC ON MSG	BOS	136	3	269		BCE STRG 2	PASS
V98X4670X	FF3/FA3 FAIL SYNC ON MSG	BOS	136	3	270		BCE STRG 3	PASS
V98X4671X	FF4/FA4 FAIL SYNC ON MSG	BOS	136	3	271		BCE STRG 4	PASS
V98X4672X	FF1 NSP DISCRETES FL MSG	BOS	136	3	272		BCE STRG 1	NSP
V98X4674X	FF3 NSP DISCRETES FL MSG	BOS	136	3	274		BCE STRG 3	NSP
V98X4247X	FF1 GPS BYPASS FL MSG	BOS	136	3	276		BCE STRG 1	GPS
V98X4248X	FF2 GPS BYPASS FL MSG	BOS	136	3	277		BCE STRG 2	GPS
V98X4249X	FF3 GPS BYPASS FL MSG	BOS	136	3	278		BCE STRG 3	GPS
V98X4680X	FF 1 I/O ERROR MSG	BOS	136	3	280		I/O ERROR	FF1
V98X4681X	FF 2 I/O ERROR MSG	BOS	136	3	281		I/O ERROR	FF2
V98X4682X	FF 3 I/O ERROR MSG	BOS	136	3	282		I/O ERROR	FF3
V98X4683X	FF 4 I/O ERROR MSG	BOS	136	3	283		I/O ERROR	FF4
V98X4684X	FA 1 I/O ERROR MSG	BOS	136	3	284		I/O ERROR	FA1
V98X4685X	FA 2 I/O ERROR MSG	BOS	136	3	285		I/O ERROR	FA2
V98X4686X	FA 3 I/O ERROR MSG	BOS	136	3	286		I/O ERROR	FA3
V98X4687X	FA 4 I/O ERROR MSG	BOS	136	3	287		I/O ERROR	FA4
V98X4688X	BFS GPC POWER TRANSIENT MSG	BOS	136	3	288		GPC	PWR
V98X4689X	PROCESS FORCE CLOSE MSG	BOS	136	3	289		GPC	BITE
V98X4691X	BCE 25 OR IOP PARITY ERROR MSG	BOS	136	3	291		GPC	IOP
V98X4695X	64 KBS LOAD READ ERROR MSG	BOS	136	3	295		TFL FAIL	
V92X0490X	PAYLOAD BAY DOOR SEQ FAIL	PBD SEQ	SMO					
V98X4699X	PAYLOAD BAY DOOR SEQ FAIL MSG	PBD SEQ	SMO	3	299	S63	PBD SEQ	FAIL

Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE TEXT MAJOR	TEXT	MIN
V98X4703X	PAYLOAD ALERT MSG	PYLD	0136	3	303	206 PL CL 3		
B90X0213*	TACAN AZ RESID STAT FLAG	NAV	36					
B90X0215*	TACAN RANGE RESID STAT FLAG	NAV	36					
B90X0223*	BAROALT RESID STAT FLAG	NAV	36					
B90X0712*	DRAG ALT RESID STAT FLAG	NAV	36					
B90X0374*	GPS QA2 RESID STAT FLAG	NAV	136					
V98X4707X	ADTA/DRAG/TAC/GPS EDIT HIST MSG	GAX	136	3	307	NAV EDIT		
B94J4160*	IMU 1 FAIL	IMUHIP	136					
B94J4161*	IMU 2 FAIL	IMUHIP	136					
B94J4162*	IMU 3 FAIL	IMUHIP	136					
V98X4708X	IMU 1/2/3 FL MSG	GAX	136	3	308	RM FAIL	IMU	
B98X4881*	ADTA 1 FAIL	ADTAHIP	36					
B98X4882*	ADTA 2 FAIL	ADTAHIP	36					
B98X4883*	ADTA 3 FAIL	ADTAHIP	36					
B98X4884*	ADTA 4 FAIL	ADTAHIP	36					
V98X4710X	ADTA 1/2/3/4 FL MSG	GAX	36	3	310	RM FAIL	ADTA	
B90X0195*	PASS TO BFS SV XFER FAIL	NAV	136					
V98X4754X	PASS TO BFS XFER FL MSG-CL3	GAX	136	3	311	RM FAIL	XFER	
B90X1105*	MEP ALERT STATUS	ETL-GUID	36					
V98X4715X	MEP ALERT MSG	GAX	36	3	315	SW TO MEP		
T41P1700C	ET-LH2 ULLAGE PRESS NO.1	HDWR	16					
T41P1750C	ET-LO2 ULLAGE PRESS NO.1	HDWR	16					
T41P1701C	ET-LH2 ULLAGE PRESS NO.2	HDWR	16					
T41P1751C	ET-LO2 ULLAGE PRESS NO.2	HDWR	16					
T41P1702C	ET-LH2 ULLAGE PRESS NO.3	HDWR	16					
T41P1752C	ET-LO2 ULLAGE PRESS NO.3	HDWR	16					
V98X4719X	ET FU/OX ULL P HIGH/LOW MSG	GAX	16	3	319	MPS LH2/O2	ULL	
V43T4643A	OMS-L ENG FUEL INJECTOR TEMP	HDWR	13					
V98X4720X	OMS-L FU INJ T HI MSG	GAX	13	3	320	L OMS	TEMP	
V43P4122C	OMS-L POD HE TANK PRESS 2	HDWR	136					
V43P4548C	OMS-L ENG PNEU SUPPLY PRESS 2	HDWR	136					
V43P4549C	OMS-L ENG RGLTR OUT PRESS	HDWR	136					
V98X4722X	OMS L HE/N2/PNEU PRESS FL MSG	GAX	136	3	322	L OMS	TK P	
V43T5643A	OMS-R ENG FUEL INJECTOR TEMP	HDWR	13					
V98X4724X	OMS-R FU INJ T HI MSG	GAX	13	3	324	R OMS	TEMP	
V43P5122C	OMS-R POD HE TANK PRESS 2	HDWR	136					
V43P5548C	OMS-R ENG PNEU SUPPLY PRESS 2	HDWR	136					
V43P5549C	OMS-R ENG RGLTR OUT PRESS	HDWR	136					
V98X4726X	OMS R HE/N2/PNEU PRESS FL MSG	GAX	136	3	326	R OMS	TK P	



Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE TEXT MAJOR	MIN
V98X4728X	DEU 1 BITE FL MSG	MI	136	3	328	CRT BITE	1
V98X4729X	DEU 2 BITE FL MSG	MI	136	3	329	CRT BITE	2
V98X4730X	DEU 3 BITE FL MSG	MI	136	3	330	CRT BITE	3
V98X4731X	DEU 4 BITE FL MSG	MI	136	3	331	CRT BITE	4
V98X4732X	CRT 1 I/O ERROR FL MSG	MI	136	3	332	I/O ERROR	CRT1
V98X4733X	CRT 2 I/O ERROR FL MSG	MI	136	3	333	I/O ERROR	CRT2
V98X4734X	CRT 3 I/O ERROR FL MSG	MI	136	3	334	I/O ERROR	CRT3
V98X4735X	CRT 4 I/O ERROR FL MSG	MI	136	3	335	I/O ERROR	CRT4
V95X1202X	ME-1 CMD PATH FAIL FLAG	SEQ	16				
V98X4739X	ME-1 CMD PATH FL MSG	SEQ	16	3	339	MPS CMD	C
V95X1203X	ME-2 CMD PATH FAIL FLAG	SEQ	16				
V98X4737X	ME-2 CMD PATH FL MSG	SEQ	16	3	337	MPS CMD	L
V95X1204X	ME-3 CMD PATH FAIL FLAG	SEQ	16				
V98X4738X	ME-3 CMD PATH FL MSG	SEQ	16	3	338	MPS CMD	R
V95X1150X	ME-1 FLIGHT DATA PATH FAIL FLAG	SEQ	16				
V98X4743X	ME-1 FLT DATA PATH FL MSG	SEQ	16	3	343	MPS DATA	C
V95X1151X	ME-2 FLIGHT DATA PATH FAIL FLAG	SEQ	16				
V98X4741X	ME-2 FLT DATA PATH FL MSG	SEQ	16	3	341	MPS DATA	L
V95X1152X	ME-3 FLIGHT DATA PATH FAIL FLAG	SEQ	16				
V98X4742X	ME-3 FLT DATA PATH FL MSG	SEQ	16	3	342	MPS DATA	R
V95X1194X	ME-1 ELECTRONIC LOCKUP MODE FLAG	SEQ	16				
V98X4747X	ME-1 ELEC LOCKUP FL MSG	SEQ	16	3	347	MPS ELEC	C
V95X1195X	ME-2 ELECTRONIC LOCKUP MODE FLAG	SEQ	16				
V98X4745X	ME-2 ELEC LOCKUP FL FLAG	SEQ	16	3	345	MPS ELEC	L
V95X1196X	ME-3 ELECTRONIC LOCKUP MODE FLAG	SEQ	16				
V98X4746X	ME-3 ELEC LOCKUP FL MSG	SEQ	16	3	346	MPS ELEC	R
V95X1198X	ME-1 HYDRAULIC LOCKUP MODE FLAG	SEQ	16				
V98X4751X	ME-1 HYD LOCKUP FL MSG	SEQ	16	3	351	MPS HYD	C
V95X1199X	ME-2 HYDRAULIC LOCKUP MODE FLAG	SEQ	16				
V98X4749X	ME-2 HYD LOCKUP FL MSG	SEQ	16	3	349	MPS HYD	L
V95X1200X	ME-3 HYDRAULIC LOCKUP MODE FLAG	SEQ	16				
V98X4750X	ME-3 HYD LOCKUP FL MSG	SEQ	16	3	350	MPS HYD	R

Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE TEXT MAJOR	MIN
V46T1175A	APU 1 ISO VALVE A TEMP 1	HDWR	0136				
V46T1275A	APU 2 ISO VALVE A TEMP 1	HDWR	0136				
V46T1375A	APU 3 ISO VALVE A TEMP 1	HDWR	0136				
V46T1173A	APU 1 ISO VALVE B TEMP 1	HDWR	0136				
V46T1273A	APU 2 ISO VALVE B TEMP 1	HDWR	0136				
V46T1373A	APU 3 ISO VALVE B TEMP 1	HDWR	0136				
V98X4752X	APU ISO VLV THERMAL FL MSG	SM	0136	3	352	SM2 FU TK VLV	APU
V98X0288X	EQUIV CABIN DP/DT FL MSG	SM	136	3	366	SM1 CABN DP/DT	EQ
V98X4767X	EMER DP/DT FL MSG	SM	136	3	367	SM1 CABN DP/DT	BU
V98X4825X	ETL GUID DOWNMODE FLAG	ETL-GUID	36				
V98X4768X	ETL GUID DOWNMODE MSG	GAX	36	3	368	OTT ST IN	
V94X2062X	TAL TARGET ERROR INDICATOR	HORIZ	1				
V98X4383X	TAL TARGET ERROR MSG-BFS	GAX	1	3	372	TARGET ERR	TAL
V94X2063X	RTLS TARGET ERROR INDICATOR	HORIZ	16				
V98X4384X	RTLS TARGET ERROR MSG-BFS	GAX	16	3	373	TARGET ERR	RTLS
V92X0523X	PBD OUT OF CONFIGURATION	PBD SEQ	SM0				
V98X4770X	PBD OUT OF CONFIGURATION MSG	PBD SEQ	SM0	3	376	S63 PBD CONFIG	
V45X0410E	FUEL CELL 1 H2O CONDITION	HDWR	0136				
V98X4780X	FUEL CELL 1 H2O CONDITION FL MSG	SM	0136	3	380	SM1 FC PH	1
V45X0420E	FUEL CELL 2 H2O CONDITION	HDWR	0136				
V98X4781X	FUEL CELL 2 H2O CONDITION FL MSG	SM	0136	3	381	SM1 FC PH	2
V45X0430E	FUEL CELL 3 H2O CONDITION	HDWR	0136				
V98X4782X	FUEL CELL 3 H2O CONDITION FL MSG	SM	0136	3	382	SM1 FC PH	3
V45V0102A	FCP 1 SUBSTACK 1 DELTA VOLTAGE	HDWR	0136				
V45V0103A	FCP 1 SUBSTACK 2 DELTA VOLTAGE	HDWR	0136				
V45V0104A	FCP 1 SUBSTACK 3 DELTA VOLTAGE	HDWR	0136				
V98X4784X	FCP 1 DELTA VOLTAGE FL MSG	SM	0136	3	384	SM1 FC DELTA V	1
V45V0202A	FCP 2 SUBSTACK 1 DELTA VOLTAGE	HDWR	0136				
V45V0203A	FCP 2 SUBSTACK 2 DELTA VOLTAGE	HDWR	0136				
V45V0204A	FCP 2 SUBSTACK 3 DELTA VOLTAGE	HDWR	0136				
V98X4785X	FCP 2 DELTA VOLTAGE FL MSG	SM	0136	3	385	SM1 FC DELTA V	2
V45V0302A	FCP 3 SUBSTACK 1 DELTA VOLTAGE	HDWR	0136				
V45V0303A	FCP 3 SUBSTACK 2 DELTA VOLTAGE	HDWR	0136				
V45V0304A	FCP 3 SUBSTACK 3 DELTA VOLTAGE	HDWR	0136				
V98X4786X	FCP 3 DELTA VOLTAGE FL MSG	SM	0136	3	386	SM1 FC DELTA V	3

Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE TEXT MAJOR	MIN
V51P0370A	NLG LH TIRE PRESS 1	HDWR	36				
V51P0372A	NLG LH TIRE PRESS 2	HDWR	36				
V98X4538X	NLG LH TIRE PRESS FL MSG	SM	36	3	400	SM0 TIRE PRESS	L NG
V51P0371A	NLG RH TIRE PRESS 1	HDWR	36				
V51P0373A	NLG RH TIRE PRESS 2	HDWR	36				
V98X4540X	NLG RH TIRE PRESS FL MSG	SM	36	3	401	SM0 TIRE PRESS	R NG
V51P0722A	LDG GR LH OUTBD BRAKE PRESS NO.2A	HDWR	0136				
V51P0728A	LDG GR LH INBD BRAKE PRESS NO.1A	HDWR	0136				
V51P0748A	LDG GR RH INBD BRAKE PRESS NO.1A	HDWR	0136				
V51P0742A	LDG GR RH OUTBD BRAKE PRESS NO.2A	HDWR	0136				
V98X4482X	LDG GR BRAKE PRESS SYS 2/3 FL MSG	SM	0136	3	448	SM0 BRAKE P	2/3
V51P0724A	LDG GR LH OUTBD BRAKE PRESS NO.4A	HDWR	0136				
V51P0726A	LDG GR LH INBD BRAKE PRESS NO.3A	HDWR	0136				
V51P0746A	LDG GR RH INBD BRAKE PRESS NO.3A	HDWR	0136				
V51P0744A	LDG GR RH OUTBD BRAKE PRESS NO.4A	HDWR	0136				
V98X4483X	LDG GR BRAKE PRESS SYS 1/3 FL MSG	SM	0136	3	449	SM0 BRAKE P	1/3
V41P1600A	MPS PNEU VLV HE SUPPLY PRESS	HDWR	16				
V98X4243X	MPS PNEU HE TK P LOW MSG	GAX	16	3	460	MPS PNEU P	TK
V41P1605A	MPS PNEU VLV REG HE OUTLET PRESS	HDWR	136				
V98X4244X	MPS PNEU HE REG P HI/LOW MSG	GAX	136	3	461	MPS PNEU P	REG
V41P1650A	MPS PNEU ACCUM PRESSURE	HDWR	16				
V98X4245X	MPS PNEU HE ACCUM P LOW MSG	GAX	16	3	462	MPS PNEU P	ACUM
V41P1160A	MPS E1 GH2 PRESS OUTLET PRESS	HDWR	16				
V98X4435X	MPS E1 GH2 OUTLET PRESS LOW MSG	GAX	16	3	464	MPS H2 OUT	P C
V41P1260A	MPS E2 GH2 PRESS OUTLET PRESS	HDWR	16				
V98X4436X	MPS E2 GH2 OUTLET PRESS LOW MSG	GAX	16	3	465	MPS H2 OUT	P L
V41P1360A	MPS E3 GH2 PRESS OUTLET PRESS	HDWR	16				
V98X4437X	MPS E3 GH2 OUTLET PRESS LOW MSG	GAX	16	3	466	MPS H2 OUT	P R
V41T1171A	MPS E1 GO2 PRESS OUTLET TEMP	HDWR	16				
V98X4438X	MPS E1 GO2 OUTLET TEMP LOW MSG	GAX	16	3	468	MPS O2 OUT	T C
V41T1271A	MPS E2 GO2 PRESS OUTLET TEMP	HDWR	16				
V98X4439X	MPS E2 GO2 OUTLET TEMP LOW MSG	GAX	16	3	469	MPS O2 OUT	T L
V41T1371A	MPS E3 GO2 PRESS OUTLET TEMP	HDWR	16				
V98X4440X	MPS E3 GO2 OUTLET TEMP LOW MSG	GAX	16	3	470	MPS O2 OUT	T R
V95X1623X	SSME REPOSITIONING STOP FLAG	SEQ	3				
V94X4279X	SSME REPOS FAILED MSG	SEQ	3	3	480	SSME REPOS	FAIL

Table B.4.112.3-1. BFS Annunciation Table

MML OR BFS(*) NO.	NOMENCLATURE	SOURCE	OPS AVAIL	ALARM CLASS	MSG ID	MESSAGE TEXT MAJOR	TEXT	MIN
V94X4103X	AUTOLOAD INVALID TIG INDICATOR FLAG	MNVR	1					
V98X4246X	AUTOLOAD INVALID TIG INDICATOR MSG	GAX	1	3	496	ILLEGAL	TIG	
V45P2140A	PRSD H2 MANF 1 PRESSURE	HWDR	0136					
V45P2145A	PRSD H2 MANF 2 PRESSURE	HWDR	0136					
V98X4502X	PRSD H2 MANF PRESS FL MSG	SM	0136	3	500	SM2 CRYO H2	MANF	
V45P1140A	PRSD O2 MANF 1 PRESSURE	HWDR	0136					
V45P1145A	PRSD O2 MANF 2 PRESSURE	HWDR	0136					
V98X4503X	PRSD O2 MANF PRESS FL MSG	SM	0136	3	504	SM2 CRYO O2	MANF	
V76X0124E	MAIN BUS A CONT BUS AB1/CA1 RPC ON	HDWR	0136					
V76X0125E	MAIN BUS A CONT BUS AB2/CA2 RPC ON	HDWR	0136					
V76X0126E	MAIN BUS A CONT BUS AB3/CA3 RPC ON	HDWR	0136					
V76X0224E	MAIN BUS B CONT BUS AB1/BC1 RPC ON	HDWR	0136					
V76X0225E	MAIN BUS B CONT BUS AB2/BC2 RPC ON	HDWR	0136					
V76X0226E	MAIN BUS B CONT BUS AB3/BC3 RPC ON	HDWR	0136					
V76X0324E	MAIN BUS C CONT BUS BC1/CA1 RPC ON	HDWR	0136					
V76X0325E	MAIN BUS C CONT BUS BC2/CA2 RPC ON	HDWR	0136					
V76X0326E	MAIN BUS C CONT BUS BC3/CA3 RPC ON	HDWR	0136					
V98X7256X	CNTL RPC FL MSG	SM	0136	3	508	SM1 CNTL RPC		
V98X4276X	DK 1 DEU XMTR FAIL MSG	BOS	0136	2	844	DK XMTR	1	
V98X4277X	DK 2 DEU XMTR FAIL MSG	BOS	0136	2	845	DK XMTR	2	
V98X4278X	DK 3 DEU XMTR FAIL MSG	BOS	0136	2	846	DK XMTR	3	
V98X4279X	DK 4 DEU XMTR FAIL MSG	BOS	0136	2	847	DK XMTR	4	

@ NOTE: THE PAYLOAD INPUT(S) WHICH RESULTS IN THE ANNUNCIATION OF THE PAYLOAD ALERT MESSAGE ARE DEFINED IN THE JSC-19478-XXX, PAYLOAD MANAGEMENT LEVEL C FLIGHT REQUIREMENT DOCUMENT (WHERE XXX, REPRESENTS THE NUMBER OF THE SPECIFIC OPS FLIGHT).

TABLE B.4.112-7. BFS GN&C ANNUNCIATION I/F (GAX) (4.112) I-LOADS

BFS NAME	MSID	ENG UNITS	DT	PR	D	S	PARA	MC	CAT	LAST CR	R E V
MPS_E1A_REGP_C_BIAS	V97U1345C	PSIA	F	S	L	B	4.112	00	HEP	92061A	
MPS_E1A_REGP_C_SF	V97U1346C	PSIA/COUNT	F	S	L	B	4.112	00	HEP	92061A	
MPS_E2A_REGP_L_BIAS	V97U1347C	PSIA	F	S	L	B	4.112	00	HEP	92061A	
MPS_E2A_REGP_L_SF	V97U1348C	PSIA/COUNT	F	S	L	B	4.112	00	HEP	92061A	
MPS_E3A_REGP_R_BIAS	V97U1349C	PSIA	F	S	L	B	4.112	00	HEP	92061A	
MPS_E3A_REGP_R_SF	V97U1350C	PSIA/COUNT	F	S	L	B	4.112	00	HEP	92061A	
MPS_E1B_REGP_C_BIAS	V97U1351C	PSIA	F	S	L	B	4.112	00	HEP	92061A	
MPS_E1B_REGP_C_SF	V97U1352C	PSIA/COUNT	F	S	L	B	4.112	00	HEP	92061A	
MPS_E2B_REGP_L_BIAS	V97U1353C	PSIA	F	S	L	B	4.112	00	HEP	92061A	
MPS_E2B_REGP_L_SF	V97U1354C	PSIA/COUNT	F	S	L	B	4.112	00	HEP	92061A	
MPS_E3B_REGP_R_BIAS	V97U1355C	PSIA	F	S	L	B	4.112	00	HEP	92061A	
MPS_E3B_REGP_R_SF	V97U1356C	PSIA/COUNT	F	S	L	B	4.112	00	HEP	92061A	
MPS_PNEU_ACUMP_BIAS	V97U1357C	PSIA	F	S	L	B	4.112	00	HEP	92061A	
MPS_PNEU_REGP_BIAS	V97U1358C	PSIA	F	S	L	B	4.112	00	HEP	92061A	
MPS_PNEU_REGP_SF	V97U6779C	PSIA/COUNT	F	S	L	B	4.112	00	HEP	92061A	
MPS_PNEU_ACUMP_SF	V97U6781C	PSIA/COUNT	F	S	L	B	4.112	00	HEP	92061A	
ET_LH2ULP_HI	V97U6783C	PSIA	F	S	L	B	4.112	00	UP1	92212	
ET_LH2ULP_LO	V97U6784C	PSIA	F	S	L	B	4.112	00	UP1	92212	
MPS_E1_HE_SUPPLY_PRESS_C_SF	V98U8511C	PSIA/COUNT	F	S	L	B	4.112	00	HEP	92234	
MPS_E1_HE_SUPPLY_PRESS_C_BIAS	V98U8512C	PSIA	F	S	L	B	4.112	00	HEP	92234	
MPS_E2_HE_SUPPLY_PRESS_L_SF	V98U8513C	PSIA/COUNT	F	S	L	B	4.112	00	HEP	92234	
MPS_E2_HE_SUPPLY_PRESS_L_BIAS	V98U8514C	PSIA	F	S	L	B	4.112	00	HEP	92234	
MPS_E3_HE_SUPPLY_PRESS_R_SF	V98U8515C	PSIA/COUNT	F	S	L	B	4.112	00	HEP	92234	
MPS_E3_HE_SUPPLY_PRESS_R_BIAS	V98U8516C	PSIA	F	S	L	B	4.112	00	HEP	92234	
MPS_PNEU_HE_SUPPLY_PRESS_SF	V98U8517C	PSIA/COUNT	F	S	L	B	4.112	00	HEP	92234	
MPS_PNEU_HE_SUPPLY_PRESS_BIAS	V98U8518C	PSIA	F	S	L	B	4.112	00	HEP	92234	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE B.4.112-8. BFS GN&C ANNUNCIATION I/F (GAX) (4.112) K-LOADS

BFS NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PARA	LAST CR	R E V
MPS_E2A_REGP_L_HI	V96U8479C	00	+8.10	E+02 PSIA	F	S	B	4.112	92073	
MPS_E2A_REGP_L_LO	V96U8480C	00	+6.79	E+02 PSIA	F	S	B	4.112	92073	
MPS_E3A_REGP_R_HI	V96U8481C	00	+8.10	E+02 PSIA	F	S	B	4.112	92073	
MPS_E3A_REGP_R_LO	V96U8482C	00	+6.79	E+02 PSIA	F	S	B	4.112	92073	
MPS_E1B_REGP_C_HI	V96U8483C	00	+8.10	E+02 PSIA	F	S	B	4.112	92073	
MPS_E1B_REGP_C_LO	V96U8484C	00	+6.79	E+02 PSIA	F	S	B	4.112	92073	
MPS_E2B_REGP_L_HI	V96U8485C	00	+8.10	E+02 PSIA	F	S	B	4.112	92073	
MPS_E2B_REGP_L_LO	V96U8486C	00	+6.79	E+02 PSIA	F	S	B	4.112	92073	
MPS_E3B_REGP_R_HI	V96U8487C	00	+8.10	E+02 PSIA	F	S	B	4.112	92073	
MPS_E3B_REGP_R_LO	V96U8488C	00	+6.79	E+02 PSIA	F	S	B	4.112	92073	
ET_LH2ULP_BIAS	V96U8489C	00	+1.2	E+01 PSIA	F	S	B	4.112	59811A	
ET_LH2ULP_SF	V96U8490C	00	+8.0	E-02 PSIA/COUNT	F	S	B	4.112	90568	
MPS_E1A_REGP_C_HI	V96U8499C	00	+8.10	E+02 PSIA	F	S	B	4.112	92073	
L_OMS_VLV1_POS_SF	V96U8578C	00	+2.376	E+01 PCT/VDC	F	S	A	4.112	79967G	
L_OMS_VLV1_POS_BIAS	V96U8579C	00	-8.74	E+00 PCT	F	S	C	4.112	79967G	
L_OMS_VLV2_POS_SF	V96U8580C	00	+2.376	E+01 PCT/VDC	F	S	A	4.112	79967G	
L_OMS_VLV2_POS_BIAS	V96U8581C	00	-8.74	E+00 PCT	F	S	C	4.112	79967G	
R_OMS_VLV1_POS_SF	V96U8582C	00	+2.376	E+01 PCT/VDC	F	S	A	4.112	79967G	
R_OMS_VLV1_POS_BIAS	V96U8583C	00	-8.74	E+00 PCT	F	S	C	4.112	79967G	
R_OMS_VLV2_POS_SF	V96U8584C	00	+2.376	E+01 PCT/VDC	F	S	A	4.112	79967G	
R_OMS_VLV2_POS_BIAS	V96U8585C	00	-8.74	E+00 PCT	F	S	C	4.112	79967G	
OMS_FU_INJ_T_BIAS	V96U9049C	00	-7.5	E+01 DEG	F	S	B	4.112	59811A	
OMS_FU_INJ_T_SF	V96U9050C	00	+7.5	E-01 DEG/COUNT	F	S	B	4.112	90568	

TABLE B.4.112-8. BFS GN&C ANNUNCIATION I/F (GAX) (4.112) K-LOADS

BFS NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PARA	LAST CR	R E V
OMS_FU_INJ_T_HI_LIMIT	V96U9051C	00	+2.6	E+02 DEG	F	S	B	4.112	59811A	
MPS_E1A_REGP_C_LO	V96U9224C	00	+6.79	E+02 PSIA	F	S	B	4.112	92073	
MPS_PNEUHE_TKP_LO	V97U6775C	00	+3.800	E+03 PSIA	F	S	B	4.112	89397C	
MPS_PNEU HE TANK PRESS LOW LIMIT										
MPS_PNEUHE_REGP_HI	V97U6777C	00	+8.10	E+02 PSIA	F	S	B	4.112	90472C	
MPS_PNEU HE REG PRESS HIGH LIMIT										
MPS_PNEUHE_REGP_LO	V97U6778C	00	+7.00	E+02 PSIA	F	S	B	4.112	89397C	
MPS_PNEU HE REG PRESS LOW LIMIT										
MPS_PNEUHE_ACUMP_LO	V97U6780C	00	+7.00	E+02 PSIA	F	S	B	4.112	89397C	
MPS_PNEU HE ACUM PRESS LOW LIMIT										
ET_LO2ULP_HI	V97U6785C	00	+2.9	E+01 PSIG	F	S	B	4.112	59811A	
ET_LO2ULP_LO	V97U6786C	00	+0.0	E+00 PSIG	F	S	B	4.112	59811A	
ET_LO2ULP_BIAS	V97U6787C	00	+0.0	E+00 PSIG	F	S	B	4.112	59811A	
ET_LO2ULP_SF	V97U6788C	00	+6.0	E-02 PSIG/COUNT	F	S	B	4.112	90568	
HM_EXCEED	V97U6814C	00	+8.00000	E+01 PCT	F	S	C	4.112	79967G	
ELEVON HINGE MOM EXCEED LIMIT										
HM_SF	V97U6815C	00	+1.9335	E+01 PCT/VDC	F	S	A	4.112	79967G	
ELEVON HNG MOM SCALE FACTOR										
MPS_HETKP_LO	V97U6826C	00	+1.15	E+03 PSIA	F	S	B	4.112	59811A	
MPS_LH2MANFP_HI	V97U6828C	00	+6.50	E+01 PSIA	F	S	B	4.112	90472C	
MPS_LH2MANFP_SF	V97U6830C	00	+2.0	E-01 PSIA/COUNT	F	S	B	4.112	90568	
MPS_LO2MANFP_HI	V97U6831C	00	+2.49	E+02 PSIA	F	S	B	4.112	59811A	
MPS_LO2MANFP_SF	V97U6832C	00	+6.0	E-01 PSIA/COUNT	F	S	B	4.112	90568	
OMS_HETKP_LO	V97U6840C	00	+1.500	E+03 LBS/IN**2 ABS	F	S	C	4.112	79967G	
OMS HE TK PRESS LO LIMIT										
OMS_HETKP_SF	V97U6841C	00	+1.00000	E+03 (LBS/IN**2)/VDC	F	S	A	4.112	79967G	
OMS HE TK PRESS SCALE FACTOR										
OMS_INP_SF	V97U6844C	00	+8.00000	E+01 (LBS/IN**2)/VDC	F	S	A	4.112	79967G	
OMS FU/OX INLET PRESS SCALE FACTOR										
OMS_PNEUP_SF	V97U6845C	00	+1.00000	E+03 (LBS/IN**2)/VDC	F	S	A	4.112	79967G	
OMS_PNEU SUPPLY PRESS SCALE FACTOR										
OMS_PNEUP_LO	V97U6846C	00	+1.200	E+03 LBS/IN**2 ABS	F	S	C	4.112	79967G	
OMS_PNEU SUPPLY PRESS LO LIMIT										
OMS_REGP_HI	V97U6847C	00	+4.34000	E+02 LBS/IN**2 ABS	F	S	C	4.112	79967G	
OMS REG PRESS HI LIMIT										

TABLE B.4.112-8. BFS GN&C ANNUNCIATION I/F (GAX) (4.112) K-LOADS

BFS NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PARA	LAST CR	R E V
OMS_REGP_LO OMS REG PRESS LO LIMIT	V97U6848C	00	+2.99000	E+02 LBS/IN**2 ABS	F	S	C	4.112	79967G	
OMS_REGP_SF OMS REG PRESS SCALE FACTOR	V97U6849C	00	+1.00000	E+02 (LBS/IN**2)/VDC	F	S	A	4.112	79967G	
OMS_ULLP_LO OMS FU/OX TK ULLAGE PRESS LO LIMIT	V97U6853C	00	+2.34	E+02 LBS/IN**2 ABS	F	S	C	4.112	79967G	
OMS_ULLP_SF OMS FU/OX TK ULL PRES SCALE FACTOR	V97U6854C	00	+8.00000	E+01 (LBS/IN**2)/VDC	F	S	A	4.112	79967G	
OMS_SAT_HI ELEVON POSN SAT HI LIMIT	V97U6856C	00	+1.2	E+01 DEG	F	S	C	4.112	79967G	
OMS_SAT_LO ELEVON POSN SAT LO LIMIT	V97U6857C	00	-1.5	E+01 DEG	F	S	C	4.112	79967G	
RCS_HETKP_LO RCS FU/OX HE TK PRESS LO LIMIT	V97U6864C	00	+5.00000	E+02 LBS/IN**2 ABS	F	S	C	3.3.1.10 4.112	79967G	
RCS_HETKP_SF RCS FU/OX HE TK PRESS SCALE FACTOR	V97U6865C	00	+8.00000	E+02 (LBS/IN**2)/VDC	F	S	C	3.3.1.10 4.112	79967G	
RCS_MANFP_SF RCS FU/OX MANIF P 1/2, 3/4/5 SF	V97U6869C	00	+2.00000	E+02 (LBS/IN**2)/VDC	F	S	A	4.112	79967G	
RCS_ULLP_HI RCS FU/OX TK ULLAGE PRESS HI LIMIT	V97U6876C	00	+3.12000	E+02 LBS/IN**2 ABS	F	S	C	3.3.1.10 4.112	79967G	
RCS_ULLP_LO RCS FU/OX TK ULLAGE PRESS LO LIMIT	V97U6877C	00	+2.00000	E+02 LBS/IN**2 ABS	F	S	C	3.3.1.10 4.112	79967G	
RCS_ULLP_SF RCS FU/OX TK ULL PRESS SC FACTOR	V97U6878C	00	+8.00000	E+01 (LBS/IN**2)/VDC	F	S	C	3.3.1.10 4.112	79967G	
MPS_E1_GH2_OUTP_LO SSME #1 GH2 OUTLET PRESS LOW LIMIT	V97U9601C	00	+1.050	E+03 PSIA	F	S	B	4.112	89920C	
MPS_E2_GH2_OUTP_LO SSME #2 GH2 OUTLET PRESS LOW LIMIT	V97U9602C	00	+1.050	E+03 PSIA	F	S	B	4.112	89920C	
MPS_E3_GH2_OUTP_LO SSME #3 GH2 OUTLET PRESS LOW LIMIT	V97U9603C	00	+1.050	E+03 PSIA	F	S	B	4.112	89920C	
MPS_E1_GO2_OUTT_LO SSME #1 GO2 OUTLET TEMP LOW LIMIT	V97U9604C	00	+1.25	E+02 DEG F	F	S	B	4.112	89920C	
MPS_E2_GO2_OUTT_LO SSME #2 GO2 OUTLET TEMP LOW LIMIT	V97U9605C	00	+1.25	E+02 DEG F	F	S	B	4.112	89920C	
MPS_E3_GO2_OUTT_LO SSME #3 GO2 OUTLET TEMP LOW LIMIT	V97U9606C	00	+1.25	E+02 DEG F	F	S	B	4.112	90496	
MPS_E1_GH2_OUTP_SF SSME #1 GH2 OUTLET PRESS SCALE FACTOR	V97U9607C	00	+1.00	E+01 PSIA/COUNT	F	S	B	4.112	89920C	
MPS_E2_GH2_OUTP_SF SSME #2 GH2 OUTLET PRESS SCALE FACTOR	V97U9608C	00	+1.00	E+01 PSIA/COUNT	F	S	B	4.112	89920C	
MPS_E3_GH2_OUTP_SF SSME #3 GH2 OUTLET PRESS SCALE FACTOR	V97U9609C	00	+1.00	E+01 PSIA/COUNT	F	S	B	4.112	89920C	
MPS_E1_GO2_OUTT_BIAS SSME #1 GO2 OUTLET TEMP BIAS	V97U9610C	00	-2.51504	E+02 DEG F	F	S	B	4.112	89920C	



TABLE B.4.112-8. BFS GN&C ANNUNCIATION I/F (GAX) (4.112) K-LOADS

BFS NAME DESCRIPTION	MSID	MC	KLOAD VALUE		ENG UNITS	DT	P R	S	PARA	LAST CR	R E V
MPS_E2_GO2_OUTT_BIAS SSME #2 GO2 OUTLET TEMP BIAS	V97U9611C	00	-2.51504	E+02	DEG F	F	S	B	4.112	89920C	
MPS_E3_GO2_OUTT_BIAS SSME #3 GO2 OUTLET TEMP BIAS	V97U9612C	00	-2.51504	E+02	DEG F	F	S	B	4.112	89920C	
MPS_E1_GO2_OUTT_SF SSME #1 GO2 OUTLET TEMP SCALE FACTOR	V97U9613C	00	+2.22020	E+00	DEG F/COUNT	F	S	B	4.112	89920C	
MPS_E2_GO2_OUTT_SF SSME #2 GO2 OUTLET TEMP SCALE FACTOR	V97U9614C	00	+2.22020	E+00	DEG F/COUNT	F	S	B	4.112	89920C	
MPS_E3_GO2_OUTT_SF SSME #3 GO2 OUTLET TEMP SCALE FACTOR	V97U9615C	00	+2.22020	E+00	DEG F/COUNT	F	S	B	4.112	89920C	
MPS_E1_GO2_OUTT_COEFORD2 SSME #1 GO2 OUTLET TEMP 2ND ORDER COEF	V97U9616C	00	+5.65269	E-04	DEG F/COUNT**2	F	S	B	4.112	89920C	
MPS_E2_GO2_OUTT_COEFORD2 SSME #2 GO2 OUTLET TEMP 2ND ORDER COEF	V97U9617C	00	+5.65269	E-04	DEG F/COUNT**2	F	S	B	4.112	89920C	
MPS_E3_GO2_OUTT_COEFORD2 SSME #3 GO2 OUTLET TEMP 2ND ORDER COEF	V97U9618C	00	+5.65269	E-04	DEG F/COUNT**2	F	S	B	4.112	89920C	
OMS_ULLP_HI	V97U9869C	00	+2.88	E+02	LBS/IN**2	F	S	B	4.112	59811A	
OMS_AFTQTY_SF	V99U7434C	00	+6.02	E+00	PCT/VDC	F	S	A	4.112	79967G	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

#### **B.4.150 ENTRY DISPLAY PROCESSING (PFS/BFS)**

The entry display processing function shall provide for computation and limiting of dynamic symbols displayed on the fixed background of the following displays.

- ENTRY TRAJECTORY 1
- ENTRY TRAJECTORY 2
- ENTRY TRAJECTORY 3
- ENTRY TRAJECTORY 4
- ENTRY TRAJECTORY 5

The fixed background for each of these displays is comprised of a central plot for monitoring the flight profile, an alpha scale and a drag scale. The central plot for the trajectory displays is a function of range and relative velocity. The central plot for the transition displays is a function of range and energy over weight (E/W). The description of the fixed format is in Sections 4.2.1 through 4.2.5. The functional requirements for these displays are contained in Sections 4.2.1 through 4.2.5.

The mission dependent I-Load values are defined in the STS Flight Software Initialization Load (JSC-19350) and in Table B.4.150-7. The K-Loads can be found in Table B.4.150-8. The processing required to support the display of these dynamic symbols is defined in the following paragraphs.

##### **B.4.150.1 The Central Plot Symbols**

The following dynamic symbols are available for display on the central plot of each of the entry displays:

- Shuttle Character flashed by bank angle flash flag.
- Shuttle Trailers (limit 6) computed every
  - 28.8 sec(15 entry guidance cycles) for TRAJ 1 and TRAJ 2
  - 15.36 sec(8 entry guidance cycles) for TRAJ 3, TRAJ 4 and TRAJ 5
- Guidance Character
- Guidance Trailers (limit 6) computed every
  - 28.8 sec(15 entry guidance cycles) for TRAJ 1 and TRAJ 2
  - 15.36 sec(8 entry guidance cycles) for TRAJ 3, TRAJ 4 and TRAJ 5
- Alternate Landing Site Characters (PFS Only)

The requirements for computing and limiting the central plot symbols are defined in the following paragraphs.

##### The Computation of the Shuttle Character

Note: On the first pass (only) the display flag (DISP\_IND) is initialized to 1 (i.e., I = 1, DISP\_IND = 1)

Y-Coordinate

$$\text{SHUTTLE\_YN} = \text{Integer}(\text{VC0}_1 + \text{VC1}_1 * (\text{ALT\_WHEELS} + \text{REL\_VEL\_MAG}^2 / 2 * \text{G}) \\ + \text{VC2}_1 * \text{REL\_VEL\_MAG})$$

Determine if new display is to be scheduled:

IF (SHUTTLE\_YN < E\_G\_Y\_MIN (Below X-axis of graph) OR I = I\_TRAN AND ISLECT = 5)  
THEN I = I + 1, DISP\_IND = I (Set integer indicating next display in OPS SEQ)

Initialize all displayed symbol coordinates to default values located off the display, except for the shuttle character. Recompute SHUTTLE\_YN parameter for the new display.

X-Coordinate

$$\text{RNG\_TO\_WP2} = \text{MIN}(\text{RNG\_TO\_RW\_THRESH}, -\text{HC1}_1 / (2 * \text{HC2}_1)) \\ \text{SHUTTLE\_XN} = \text{HC0}_1 + \text{HC1}_1 * \text{RNG\_TO\_WP2} + \text{HC2}_1 * \text{RNG\_TO\_WP2}^2$$

Limit X-Coordinate

$$\text{SHUTTLE\_XN} = \text{MID}(\text{E\_G\_X\_MIN}, \text{SHUTTLE\_XN}, \text{E\_G\_X\_MAX})$$

Place the nose at computed position:

$$\text{SHUTTLE\_X} = \text{SHUTTLE\_XN} + \text{DXS} \\ \text{SHUTTLE\_Y} = \text{SHUTTLE\_YN} + \text{DYS}$$

Computation of Shuttle Trailers

The first trailer will be computed in the second pass after each display is called and cyclically as indicated below:

IF I = 1 OR 2 AND ELAPSED TIME  $\geq$  28.8 seconds since last shuttle trailer OR  
IF I = 3, 4 OR 5 AND ELAPSED TIME  $\geq$  15.36 seconds since last shuttle trailer  
THEN SHUTTLE\_TRAILER(X, TRAILER\_NO) = SHUTTLE\_X\_PREV  
SHUTTLE\_TRAILER(Y, TRAILER\_NO) = SHUTTLE\_Y\_PREV

Once the limit for the number of trailers displayed has been reached, each succeeding computation of a new trailer causes deletion of the oldest trailer.

IF TRAILER\_NO = 6  
THEN TRAILER\_NO = 1  
ELSE TRAILER\_NO = TRAILER\_NO + 1

On every pass the shuttle character location shall be saved for use in computing the shuttle trailer location.

$$\text{SHUTTLE\_X\_PREV} = \text{SHUTTLE\_XN} \\ \text{SHUTTLE\_Y\_PREV} = \text{SHUTTLE\_YN}$$

Computation of Guidance Character

IF ISLECT > 1

REFERENCE RANGE:

THEN REF\_RANGE = RNG\_TO\_WP2 - DRDD\*(ACC\_DRAG - DREFP)

X COORDINATE

GUID\_X = (HC0<sub>1</sub> + HC1<sub>1</sub>\*REF\_RANGE + HC2<sub>1</sub>\*REF\_RANGE<sup>2</sup>)

Y COORDINATE

GUID\_Y = SHUTTLE\_YN

Computation of Guidance Trailer

IF ISLECT > 1 AND the shuttle trailer symbol has been computed

THEN GUID\_TRAILER (X,TRAILER\_NO) = GUID\_X\_PREV (New Guidance Trailer prior to updating TRAILER\_NO)

Note: The Y position of the shuttle trailer symbol is also the Y position of the Guidance Trailer symbol.  
Thus, the Guidance trailer Y Coordinate is not output as a separate parameter.

On every pass the Guidance character X-location shall be saved for use in computing the guidance trailer location.

GUID\_X\_PREV = GUID\_X

Computation of the Alternate Landing Site Characters (PFS Only)

DO FOR J = 1 TO 2

IF ALT\_SITE\_INDEX(J) = 0 THEN

SHUTTLE\_X\_ALT(J) = -512

SHUTTLE\_Y\_ALT(J) = -400 (OFF DISPLAY)

ELSE

Y-Coordinate

SHUTTLE\_Y\_ALT(J) = SHUTTLE\_YN

X-Coordinate

RANGE\_ALT(J) = MIN (RNG\_TO\_RW\_THRESH\_ALT(J), -HC1<sub>1</sub>/(2\*HC2<sub>1</sub>))

SHUTTLE\_X\_ALT(J) = HC0<sub>1</sub> + HC1<sub>1</sub> \* RANGE\_ALT(J) +

HC2<sub>1</sub> \* RANGE\_ALT(J)<sup>2</sup>

Limit X-Coordinate

```
SHUTTLE_X_ALT(J) = MID (E_G_X_MIN, SHUTTLE_X_ALT(J), E_G_X_MAX)
```

```
ENDDO
```

Computation of the Bank Angle Flash Flag PFS (ONLY)

```
IF (BANK*DELAZ > 0 AND |DELAZ| > YL)  
    THEN BANK_FLAG = 1  
    ELSE BANK_FLAG = 0
```

Computation of the Bank Angle Flash Flag BFS (ONLY)

```
DELAZ_RAD = DELAZ*RAD_PER_DEG  
IF (BANK*DELAZ_RAD > 0 AND |DELAZ_RAD| > YL)  
    THEN ENTRABIT(10) = 1  
    ELSE ENTRABIT(10) = 0
```

For Reference Only: The calculation for the BFS Bank Angle Flash Flag used by MEDS is performed by ETL\_GUID (reference MG038104, section 3.2.3.3, for details).

#### **B.4.150.2 Drag Scale Symbols**

Symbols for the following drag parameters shall be displayed on the entry trajectory displays.

- Actual drag acceleration
- Guidance computed reference drag

The drag scale is a one-dimensional system along a line parallel to the Y-axis. Thus the X-Coordinate of the drag scale is a constant and is not required as an output from the Entry DIP.

The requirements for computing and limiting the drag scale symbols are defined in the following paragraphs.

The Computation of Actual Drag Acceleration Symbol Position

Y-Coordinate

```
DRAG_ACC_Y = E_S_Y_MIN + D_SCALE_FACT*ACC_DRAG
```

Check drag scale upper limit and flash flag:

```
IF DRAG_ACC_Y > E_S_Y_MAX (Above scale)  
    THEN DRAG_ACC_Y = E_S_Y_MAX  
        DRAG_ACC_FLAG = FLASH  
    ELSE DRAG_ACC_FLAG = OFF
```

The Computation of Reference Drag Symbol Position

Y-Coordinate

```
IF ISLECT > 1 (Guidance Entry mode)
    THEN DRAG_REF_Y = E_S_Y_MIN + D_SCALE_FACT*DREFP
```

CHECK DRAG SCALE UPPER LIMIT AND FLASH FLAG:

```
IF DRAG_REF_Y > E_S_Y_MAX (Above scale)
    THEN DRAG_REF_Y = E_S_Y_MAX
        DRAG_REF_FLAG = FLASH
    ELSE DRAG_REF_FLAG = OFF
```

**B.4.150.3 Alpha Scale Symbols**

Symbols for the following alpha parameters shall be displayed on the entry displays:

Actual angle of attack

Nominal angle of attack command reference (i. e., scheduled angle of attack)

The alpha scale is a one-dimensional system along a line parallel to the Y-axis. Thus the X-Coordinate of the alpha scale is a constant and is not required as an output from the Entry DIP.

The requirements for computing and limiting the alpha symbols are defined in the following paragraphs.

The Computation of Actual Angle of Attack Symbol Position

Y-Coordinate

```
ACC_ALPHA_Y = E_S_Y_MIN + AL_SCALE_FACT*(ALPHA - INIT_AL_VALi)
```

Check alpha scale limits and flash flag:

```
IF ACC_ALPHA_Y < E_S_Y_MIN (Below scale)
    THEN ACC_ALPHA_Y = E_S_Y_MIN
        ACC_ALPHA_FLAG = FLASH
IF ACC_ALPHA_Y > E_S_Y_MAX (Above scale)
    THEN ACC_ALPHA_Y = E_S_Y_MAX
        ACC_ALPHA_FLAG = FLASH
IF |ALPHA - ACMD1| > 2.0
    THEN ACC_ALPHA_FLAG = FLASH
    ELSE ACC_ALPHA_FLAG = OFF
```

The Computation of Nominal Alpha Command Reference Symbol Position

Compute Y-Coordinate:

$$\text{COM\_ALPHA\_Y} = \text{E\_S\_Y\_MIN} + \text{AL\_SCALE\_FACT} * (\text{ACMD1} - \text{INIT\_AL\_VAL}_1)$$

(Note: Scale coordinate system is one dimensional. The X position of the alpha scale symbols is determined as a part of the fixed background.)

Check reference alpha scale limits and set flash flag:

```
IF COM_ALPHA_Y < E_S_Y_MIN (Below scale)
    THEN COM_ALPHA_Y = E_S_Y_MIN
        COM_ALPHA_FLAG = FLASH
IF COM_ALPHA_Y > E_S_Y_MAX (Above scale)
    THEN COM_ALPHA_Y = E_S_Y_MAX
        COM_ALPHA_FLAG = FLASH
ELSE COM_ALPHA_FLAG = OFF
```

#### **B.4.150.4 REF ROLL STATUS**

A parameter status indicator shall be displayed on the entry displays that shall indicate when the REF ROLL ANGLE (V90H1142C) has decreased below a calculated value. This same indication shall also be used to generate a Class 3 Alert.

##### The Computation of REF ROLL STATUS

$$\text{ROLRFC} = \text{ROLRF1} + \text{ROLRF2} * \text{REL\_VEL\_MAG}$$

```
IF REL_VEL_MAG > VROLF1
    THEN ROLRFC = ROLRF3 + ROLRF4 * REL_VEL_MAG
```

```
IF REL_VEL_MAG > VROLF2
    THEN ROLRFC = ROLRF5 + ROLRF6 * REL_VEL_MAG
```

```
IF REL_VEL_MAG > VROLF3
    THEN ROLRFC = ROLRF7 + ROLRF8 * REL_VEL_MAG
```

```
IF |ROLLC(3)| < ROLRFC
    THEN REF_ROL_STAT = 1
    ELSE REF_ROL_STAT = 0
```

#### **B.4.150.5 PHUGOID BANK Symbol**

A PHUGOID BANK symbol shall be displayed on the entry trajectory displays. The PHUGOID BANK scale shall be flashed when the Bank Angle flash flag is set. The scale is a one-dimensional system along a line parallel to the X-axis. Thus the Y-Coordinate of the PHUGOID BANK scale is constant and is not required as an output from the Entry DIP.

The requirements for computing and limiting the PHUGOID BANK symbol are defined in the following paragraph.

The Computation of PHUGOID BANK symbol position (480 ms)

```

IF REL_VEL_MAG < V_TEST
  THEN DIR_ROL = 1 * SIGN(BANK_ANGLE)
      DLZRL = DELAZ*DIR_ROL (PFS ONLY)
      DLZRL = DELAZ*RAD_PER_DEG*DIR_ROL (BFS ONLY)

```

PHUGOID CALCULATION (BOTH PFS & BFS)

```

IF DLZRL ≥ YL
  THEN DIR_ROL = - DIR_ROL
D_BASE = DC1
IF REL_VEL_MAG ≥ VC1
  THEN D_BASE = DC2 + DC3*REL_VEL_MAG
IF REL_VEL_MAG < VC2
  THEN D_BASE = DC4 + DC5 * REL_VEL_MAG
D_REF = D_BASE + BIAS_ITEM
HDTREF = -2 * H_SCAL * D_REF/REL_VEL_MAG
ALDRFD = (- GS * (V - MAG2/VSAT2 - 1) /D_REF) + 2 * HDTREF/REL_VEL_MAG
LODVD = (ALDRFD + K16 * (ACC_DRAG - D_REF)
        +K17 * (HDTREF - H_DOT_ELLIPSOID))/LOD
IF |LODVD| ≥ 1
  THEN LODVD = 1 * SIGN(LODVD)
      BCD = DIR_ROL*ARCCOS(LODVD)
      ALPHA_R = ALPHA * RAD_PER_DEG
      RCD = ARCTAN2 * (SIN(BCD),COS(ALPHA_R) * COS (BCD)) * DEG_PER_RAD
      ROLERR = RCD - PHI

```

Compute X-Coordinate:

```

X_PHUGOID_BK = INTEGER (P_S_X_MIN + (P_S_X_MAX - P_S_X_MIN)/2
  + PH_SCALE_FACT * ROLERR)

```

Check commanded PHUGOID BANK scale limits and set flash flag:

```

IF X_PHUGOID_BK > P_S_X_MAX (Right of scale)
  THEN X_PHUGOID_BK = P_S_X_MAX
      X_PHUGOID_FLAG = 1 (FLASH)
ELSE IF X_PHUGOID_BK < P_S_X_MIN (LEFT OF SCALE)
  THEN X_PHUGOID_BK = P_S_X_MIN
      X_PHUGOID_FLAG = 1 (FLASH)
ELSE X_PHUGOID_FLAG = 0 (OFF)

```



**B.4.150.6 The Derivation of the Entry DIP Coefficients (Information Only)**

Table B.4.150.6-1 contains constants associated with the fixed backgrounds of the entry displays. The values of VERT\_1 and VERT\_2 represent the endpoints of the ordinate in fps for the relative velocity displays and in ft for the energy over weight displays. The values of HORZ\_1, HORZ\_3 and HORZ\_2 represent the endpoints and midpoint of the ABSCISSA in nautical miles, respectively.

The corresponding locations or I-LOAD MSIDs of these points are shown at the bottom of table B4.150.6-1. The tube locations are defined with origin at center of tube. The I-LOAD values can be found in the JSC-19350 STS Flight Software Initialization Load.

Table B4.150.6-2 contains the I-LOAD MSIDs of the coefficients associated with the five entry displays. The values for these I-LOADs are found in the JSC-19350 STS Flight Software Initialization Load.

Table B.4.150.6-1. ENTRY DISPLAY BACKGROUND CONSTANTS.						
	VERT_1	VERT_2		HORZ_1	HORZ_2	HORZ_3
TRAJ 1	17000	24500		800	1800	3800
TRAJ 2	14000	17000		430	720	1300
TRAJ 3	10500	14000		315	477	800
TRAJ 4	700000	1900000		145	257	480
TRAJ 5	180000	700000		55	110	220
COORD	V97U6769C	271		V97U6768C	44	V97U6767C

These constants must satisfy the following equations.

For the ordinate, the two endpoints are used to solve two simultaneous equations:

$$\begin{aligned} V97U6769C &= VC0 + VC1 (VERT_1) + VC2 (VERT_1) \\ 271 &= VC0 + VC1 (VERT_2) + VC2 (VERT_2) \end{aligned}$$

For the ABSCISSA, the endpoints and midpoint are used to solve three simultaneous equations.

$$\begin{aligned} V97U6768C &= HC0 + HC1 (HORZ_1) + HC2 (HORZ_1)^2 \\ 44 &= HC0 + HC1 (HORZ_2) + HC2 (HORZ_2)^2 \\ V97U6767C &= HC0 + HC1 (HORZ_3) + HC2 (HORZ_3)^2 \end{aligned}$$

Table B.4.150.6-2. ENTRY DISPLAY GRAPH COEFFICIENTS						
	VC0	VC1	VC2	HC0	HC1	HC2
TRAJ 1	V97U6928C	V97U7038C	V97U7043C	V97U6795C	V97U6800C	V97U6805C
TRAJ 2	V97U6929C	V97U7039C	V97U7044C	V97U6796C	V97U6801C	V97U6806C
TRAJ 3	V97U6930C	V97U7040C	V97U7045C	V97U6797C	V97U6802C	V97U6807C
TRAJ 4	V97U6931C	V97U7041C	V97U7046C	V97U6798C	V97U6803C	V97U6808C
TRAJ 5	V97U6932C	V97U7042C	V97U7047C	V97U6799C	V97U6804C	V97U6809C

Table B.4.150.6-2. ENTRY DISPLAY GRAPH COEFFICIENTS							
	VC0	VC1	VC2		HC0	HC1	HC2

The drag scale ranges from 0 to 50 fps<sup>2</sup> on all five entry displays. The drag scale factor (D\_SCALE\_FACT) for the coordinate system is  $(V97U6770C - V97U6771C) / 50 = V97U6750C$ .

The alpha scale ranges from 25 to 50 degrees on TRAJ 1 and TRAJ 2; from 20 to 45 degrees on TRAJ 3 and TRAJ 4; and from 5 to 30 degrees on TRAJ 5. The alpha scale factor (AL\_SCALE\_FACT) for the coordinate system is  $(V97U6770C - V97U6771C) / 25 = V97U6701C$ .

**B.4.150.7 BFS Supplemental Description**

1. The “computation of PHUGOID BANK symbol position” in the Entry DOP is to be performed at a processing rate of once every 320 ms.
2. X\_PHUGOID\_BK is computed in the Entry DOP as follows:

$$X\_PHUGOID\_BK = \text{Integer} (P\_S\_BIAS + PH\_SCALE\_FACT * ROLERR)$$

Where P\_S\_BIAS (V97U7072C) is a mission dependent I-LOAD constant.

**B.4.150.8 Entry Display Interface Support Functions**

Table B.4.150-5	Input Functional Parameters
Table B.4.150-6	Output Functional Parameters
Table B.4.150-7	I-Loads
Table B.4.150-8	K-Loads
Table B.4.150-9	Constants

TABLE B.4.150-5. INPUT FUNCTIONAL PARAMETERS FOR ENTRY DISPLAY PROCESSING (G4.150)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
ACC_DRAG	V95A0160CB	DRAG DECEL	ENT UPP	FT/S2			93017G	*
ACMD1	V90H1192C	SCHEDULED ANGLE OF ATTACK	ENT GUID	DEG			92354	
ALPHA	V95H3021C	GN&C ANGLE OF ATTACK	ADTA SOP	DEG		SPL	93017G	*
ALT_SITE_INDEX(1)	V94U5524CA	ALTERNATE SITE 1 INDEX	ENT BRG DISP	ND	HXS		93090E	
ALT_SITE_INDEX(1)	V94U5524CC	ALTERNATE SITE 1 INDEX	ENT SITE LOOKUP	ND	HXS		93090E	
ALT_SITE_INDEX(2)	V94U5525CA	ALTERNATE SITE 2 INDEX	ENT BRG DISP	ND	HXS		93090E	
ALT_SITE_INDEX(2)	V94U5525CC	ALTERNATE SITE 2 INDEX	ENT SITE LOOKUP	ND	HXS		93090E	
ALT_WHEELS	V95H0165CB	ALT TO REAR WHEELS/NAV BASE(ENTRY)	ENT UPP	FT	DPL		93017G	*
BANK	V90H2201C	BANK ANGLE	A/E ATT PROC	DEG	SPL		93017G	*
BIAS_ITEM	V93R5203CA	DRAG REF BIAS	ENTRY TRAJ1	FT/S2				
BIAS_ITEM	V93R5203CB	DRAG REF BIAS	ENTRY TRAJ2	FT/S2				
BIAS_ITEM	V93R5203CC	DRAG REF BIAS	ENTRY TRAJ3	FT/S2				
BIAS_ITEM	V93R5203CD	DRAG REF BIAS	ENTRY TRAJ4	FT/S2				
BIAS_ITEM	V93R5203CE	DRAG REF BIAS	ENTRY TRAJ5	FT/S2				
DELAZ	V95H0172C	HEADING ERR WRT HAC TANGENT POINT	ENT UPP	RAD	SPL		93017G	*
DRDD	V90R1137C	DERIVATIVE OF RANGE WRT DRAG	ENT GUID	NM	SPL		93017G	*
DREFP	V90A1135C	REF DRAG	ENT GUID	FT/S2	SPL		93017G	*
H_DOT_ELLIPSOID/H_DOT	V95L0265CD	EST ALTITUDE RATE	ENT UPP	FT/S	SPL		93017G	*
ISLECT	V90J1138C	ENTRY GUID SUBPHASE INDICATOR	ENT GUID		HXS		93017G	*
LOD	V95U0180C	LIFT/DRAG	ENT UPP		SPL		93017G	*
PHI/PHI_TOPO	V90H2202C	BODY ROLL ATTITUDE EULER ANGLE	A/E ATT PROC	DEG	SPL		93017G	*
PTI_ACT_D	V90X3249X	PTI ACTIVE FLAG	PTI		BD		93017G	*
PTI_WINDOW	V90X2401X	VEHICLE IN PTI WINDOW	PTI				89740B	
REL_VEL_MAG/V	V95L0151CC	GND REL VEL MAGNITUDE IN M50 SYS	ENT UPP	FT/S	SPL		93017G	*
RNG_TO_RW_THRESH	V95H0176CA	RANGE TO RUNWAY THRESHOLD VIA WP1	ENT UPP	NM			93017G	*
RNG_TO_RW_THRESH_ALT(1)	V94U6528C	RANGE TO ALT SITE 1 PRI RW THRESH	ENT BRG SPEC	NM	SPL		93090E	
RNG_TO_RW_THRESH_ALT(2)	V94U6529C	RANGE TO ALT SITE 2 PRI RW THRESH	ENT BRG SPEC	NM	SPL		93090E	
ROLLC(3)	V90H1142C	REF ROLL ANGLE	ENT GUID	DEG	SPL		93017G	*
T2	V90A1134C	CONST DRAG LEVEL TO REACH TARGET	ENT GUID	FT/S2	SPL		93017G	*
V_MAG	V95L0150C	VEHICLE INERTIAL SPEED	ENT UPP	FT/S			93017G	*
YL	V90H1183C	MAXIMUM HEADING ERROR ABS VALUE	ENT GUID	RAD				

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE B.4.150-6. OUTPUT FUNCTIONAL PARAMETERS FROM ENTRY DISPLAY PROCESSING (G4.150)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
ACC_ALPHA_FLAG	V94X1242X	ALPHA SYMBOL FLASH FLAG	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5					
ACC_ALPHA_Y	V94U1235C	Y COORD OF ALPHA SYMBOL	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
BANK_FLAG	V94X1238X	BANK ANGLE FLASH FLAG	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5				92522D	
COM_ALPHA_FLAG	V94X1246X	ALPHA CMD FLASH FLAG	MEDS FC GNC XFER ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5					
COM_ALPHA_Y	V94U1236C	Y COORD OF COMMANDED ALPHA SYMBOL	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
DISP_PRO	V94X1237X	COMMAND TO PROCEED TO NEXT DISPLAY	MSC					
DRAG_ACC_FLAG	V94X1241X	DRAG TRIANGLE FLASH FLAG	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5					
DRAG_ACC_Y	V94U1230C	Y COORD OF DRAG ACC SYMBOL	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
DRAG_REF_FLAG	V94X1240X	REFERENCE DRAG FLASH FLAG	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5					

TABLE B.4.150-6. OUTPUT FUNCTIONAL PARAMETERS FROM ENTRY DISPLAY PROCESSING (G4.150)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
DRAG_REF_Y	V94U1231C	Y COORD OF DRAG REFERENCE SYMBOL	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
D_REF	V94A1252C	BIASED REF DRAG	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5		VAR			
GUID_TRAILER(X,1)	V94U1213C	X COORD GUIDANCE TRAILER (1)	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
GUID_TRAILER(X,2)	V94U1214C	X COORD GUIDANCE TRAILER (2)	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
GUID_TRAILER(X,3)	V94U1215C	X COORD GUIDANCE TRAILER (3)	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
GUID_TRAILER(X,4)	V94U1216C	X COORD GUIDANCE TRAILER (4)	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
GUID_TRAILER(X,5)	V94U1217C	X COORD GUIDANCE TRAILER (5)	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
GUID_TRAILER(X,6)	V94U1218C	X COORD GUIDANCE TRAILER (6)	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
GUID_X	V94U1202C	X COORD OF GUIDANCE SYMBOL	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			

TABLE B.4.150-6. OUTPUT FUNCTIONAL PARAMETERS FROM ENTRY DISPLAY PROCESSING (G4.150)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
GUID_Y	V94U1245C	Y COORD OF GUIDANCE SYMBOL	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
PTI_IND	V90X3220XC	PTI INDICATOR	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5		BD		79994C	
REF_ROL_STAT	V94X1253X	REF ROLL STATUS	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5		BD			
SHUTTLE_X	V94U1201C	X COORD OF SHUTTLE PROFILE	GAX ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
SHUTTLE_X_ALT(1)	V94H5634C	X COORD SHUTTLE SYMBOL ALT SITE 1	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR		93090E	
SHUTTLE_X_ALT(2)	V94H6498C	X COORD SHUTTLE SYMBOL ALT SITE 2	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR		93090E	
SHUTTLE_Y	V94U1203C	Y COORD OF SHUTTLE PROFILE	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
SHUTTLE_Y_ALT(1)	V94H5635C	Y COORD SHUTTLE SYMBOL ALT SITE 1	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR		93090E	
SHUTTLE_Y_ALT(2)	V94H6499C	Y COORD SHUTTLE SYMBOL ALT SITE 2	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR		93090E	

TABLE B.4.150-6. OUTPUT FUNCTIONAL PARAMETERS FROM ENTRY DISPLAY PROCESSING (G4.150)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
TRAILER(X,1)	V94U1205C	X COORD SHUTTLE TRAILER (1)	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
TRAILER(X,2)	V94U1206C	X COORD SHUTTLE TRAILER (2)	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
TRAILER(X,3)	V94U1207C	X COORD SHUTTLE TRAILER (3)	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
TRAILER(X,4)	V94U1208C	X COORD SHUTTLE TRAILER (4)	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
TRAILER(X,5)	V94U1209C	X COORD SHUTTLE TRAILER (5)	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
TRAILER(X,6)	V94U1210C	X COORD SHUTTLE TRAILER (6)	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
TRAILER(Y,1)	V94U1222C	Y COORD SHUTTLE TRAILER (1)	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
TRAILER(Y,2)	V94U1223C	Y COORD SHUTTLE TRAILER (2)	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
TRAILER(Y,3)	V94U1224C	Y COORD SHUTTLE TRAILER (3)	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			

TABLE B.4.150-6. OUTPUT FUNCTIONAL PARAMETERS FROM ENTRY DISPLAY PROCESSING (G4.150)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
TRAILER(Y,4)	V94U1225C	Y COORD SHUTTLE TRAILER (4)	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
TRAILER(Y,5)	V94U1226C	Y COORD SHUTTLE TRAILER (5)	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
TRAILER(Y,6)	V94U1227C	Y COORD SHUTTLE TRAILER (6)	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5	AU	VAR			
X_PHUGOID_BK	V94U1250C	X COORD OF PHUGOID BANK SYMBOL	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5		VAR			
X_PHUGOID_FLAG	V94X1251X	PHUGOID BANK SYMBOL FLASH FLAG	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5					

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec



TABLE B.4.150-7. ENTRY DISPLAY PROCESSING (G4.150) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
AL_SCALE_FACT	V97U6701C	AU/DEG	F	S	M	C	G4.150	00	ZFG	90593A	
DC1	V97U7061C	FT/SEC**2	F	S	M	C	G4.150	00	ETD	DC0599	
DC2	V97U7062C	FT/SEC**2	F	S	M	C	G4.150	00	ETD	DC0599	
DC3	V97U7063C	SEC**-1	F	S	M	C	G4.150	00	ETD	DC0599	
DC4	V97U7064C	FT/SEC**2	F	S	M	C	G4.150	00	ETD	DC0599	
DC5	V97U7065C	SEC**-1	F	S	M	C	G4.150	00	ETD	DC0599	
DXS	V97U6765C	AU	F	S	M	C	G4.150	00	ZFG	90593A	
DYS	V97U6766C	AU	F	S	M	C	G4.150	00	ZFG	90593A	
D_SCALE_FACT	V97U6750C	AU/(FT/SEC**2)	F	S	M	C	G4.150	00	ZFG	90593A	
E_G_X_MAX	V97U6767C	AU	F	S	M	C	G4.150	00	ZFG	90593A	
E_G_X_MIN	V97U6768C	AU	F	S	M	C	G4.150	00	ZFG	90593A	
E_G_Y_MIN	V97U6769C	AU	F	S	M	C	G4.150	00	ZFG	90593A	
E_S_Y_MAX	V97U6770C	AU	F	S	M	C	G4.150	00	ZFG	90593A	
E_S_Y_MIN	V97U6771C	AU	F	S	M	C	G4.150	00	ZFG	90593A	
HC0(1)	V97U6795C	AU	F	S	M	C	G4.150	00	ET1	DC0599	
HC0(2)	V97U6796C	AU	F	S	M	C	G4.150	00	ET2	DC0599	
HC0(3)	V97U6797C	AU	F	S	M	C	G4.150	00	ET3	DC0599	
HC0(4)	V97U6798C	AU	F	S	M	C	G4.150	00	ET4	DC2213	
HC0(5)	V97U6799C	AU	F	S	M	C	G4.150	00	ET5	DC0599	
HCl(1)	V97U6800C	AU/NMI	F	S	M	C	G4.150	00	ET1	DC0599	
HCl(2)	V97U6801C	AU/NMI	F	S	M	C	G4.150	00	ET2	DC0599	
HCl(3)	V97U6802C	AU/NMI	F	S	M	C	G4.150	00	ET3	DC0599	
HCl(4)	V97U6803C	AU/NMI	F	S	M	C	G4.150	00	ET4	DC2213	
HCl(5)	V97U6804C	AU/NMI	F	S	M	C	G4.150	00	ET5	DC0599	
HC2(1)	V97U6805C	AU/NMI**2	F	S	M	C	G4.150	00	ET1	DC0599	
HC2(2)	V97U6806C	AU/NMI**2	F	S	M	C	G4.150	00	ET2	DC0599	
HC2(3)	V97U6807C	AU/NMI**2	F	S	M	C	G4.150	00	ET3	DC0599	
HC2(4)	V97U6808C	AU/NMI**2	F	S	M	C	G4.150	00	ET4	DC2213	
HC2(5)	V97U6809C	AU/NMI**2	F	S	M	C	G4.150	00	ET5	DC0599	
H_SCAL	V97U7067C	FT	F	S	M	C	G4.150	00	ZFG	90593A	
INIT_AL_VAL(1)	V97U6821C	DEG	F	S	M	C	G4.150	00	ET1	DC0599	
INIT_AL_VAL(2)	V97U6822C	DEG	F	S	M	C	G4.150	00	ET2	DC0599	
INIT_AL_VAL(3)	V97U6823C	DEG	F	S	M	C	G4.150	00	ET3	DC0599	
INIT_AL_VAL(4)	V97U6824C	DEG	F	S	M	C	G4.150	00	ET4	DC2213	
INIT_AL_VAL(5)	V97U6825C	DEG	F	S	M	C	G4.150	00	ET5	DC0599	
I_TRAN	V97U7071C	ND	I	S	M	C	G4.150	00	ZFG	90593A	
K16	V97U7068C	SEC**2/FT	F	S	M	C	G4.150	00	ETD	DC0599	
K17	V97U7069C	SEC/FT	F	S	M	C	G4.150	00	ETD	DC0599	
PH_SCALE_FACT	V97U7035C	AU/DEG	F	S	M	C	G4.150	00	ZFG	90593A	
P_S_X_MAX	V97U7037C	AU	F	S	M	C	G4.150	00	ZFG	90593A	
P_S_X_MIN	V97U7036C	AU	F	S	M	C	G4.150	00	ZFG	90593A	
ROLRF1	V97U7051C	DEG	F	S	M	C	G4.150	00	ETD	DC0599	
ROLRF2	V97U7052C	DEG*SEC/FT	F	S	M	C	G4.150	00	ETD	DC0599	
ROLRF3	V97U7053C	DEG	F	S	M	C	G4.150	00	ETD	DC0599	
ROLRF4	V97U7054C	DEG*SEC/FT	F	S	M	C	G4.150	00	ETD	DC0599	
ROLRF5	V97U7055C	DEG	F	S	M	C	G4.150	00	ETD	DC0599	
ROLRF6	V97U7056C	DEG*SEC/FT	F	S	M	C	G4.150	00	ETD	DC0599	

TABLE B.4.150-7. ENTRY DISPLAY PROCESSING (G4.150) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
ROLRF7	V97U7057C	DEG	F	S	M	C	G4.150	00	ETD	DC0599	
ROLRF8	V97U7058C	DEG*SEC/FT	F	S	M	C	G4.150	00	ETD	DC0599	
VC0 (1)	V97U6928C	AU	F	S	M	C	G4.150	00	ET1	DC0599	
VC0 (2)	V97U6929C	AU	F	S	M	C	G4.150	00	ET2	DC0599	
VC0 (3)	V97U6930C	AU	F	S	M	C	G4.150	00	ET3	DC0599	
VC0 (4)	V97U6931C	AU	F	S	M	C	G4.150	00	ET4	DC2213	
VC0 (5)	V97U6932C	AU	F	S	M	C	G4.150	00	ET5	DC0599	
VC1	V97U7059C	FT/SEC	F	S	M	C	G4.150	00	ETD	DC0599	
VC1 (1)	V97U7038C	AU/FT	F	S	M	C	G4.150	00	ZFG	90593A	
VC1 (2)	V97U7039C	AU/FT	F	S	M	C	G4.150	00	ZFG	90593A	
VC1 (3)	V97U7040C	AU/FT	F	S	M	C	G4.150	00	ZFG	90593A	
VC1 (4)	V97U7041C	AU/FT	F	S	M	C	G4.150	00	ET4	DC2213	
VC1 (5)	V97U7042C	AU/FT	F	S	M	C	G4.150	00	ET5	DC0599	
VC2	V97U7060C	FT/SEC	F	S	M	C	G4.150	00	ETD	DC0599	
VC2 (1)	V97U7043C	AU/(FT/SEC)	F	S	M	C	G4.150	00	ET1	DC0599	
VC2 (2)	V97U7044C	AU/(FT/SEC)	F	S	M	C	G4.150	00	ET2	DC0599	
VC2 (3)	V97U7045C	AU/(FT/SEC)	F	S	M	C	G4.150	00	ET3	DC0599	
VC2 (4)	V97U7046C	AU/(FT/SEC)	F	S	M	C	G4.150	00	ZFG	90593A	
VC2 (5)	V97U7047C	AU/(FT/SEC)	F	S	M	C	G4.150	00	ZFG	90593A	
VROLF1	V97U7048C	FT/SEC	F	S	M	C	G4.150	00	ETD	DC0599	
VROLF2	V97U7049C	FT/SEC	F	S	M	C	G4.150	00	ETD	DC0599	
VROLF3	V97U7050C	FT/SEC	F	S	M	C	G4.150	00	ETD	DC0599	
V_TEST	V97U7066C	FT/SEC	F	S	M	C	G4.150	00	ETD	DC0599	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.4.150-8. ENTRY DISPLAY PROCESSING (G4.150) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
VSAT	V97U0439C	00	+2.5766200	E+04 FT/SEC	F	S	C	G4.150 G4.8	29685A	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.4.150-9. ENTRY DISPLAY PROCESSING (G4.150) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
--------------------------	------	----	----------------	-----------	----	--------	---	---------	---------	-------------

---

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

#### B.4.154 VERTICAL SITUATION DISPLAY PROCESSING (PFS/BFS)

The vertical situation display processing function shall provide computation of the dynamic orbiter symbol displayed on the fixed background of the vertical situation displays. The fixed background of both vertical situation displays is a function of altitude and range to go. In addition, the processing function shall provide computation of the current energy state symbol Y-position to be displayed on a fixed background energy scale. The nominal, upper and lower energy limit tic mark Y-positions shall also be computed for display on the energy scale. This function shall also compute the Y-position of the current pitch attitude symbol for display on the fixed background scale. The description of the fixed format is in Sections 4.2.6 and 4.2.7.

The processing required to support the display of the dynamic symbols is defined in the following paragraphs. The cyclic computation rate of the display processing in the PFS is once every 480ms for OPS 1/6 and once every 960ms for OPS 3. The BFS processing rate is once every 320ms for the Mach-Alpha Indicator.

The I-Load values are defined in the STS Flight Software Initialization Load (JSC-19350) and in Table B.4.154-7. The K-Loads can be found in Table B.4.154-8.

For BFS processing, the following I-LOAD values are initialized as shown at the OPS transitions listed:

##### OPS1

X\_AIM\_PT = X\_WP2\_RTLS

##### OPS3

ES\_C12(1) = ES\_C12\_03(1)

ES\_C12(2) = ES\_C12\_03(2)

EDRS2(1) = EDRS2\_03(1)

EDRS2(2) = EDRS2\_03(2)

X\_AIM\_PT = X\_WP2

RMEPMIN = RMEPMIN\_03

RT1\_ALT\_VS1 = RT1\_ALT\_VS1\_03

OPS1 transition (PFS and BFS)

IGSD = 1

OPS3 (PFS and BFS)

IGSD = IGS

IF TG\_END = 1

THEN PRED\_R = R\_GND\_AP

ELSE PRED\_R = RPRED + X\_AIM\_PT

IF (PRED\_R < RT1\_RNG\_VS1 AND ALT\_WHEELS < RT1\_ALT\_VS1) OR OPS 603 PRO

THEN (1)

ELSE (2)

(1)

IF ALT\_WHEELS  $\geq$  HSWITCH  
THEN I = 1 (VERTICAL SITUATION 1)  
ELSE I = 2 (VERTICAL SITUATION 2) (SET ADV\_FLAG)

Computation of Orbiter Symbol Nose

IF ALT\_WHEELS  $\leq$  HBIAS(2) OR PRED\_R  $\leq$  RBIAS(2)  
THEN VSHUTTLE\_Y = VS\_Y\_MIN  
VSHUTTLE\_X = VS\_X\_MIN

(1)

X-Coordinate

VSHUTTLE\_XN = XSCALE<sub>I</sub> \* (PRED\_R - RBIAS<sub>I</sub>) + VS\_X\_MIN

Y-Coordinate

VSHUTTLE\_YN = YSCALE<sub>I</sub> \* (ALT\_WHEELS - HBIAS<sub>I</sub>) + VS\_Y\_MIN

Altitude dissipation rate

ALT\_DIS\_ANGLE = ARCTAN2((- H\_DOT\_ELLIPSOID\*YSCALE<sub>I</sub>),  
(V\_GROUNDSPEED \* XSCALE<sub>I</sub>))

To satisfy display requirements the altitude dissipation angle is measured from 0 to 360 CW, where zero position equals shuttle nose pointing toward top of CRT. Thus, the displayed altitude dissipation shall be generated as follows:

DISP\_ALT\_DIS\_ANGLE = (- 90 - ALT\_DIS\_ANGLE \* 180/PI)(MOD 360)

(1)

Computation of Orbiter Symbol Center

X-Coordinate

VSHUTTLE\_X = VSHUTTLE\_XN + DXS\*COS(ALT\_DIS\_ANGLE) - DYS\*SIN(ALT\_DIS\_ANGLE)

Y-Coordinate

VSHUTTLE\_Y = VSHUTTLE\_YN + DXS\*SIN(ALT\_DIS\_ANGLE) +  
DYS\*COS(ALT\_DIS\_ANGLE)

(1) (2)

Conversion of Digital Data

This principal function shall also provide the necessary conversion processing required to support the digitals on the vertical situation displays. The speedbrake command shall be converted from degrees to percent; the speedbrake position is already in percent.

$$VS\_SBC = 100 * SBC / 98.6$$

where:

```
IF TG_END = 0
  THEN SBC = DSBC_AT
IF TG_END = 1
  THEN SBC = DSBC_AL
```

where :

$$0 \leq SBC \leq 98.6 \text{ DEGREES}$$

(2)

Computation of the Mach–Alpha Indicator

Y–Coordinate

$$ALPHA\_PLOT = MID (RT2\_ALPHA\_MIN, ALPHA\_N, RT2\_ALPHA\_MAX)$$

```
IF ALPHA_N > RT2_ALPHA_MAX
  THEN SHUTTLE_ALPHA_FLAG = FLASH
ELSE IF ALPHA_N < RT2_ALPHA_MIN
  THEN SHUTTLE_ALPHA_FLAG = FLASH
ELSE SHUTTLE_ALPHA_FLAG = OFF
```

$$RT1\_SQUARE\_Y = \text{Integer} (RT1\_ALPHA\_BIAS + RT1\_ALPHA\_SC\_FACT * ALPHA\_PLOT)$$

X–Coordinate

$$MACH\_PLOT = MID (RT1\_MACH\_MIN, MACH, RT1\_MACH\_MAX)$$

$$RT1\_SQUARE\_X = \text{Integer}(RT1\_MACH\_BIAS + RT1\_MACH\_SC\_FACT * MACH\_PLOT)$$

(1) (2)

Energy Scale Symbols:

Symbols for the following energy parameters shall be displayed.

- energy upper and lower limits
- nominal energy
- current shuttle energy
- OTT downmode energy

The energy scale is a one–dimensional system along a line parallel to the Y axis. Thus the X–Coordinate of the energy scale is a constant and is not required as an output from the Vertical Situation DIP. The requirements for computing and limiting the energy symbols are defined in the following paragraphs. The coordinate system used is the center of the CRT with X positive to the right and Y positive up.

COMPUTATION OF ENERGY SYMBOLS (PFS ONLY)

```
IF ALT_WHEELS > HSWITCH2
  THEN Perform Energy Scale Symbol Computations
  ELSE  NOM_ENERGY_Y, SHUTTLE_ENER_Y, EMOH_ENER_Y, ENER_UL_Y AND
        ENER_LL_Y = - 400
```

COMPUTATION OF ENERGY SYMBOLS (BFS ONLY)

```
IF ALT_WHEELS > HSWITCH2 AND (ISLECT_GUID = 12 OR (ISLECT_GUID ≥ 6 AND
ISLECT_GUID ≤ 9))
  THEN Perform energy scale symbol computations
  ELSE  NOM_ENERGY_Y, SHUTTLE_ENER_Y, ENER_UL_Y AND ENER_LL_Y = - 400
```

(1) (2)

Computation of Nominal Energy Symbol Position

Compute S-TURN level

```
IF PRED_R > RMINST
  THEN ENERGY_STURN = ES
  ELSE ENERGY_STURN = ES_C12IGSD + EDRS2IGSD * (PRED_R - RMINST)
```

Compute required scale factor

ENERGY\_SCALE = SCALE\_LEN/(ENERGY\_STURN - EMEP)

Y-Coordinate

NOM\_ENERGY\_Y = YMEP + ENERGY\_SCALE \* (EN - EMEP)

(1) (2)

Computation of Current Energy Symbol Position

Y-Coordinate

SHUTTLE\_ENER\_Y = Integer (YMEP + ENERGY\_SCALE \* (EOW - EMEP))

(2)

Limit symbol and determine flash requirement

```
IF EOW ≥ EN
  THEN IF EOW > ENERGY_STURN
        THEN IF PRED_R ≥ RMINST
              THEN SHUTTLE_ENER_FLAG = FLASH
              ELSE SHUTTLE_ENER_FLAG = OFF
```

```
IF SHUTTLE_ENER_Y > YMAX
  THEN SHUTTLE_ENER_Y = YMAX
  ELSE SHUTTLE_ENER_FLAG = OFF
```



```
IF EOW ≤ EMEP
  THEN IF      PRED_R ≥ RMEPMIN
        THEN  SHUTTLE_ENER_FLAG = FLASH
        ELSE  SHUTTLE_ENER_FLAG = OFF
IF SHUTTLE_ENER_Y < YMIN
  THEN  SHUTTLE_ENER_Y = YMIN
  ELSE  SHUTTLE_ENER_FLAG = OFF
```

(1) (2)

Computation of Energy Symbol Limit Position

Compute upper energy limit symbol position

$ENER\_UL\_Y = YMEP + ENERGY\_SCALE * (EMAX - EMEP) + 11$

Compute lower energy limit symbol position

$ENER\_LL\_Y = YMEP + ENERGY\_SCALE*(EMIN - EMEP) + 11$

The above ENER\_UL\_Y and ENER\_LL\_Y requirements include a +11 AU bias. Since the energy tick marks on the Vert Sit displays are depicted using underscores ("\_") rather than hyphens ("-"), this bias is implemented to account for the different vertical placement of the two symbols within the character space.

(1) (2)

Computation of OTT Downmode Energy Symbol Position

Compute OTT Downmode Energy Symbol position

```
IF PRED_R < RMOH
  THEN  EMOH_ENER_Y = -400
  ELSE  EMOH_ENER_Y = YMEP + ENERGY_SCALE*(EMOH - EMEP)
```

(1)

Theta Scale Symbol

The current vehicle pitch attitude shall be displayed on the left side of the existing energy scale. The requirements for computing and limiting the theta symbol are defined as follows:

Computation of Current Theta Symbol Position

```
IF REL_VEL_MAG ≤ V_DEFAULT
  THEN IV = 1 (DETERMINE VELOCITY REGION)
  IF (REL_VEL_MAG > V1) THEN IV = 2
  IF (REL_VEL_MAG > V2) THEN IV = 3
  IF (REL_VEL_MAG > V3) THEN IV = 4
```

COMPUTE THETA MAX VALUE FOR SCALING

$THETA\_MAX = A(IV,1) + A(IV,2)*REL\_VEL\_MAG + A(IV,3)*(1./COSPHI - 1.)$   
 $+ (A(IV,4) + A(IV,5)*REL\_VEL\_MAG)*DSBFBP$

COMPUTE THETA MIN VALUE FOR SCALING

```

THETA_MIN = B(IV,1) + B(IV,2)*REL_VEL_MAG + B(IV,3)*(1./COSPFI -1.)
            + (B(IV,4) + B(IV,5)*REL_VEL_MAG)*DSBFBP + MID (PITCH_MAX
            - DPDV*(REL_VEL_MAG - VB)/VD,PITCH_MAX, PITCH_MIN)*((M -
            WT_NOM) / (WT_DENOM))

```

LIMIT THETA SCALE SENSITIVITY

```

IF THETA_MAX < THETA_MIN + DTHT
    THEN THETA_MAX = THETA_MIN + DTHT

```

COMPUTE THETA SCALE FACTOR

```

THETA_SCALE = SCALE_LEN / (THETA_MIN - THETA_MAX)

```

COMPUTE THETA SYMBOL Y-POSITION

```

THETA_Y = INTEGER (YMEP - THETA_SCALE*(THETA - THETA_MIN))

```

LIMIT THETA SYMBOL Y POSITION

```

IF THETA_Y > YMAX
    THEN THETA_Y = YMAX
IF THETA_Y < YMIN
    THEN THETA_Y = YMIN
    IF THETA_Y = Y_MIN OR THETA_Y = Y_MAX
        THEN SHUTTLE_THETA_FLAG = FLASH
    ELSE SHUTTLE_THETA_FLAG = OFF

```

**B.4.154.1 The Derivation of the Vertical Situation DIP Coefficients (Information Only)**

Table B 4.154.1-1 contains the I-LOAD MSID's or the constants associated with the fixed backgrounds of the vertical situation displays. VSVERT\_1 and VSVERT\_2 represent the end points of the ordinate in feet. The values of VSHORZ\_1 and VSHORZ\_2 represent the endpoints of the abscissa in feet. The bottom line of the table shows the corresponding I-LOAD MSID's or locations of these points in tube coordinates with the origin at the tube center. The I-LOAD values may be obtained from the JSC-19350 STS Flight Software Initialization Load.

Table B.4.154.1-2 contains the I-LOAD MSID's of the biases and scale factors associated with the vertical situation displays. The I-LOAD values may be found in the JSC-19350 STS Flight Software Initialization Load.

Table B.4.154.1-3 contains the I-LOAD MSID's of the biases and scale factors associated with the Alpha/Mach profile on the Vertical Situation 1 Display. The I-LOAD values may be found in the JSC-19350 STS Flight Software Initialization Load.

Table B.4.154.1-1. VERTICAL SITUATION DISPLAY BACKGROUND CONSTANTS				
	VSVERT_1	VSVERT_2	VSHORZ_1	VSHORZ_2
VERT SIT 1	V97U6820C	100000	V97U6862C	493261
VERT SIT 2	V97U6794C	V97U6820C	V97U6863C	153555
COORDINATES	V97U6939C	273	V97U6938C	404

Table B.4.154.1-2. VERTICAL SITUATION DIP CONSTANTS				
	RANGE SCALE		ALTITUDE SCALE	
	XSCALE	RBIAS	YSCALE	HBIAS
VERT SIT 1	V97U6944C	V97U6862C	V97U6946C	V97U6793C
VERT SIT 2	V97U6945C	V97U6863C	V97U6947C	V97U6794C

Table B.4.154.1-3. ALPHA/MACH (VSI) DIP CONSTANTS							
POS_1	POS_2	SCALE_1	SCALE_2	SCALE FACTOR		BIAS	
				NAME	VALUE	NAME	VALUE
284	116	V97U6899C	8	RT1_ALPHA_SC_FACT	V97U6884C	RT1_ALPHA_BIAS	V97U6881C
-456	-75	3.0	6.0	RT1_MACH_SC_FACT	V97U6893C	RT1_MACH_BIAS	V97U6890C

NOTE: Addressable Unit (AU) position and BIAS data are with respect to the center of the CRT.

#### B.4.154.2 BFS Supplemental Requirements

1. The computation of the MACH-ALPHA indicator in the BFS VERTICAL SITUATION DISPLAY OUTPUT PROCESSOR (DOP 3) is to be performed at a processing rate of once every 320 ms.
2. The speedbrake command shall be blank after the end of TAEM, since Guidance is terminated at this point.

**B.4.154.3 Vertical Situation Display Interface Support Functions**

Table B.4.154-5	Input Functional Parameters
Table B.4.154-6	Output Functional Parameters
Table B.4.154-7	I-Loads
Table B.4.154-8	K-Loads
Table B.4.154-9	Constants

TABLE B.4.154-5. INPUT FUNCTIONAL PARAMETERS FOR VERTICAL SITUATION DISPLAY PROCESSING (G4.154)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
ALPHA_N	V90H2246C	NAV DERIVED ANGLE OF ATTACK	A/E ATT PROC	DEG	SPL		93017G	*
ALT_WHEELS	V95H0165CA	ALT TO REAR WHEELS/NAV BASE(ENTRY)	RTLS UPP	FT			93017G	*
ALT_WHEELS	V95H0165CC	ALT TO REAR WHEELS/NAV BASE(ENTRY)	TAEM UPP	FT	DPL		93017G	*
ALT_WHEELS	V95H0165CD	ALT TO REAR WHEELS/NAV BASE(ENTRY)	A/L UPP	FT	DPL		93017G	*
COSPHI	V90H2204C	EULER ANGLE ROLL COSINE	A/E ATT PROC					
DSBC_AL	V90H1011CB	SPEEDBRAKE ANGLE COMMAND-AUTO LAND	A/L GUID	DEG			93017G	*
DSBC_AL	V90H1011CD	SPEEDBRAKE ANGLE COMMAND-AUTO LAND	GRTLS A/L GUID	DEG			93017G	*
DSBC_AT	V90H1011CA	SPEEDBRAKE ANGLE COMMAND-AUTO LAND	GRTLS TAEM GUID	DEG			93017G	*
DSBC_AT	V90H1011CC	SPEEDBRAKE ANGLE COMMAND-AUTO LAND	TAEM GUID	DEG			93017G	*
DSBFBP	V95H8250C	PERCENTAGE OF MAX SPEEDBRAKE POS	SB PFB SOP	PCT	BSS			
EMAX	V90U1229CA	UPPER E/W REF FOR NZC LIMITING	TAEM GUID	FT				
EMAX	V90U1229CB	UPPER E/W REF FOR NZC LIMITING	GRTLS TAEM GUID	FT				
EMEP	V90U1227CA	E/W REF FOR MEPALERT	TAEM GUID	FT				
EMEP	V90U1227CB	E/W REF FOR MEPALERT	GRTLS TAEM GUID	FT				
EMIN	V90U1228CA	LOWER E/W REF FOR NZC LIMITING	TAEM GUID	FT				
EMIN	V90U1228CB	LOWER E/W REF FOR NZC LIMITING	GRTLS TAEM GUID	FT				
EMOH	V90U1232CA	E/W REF FOR OHALRT	TAEM GUID	FT				
EMOH	V90U1232CB	E/W REF FOR OHALRT	GRTLS TAEM GUID	FT				
EN	V90U1225CA	REFERENCE ENERGY OVER WEIGHT	TAEM GUID	FT				
EN	V90U1225CB	REFERENCE ENERGY OVER WEIGHT	GRTLS TAEM GUID	FT				
EOW	V90U1231CA	ENERGY OVER WEIGHT	TAEM GUID	FT				
EOW	V90U1231CB	ENERGY OVER WEIGHT	GRTLS TAEM GUID	FT			93090E	
ES	V90U1226CA	E/W REF FOR S-TURN INITIATION	TAEM GUID	FT				
ES	V90U1226CB	E/W REF FOR S-TURN INITIATION	GRTLS TAEM GUID	FT				
H_DOT_ELLIPSOID/H_DOT	V95L0265CA	EST ALTITUDE RATE	RTLS UPP	FT/S	SPL		93017G	*
H_DOT_ELLIPSOID/H_DOT	V95L0265CC	EST ALTITUDE RATE	TAEM UPP	FT/S	SPL		93017G	*
H_DOT_ELLIPSOID/H_DOT	V95L0265CD	EST ALTITUDE RATE	A/L UPP	FT/S	SPL		93017G	*
IGS	V90J1230CA	GLIDESLOPE INDEX	TAEM GUID		HXS		93017G	*
IGS	V90J1230CB	GLIDESLOPE INDEX	A/L GUID		HXS		93017G	*
IPHASE	V90J1117CA	TAEM GUIDANCE PHASE INDICATOR	TAEM GUID	ND			93017G	*
IPHASE	V90J1117CB	TAEM GUIDANCE PHASE INDICATOR	GRTLS TAEM GUID	ND			93017G	*
M/CURR_ORB_MASS/MASS	V90U1961CC	CURRENT VEHICLE MASS	DEORB GUID	SLUGS			93090E	
M/MACH	V95L3029C	GN&C MACH NUMBER	ADTA SOP		SPL		93017G	*
MM_CODE_603/MM_603	V90X8122X	MAJOR MODE 603 FLAG	MSC				92355B	
REL_VEL_MAG	V95L0151CA	GND REL VEL MAGNITUDE IN M50 SYS	RTLS UPP	FT/S	SPL		93017G	*
REL_VEL_MAG/V	V95L0151CB	GND REL VEL MAGNITUDE IN M50 SYS	A/L UPP	FT/S	SPL		93017G	*
REL_VEL_MAG/V	V95L0151CD	GND REL VEL MAGNITUDE IN M50 SYS	TAEM UPP	FT/S	SPL		93017G	*
RPRED	V90H1103CA	RANGE TO RUNWAY THRESHOLD VIA WP1	GRTLS TAEM GUID	FT			93017G	*
RPRED	V90H1103CB	RANGE TO RUNWAY THRESHOLD VIA WP1	TAEM GUID	FT			93017G	*
R_GND_AP	V90H1034CA	RANGE TO RUNWAY TARGET	A/L GUID	FT				
R_GND_AP	V90H1034CB	RANGE TO RUNWAY TARGET	GRTLS A/L GUID	FT				
TG_END	V90X1108XA	TAEM GUIDANCE TERMINATION FLAG	TAEM GUID				93017G	*
TG_END	V90X1108XB	TAEM GUIDANCE TERMINATION FLAG	GRTLS TAEM GUID				92355B	
THETA/THETA_TOPO	V90H2217C	BODY PITCH ATTITUDE EULER ANGLE	A/E ATT PROC	DEG	SPL		93017G	*
V_GROUNDSPEED/VH	V95L0178CA	GROUNDSPPEED	RTLS UPP	FT/S			92389C	
V_GROUNDSPEED/VH	V95L0178CC	GROUNDSPPEED	TAEM UPP	FT/S			92389C	

TABLE B.4.154-5. INPUT FUNCTIONAL PARAMETERS FOR VERTICAL SITUATION DISPLAY PROCESSING (G4.154)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
V_GROUNDSPEED/VH	V95L0178CD	GROUNDSPEED	A/L UPP	FT/S			92450C	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.4.154-6. OUTPUT FUNCTIONAL PARAMETERS FROM VERTICAL SITUATION DISPLAY PROCESSING (G4.154)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
ADV_FLAG	V94X1306X	VERT SIT ADVANCE FLAG	MSC					
DISP_ALT_DIS_ANGLE	V94H1305C	SHUTTLE SYMBOL ROTATION ANGLE	VERT SIT1 DISP	DEG	VAR			
EMOH_ENER_Y	V94U1313C	Y-COORD OF OTT DOWNMODE ENERGY SYM	VERT SIT2 DISP ENT BRG DISP	AU	VAR		93090E	
ENER_LL_Y	V94H1310C	Y-COORD OF LOWER ENERGY LIMIT	VERT SIT1 DISP VERT SIT2 DISP ENT BRG DISP HUD PROC	AU	VAR		93090E	
ENER_UL_Y	V94H1309C	Y-COORD OF UPPER ENERGY LIMIT	VERT SIT1 DISP VERT SIT2 DISP ENT BRG DISP HUD PROC	AU	VAR		93090E	
NOM_ENERGY_Y	V94H1307C	Y-COORD OF NOMINAL ENERGY SYMBOL	VERT SIT1 DISP VERT SIT2 DISP ENT BRG DISP HUD PROC	AU	VAR		93090E	
SHUTTLE_ALPHA_FLAG	V94X1315X	SHUTTLE ALPHA FLASH FLAG	VERT SIT1 DISP					
SHUTTLE_ENER_FLAG	V94X1311X	SHUTTLE ENERGY FLASH FLAG	ENT BRG DISP				93090E	
SHUTTLE_ENER_Y	V94H1308C	Y-COORD OF CURRENT ENERGY SYMBOL	VERT SIT1 DISP VERT SIT2 DISP ENT BRG DISP HUD PROC	AU	VAR		93090E	
SHUTTLE_THETA_FLAG	V94X1314X	SHUTTLE THETA FLASH FLAG	VERT SIT1 DISP VERT SIT2 DISP					
THETA_MAX	V85H0646C	PITCH ATTITUDE MAX LIMIT	MEDS FC GNC XFER	DEG	SPL		92332D	
THETA_MIN	V85H0647C	PITCH ATTITUDE MIN LIMIT	MEDS FC GNC XFER	DEG	SPL		92332D	
THETA_Y	V94H1312C	Y-COORD OF THETA SYMBOL	VERT SIT1 DISP VERT SIT2 DISP	AU	VAR			
VSHUTTLE_X	V94H1302C	X-POSITION OF SHUTTLE SYMBOL	VERT SIT1 DISP VERT SIT2 DISP	AU	VAR			
VSHUTTLE_Y	V94H1303C	Y-POSITION OF SHUTTLE SYMBOL	VERT SIT1 DISP VERT SIT2 DISP	AU	VAR			
VS_SBC	V94U1300C	SPEEDBRAKE COMMAND-VERT SIT	VERT SIT1 DISP VERT SIT2 DISP	PCT	VAR			
	V94U1340C	X-COORD OF ALPHA-MACH	VERT SIT1 DISP		VAR			
	V94U1341C	Y-COORD OF ALPHA-MACH	VERT SIT1 DISP		VAR			

TABLE B.4.154-6. OUTPUT FUNCTIONAL PARAMETERS FROM VERTICAL SITUATION DISPLAY PROCESSING (G4.154)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
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**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**



TABLE B.4.154-7. VERTICAL SITUATION DISPLAY PROCESSING (G4.154) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
A(1,1)	V97U6948C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
A(1,2)	V97U6949C	DEG/(FT/SEC)	F	S	M	C	G4.154	00	VSC	DC0599	
A(1,3)	V97U6950C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
A(1,4)	V97U6951C	ND	F	S	M	C	G4.154	00	VSC	DC0599	
A(1,5)	V97U6952C	SEC/FT	F	S	M	C	G4.154	00	VSC	DC0599	
A(2,1)	V97U6953C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
A(2,2)	V97U6954C	DEG/(FT/SEC)	F	S	M	C	G4.154	00	VSC	DC0599	
A(2,3)	V97U6955C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
A(2,4)	V97U6956C	ND	F	S	M	C	G4.154	00	VSC	DC0599	
A(2,5)	V97U6957C	SEC/FT	F	S	M	C	G4.154	00	VSC	DC0599	
A(3,1)	V97U6958C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
A(3,2)	V97U6959C	DEG/(FT/SEC)	F	S	M	C	G4.154	00	VSC	DC0599	
A(3,3)	V97U6960C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
A(3,4)	V97U6961C	ND	F	S	M	C	G4.154	00	VSC	DC0599	
A(3,5)	V97U6962C	SEC/FT	F	S	M	C	G4.154	00	VSC	DC0599	
A(4,1)	V97U6963C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
A(4,2)	V97U6964C	DEG/(FT/SEC)	F	S	M	C	G4.154	00	VSC	DC0599	
A(4,3)	V97U6965C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
A(4,4)	V97U6966C	ND	F	S	M	C	G4.154	00	VSC	DC0599	
A(4,5)	V97U6967C	SEC/FT	F	S	M	C	G4.154	00	VSC	DC0599	
B(1,1)	V97U6968C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
B(1,2)	V97U6969C	DEG/(FT/SEC)	F	S	M	C	G4.154	00	VSC	DC0599	
B(1,3)	V97U6970C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
B(1,4)	V97U6971C	ND	F	S	M	C	G4.154	00	VSC	DC0599	
B(1,5)	V97U6972C	SEC/FT	F	S	M	C	G4.154	00	VSC	DC0599	
B(2,1)	V97U6973C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
B(2,2)	V97U6974C	DEG/(FT/SEC)	F	S	M	C	G4.154	00	VSC	DC0599	
B(2,3)	V97U6975C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
B(2,4)	V97U6976C	ND	F	S	M	C	G4.154	00	VSC	DC0599	
B(2,5)	V97U6977C	SEC/FT	F	S	M	C	G4.154	00	VSC	DC0599	
B(3,1)	V97U6978C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
B(3,2)	V97U6979C	DEG/(FT/SEC)	F	S	M	C	G4.154	00	VSC	DC0599	
B(3,3)	V97U6980C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
B(3,4)	V97U6981C	ND	F	S	M	C	G4.154	00	VSC	DC0599	
B(3,5)	V97U6982C	SEC/FT	F	S	M	C	G4.154	00	VSC	DC0599	
B(4,1)	V97U6983C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
B(4,2)	V97U6984C	DEG/(FT/SEC)	F	S	M	C	G4.154	00	VSC	DC0599	
B(4,3)	V97U6985C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
B(4,4)	V97U6986C	ND	F	S	M	C	G4.154	00	VSC	DC0599	
B(4,5)	V97U6987C	DEG/(FT/SEC)	F	S	M	C	G4.154	00	VSC	DC0599	
DPDV	V97U6989C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
DTHT	V96U8740C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
EDRS2(1)	V97U6992C	FT/FT	F	S	M	C	G4.154	01	VR1	93090E	
							G5.27	03	VE1		
EDRS2(2)	V96U9527C	FT/FT	F	S	M	C	G4.154	01	VR2	DC0599	
								03	VE2		

TABLE B.4.154-7. VERTICAL SITUATION DISPLAY PROCESSING (G4.154) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
ES_C12(1)	V97U7003C	FT	F	S	M	C	G4.154 G5.27	01 03	VR1 VE1	93090E	
ES_C12(2)	V96U9528C	FT	F	S	M	C	G4.154	01 03	VR2 VE2	DC0599	
HBIAS(1)	V97U6793C	FT	F	S	M	C	G4.154	00	VSC	DC0599	
HBIAS(2)	V97U6794C	FT	F	S	M	C	G4.154	00	VSC	DC0599	
HSWITCH	V97U6820C	FT	F	S	M	C	G4.154	00	VSC	DC0599	
HSWITCH2	V97U7023C	FT	F	S	M	C	G4.154 G5.27	00	VSC	93090E	
PITCH_MAX	V97U7004C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
PITCH_MIN	V97U7005C	DEG	F	S	M	C	G4.154	00	VSC	DC0599	
RBIAS(1)	V97U6862C	FT	F	S	M	C	G4.154	00	VSC	DC0599	
RBIAS(2)	V97U6863C	FT	F	S	M	C	G4.154	00	VSC	DC0599	
RMEPMIN	V97U7006C	FT	F	S	M	C	G4.154	01 03	VR1 VE1	DC0599	
RMINST	V97U7007C	FT	F	S	M	C	G4.154 G5.27	01 03	VR1 VE1	93090E	
RT1_ALPHA_BIAS	V97U6881C	AU	F	S	M	C	G4.154	00	VSA	DC0599	
RT1_ALPHA_SC_FACT	V97U6884C	AU/DEG	F	S	M	C	G4.154	00	VSA	DC0599	
RT1_ALT_VSI	V97U6885C	FT	F	S	M	C	G4.154	01 03	VR1 VE1	DC0599	
RT1_MACH_BIAS	V97U6890C	AU	F	S	M	C	G4.154	00	VSA	DC0599	
RT1_MACH_MAX	V97U6891C	MACH	F	S	M	C	G4.154	00	VSA	DC0599	
RT1_MACH_MIN	V97U6892C	MACH	F	S	M	C	G4.154	00	VSA	DC0599	
RT1_MACH_SC_FACT	V97U6893C	AU/MACH	F	S	M	C	G4.154	00	VSA	DC0599	
RT1_RNG_VSI	V97U6898C	FT	F	S	M	C	G4.154	00	VSC	DC0599	
RT2_ALPHA_MAX	V97U6899C	DEG	F	S	M	C	G4.154	00	VSA	DC0599	
RT2_ALPHA_MIN	V96U8741C	DEG	F	S	M	C	G4.154	00	VSA	DC0599	
SCALE_LEN	V97U6926C	AU	F	S	D	C	G4.154 G5.27	00	ZFG	93090E	
V1	V97U7011C	FT/SEC	F	S	M	C	G4.154	00	VSC	DC0599	
V2	V97U7012C	FT/SEC	F	S	M	C	G4.154	00	VSC	DC0599	
V3	V97U7013C	FT/SEC	F	S	M	C	G4.154	00	VSC	DC0599	
VB	V97U7009C	FT/SEC	F	S	M	C	G4.154	00	VSC	DC0599	
VD	V97U7010C	FT/SEC	F	S	M	C	G4.154	00	VSC	DC0599	
VS_X_MIN	V97U6938C	AU	F	S	M	C	G4.154	00	VSC	DC0599	
VS_Y_MIN	V97U6939C	AU	F	S	M	C	G4.154	00	VSC	DC0599	
V_DEFAULT	V96U8739C	FT/SEC	F	S	M	C	G4.154	00	VSC	DC0599	
WT_DENOM	V97U7014C	SLUGS	F	S	M	C	G4.154	00	VSC	DC0599	
WT_NOM	V97U7015C	SLUGS	F	S	M	C	G4.154	00	VSC	DC0599	
XSCALE(1)	V97U6944C	AU/FT	F	S	M	C	G4.154	00	VSC	DC0599	
XSCALE(2)	V97U6945C	AU/FT	F	S	M	C	G4.154	00	VSC	DC0599	

TABLE B.4.154-7. VERTICAL SITUATION DISPLAY PROCESSING (G4.154) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
X_AIM_PT	V97U0445C	FT	F	S	M	C	G4.10 G4.154 G4.220 G4.234 G4.237 G4.252 G5.27 G5.7	01 03	GL1 GL3	93090E	
YMAX	V97U7016C	AU	F	S	D	C	G4.154 G5.27	00	ZFG	93090E	
YMEP	V97U7017C	AU	F	S	D	C	G4.154 G5.27	00	ZFG	93090E	
YMIN	V97U7018C	AU	F	S	D	C	G4.154 G5.27	00	ZFG	93090E	
YSCALE(1)	V97U6946C	AU/FT	F	S	M	C	G4.154	00	VSC	DC0599	
YSCALE(2)	V97U6947C	AU/FT	F	S	M	C	G4.154	00	VSC	DC0599	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

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TABLE B.4.154-8. VERTICAL SITUATION DISPLAY PROCESSING (G4.154) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.4.154-9. VERTICAL SITUATION DISPLAY PROCESSING (G4.154) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

#### **B.4.160 XXXXXX TRAJ DISPLAY PROCESSING (PFS)**

The XXXXXX TRAJ display processing function shall perform the computation and limiting of the dynamic symbols displayed on the fixed backgrounds of the XXXXXX TRAJ 1, XXXXXX TRAJ 2, and RTLS TRAJ 2 displays.

The fixed background of the XXXXXX TRAJ 1 display is comprised of a central plot for monitoring the flight profile. The central plot is a plot of relative velocity vs. altitude.

The fixed background of the XXXXXX TRAJ 2 display is comprised of a central plot for monitoring the flight profile and an inertial velocity scale. The central plot is a plot of inertial velocity vs. altitude. The inertial velocity scale is used to monitor countdown to MECO.

The fixed background of the RTLS TRAJ 2 display is comprised of a central plot for monitoring the flight profile and a delta range scale. The central plot is a plot of horizontal component of relative velocity vs. altitude. The delta range scale is used to monitor powered pitchdown to MECO.

In addition, the XXXXXX TRAJ display processing function determines the display title for the XXXXXX TRAJ 1 and XXXXXX TRAJ 2 displays. The function calculates the amount of ET propellant remaining for display on the XXXXXX TRAJ 2 and RTLS TRAJ 2 displays, and computes the RTLS guidance status parameter for the RTLS TRAJ 2 display.

The description of the fixed formats for the XXXXXX TRAJ 1, XXXXXX TRAJ 2, and RTLS TRAJ 2 displays are contained in sections 4.2.38, 4.2.39, and 4.2.40, respectively, of the Level C D&C FSSR.

The I-Load values are defined in the STS Flight Software Initialization Load (JSC-19350) and in Table B.4.160-7. The processing required to support the display of the dynamic symbols is defined in the following paragraphs.

##### Computation of Ascent Display Dynamic Titles (.52 Hz)

```
IF MM_CODE_101 = 1
  THEN DISP_TITLE = 1 (LAUNCH TRAJ 1)
IF MM_CODE_102 = 1 AND NO ABORT HAS BEEN REQUESTED
  THEN DISP_TITLE = 2 (ASCENT TRAJ 1)
IF MM_CODE_102 = 1 AND RTLS_ABORT_DECLARED = 1
  THEN DISP_TITLE = 3 (RTLS TRAJ 1)
IF MM_CODE_102 = 1 AND S_ATO = 1
  THEN DISP_TITLE = 5 (ATO TRAJ 1)
IF MM_CODE_103 = 1 AND NO ABORT_REQUESTED
  THEN DISP_TITLE = 6 (ASCENT TRAJ 2)
IF MM_CODE_103 = 1 AND TAL_ABORT_DECLARED = 1
  THEN DISP_TITLE = 7 (TAL TRAJ 2)
IF MM_CODE_103 = 1 AND S_ATO = 1
  THEN DISP_TITLE = 8 (ATO TRAJ 2)
```

Computation of Remaining Propellant (MM 103 and MM 601) (1.04 Hz)

```
IF MM_CODE_103 = 1 OR MM_CODE_601 = 1
  THEN CURRENT_RPRLT = 32.174* M - R2_FINAL_WT
      PRPLT = (CURRENT_PRPLT/TOTAL_PRPLT)*100
```

Computation of Dynamic Symbols

The following three sections specify the dynamic symbol processing requirements for each of the XXXXXX TRAJ 1, XXXXXX TRAJ 2 and RTLS TRAJ 2 displays, respectively. In specifying the update of the push-down stack of variables for predictor symbols in each of these sections, the following notational convention is used:

A0 = A1 = A2 = A3 = FSSR Variable

where A0, A1, A2 and A3 denote the set of push-down stack variables, and FSSR Variable denotes the FSSR name of a variable (e.g., V\_INERTIAL\_MAG). (For the RTLS TRAJ 2 Display, there are only three push-down stack variables; therefore, the A0 variable is omitted.) This notation has two meanings:

1. On the first pass of dynamic symbol processing for each display after entering its respective major mode, each of the push-down stack of variables is initialized to the value of the FSSR Variable.
2. On subsequent passes of dynamic symbol processing for each display, A0 is set to the value of A1 (if applicable), A1 is then set to the value of A2, A2 is then set to the value of A3, and A3 is then set to the current value of the FSSR Variable.

**B.4.160.1 XXXXXX TRAJ 1 Display**

Symbols representing plotted current and predicted vehicle altitude/ relative velocity states are displayed on TRAJ 1. The processing of this section is performed only if MM\_CODE\_102 = 1. The requirements for computing and limiting the dynamic symbols are defined as follows:

The Computation of the Altitude/Velocity Indicator (1.04 Hz)

X-COORDINATE

V\_RHO\_MAG = MID(A1\_V\_MIN, REL\_VEL\_MAG, A1\_V\_MAX)

A1\_STATE\_X = A1\_X\_BIAS + A1\_X\_SC\_FACT\*V\_RHO\_MAG

Y-COORDINATE

H\_ELLIPSOID = MID(A1\_H\_MIN, ALT, A1\_H\_MAX)

A1\_STATE\_Y = A1\_Y\_BIAS + A1\_Y\_SC\_FACT\*H\_ELLIPSOID

The Computation of the Predicted Altitude/Velocity Indicator(1/04 Hz)

UPDATE PUSH-DOWN STACK AND COMPUTE DELTAS



V0 = V1 = V2 = V3 = REL\_VEL\_MAG  
H0 = H1 = H2 = H3 = ALT  
HDOT0 = HDOT1 = HDOT2 = HDOT3 = H\_DOT\_ELLIPSOID  
DELTA\_V = MID(V3 - V2, V2 - V1, V1 - V0)  
DELTA\_H = MID(H3 - H2, H2 - H1, H1 - H0)  
DELTA\_HDOT = MID(HDOT3 - HDOT2, HDOT2 - HDOT1, HDOT1 - HDOT0)

X-COORDINATE OF THE 20 SECOND PREDICTOR

VPRED\_20 = V3 + (DELTA\_V/.96)\*20  
V\_LIMIT\_20 = MID(A1\_V\_MAX, VPRED\_20, A1\_V\_MIN)  
A1\_PRED\_X = V\_LIMIT\_20\*A1\_X\_SC\_FACT + A1\_X\_BIAS

Y-COORDINATE OF THE 20 SECOND PREDICTOR

HPRED\_20 = H3 + (DELTA\_H/.96)\*20 + .5\*(DELTA\_HDOT/.96)\*20<sup>2</sup>  
H\_LIMIT\_20 = MID(A1\_H\_MAX, HPRED\_20, A1\_H\_MIN)  
A1\_PRED\_Y = H\_LIMIT\_20\*A1\_Y\_SC\_FACT + A1\_Y\_BIAS

**B.4.160.2 XXXXXX TRAJ 2 Display**

Symbols representing plotted current and predicted vehicle states, and inertial velocity on a horizontal MECO countdown scale, are displayed on the TRAJ 2 display. The processing of this section is performed only if MM\_CODE\_103 = 1. The requirements for computing and limiting these symbols are defined in the following paragraphs.

The Computation of the Vehicle State Character (1.04 Hz)

X-COORDINATE

VI\_PLOT = MID(A2\_V\_MIN, V\_INERTIAL\_MAG, A2\_V\_MAX)  
A2\_STATE\_X = A2\_X\_BIAS + A2\_X\_SC\_FACT\*VI\_PLOT

Y-COORDINATE

H\_ELLIPSOID = MID(A2\_H\_MIN, ALT, A2\_H\_MAX)  
A2\_STATE\_Y = A2\_Y\_BIAS + A2\_Y\_SC\_FACT\*H\_ELLIPSOID

The Computation of the Predicted Altitude/Velocity Indicators (1.04 Hz)

UPDATE PUSH-DOWN STACK AND COMPUTE DELTAS

V0 = V1 = V2 = V3 = V\_INERTIAL\_MAG  
H0 = H1 = H2 = H3 = ALT  
HDOT0 = HDOT1 = HDOT2 = HDOT3 = H\_DOT\_ELLIPSOID  
DELTA\_V = MID(V3-V2, V2-V1, V1-V0)

DELTA\_H = MID(H3-H2, H2-H1, H1-H0)

DELTA\_HDOT = MID(HDOT3 - HDOT2, HDOT2 - HDOT1, HDOT1 - HDOT0)

X-COORDINATE OF THE 30 SECOND PREDICTOR

VPRED\_30 = V3 + (DELTA\_V/.96)\*30

V\_LIMIT\_30 = MID(A2\_V\_MAX, VPRED\_30, A2\_V\_MIN)

A2\_PRED\_X\_30 = V\_LIMIT\_30\*A2\_X\_SC\_FACT + A2\_X\_BIAS

Y-COORDINATE OF THE 30 SECOND PREDICTOR

HPRED\_30 = H3 + (DELTA\_H/.96)\*30 + .5\*(DELTA\_HDOT/.96)\*30<sup>2</sup>

H\_LIMIT\_30 = MID(A2\_H\_MAX, HPRED\_30, A2\_H\_MIN)

A2\_PRED\_Y\_30 = H\_LIMIT\_30\*A2\_Y\_SC\_FACT + A2\_Y\_BIAS

X-COORDINATE OF THE 60 SECOND PREDICTOR

VPRED\_60 = V3 + (DELTA\_V/.96)\*60

V\_LIMIT\_60 = MID(A2\_V\_MAX, VPRED\_60, A2\_V\_MIN)

A2\_PRED\_X\_60 = V\_LIMIT\_60\*A2\_X\_SC\_FACT + A2\_X\_BIAS

Y-COORDINATE OF THE 60 SECOND PREDICTOR

HPRED\_60 = H3 + (DELTA\_H/.96)\*60 + .5\*(DELTA\_HDOT/.96)\*60<sup>2</sup>

H\_LIMIT\_60 = MID(A2\_H\_MAX, HPRED\_60, A2\_H\_MIN)

A2\_PRED\_Y\_60 = H\_LIMIT\_60\*A2\_Y\_SC\_FACT + A2\_Y\_BIAS

The Computation of the Inertial Velocity Character (2.08 Hz)

The inertial velocity character shall be initialized at a position corresponding to the lower end of the inertial velocity scale. VI\_FIRST\_PASS\_COMPL shall be initialized to 0.

X-COORDINATE

IF TAL\_ABORT\_DECLARED = 0

THEN V2\_PLOT = V\_INERTIAL\_MAG

V2\_PLOT = MID(A2\_VI\_MIN, V2\_PLOT, A2\_VI\_MAX)

A2\_VI\_X = A2\_X2\_BIAS + A2\_X2\_SC\_FACT\*V2\_PLOT

ELSE

IF VI\_FIRST\_PASS\_COMPL = 1

THEN DEL\_V\_PLOT = VDMAG - V\_INERTIAL\_MAG

V2\_PLOT = A2\_VI\_MIN + DEL\_V\_MAX - DEL\_V\_PLOT

V2\_PLOT = MID(A2\_VI\_MIN, V2\_PLOT, A2\_VI\_MAX)

A2\_VI\_X = A2\_X2\_BIAS + A2\_X2\_SC\_FACT\*V2\_PLOT

ELSE

VI\_FIRST\_PASS\_COMPL = 1

Note: VDMAG is limited between VD\_TAL\_MIN and VD\_TAL\_MAX in ASC 2STG GUID (4.2).

### B.4.160.3 RTLS TRAJ 2 Display

Symbols representing plotted current and predicted vehicle states, and delta range on a horizontal countdown to powered pitchdown to MECO scale, are displayed on the RTLS TRAJ 2 display. The processing of this section is performed only if MM\_CODE\_601 = 1. The requirements for computing and limiting these symbols are defined in the following paragraphs.

#### The Computation of the Altitude/Velocity Indicator (.52 Hz)

##### X-COORDINATE

REL\_VEL\_PLOT = MID(R2\_V\_MIN, V\_HORIZ\_DNRNG, R2\_V\_MAX)  
R2\_STATE\_X = INTEGER(R2\_X\_BIAS + R2\_X\_SC\_FACT\*REL\_VEL\_PLOT)

##### Y-COORDINATE

H\_ELLIPSOID = MID(R2\_H\_MIN, ALT, R2\_H\_MAX)  
R2\_STATE\_Y = INTEGER(R2\_Y\_BIAS\_PASS + R2\_Y\_SC\_FACT\*H\_ELLIPSOID)

#### The Computation of the Predicted Altitude/Velocity Indicator (.52 Hz)

The computation of the Predicted Altitude/Velocity Indicators must be performed at a rate less than or equal to the update rate of its two input parameters; V\_HORIZ\_DNRNG (V90L0474C), and ALT (V95H0175CA). The K-Load DTC (V97U6762C) must be equal to the time interval between successive computations of these indicators.

##### X-COORDINATE

###### Update push-down stack

V1 = V2 = V3 = V\_HORIZ\_DNRNG  
VD1 = (V2 - V1)/DTC  
VD2 = (V3 - V2)/DTC  
VD = (VD1 + VD2)/2  
V\_PRED\_2 = V2 + (DTC + DT\_4)\*VD  
V\_PRED\_3 = V2 + (DTC + DT5)\*VD  
V\_PRED\_2 = MID(R2\_V\_MIN, V\_PRED\_2, R2\_V\_MAX)  
R2\_PRED\_X = INTEGER(R2\_X\_BIAS + R2\_X\_SC\_FACT\*V\_PRED\_2)  
V\_PRED\_3 = MID(R2\_V\_MIN, V\_PRED\_3, R2\_V\_MAX)  
R2\_PRED\_X2 = INTEGER(R2\_X\_BIAS + R2\_X\_SC\_FACT\*V\_PRED\_3)

##### Y-COORDINATE

###### Update push-down stack

H1 = H2 = H3 = ALT  
HD1 = (H2 - H1)/DTC  
HD2 = (H3 - H2)/DTC

$$HD = (HD1 + HD2)/2$$

$$HDD = (HD2 - HD1)/DTC$$

$$H\_PRED\_2 = H2 + (DT\_4 + DTC)*HD + (DT\_4 + DTC)^2*HDD/2$$

$$H\_PRED\_3 = H2 + (DT5 + DTC)*HD + (DT5 + DTC)^2*HDD/2$$

$$H\_PRED\_2 = MID(R2\_H\_MIN, H\_PRED\_2, R2\_H\_MAX)$$

$$R2\_PRED\_Y = INTEGER(R2\_Y\_BIAS\_PASS + R2\_Y\_SC\_FACT*H\_PRED\_2)$$

$$H\_PRED\_3 = MID(R2\_H\_MIN, H\_PRED\_3, R2\_H\_MAX)$$

$$R2\_PRED\_Y2 = INTEGER(R2\_Y\_BIAS\_PASS + R2\_Y\_SC\_FACT*H\_PRED\_3)$$

The Computation of the Delta Range Indicator (2.08 Hz)

COMPUTE DELTA R

IF V\_HORIZ\_DNRNG < 0

    THEN REL\_VEL\_PLOT = -REL\_VEL\_MAG

    ELSE REL\_VEL\_PLOT = REL\_VEL\_MAG

RP = R2\_RP\_1\*REL\_VEL\_PLOT + R2\_RP\_2 + R2\_RP\_3\*FLT\_PATH\_ANG

DELTA\_R = RP - RNG\_TO\_RW\_THRESH (NMI)

X-COORDINATE

DEL\_R = MID(R2\_D\_R\_MIN, DELTA\_R, R2\_D\_R\_MAX)

R2\_D\_R\_X = INTEGER(R2\_D\_R\_BIAS + R2\_D\_R\_SC\_FACT\*DEL\_R)

Computation of the RTLS Guidance Status Parameter (GUID) (.52 Hz)

Compute GUID according to the following table only if an RTLS is in progress, i.e.

RTLS\_ABORT\_DECLARED (V90X8637X) = 1.

GUID UNCONV FLAG (V90X2084X)	VALUE OF RTLS MASS DISPLAY PARAMETER (V90U2480C)	VALUE OF GUID XXXX DISPLAYED IN FIELD (V94J1366C – CHAR) (V94G1367C – DEC)	DATA TYPE OF GUID
ON or OFF	-999	INIT (Initialization)	CHAR
ON or OFF	GREATER THAN -999 BUT LESS THAN ZERO	INHB (Inhibit)	CHAR
ON	GREATER THAN OR EQUAL TO ZERO BUT LESS THAN +777	INHB (Inhibit)	CHAR
OFF	GREATER THAN OR EQUAL TO ZERO BUT LESS THAN +777	Value of RTLS Mass display parameter	DEC
ON or OFF	GREATER THAN OR EQUAL TO +777	PPA (Powered pitch-around)	CHAR

**B.4.160.4 The Derivation of the XXXXXX TRAJ DIP Coefficients (Information Only)**

All of the scale factors and biases are calculated using the relationships

$$POS\_1 = BIAS + (Scale\ Factor) (SCALE\_1)$$

$$POS\_2 = BIAS + (Scale\ Factor) (SCALE\_2)$$

where POS\_1 and POS\_2 are two locations on the implied scale on the face of the CRT and SCALE\_1 and SCALE\_2 are the two corresponding values of the parameter represented by the scale. Table B.4.160.4-1 lists the I-LOAD MSIDs of XXXXXX TRAJ 1/2 DIP coefficients Scale Factor and BIAS, and the values or I-LOAD MSIDs of POS\_1, POS\_2, SCALE\_1, and SCALE\_2 used. Table B.4.160.4-2 lists the I-LOAD MSIDs of RTLS TRAJ 2 DIP coefficients Scale Factor and BIAS, and the values or I-LOAD MSIDs of POS\_1, POS\_2, SCALE\_1, and SCALE\_2 used. The tube locations are given in Addressable Unit (AU) coordinates with origin at the center of the tube.

Table B.4.160.4-1. XXXXXX TRAJ 1/2 DIP COEFFICIENTS					
POS_1	POS_2	SCALE_1	SCALE_2	SCALE FACTOR	BIAS
493	-340	V97U6718C A1_V_MAX	V97U6719C A1_V_MIN	V97U6721C A1_X_SC_FACT	V97U6720C A1_X_BIAS
270	-270	V97U6703C A1_H_MAX	V97U6704C A1_H_MIN	V97U6723C A1_Y_SC_FACT	V97U6722C A1_Y_BIAS
481	-280	V97U6735C A2_V_MAX	V97U6736C A2_V_MIN	V97U6741C A2_X_SC_FACT	V97U6740C A2_X_BIAS
243	-226	V97U6733C A2_H_MAX	V97U6734C A2_H_MIN	V97U6745C A2_Y_SC_FACT	V97U6744C A2_Y_BIAS
451	-299	V97U6738C A2_VI_MAX	V97U6739C A2_VI_MIN	V97U6743C A2_X2_SC_FACT	V97U6742C A2_X2_BIAS

Table B.4.160.4-2. RTLS TRAJ 2 DIP COEFFICIENTS					
POS_1	POS_2	SCALE_1	SCALE_2	SCALE_FACTOR	BIAS
498	-433	V97U6918C R2_V_MAX	V97U6919C R2_V_MIN	V97U6921C R2_X_SC_FACT	V97U6920C R2_X_BIAS
271	-239	V97U6914C	V97U6915C	V97U6923C	V97U8142C

Table B.4.160.4-2. RTLS TRAJ 2 DIP COEFFICIENTS					
POS_1	POS_2	SCALE_1	SCALE_2	SCALE_FACTOR	BIAS
		R2_H_MAX	R2_H_MIN	R2_Y_SC_FACT	R2_Y_BIAS_PASS
-376	424	V97U6910C R2_D_R_MAX	V97U6911C R2_D_R_MIN	V97U6912C R2_D_R_SC_FACT	V97U6909C R2_D_R_BIAS

NOTE: Addressable Unit (AU) position and BIAS data is with respect to the center of the CRT.

**B.4.160.5 XXXXXX TRAJ Display Interface Support Functions**

Table B.4.160-5 Input Functional Parameters

Table B.4.160-6 Output Functional Parameters

Table B.4.160-7 I-Loads

Table B.4.160-8 K-Loads

Table B.4.160-9 Constants

TABLE B.4.160-5. INPUT FUNCTIONAL PARAMETERS FOR TRAJECTORY DISPLAY PROCESSING (G4.160)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
ALT	V95H0175CA	CURR ORB ALT ABOVE REF ELLIPSOID	RTLS UPP	FT	SPL		93017G	*
ALT	V95H0175CB	CURR ORB ALT ABOVE REF ELLIPSOID	ASC UPP	FT			93017G	*
FLT_PATH_ANG/GAMMA	V95H0261CC	GROUND-REL FLT PATH ANGLE	RTLS UPP	SPECIAL			93017G	*
H_DOT_ELLIPSOID/H_DOT	V95L0265CE	EST ALTITUDE RATE	ASC UPP	FT/S			93012D	
M/CURR_ORB_MASS/WEIGHT	V90U1961CG	CURRENT VEHICLE MASS	ASC 2STG GUID	SLUGS			93017G	*
M/CURR_ORB_MASS/WEIGHT	V90U1961CH	CURRENT VEHICLE MASS	PW RTLS GUID	SLUGS			93017G	*
M/CURR_ORB_MASS/WEIGHT	V90U1961CL	CURRENT VEHICLE MASS	PW CONT GUID	SLUGS			93017G	*
MF_DISPLAY	V90U2480C	RTLS MASS DISPLAY PARAMETER	PW RTLS GUID	ND	HXS		93017G	*
MM_CODE_101/MM_101	V90X8155X	MAJOR MODE 101 FLAG	MSC				93012D	
MM_CODE_102/MM_102	V90X8158X	MAJOR MODE 102 FLAG	MSC				93012D	
MM_CODE_103/MM_103	V90X8156X	MAJOR MODE 103 FLAG	MSC				93012D	
MM_CODE_601/MM_601	V90X8194X	MAJOR MODE 601 FLAG	MSC		BD		93012D	
REL_VEL_MAG	V95L0151CA	GND REL VEL MAGNITUDE IN M50 SYS	RTLS UPP	FT/S	SPL		93017G	*
REL_VEL_MAG	V95L0151CE	GND REL VEL MAGNITUDE IN M50 SYS	ASC UPP	FT/S			93017G	*
RNG_TO_RW_THRESH	V95H0176CB	RANGE TO RUNWAY THRESHOLD VIA WP1	RTLS UPP	NM			92522D	
RTLS_ABORT_DECLARED	V90X8637XA	RTLS ABORT DECLARED	MSC		BD		93167A	*
RTLS_ABORT_DECLARED	V90X8637XB	RTLS ABORT DECLARED	ET SEP SEQ		BD		93167A	*
RTLS_ABORT_DECLARED	V90X8637XC	RTLS ABORT DECLARED	CONT 3E/O GUID		BD		93167A	*
S_ATO	V90X8635X	ATO ABORT DECLARED	MSC				93012D	
S_UNCONV	V90X2084XB	PEG UNCONVERGED DSCR IND	PW RTLS GUID		BD		90964	
TAL_ABORT_DECLARED	V90X8658X	TAL ABORT DECLARED	MSC				93090E	
VDMAG	V90U8499CA	DESIRED MECO VELOCITY	ASC 2STG GUID	FT/S			93012D	
VDMAG	V90U8499CB	DESIRED MECO VELOCITY	AOA/ATO TGT	FT/S			93012D	
V_HORIZ_DNRNG	V90L0474C	DOWNRANGE HORIZ EARTH REL VEL	RTLS UPP	FT/S			90705H	
V_INERTIAL_MAG	V95L0510CA	MAG OF VEHICLE INERTIAL VELOCITY	ASC UPP	FT/S			93090E	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE B.4.160-6. OUTPUT FUNCTIONAL PARAMETERS FROM TRAJECTORY DISPLAY PROCESSING (G4.160)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
A1_PRED_X	V94U1280C	ASC TRAJ 1 ALT/VEL PRED X COORD	XXXXXX TRAJ 1 DISP	AU	VAR		93012D	
A1_PRED_Y	V94U1281C	ASC TRAJ 1 ALT/VEL PRED Y COORD	XXXXXX TRAJ 1 DISP	AU	VAR		93012D	
A1_STATE_X	V94U1282C	ASC TRAJ 1 ALT/VEL X COORD	XXXXXX TRAJ 1 DISP	AU	VAR		93012D	
A1_STATE_Y	V94U1283C	ASC TRAJ 1 ALT/VEL Y COORD	XXXXXX TRAJ 1 DISP	AU	VAR		93012D	
A2_PRED_X_30	V94U1284C	ASC TRAJ 2 ALT/VEL PRED X POS_30	XXXXXX TRAJ 2 DISP	AU	VAR		93012D	
A2_PRED_X_60	V94U1286C	ASC TRAJ 2 ALT/VEL PRED X POS_60	XXXXXX TRAJ 2 DISP	AU	VAR		93012D	
A2_PRED_Y_30	V94U1285C	ASC TRAJ 2 ALT/VEL PRED Y POS_30	XXXXXX TRAJ 2 DISP	AU	VAR		93012D	
A2_PRED_Y_60	V94U1287C	ASC TRAJ 2 ALT/VEL PRED Y POS_60	XXXXXX TRAJ 2 DISP	AU	VAR		93012D	
A2_STATE_X	V94U1288C	ASC TRAJ 2 ALT/VEL X COORD	XXXXXX TRAJ 2 DISP	AU	VAR		93012D	
A2_STATE_Y	V94U1289C	ASC TRAJ 2 ALT/VEL Y COORD	XXXXXX TRAJ 2 DISP	AU	VAR		93012D	
A2_VI_X	V94U1290C	X COORD OF INERTIAL VELOCITY	XXXXXX TRAJ 2 DISP	AU	VAR		93012D	
DELTA_R	V90H6981C	RANGE TO RTLS MECO TARGET LINE	CONT 3E/O GUID	NM			90705H	
			PW CONT GUID					
DISP_TITLE	V94J3910C	ASC DISPLAY DYNAMIC TITLE INTEGER	XXXXXX TRAJ 1 DISP				93012D	
			XXXXXX TRAJ 2 DISP					
GUID_XXXX_CHAR	V94J1366C	RTLS GUID STATUS-CHAR STRING	RTLS TRAJ 2 DISP				93012D	
GUID_XXXX_DEC	V94G1367C	RTLS GUID STATUS-DECIMAL VAL	RTLS TRAJ 2 DISP				93012D	
PRPLT	V94U1325C	ET PROPELLANT REMAINING	RTLS TRAJ 2 DISP	PCT	VAR		93012D	
			XXXXXX TRAJ 2 DISP					
R2_D_R_X	V94U1324C	X COORD OF DELTA RANGE	RTLS TRAJ 2 DISP	AU	VAR		93012D	
R2_PRED_X	V94U1321C	ALT/VEL PRED X POS 1	RTLS TRAJ 2 DISP	AU	VAR		93012D	
R2_PRED_X2	V94J1335C	ALT/VEL PRED X POS 2	RTLS TRAJ 2 DISP	AU	VAR		93012D	
R2_PRED_Y	V94H1326C	ALT/VEL PRED Y POS 1	RTLS TRAJ 2 DISP	AU	VAR		93012D	
R2_PRED_Y2	V94J1336C	ALT/VEL PRED Y POS 2	RTLS TRAJ 2 DISP	AU	VAR		93012D	
R2_STATE_X	V94U1322C	ALT/VEL X COORD	RTLS TRAJ 2 DISP	AU	VAR		93012D	
R2_STATE_Y	V94U1323C	ALT/VEL Y COORD	RTLS TRAJ 2 DISP	AU	VAR		93012D	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec



TABLE B.4.160-7. TRAJECTORY DISPLAY PROCESSING (G4.160) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
A1_H_MAX	V97U6703C	FT	F	S	M	C	G4.160	00	DF1	93012D	
A1_H_MIN	V97U6704C	FT	F	S	M	C	G4.160	00	DF1	93012D	
A1_V_MAX	V97U6718C	FT/SEC	F	S	M	C	G4.160	00	DF1	93012D	
A1_V_MIN	V97U6719C	FT/SEC	F	S	M	C	G4.160	00	DF1	93012D	
A1_X_BIAS	V97U6720C	AU	F	S	M	C	G4.160	00	DF1	93012D	
A1_X_SC_FACT	V97U6721C	AU/(FT/SEC)	F	S	M	C	G4.160	00	DF1	93012D	
A1_Y_BIAS	V97U6722C	AU	F	S	M	C	G4.160	00	DF1	93012D	
A1_Y_SC_FACT	V97U6723C	AU/FT	F	S	M	C	G4.160	00	DF1	93012D	
A2_H_MAX	V97U6733C	FT	F	S	M	C	G4.160	00	DF2	93012D	
A2_H_MIN	V97U6734C	FT	F	S	M	C	G4.160	00	DF2	93012D	
A2_VI_MAX	V97U6738C	FT/SEC	F	S	M	C	G4.160	00	DAI	93012D	
A2_VI_MIN	V97U6739C	FT/SEC	F	S	M	C	G4.160	00	DAI	93012D	
A2_V_MAX	V97U6735C	FT/SEC	F	S	M	C	G4.160	00	DF2	93012D	
A2_V_MIN	V97U6736C	FT/SEC	F	S	M	C	G4.160	00	DF2	93012D	
A2_X2_BIAS	V97U6742C	AU	F	S	M	C	G4.160	00	DAI	93012D	
A2_X2_SC_FACT	V97U6743C	AU/(FT/SEC)	F	S	M	C	G4.160	00	DF2	93012D	
A2_X_BIAS	V97U6740C	AU	F	S	M	C	G4.160	00	DF2	93012D	
A2_X_SC_FACT	V97U6741C	AU/(FT/SEC)	F	S	M	C	G4.160	00	DF2	93012D	
A2_Y_BIAS	V97U6744C	AU	F	S	M	C	G4.160	00	DF2	93012D	
A2_Y_SC_FACT	V97U6745C	AU/FT	F	S	M	C	G4.160	00	DF2	93012D	
DEL_V_MAX	V99U7384C	FT/SEC	F	S	M	C	G4.160	00	DAI	93012D	
DT5	V96U7885C	SEC	F	S	M	P	G4.160	00	DFR	93012D	
DT_4	V97U6761C	SEC	F	S	M	P	G4.160	00	DFR	93012D	
R2_D_R_BIAS	V97U6909C	AU	F	S	M	C	G4.160	00	DAH	93012D	
R2_D_R_MAX	V97U6910C	NMI	F	S	M	C	G4.160	00	DFR	93012D	
R2_D_R_MIN	V97U6911C	NMI	F	S	M	C	G4.160	00	DFR	93012D	
R2_D_R_SC_FACT	V97U6912C	AU/NMI	F	S	M	C	G4.160	00	DFR	93012D	
R2_FINAL_WT	V97U6913C	LB	F	S	M	C	G4.160	00	DAH	93012D	
R2_H_MAX	V97U6914C	FT	F	S	M	C	G4.160	00	DFR	93012D	
R2_H_MIN	V97U6915C	FT	F	S	M	C	G4.160	00	DFR	93012D	
R2_RP_1	V97U6916C	NMI/(FT/SEC)	F	S	M	C	G4.160	00	DAH	93012D	
R2_RP_2	V97U6917C	NMI	F	S	M	C	G4.160	00	DAH	93012D	
R2_RP_3	V97U7019C	NMI/RAD	F	S	M	C	G4.160	00	DAH	93012D	
R2_V_MAX	V97U6918C	FT/SEC	F	S	M	C	G4.160	00	DAH	93012D	
R2_V_MIN	V97U6919C	FT/SEC	F	S	M	C	G4.160	00	DFR	93012D	
R2_X_BIAS	V97U6920C	AU	F	S	M	C	G4.160	00	DAH	93012D	
R2_X_SC_FACT	V97U6921C	AU/(FT/SEC)	F	S	M	C	G4.160	00	DAH	93012D	
R2_Y_BIAS_PASS	V97U8142C	AU	F	S	M	P	G4.160	00	DAH	93012D	
R2_Y_SC_FACT	V97U6923C	AU/FT	F	S	M	C	G4.160	00	DFR	93012D	
TOTAL_PRPLT	V97U6927C	LB	F	S	M	C	G4.160	00	DAH	93012D	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE B.4.160-8. TRAJECTORY DISPLAY PROCESSING (G4.160) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
DTC ALT/VEL UPDATE INTERVAL	V97U6762C	00	+1.92	E+00 SEC	F		S P	G4.160	93012D	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.4.160-9. TRAJECTORY DISPLAY PROCESSING (G4.160) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

#### B.4.206 ASCENT DISPLAY INTERFACE PROCESSING (BFS)

The Ascent Display Processing function shall provide for the computation and limiting of the dynamic symbols displayed on the fixed background of the following displays:

XXXXXX TRAJ 1

XXXXXX TRAJ 2

The fixed background for the TRAJ 1 display is comprised of a central plot for monitoring the flight profile and an EAS (Equivalent Air Speed). The central plot of the display is a function of altitude and relative velocity. Dynamic symbols on the central plot indicate current vehicle state and the predicted vehicle state. The fixed background for the TRAJ 2 display is comprised of a central plot, a delta H-Dot scale, a total load scale, and an expanded inertial velocity scale. The central plot of the display is a function of altitude and inertial velocity. Dynamic symbols on the central plot indicate current vehicle state and two predicted vehicle states.

The description of the fixed formats of the Ascent displays is contained in sections 4.2.16 and 4.2.17 of the Level C D&C FSSR.

The I-Load values are defined in the STS Flight Software Initialization Load (JSC-19350) and in Table B.4.206-7. The processing required to support the display of these dynamic symbols is defined in the following paragraphs.

##### B.4.206.1 XXXXXX TRAJ 1 Display

A symbol representing current vehicle altitude/velocity state is displayed on TRAJ 1. The requirements for computing and limiting the dynamic symbols are defined as follows:

###### The Computation of the Altitude/Velocity Indicator

###### X-COORDINATE

$V\_RHO\_MAG = MID(A1\_V\_MIN, REL\_VEL\_MAG, A1\_V\_MAX)$

$TRAJ\_STATE\_X = A1\_X\_BIAS + A1\_X\_SC\_FACT * V\_RHO\_MAG$

###### Y-COORDINATE

$H\_ELLIPSOID = MID(A1\_H\_MIN, ALT, A1\_H\_MAX)$

$TRAJ\_STATE\_Y = A1\_Y\_BIAS + A1\_Y\_SC\_FACT * H\_ELLIPSOID$

###### The Computation of the KEAS Indicator

CONVERT EAS From FPS to KNOTS

$KEAS = EAS * .59245$

Y-COORDINATE

```
KEAS = MID(A1_EAS_MIN, KEAS, A1_EAS_MAX)
EAS_Y = A1_EAS_BIAS + A1_KEAS_SC_FACT*KEAS
IF KEAS > A1_EAS_FLASH
    THEN    EAS_FLAG = FLASH
    ELSE    EAS_FLAG = OFF
```

The Computation of the Predicted Altitude/Velocity Indicator(.96 HZ)

UPDATE PUSH-DOWN STACK AND COMPUTE DELTAS

```
V0 = V1 = V2 = V3 = REL_VEL_MAG
H0 = H1 = H2 = H3 = ALT
HDOT0 = HDOT1 = HDOT2 = HDOT3 = H_DOT
DELTA_V = MID(V3 - V2, V2 - V1, V1 - V0)
DELTA_H = MID(H3 - H2, H2 - H1, H1 - H0)
DELTA_HDOT = MID(HDOT3 - HDOT2, HDOT2 - HDOT1, HDOT1 - HDOT0)
```

X-COORDINATE OF THE 20 SECOND PREDICTOR

```
VPRED_20 = V3 + (DELTA_V/.96)*20
V_LIMIT_20 = MID(A1_V_MAX, VPRED_20, A1_V_MIN)
PRED_X_20 = V_LIMIT_20*A1_X_SC_FACT + A1_X_BIAS
```

Y-COORDINATE OF THE 20 SECOND PREDICTOR

```
HPRED_20 = H3 + (DELTA_H/.96)*20 + .5*(DELTA_HDOT/.96)*202
H_LIMIT_20 = MID(A1_H_MAX, HPRED_20, A1_H_MIN)
PRED_Y_20 = H_LIMIT_20*A1_Y_SC_FACT + A1_Y_BIAS
```

**B.4.206.2 XXXXXX TRAJ 2 Display**

Symbols representing current and predicted vehicle state, inertial velocity, delta H-Dot, and total load are displayed on the TRAJ 2 display.

The requirements for computing and limiting these symbols are defined in the following paragraphs.

Processing for the TRAJ 2 display occurs during MM 103.

The Computation of the Vehicle State Character

Then Compute the X and Y coordinates

X-COORDINATE

```
VI_PLOT = MID(A2_V_MIN, V_INERTIAL_MAG, A2_V_MAX)
TRAJ_STATE_X = A2_X_BIAS + A2_X_SC_FACT*VI_PLOT
```

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Y-COORDINATE

$$H\_ELLIPSOID = MID(A2\_H\_MIN, ALT, A2\_H\_MAX)$$

$$TRAJ\_STATE\_Y = A2\_Y\_BIAS + A2\_Y\_SC\_FACT * H\_ELLIPSOID$$
The Computation of the Inertial Velocity Character

The inertial velocity character will be initialized at a position corresponding to the lower end of the inertial velocity scale.

X-COORDINATE

```

IF TAL_ABORT_DECLARED = 0
  THEN V2_PLOT = V_INERTIAL_MAG
      V2_PLOT = MID(A2_VI_MIN, V2_PLOT, A2_VI_MAX)
      TRAJ2_VI_X = A2_X2_BIAS + A2_X2_SC_FACT * V2_PLOT
ELSE
  IF RNG_TO_RW_THRESH > 0 AND TAL_TGT_COMPLETE = 1
    THEN DEL_V_TAL = A(8) + A(9) RNG_TO_RW_THRESH +
                A(10) RNG_TO_RW_THRESH2 +
                A(11) RNG_TO_RW_THRESH3
    DEL_V_PLOT = MID(VD_TAL_MIN, DEL_V_TAL, VD_TAL_MAX) -
                V_INERTIAL_MAG
    V2_PLOT = A2_VI_MIN + DEL_V_MAX - DEL_V_PLOT
    V2_PLOT = MID(A2_VI_MIN, V2_PLOT, A2_VI_MAX)
    TRAJ2_VI_X = A2_X2_BIAS + A2_X2_SC_FACT * V2_PLOT

```

THE COMPUTATION OF THE DELTA-H-DOT INDICATOR

```

IF LAUNCH_SITE = 0
  THEN IF TAL_ABORT_DECLARED = 1
        D_H_DOT = H_DOT - HDAOA
        ELSE D_H_DOT = H_DOT - HDNOM
IF LAUNCH_SITE = 1
  THEN IF S_ATO = 1
        D_H_DOT = H_DOT - HDAOA
        ELSE D_H_DOT = H_DOT - HDNOM

```

where HDAOA and HDNOM are obtained from Table B.4.206.2-1 by linear interpolation as a function of REL\_VEL\_MAG. The values of Table B.4.206.2-1 are mission dependent I-LOADS and can be found in the JSC-19350 STS Flight Software Initialization Load.

Y-COORDINATE

```
IF LAUNCH_SITE = 1 AND TAL_ABORT_DECLARED = 1
  THEN DHD_Y = 400
  ELSE DHD_PLOT = MID(A2_DHD_MIN, D_H_DOT, A2_DHD_MAX)
  IF DHD_PLOT = D_H_DOT
    THEN DHD_FLAG = OFF
    ELSE DHD_FLAG = FLASH
  DHD_Y = A2_DHD_BIAS + A2_DHD_SC_FACT*DHD_PLOT
```

THE COMPUTATION OF THE TOTAL LOAD INDICATOR

Y-COORDINATE

```
G_LOAD = MID(A2_G_MIN, LOAD_TOTAL, A2_G_MAX)
G_LOAD_Y = A2_G_BIAS + A2_G_SC_FACT*G_LOAD
IF G_LOAD > A2_G_FLASH
  THEN G_LOAD_FLAG = FLASH
  ELSE G_LOAD_FLAG = OFF
```

The Computation of the Predicted Altitude/Velocity Indicator (.96 HZ)

UPDATE PUSH-DOWN STACK AND COMPUTE DELTAS

```
V0 = V1 = V2 = V3 = V_INERTIAL_MAG
H0 = H1 = H2 = H3 = ALT
HDOT0 = HDOT1 = HDOT2 = HDOT3 = H_DOT
DELTA_V = MID(V3-V2, V2-V1, V1-V0)
DELTA_H = MID(H3-H2, H2-H1, H1-H0)
DELTA_HDOT = MID(HDOT3 - HDOT2, HDOT2 - HDOT1, HDOT1 - HDOT0)
```

X-COORDINATE OF THE 30 SECOND PREDICTOR

```
VPRED_30 = V3 + (DELTA_V/.96)*30
V_LIMIT_30 = MID(A2_V_MAX, VPRED_30, A2_V_MIN)
PRED_X_30 = V_LIMIT_30*A2_X_SC_FACT + A2_X_BIAS
```

Y-COORDINATE OF THE 30 SECOND PREDICTOR

```
HPRED_30 = H3 + (DELTA_H/.96)*30 + .5*(DELTA - HDOT/.96)*302
H_LIMIT_30 = MID(A2_H_MAX, HPRED_30, A2_H_MIN)
PRED_Y_30 = H_LIMIT_30*A2_Y_SC_FACT + A2_Y_BIAS
```

X-COORDINATE OF THE 60 SECOND PREDICTOR

```
VPRED_60 = V3 + (DELTA_V/.96)*60
V_LIMIT_60 = MID(A2_V_MAX, VPRED_60, A2_V_MIN)
PRED_X_60 = V_LIMIT_60*A2_X_SC_FACT + A2_X_BIAS
```

Y-COORDINATE OF THE 60 SECOND PREDICTOR

$$HPRED\_60 = H3 + (DELTA\_M/.96)*60 + .5*(DELTA - HDOT/.96)*60^2$$

$$H\_LIMIT\_60 = MID(A2\_H\_MAX, HPRED\_60, A2\_H\_MIN)$$

$$PRED\_Y\_60 = H\_LIMIT\_60*A2\_Y\_SC\_FACT + A2\_Y\_BIAS$$

COMPUTATION OF ASCENT DISPLAY DYNAMIC TITLES

```

IF MM_CODE_101 = 1
    THEN DISP_TITLE = 1 (LAUNCH TRAJ 1)
IF MM_CODE_102 = 1 AND NO ABORT REQUESTED
    THEN DISP_TITLE = 2 (ASCENT TRAJ 1)
IF MM_CODE_102 = 1 AND RTLS_ABORT = 1
    THEN DISP_TITLE = 3 (RTLS TRAJ 1)
IF MM_CODE_102 = 1 AND S_ATO = 1
    THEN DISP_TITLE = 5 (ATO TRAJ 1)
IF MM_CODE_103 = 1 AND NO ABORT REQUESTED
    THEN DISP_TITLE = 6 (ASCENT TRAJ 2)
IF MM_CODE_103 = 1 AND TAL_ABORT_DECLARED = 1
    THEN DISP_TITLE = 7 (TAL TRAJ 2)
IF MM_CODE_103 = 1 AND S_ATO = 1
    THEN DISP_TITLE = 8 (ATO TRAJ 2)
    
```

Table B.4.206.2-1. NOMINAL AND TAL ALTITUDE RATE vs RELATIVE VELOCITY (ASCENT)			
I	V (I)	HDAOA (I)	HDNOM (I)
1	V97U8763C	V97U8801C	V97U8782C
2	V97U8764C	V97U8802C	V97U8783C
3	V97U8765C	V97U8803C	V97U8784C
4	V97U8766C	V97U8804C	V97U8785C
5	V97U8767C	V97U8805C	V97U8786C
6	V97U8768C	V97U8806C	V97U8787C
7	V97U8769C	V97U8807C	V97U8788C
8	V97U8770C	V97U8808C	V97U8789C
9	V97U8771C	V97U8809C	V97U8790C
10	V97U8772C	V97U8810C	V97U8791C
11	V97U8773C	V97U8811C	V97U8792C
12	V97U8774C	V97U8812C	V97U8793C
13	V97U8775C	V97U8813C	V97U8794C

Note: V is Relative Velocity (REL\_VEL\_MAG),  
HDAOA is TAL ( Ft/Sec) Alt. Rate,  
HDNOM is Nominal Altitude Rate.



**B.4.206.3 The Derivation of the Ascent DIP Coefficients**

Scale factors and biases are calculated using the following relationships:

$$POS\_1 = BIAS + (Scale\ Factor) (SCALE\_1)$$

$$POS\_2 = BIAS + (Scale\ Factor) (SCALE\_2)$$

where POS\_1 and POS\_2 are two locations on the implied scale on the face of the CRT and SCALE\_1 and SCALE\_2 are the two corresponding values of the parameter represented by the scale. Table B.4.206.3-1 lists all of the Ascent TRAJ 1 and TRAJ 2 DIP coefficients. The coefficients that are derived from the position and scale I-Loaded MSIDs are indicated with an asterisk. I-LOAD values can be found in the JSC-19350 STS Flight Software Initialization Load. Scale factors and biases named below are found in the BFS derived equation file specified in the Flight Software Class 1 Integration Plan (CIP) JSC-22320.

Table B.4.206.3-1. ASCENT DIP COEFFICIENTS					
POS_1	POS_2	SCALE_1	SCALE_2	SCALE_FACTOR	BIAS
493	-340	V97U6718C A1_V_MAX	V97U6719C A1_V_MIN	V97U6721C A1_X_SC_FACT	V97U6720C A1_X_BIAS
270	-270	V97U6703C A1_H_MAX	V97U6704C A1_H_MIN	V97U6723C A1_Y_SC_FACT	V97U6722C A1_Y_BIAS
V97U8876C A1_EAS_Y_MAX	V97U8877C A1_EAS_Y_MIN	V97U6711C A1_EAS_MAX	V97U6712C A1_EAS_MIN	V97U6713C* A1_EAS_SC_FACT	V97U6709C* A1_EAS_BIAS
481	-280	V97U6735C A2_V_MAX	V97U6736C A2_V_MIN	V97U6741C A2_X_SC_FACT	V97U6740C A2_X_BIAS
243	-226	V97U6733C A2_H_MAX	V97U6734C A2_H_MIN	V97U6745C A2_Y_SC_FACT	V97U6744C A2_Y_BIAS
451	-299	V97U6738C A2_VI_MAX	V97U6739C A2_VI_MIN	V97U6743C A2_X2_SC_FACT	V97U6742C A2_X2_BIAS
V97U8884C A2_DHD_Y_MAX	V97U8885C A2_DHD_Y_MIN	V97U6725C A2_DHD_MAX	V97U6726C* A2_DHD_MIN	V97U6727C* A2_DHD_SC_FACT	V97U6724C* A2_DHD_BIAS
V97U8886C A2_G_Y_MAX	V97U8887C A2_G_Y_MIN	V97U6730C A2_G_MAX	V97U6731C A2_G_MIN	V97U6732C* A2_G_SC_FACT	V97U6728C* A2_G_BIAS

\*Derived I-Load, BFS Only

Table B.4.206.3-2. ASCENT TRAJ DISP / GUIDANCE INTERFACE		
THIS TABLE LISTS THE GUIDANCE / DISPLAY INTERFACE VARIABLES THAT THE ASCENT TRAJECTORY DISPLAY USES IN COMPUTATIONS.		
NOMENCLATURE	GUIDANCE VARIABLES	DISPLAY VARIABLES
ASCENT	A(8)	A2VITAL+14
TARGETING	A(9)	A2VITAL+16
TABLE	A(10)	A2VITAL+18
	A(11)	A2VITAL+20

**B.4.206.4 Ascent Traj Display Interface Support Functions**

Table B.4.206-5                    Input Functional Parameters (not supported)

Table B.4.206-6                    Output Functional Parameters (not supported)

Table B.4.206-7                    I-Loads

Table B.4.206-8                    K-Loads

Table B.4.206-9                    Constants N/A

TABLE B.4.206-7. BFS ASCENT DISPLAY PROCESSING (4.206) I-LOADS

BFS NAME	MSID	ENG UNITS	DT	PR	D	S	PARA	MC	CAT	LAST CR	R E V
A1_H_MAX	V97U6703C	FT	F	S	M	C	4.206	00	DF1	93012D	
A1_H_MIN	V97U6704C	FT	F	S	M	C	4.206	00	DF1	93012D	
A1_EAS_FLASH	V97U6710C	KNOTS	F	S	M	B	4.206	00	DF1	93012D	
A1_EAS_MAX	V97U6711C	KNOTS	F	S	M	B	4.206	00	DF1	93012D	
A1_EAS_MIN	V97U6712C	KNOTS	F	S	M	B	4.206	00	DF1	93012D	
A1_V_MAX	V97U6718C	FT/SEC	F	S	M	C	4.206	00	DF1	93012D	
A1_V_MIN	V97U6719C	FT/SEC	F	S	M	C	4.206	00	DF1	93012D	
A1_X_BIAS	V97U6720C	AU	F	S	M	C	4.206	00	DF1	93012D	
A1_X_SC_FACT	V97U6721C	AU/(FT/SEC)	F	S	M	C	4.206	00	DF1	93012D	
A1_Y_BIAS	V97U6722C	AU	F	S	M	C	4.206	00	DF1	93012D	
A1_Y_SC_FACT	V97U6723C	AU/FT	F	S	M	C	4.206	00	DF1	93012D	
A2_DHD_MAX	V97U6725C	FT/SEC	F	S	M	B	4.206 4.218	00	DF2	93012D	
A2_G_FLASH	V97U6729C	G	F	S	M	B	4.206 4.218	00	DF2	93012D	
A2_G_MAX	V97U6730C	G	F	S	M	B	4.206 4.218	00	DF2	93012D	
A2_G_MIN	V97U6731C	G	F	S	M	B	4.206 4.218	00	DF2	93012D	
A2_H_MAX	V97U6733C	FT	F	S	M	C	4.206	00	DF2	93012D	
A2_H_MIN	V97U6734C	FT	F	S	M	C	4.206	00	DF2	93012D	
A2_V_MAX	V97U6735C	FT/SEC	F	S	M	C	4.206	00	DF2	93012D	
A2_V_MIN	V97U6736C	FT/SEC	F	S	M	C	4.206	00	DF2	93012D	
A2_VI_MAX	V97U6738C	FT/SEC	F	S	M	C	4.206	00	DAI	93012D	
A2_VI_MIN	V97U6739C	FT/SEC	F	S	M	C	4.206	00	DAI	93012D	
A2_X_BIAS	V97U6740C	AU	F	S	M	C	4.206	00	DF2	93012D	
A2_X_SC_FACT	V97U6741C	AU/(FT/SEC)	F	S	M	C	4.206	00	DF2	93012D	
A2_X2_BIAS	V97U6742C	AU	F	S	M	C	4.206	00	DAI	93012D	
A2_X2_SC_FACT	V97U6743C	AU/(FT/SEC)	F	S	M	C	4.206	00	DF2	93012D	
A2_Y_BIAS	V97U6744C	AU	F	S	M	C	4.206	00	DF2	93012D	
A2_Y_SC_FACT	V97U6745C	AU/FT	F	S	M	C	4.206	00	DF2	93012D	
V(01)	V97U8763C	FT/SEC	F	S	M	B	4.206	00	DAB	DC0617	
V(02)	V97U8764C	FT/SEC	F	S	M	B	4.206	00	DAB	DC0617	
V(03)	V97U8765C	FT/SEC	F	S	M	B	4.206	00	DAB	DC0617	
V(04)	V97U8766C	FT/SEC	F	S	M	B	4.206	00	DAB	DC0617	
V(05)	V97U8767C	FT/SEC	F	S	M	B	4.206	00	DAB	DC0617	
V(06)	V97U8768C	FT/SEC	F	S	M	B	4.206	00	DAB	DC0617	
V(07)	V97U8769C	FT/SEC	F	S	M	B	4.206	00	DAB	DC0617	
V(08)	V97U8770C	FT/SEC	F	S	M	B	4.206	00	DAB	DC0617	
V(09)	V97U8771C	FT/SEC	F	S	M	B	4.206	00	DAB	DC0617	
V(10)	V97U8772C	FT/SEC	F	S	M	B	4.206	00	DAB	DC0617	
V(11)	V97U8773C	FT/SEC	F	S	M	B	4.206	00	DAB	DC0617	
V(12)	V97U8774C	FT/SEC	F	S	M	B	4.206	00	DAB	DC0617	
V(13)	V97U8775C	FT/SEC	F	S	M	B	4.206	00	DAB	DC0617	
HDNOM(01)	V97U8782C	FT/SEC	F	S	M	B	4.206	00	DAC	DC0830	
HDNOM(02)	V97U8783C	FT/SEC	F	S	M	B	4.206	00	DAC	DC0830	
HDNOM(03)	V97U8784C	FT/SEC	F	S	M	B	4.206	00	DAC	DC0830	

TABLE B.4.206-7. BFS ASCENT DISPLAY PROCESSING (4.206) I-LOADS

BFS NAME	MSID	ENG UNITS	DT	PR	D	S	PARA	MC	CAT	LAST CR	R E V
HDNOM(04)	V97U8785C	FT/SEC	F	S	M	B	4.206	00	DAC	DC0830	
HDNOM(05)	V97U8786C	FT/SEC	F	S	M	B	4.206	00	DAC	DC0830	
HDNOM(06)	V97U8787C	FT/SEC	F	S	M	B	4.206	00	DAC	DC0830	
HDNOM(07)	V97U8788C	FT/SEC	F	S	M	B	4.206	00	DAC	DC0830	
HDNOM(08)	V97U8789C	FT/SEC	F	S	M	B	4.206	00	DAC	DC0830	
HDNOM(09)	V97U8790C	FT/SEC	F	S	M	B	4.206	00	DAC	DC0830	
HDNOM(10)	V97U8791C	FT/SEC	F	S	M	B	4.206	00	DAC	DC0830	
HDNOM(11)	V97U8792C	FT/SEC	F	S	M	B	4.206	00	DAC	DC0830	
HDNOM(12)	V97U8793C	FT/SEC	F	S	M	B	4.206	00	DAC	DC0830	
HDNOM(13)	V97U8794C	FT/SEC	F	S	M	B	4.206	00	DAC	DC0830	
HDAOA(01)	V97U8801C	FT/SEC	F	S	M	B	4.206	00	DAD	DC0830	
HDAOA(02)	V97U8802C	FT/SEC	F	S	M	B	4.206	00	DAD	DC0830	
HDAOA(03)	V97U8803C	FT/SEC	F	S	M	B	4.206	00	DAD	DC0830	
HDAOA(04)	V97U8804C	FT/SEC	F	S	M	B	4.206	00	DAD	DC0830	
HDAOA(05)	V97U8805C	FT/SEC	F	S	M	B	4.206	00	DAD	DC0830	
HDAOA(06)	V97U8806C	FT/SEC	F	S	M	B	4.206	00	DAD	DC0830	
HDAOA(07)	V97U8807C	FT/SEC	F	S	M	B	4.206	00	DAD	DC0830	
HDAOA(08)	V97U8808C	FT/SEC	F	S	M	B	4.206	00	DAD	DC0830	
HDAOA(09)	V97U8809C	FT/SEC	F	S	M	B	4.206	00	DAD	DC0830	
HDAOA(10)	V97U8810C	FT/SEC	F	S	M	B	4.206	00	DAD	DC0830	
HDAOA(11)	V97U8811C	FT/SEC	F	S	M	B	4.206	00	DAD	DC0830	
HDAOA(12)	V97U8812C	FT/SEC	F	S	M	B	4.206	00	DAD	DC0830	
HDAOA(13)	V97U8813C	FT/SEC	F	S	M	B	4.206	00	DAD	DC0830	
A1_EAS_Y_MAX	V97U8876C	AU	F	S	M	B	4.206	00	DF1	93012D	
A1_EAS_Y_MIN	V97U8877C	AU	F	S	M	B	4.206	00	DF1	93012D	
A2_DHD_Y_MAX	V97U8884C	AU	F	S	M	B	4.206	00	DF2	93012D	
A2_DHD_Y_MIN	V97U8885C	AU	F	S	M	B	4.206	00	DF2	93012D	
A2_G_Y_MAX	V97U8886C	AU	F	S	M	B	4.206	00	DF2	93012D	
A2_G_Y_MIN	V97U8887C	AU	F	S	M	B	4.206	00	DF2	93012D	
DEL_V_MAX	V99U7384C	FT/SEC	F	S	M	C	4.206	00	DAI	93012D	
LAUNCH_SITE	V99U9700C	ND	I	S	M	B	4.206	00	DF2	93012D	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE B.4.206-8. BFS ASCENT DISPLAY PROCESSING (4.206) K-LOADS

BFS NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PARA	LAST CR	R E V
-------------------------	------	----	-------------	-----------	----	--------	---	------	---------	-------------

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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

#### B.4.218 RTLS TRAJ 2 DISPLAY INTERFACE PROCESSING (BFS)

The RTLS TRAJ 2 display processing function shall perform the computation and limiting of the dynamic symbols displayed on the fixed background of the RTLS TRAJ 2 display.

The fixed background of the RTLS TRAJ 2 display is comprised of a central plot for monitoring the flight profile, a delta H-dot scale, a delta range scale, a total vehicle load scale, and an angle of attack scale. The central plot is a function of altitude and horizontal velocity.

In addition, the RTLS TRAJ 2 display processing function calculates the amount of ET propellant remaining for display on the RTLS TRAJ 2 display.

The description of the fixed format for the display is contained in section 4.2.34 of the Level C D&C FSSR.

The I-Load values are defined in the JSC-19350 STS Flight Software Initialization Load and in Table B.4.218-7. The processing required to support the display of the dynamic symbols is defined in the following paragraphs.

##### The Computation of the Delta Range Indicator (Only if RTLS ABORT = 1)

```
IF RTLS_ABORT = 1 (Compute DELTA_R as follows)
  THEN IF V_HORIZ_DRNG < 0
    THEN REL_VEL_PLOT = -REL_VEL_MAG
    ELSE REL_VEL_PLOT = REL_VEL_MAG
  RP = R2_RP_1 * REL_VEL_PLOT + R2_RP_2 + R2_RP_3*FLT_PATH_ANG
  DELTA_R = RP - RNG_TO_RW_THRESH (NMI)
NO ELSE
```

##### X-Coordinate

```
DEL_R = MID (R2_D_R_MIN, DELTA_R, R2_D_R_MAX)
R2_D_R_X = INTEGER (R2_D_R_BIAS + R2_D_R_SC_FACT*DEL_R)
```

##### The Computation of the Altitude/Velocity Indicator

##### X-Coordinate

```
REL_VEL_PLOT = MID (R2_V_MIN, V_HORIZ_DNRNG, R2_V_MAX)
R2_STATE_X = INTEGER (R2_X_BIAS + R2_X_SC_FACT*REL_VEL_PLOT)
```

##### Y-Coordinate

```
H_ELLIPSOID = MID (R2_H_MIN, ALT, R2_H_MAX)
R2_STATE_Y = INTEGER (R2_Y_BIAS + R2_Y_SC_FACT*H_ELLIPSOID)
```

The Computation of the Predicted Altitude/Velocity Indicator (.96 HZ)

UPDATE PUSH DOWN STACK & COMPUTE DELTAS

V0 = V1 = V2 = V3 = V\_HORIZ\_DNRNG  
H0 = H1 = H2 = H3 = ALT  
HDOT0 = HDOT1 = HDOT2 = HDOT3 = H\_DOT\_ELLIPSOID  
DELTA\_V = MID (V3 - V2, V2 - V1, V1 - V0)  
DELTA\_H = MID (H3 - H2, H2 - H1, H1 - H0)  
DELTA\_HDOT = MID (HDOT3 - HDOT2, HDOT2 - HDOT1, HDOT1 - HDOT0)

X-Coordinate of the 30 Sec Predictor

VPRED\_30 = V3 + (DELTA\_V/.96) \* 30  
V\_LIMIT\_30 = MID (R2\_V\_MAX, VPRED\_30, R2\_V\_MIN)  
PRED\_X\_30 = V\_LIMIT\_30 \* R2\_X\_SC\_FACT + R2\_X\_BIAS

Y-Coordinate of the 30 Sec Predictor

HPRED\_30 = H3 + (DELTA\_H/.96) \* 30 + .5 \* (DELTA\_HDOT/.96) \* 30<sup>2</sup>  
H\_LIMIT\_30 = MID (R2\_H\_MAX, HPRED\_30, R2\_H\_MIN)  
PRED\_Y\_30 = H\_LIMIT\_30 \* R2\_Y\_SC\_FACT + R2\_Y\_BIAS

X-Coordinate of the 60 Sec Predictor

VPRED\_60 = V3 + (DELTA\_V/.96) \* 60  
V\_LIMIT\_60 = MID (R2\_V\_MAX, VPRED\_60, R2\_V\_MIN)  
PRED\_X\_60 = V\_LIMIT\_60 \* R2\_X\_SC\_FACT + R2\_X\_BIAS

Y-Coordinate of the 60 Sec Predictor

HPRED\_60 = H3 + (DELTA\_H/.96) \* 60 + .5 \* (DELTA\_HDOT/.96) \* 60<sup>2</sup>  
H\_LIMIT\_60 = MID (R2\_H\_MAX, HPRED\_60, R2\_H\_MIN)  
PRED\_Y\_60 = H\_LIMIT\_60 \* R2\_Y\_SC\_FACT + R2\_Y\_BIAS

The Computation of the Alpha Indicator

Y-Coordinate

ALPHA\_PLOT = MID (RB\_ALPHA\_MIN, ALPHA\_ND, RB\_ALPHA\_MAX)  
RB\_ALPHA\_Y = INTEGER (RB\_ALPHA\_BIAS + RB\_ALPHA\_SC\_FACT \* ALPHA\_PLOT)

The Computation of the Delta-H-Dot Indicator

D\_H\_DOT = HDR - H\_DOT\_ELLIPSOID

where HDR is obtained from Table B.4.218.0-1 by linear interpolation as a function of DELTA R. The values of HDR in the Table B.4.218.0-1 are mission dependent I-LOADS. They can be found in the JSC-19350 STS Flight Software Initialization Load.

```
IF - 550 < DELTA_R < -50 AND V_HORIZ_DNRNG < 0
  THEN Compute DHD_Y
  ELSE DHD_Y = - 400
```

DHD Y Computation

```
DHD_PLOT = MID (A2_DHD_MIN, D_H_DOT, A2_DHD_MAX)
IF DHD_PLOT = D_H_DOT
  THEN DHD_FLAG = OFF
  ELSE DHD_FLAG = FLASH
DHD_Y = A2_DHD_BIAS + A2_DHD_SC_FACT * DHD_PLOT
```

The Computation of the Total Load Indicator

Y-Coordinate

```
G_LOAD = MID (A2_G_MIN, LOAD_TOTAL, A2_G_MAX)
G_LOAD_Y = RB_G_BIAS + RB_G_SC_FACT * G_LOAD
IF G_LOAD > A2_G_FLASH
  THEN G_LOAD_FLAG = FLASH
  ELSE G_LOAD_FLAG = OFF
```

Computation of Remaining Propellant

CURRENT\_PRPLT = 32.174 \* M - R2\_FINAL\_WT

PRPLT = (CURRENT\_PRPLT/TOTAL\_PRPLT) \* 100%



Computation of the RTLS Guidance Status Parameter (GUID)

Compute GUID according to the following table only if an RTLS is in progress, i.e. RTLS ABORT DECLARED (V90X8637X) = 1.

GUID UNCONV FLAG-BFS (V90X2084X)	VALUE OF RTLS MASS DISPLAY PARAMETER -BFS (V90U0126C)	VALUE OF GUID XXXX DISPLAYED IN FIELD (V94J1366C - CHAR) (V94G1367C - DEC)	DATA TYPE OF GUID
ON OR OFF	-999	INIT (Initialization)	CHAR
ON OR OFF	GREATER THAN -999 BUT LESS THAN ZERO	INHB (Inhibit)	CHAR
ON	GREATER THAN OR EQUAL TO ZERO BUT LESS THAN +777	INHB (Inhibit)	CHAR
OFF	GREATER THAN OR EQUAL TO ZERO BUT LESS THAN +777	Value of RTLS Mass display parameter	DEC
ON OR OFF	GREATER THAN OR EQUAL TO +777	PPA <del>✓</del> (Powered pitch-around)	CHAR

Table B.4.218.0-1. RTLS ALTITUDE RATE VS DELTA_R		
I	DELTA_R	HDR
1	-550	V96U7865C
2	-450	V96U7866C
3	-350	V96U7867C
4	-250	V96U7868C
5	-150	V96U7869C
6	-50	V96U7870C

**B.4.218.1 The Derivation of the RTLS Trajectory 2 DIP Coefficients**

All of the scale factors and biases are derived by using the relationship

$$POS\_1 = BIAS + (SCALE\_FACTOR) (SCALE\_1)$$

$$POS\_2 = BIAS + (SCALE\_FACTOR) (SCALE\_2)$$

where POS\_1 and POS\_2 are two locations on a (possibly implied) scale on the face of the CRT and SCALE\_1 and SCALE\_2 are the two corresponding values of the parameter represented by the scale.

Table B.4.218.1-1 lists the RTLS Trajectory 2 DIP coefficients and the MSIDs or values of POS\_1, POS\_2, SCALE\_1, SCALE\_2, SCALE FACTOR and BIAS used. I-LOAD values can be found in the JSC-19350 STS Flight Software Initialization Load.

Table B.4.218.1-1. RTLS TRAJ 2 DIP COEFFICIENTS							
POS_1	POS_2	SCALE_1	SCALE_2	SCALE FACTOR		BIAS	
				NAME	VALUE	NAME	VALUE
498	-433	V97U 6918C	V97U 6919C	R2_X_SC_ FACT	V97U6921C	R2_X_BIAS	V97U 6920C
-239	271	V97U 6915C	V97U 6914C	R2_Y_SC_ FACT	V97U6923C	R2_Y_BIAS	V97U 6922C
-376	424	V97U 6910C	V97U 6914C	R2_D_R_SC_ FACT	V97U6912C	R2_D_R_ BIAS	V97U 6909C
256	-256	V97U 8705C	V97U 8706C	RB_ALPHA_ SC_FACT	V97U8708C	RB_ALPHA_ BIAS	V97U 8707C
-37	-262	3.5	2.0	RB_G_SC_ FACT	V96U8704C	RB_G_BIAS	V96U 8703C
*V97U 8884C	V97U* 8885C	V97U 6725C	V97U* 6726C	A2_DHD_SC_ FACT	V97U6727C*	A2_DHD_ BIAS	V97U* 6724C

\* Derived equation parameters

**B.4.218.2 RTLS Traj 2 Display Interface Support Functions**

Table B.4.218-5 Input Functional Parameters (not supported)

Table B.4.218-6 Output Functional Parameters (not supported)

Table B.4.218-7 I-Loads

Table B.4.218-8 K-Loads

Table B.4.218-9 Constants N/A

TABLE B.4.218-7. BFS RTLS TRAJ 2 DISPLAY PROCESSING (4.218) I-LOADS

BFS NAME	MSID	ENG UNITS	DT	PR	D	S	PARA	MC	CAT	LAST CR	R E V
HDR(01)	V96U7865C	FT/SEC	F	S	M	B	4.218	00	DAA	93012D	
HDR(02)	V96U7866C	FT/SEC	F	S	M	B	4.218	00	DAA	93012D	
HDR(03)	V96U7867C	FT/SEC	F	S	M	B	4.218	00	DAA	93012D	
HDR(04)	V96U7868C	FT/SEC	F	S	M	B	4.218	00	DAA	93012D	
HDR(05)	V96U7869C	FT/SEC	F	S	M	B	4.218	00	DAA	93012D	
HDR(06)	V96U7870C	FT/SEC	F	S	M	B	4.218	00	DAA	93012D	
RB_G_BIAS	V96U8703C	AU	F	S	M	B	4.218	00	DFR	93012D	
RB_G_SC_FACT	V96U8704C	AU/G	F	S	M	B	4.218	00	DFR	93012D	
A2_DHD_MAX	V97U6725C	FT/SEC	F	S	M	B	4.206	00	DF2	93012D	
A2_G_FLASH	V97U6729C	G	F	S	M	B	4.218 4.206	00	DF2	93012D	
A2_G_MAX	V97U6730C	G	F	S	M	B	4.218 4.206	00	DF2	93012D	
A2_G_MIN	V97U6731C	G	F	S	M	B	4.218 4.206	00	DF2	93012D	
R2_D_R_BIAS	V97U6909C	AU	F	S	M	C	4.218	00	DAH	93012D	
R2_D_R_MAX	V97U6910C	NMI	F	S	M	C	4.218	00	DFR	93012D	
R2_D_R_MIN	V97U6911C	NMI	F	S	M	C	4.218	00	DFR	93012D	
R2_D_R_SC_FACT	V97U6912C	AU/NMI	F	S	M	C	4.218	00	DFR	93012D	
R2_FINAL_WT	V97U6913C	LB	F	S	M	C	4.218	00	DAH	93012D	
R2_H_MAX	V97U6914C	FT	F	S	M	C	4.218	00	DFR	93012D	
R2_H_MIN	V97U6915C	FT	F	S	M	C	4.218	00	DFR	93012D	
R2_RP_1	V97U6916C	NMI / (FT/SEC)	F	S	M	C	4.218	00	DAH	93012D	
R2_RP_2	V97U6917C	NMI	F	S	M	C	4.218	00	DAH	93012D	
R2_V_MAX	V97U6918C	FT/SEC	F	S	M	C	4.218	00	DAH	93012D	
R2_V_MIN	V97U6919C	FT/SEC	F	S	M	C	4.218	00	DFR	93012D	
R2_X_BIAS	V97U6920C	AU	F	S	M	C	4.218	00	DAH	93012D	
R2_X_SC_FACT	V97U6921C	AU / (FT/SEC)	F	S	M	C	4.218	00	DAH	93012D	
R2_Y_BIAS	V97U6922C	AU	F	S	M	B	4.218	00	DFR	93012D	
R2_Y_SC_FACT	V97U6923C	AU/FT	F	S	M	C	4.218	00	DFR	93012D	
TOTAL_PRPLT	V97U6927C	LB	F	S	M	C	4.218	00	DAH	93012D	
R2_RP_3	V97U7019C	NMI/RAD	F	S	M	C	4.218	00	DAH	93012D	
RB_ALPHA_MAX	V97U8705C	DEG	F	S	M	B	4.218	00	DFR	93012D	
RB_ALPHA_MIN	V97U8706C	DEG	F	S	M	B	4.218	00	DFR	93012D	
RB_ALPHA_BIAS	V97U8707C	AU	F	S	M	B	4.218	00	DFR	93012D	
RB_ALPHA_SC_FACT	V97U8708C	AU/DEG	F	S	M	B	4.218	00	DFR	93012D	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE B.4.218-8. BFS RTLS TRAJ 2 DISPLAY PROCESSING (4.218) K-LOADS

BFS NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PARA	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**B.5.3 GPS STATUS DISPLAY PROCESSING (PFS)**

The GPS status specialist function shall provide computations for the following status indicator to be displayed on a GPS status display in section 4.2.36 (PFS).

The Computation of Status Indicators

For the PFS, the status indicator for the GPS LRU's Parameters shall be determined as shown in the following logic:

O U T P U T	GPS "x" Display Status Indicator	M	↓	?	(blank)
I N P U T S	GPS_COMMFAULT(x)	Fault	Good	Good	Good
			and	and	and
	SEL_CMD(x)	—	Fail (off)	Fail (off)	Good (on)
	GPS_DISP_DILEMMA(x)	—	Good (off)	Dilemma (on)	—

where "x" is 1, 2, or 3

**B.5.3.1 GPS Status Display Interface Support Functions**

Table B.5.3-5 Input Functional Parameters

Table B.5.3-6 Output Functional Parameters

Table B.5.3-7 I-Loads

Table B.5.3-8 K-Loads

Table B.5.3-9 Constants

TABLE B.5.3-5. INPUT FUNCTIONAL PARAMETERS FOR GPS STATUS SPEC FUNCTION (REF DISP 6.51) (G5.3)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
GPS_COMMFAULT(1)	V91X0015X	FF1 GPS1 COMMFAULT	FCOS		BD		92067D	
GPS_COMMFAULT(2)	V91X0016X	FF2 GPS2 COMMFAULT	FCOS		BD		92067D	
GPS_COMMFAULT(3)	V91X0017X	FF3 GPS3 COMMFAULT	FCOS		BD		92067D	
GPS_DISP_DILEMMA(1)	V94X0022X	GPS 1 DISPLAY DILEMMA FLAG	GPS RCVR STATE PROC		BD		92208C	
GPS_DISP_DILEMMA(2)	V94X0023X	GPS 2 DISPLAY DILEMMA FLAG	GPS RCVR STATE PROC		BD		92208C	
GPS_DISP_DILEMMA(3)	V94X0024X	GPS 3 DISPLAY DILEMMA FLAG	GPS RCVR STATE PROC		BD		92208C	
SEL_CMD(1)	V94X1034X	GPS 1 SEL FILTER CANDIDATE	GPS RCVR STATE PROC		BD		92067D	
SEL_CMD(2)	V94X1035X	GPS 2 SEL FILTER CANDIDATE	GPS RCVR STATE PROC		BD		92067D	
SEL_CMD(3)	V94X1036X	GPS 3 SEL FILTER CANDIDATE	GPS RCVR STATE PROC		BD		92067D	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.5.3-6. OUTPUT FUNCTIONAL PARAMETERS FROM GPS STATUS SPEC FUNCTION (REF DISP 6.51) (G5.3)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
GPS_DISP_FAIL_DIL(1)	V94J6090CC	GPS 1 DISPLAY STATUS	GPS STATUS DISP		VAR		92067D	
GPS_DISP_FAIL_DIL(2)	V94J6091CC	GPS 2 DISPLAY STATUS	GPS STATUS DISP		VAR		92067D	
GPS_DISP_FAIL_DIL(3)	V94J6092CC	GPS 3 DISPLAY STATUS	GPS STATUS DISP		VAR		92067D	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE B.5.3-7. GPS STATUS SPEC FUNCTION (REF DISP 6.51) (G5.3) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
-----------	------	-----------	----	----	---	---	---------	----	-----	---------	-------------

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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**



TABLE B.5.3-8. GPS STATUS SPEC FUNCTION (REF DISP 6.51) (G5.3) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
--------------------------	------	----	-------------	-----------	----	--------	---	---------	---------	-------------

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.5.3-9. GPS STATUS SPEC FUNCTION (REF DISP 6.51) (G5.3) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
--------------------------	------	----	----------------	-----------	----	--------	---	---------	---------	-------------

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

### **B.5.7 HORIZONTAL SITUATION DISPLAY PROCESSING (PFS/BFS)**

The horizontal situation specialist function shall provide computations for the following dynamic symbols to be displayed on a horizontal situation display in sections 4.2.9 (PFS) and 4.2.11 (BFS).

- Runway symbol
- Selected heading alignment cone
- Three heading indicators for TAEM spiral
- Vector – from Touchdown point to HAC intersection
- 20, 40, and 60 second Orbiter position predictors
- HAC Intercept Predictor/Crosstrack Error Scale (PFS only)
- Guidance Altitude Error Scale (PFS only)

The symbols described in the first five bullets above are located with reference to a fixed Shuttle character. The description of the fixed format and the functional requirements for the horizontal situation display are defined in sections 4.2.9 (PFS) and 4.2.11 (BFS) of this FSSR. The special processing required to display these dynamic symbols is defined in the following paragraphs.

The I-Load values associated with the horizontal situation specialist function are defined in the JSC-19350 STS Flight Software Initialization Load and in Table B.5.7-7.

The constants associated with the PFS horizontal situation specialist function are defined in Table B.5.7-9 HORIZ SIT SPEC FUNCTION (Ref. DISPL 6.21) (G5.7) CONSTANTS.

#### The Computation of Necessary Parameters

Processing for these dynamic characters is only performed when the vehicle altitude is at or below a preselected value, HS\_ALT (I-Load); otherwise, they will be blanked.

```
IF ALT_WHEELS ≤ HS_ALT  
  THEN Perform the following computations;  
  ELSE Set all outputs to default values located off the display  
        (to blank the graphic portion of the display).
```

For BFS processing, the listed I-LOAD constants are reinitialized as shown at OPS 1 and OPS 3 transition:

#### OPS 1

X\_AIM\_PT = X\_WP2\_RTLS

#### OPS 3

X\_AIM\_PT = X\_WP2

Determine X Distance of HAC

IF TAEM GUIDANCE (4.9) OR GRTLS TAEM GUIDANCE (4.204) is running

THEN XHACD = -XHAC  
 ELSE XHACD = -X\_NEP

Select Predicted Range

IF MM\_CODE\_304

THEN PRED\_R = RNG\_TO\_RW\_THRESH \* FT\_PER\_NMI

ELSE IF TG\_END = 0

THEN PRED\_R = RPRED

IF TG\_END = 1

THEN PRED\_R = R\_GND\_AP - X\_AIM\_PT

Scale Factor

IF PRED\_R < XHACD

THEN SCALE\_FACTOR = HS\_Y\_RANGE / (XHACD + X\_AIM\_PT)

ELSE SCALE\_FACTOR = HS\_Y\_RANGE / (PRED\_R + X\_AIM\_PT)

Wind Correction

DELAZ = (- BETA\_N \* COS (PHI \* PI/180)) \* PI/180

Rotation Angle

TC = COURSE\_WRT\_RW \* PI/180 + DELAZ

The Computation of Linear Extension from Touchdown Point to Circle Intersection

Vector Tail Coordinates

X\_TAIL\_COORD = SCALE\_FACTOR \* ((POSN\_WRT\_RW<sub>1</sub> - X\_AIM\_PT) \* SIN(TC)  
 - POSN\_WRT\_RW<sub>2</sub> \* COS(TC)) + HS\_N\_X

Y\_TAIL\_COORD = - SCALE\_FACTOR \* ((POSN\_WRT\_RW<sub>1</sub> - X\_AIM\_PT) \* COS(TC)  
 + POSN\_WRT\_RW<sub>2</sub> \* SIN(TC)) + HS\_N\_Y

Vector Head Coordinates

X\_HEAD\_COORD = SCALE\_FACTOR \* ((POSN\_WRT\_RW<sub>1</sub> + XHACD) \* SIN(TC)  
 - POSN\_WRT\_RW<sub>2</sub> \* COS(TC)) + HS\_N\_X

Y\_HEAD\_COORD = - SCALE\_FACTOR \* ((POSN\_WRT\_RW<sub>1</sub> + XHACD) \* COS(TC)  
 + POSN\_WRT\_RW<sub>2</sub> \* SIN(TC)) + HS\_N\_Y

The Computation of the Runway Symbol (RW Coordinates)

X-Coordinate

X\_RW\_WP2 = X\_TAIL\_COORD

Y-Coordinate

$$Y_{RW\_WP2} = Y_{TAIL\_COORD}$$

(NOTE: The position of the runway symbol is also the end point of the vector. Thus, the formulation of the X and Y coordinates of the runway symbol are for requirements purposes only and shall not be output as separate parameters.)

The Computation of the Selected Heading Alignment Cones (RW Coordinates)

Selected Heading alignment cone

X-Coordinate

$$X_{HACC} = SCALE\_FACTOR * ((POS\_WRT\_RW_1 + XHACD) * SIN(TC) - (POS\_WRT\_RW_2 - RF * YSGNP) * COS(TC)) + HS\_N\_X$$

Y-Coordinate

$$Y_{HACC} = -SCALE\_FACTOR * ((POS\_WRT\_RW_1 + XHACD) * COS(TC) + (POS\_WRT\_RW_2 - RF * YSGNP) * SIN(TC)) + HS\_N\_Y$$

Circle radius

$$RAD_{HACC} = SCALE\_FACTOR * RTURN$$

The Computation of the Three Orbiter Position Predictor Symbols

Predictor drives

IF (PHI = 0 OR V\_GROUND\_SPEED = 0

THEN Y\_PRED1 = V\_GROUND\_SPEED \* HDT1  
 X\_PRED1 = - Y\_PRED1 \* DELAZ  
 Y\_PRED2 = V\_GROUND\_SPEED \* HDT2  
 X\_PRED2 = - Y\_PRED2 \* DELAZ  
 Y\_PRED3 = V\_GROUND\_SPEED \* HDT3  
 X\_PRED3 = - Y\_PRED3 \* DELAZ

ELSE G\_TAN\_PHI = G\_TAN (PHI \* PI/180)  
 RTURNP = V\_GROUND\_SPEED<sup>2</sup>/G\_TAN\_PHI  
 TURNRAT = G\_TAN\_PHI/V\_GROUND\_SPEED  
 Y\_PRED1 = (RTURNP \* SIN(TURNRAT \* HDT1))  
 + DELAZ \* (RTURNP \* (1. - COS(TURNRAT \* HDT1)))  
 X\_PRED1 = (RTURNP \* (1.- COS(TURNRAT \* HDT1)))  
 - DELAZ \* (RTURNP \* SIN(TURNRAT \* HDT1)))  
 Y\_PRED2 = (RTURNP \* SIN(TURNRAT \* HDT2))  
 + DELAZ (RTURNP \* (1. - COS(TURNRAT \* HDT2)))  
 X\_PRED2 = (RTURNP \* (1. - COS(TURNRAT \* HDT2)))  
 - DELAZ (RTURNP \* SIN(TURNRAT \* HDT2))  
 Y\_PRED3 = (RTURNP \* SIN(TURNRAT \* HDT3))  
 + DELAZ \* (RTURNP \* (1. - COS(TURNRAT \* HDT3)))  
 X\_PRED3 = (RTURNP \* (1. - COS(TURNRAT \* HDT3)))  
 - DELAZ \* (RTURNP \* SIN(TURNRAT \* HDT3))

20 Sec Position Predictor

X Coordinate

X\_20PRED = SCALE\_FACTOR \* X\_PRED1 + HS\_N\_X

Y Coordinate

Y\_20PRED = SCALE\_FACTOR \* Y\_PRED1 + HS\_N\_Y

40 Sec Predictor

X Coordinate

X\_40PRED = SCALE\_FACTOR \* X\_PRED2 + HS\_N\_X

Y Coordinate

Y\_40PRED = SCALE\_FACTOR \* Y\_PRED2 + HS\_N\_Y

60 Sec Position Predictor

X Coordinate

$$X_{60PRED} = SCALE\_FACTOR * X\_PRED3 + HS\_N\_X$$

Y Coordinate

$$Y_{60PRED} = SCALE\_FACTOR * Y\_PRED3 + HS\_N\_Y$$

Horizontal and Vertical Scale Initialization (PFS only, first pass only)

First pass initialization:

Perform the following initialization upon activation of TAEM GUIDANCE (4.9) or when IPHASE first becomes less than 4 and GRTLS TAEM GUIDANCE (4.204) is active:

Initialize TGO\_XTRACK\_DISP and HERROR\_DISP such that the symbols do not appear on the display until computed in the sections below.

Initialize display flags

DO\_TGO\_DISPLAY = ON

DO\_RERRC\_DISPLAY = OFF

DO\_Y\_DISPLAY = OFF

DO\_HERROR\_DISPLAY = ON

(The four flags directly above shall be set to OFF anytime in OPS 1 or when major mode is 601, 602, 301, 302, 303, or 304).

Initialize additional parameters for Time to HAC Intercept computations

YSGNPO = YSGNP

HAC\_TIME\_SNAPPED = OFF

Initialize tick locations, labels and full scale magnitude for Time to HAC Intercept scale

If YSGNP > 0,

then TGO\_MIN = TGOSC

else TGO\_MIN = 0,

TGO\_SCALE\_FACTOR = YSGNP (HORIZ\_SCALE\_X1 - HORIZ\_SCALE\_X2)/(TGOSC)

DO FOR I = 1, 5

TGO\_TICK\_LOC(I) = HORIZ\_SCALE\_X1 + (TGO\_TICK\_MARK(I) - TGO\_MIN)  
TGO\_SCALE\_FACTOR

END DO

Note that I-Loading two ticks in the same location shall result in the appearance of one tick at the I-Loaded location at double intensity.

Initialize tick locations, labels, and full scale magnitude for Altitude Error Scale

DO FOR I = 1, HERROR\_NO\_DIV + 1

HERROR\_TICK\_LOC(I) = INTEGER(HERROR\_SCALE\_Y2 + (I-1) ((HERROR\_SCALE\_Y1 - HERROR\_SCALE\_Y2)/HERROR\_NO\_DIV))

END DO

HERROR\_LABEL = HERROR\_SC1\_LABEL

HERROR\_MAX = HERRSC1

HERROR\_SCALE\_FACTOR = (HERROR\_SCALE\_Y2 - HERROR\_SCALE\_Y1) / (2 HERROR\_MAX)

End first pass initialization

Horizontal and Vertical Scale Reinitialization when YSGNP changes value (PFS only)

Perform the following reinitialization when DO\_TGO\_DISPLAY = ON and YSGNP changes value:

If YSGNPO ≠ YSGNP and DO\_TGO\_DISPLAY = ON then

If YSGNP > 0,

then TGO\_MIN = TGOSC  
else TGO\_MIN = 0.

TGO\_SCALE\_FACTOR = YSGNP (HORIZ\_SCALE\_X1 - HORIZ\_SCALE\_X2)/(TGOSC)

DO FOR I = 1, 5

TGO\_TICK\_LOC(I) = HORIZ\_SCALE\_X1 + (TGO\_TICK\_MARK(I) - TGO\_MIN) / TGO\_SCALE\_FACTOR

END DO

Note that I-Loading two ticks in the same location shall result in the appearance of one tick at the I-Loaded location at double intensity.

YSGNPO = YSGNP

End reinitialization



Horizontal and Vertical Scale Computations (PFS only)

Perform the following computations when TAEM GUIDANCE (4.9) or [GRTLS TAEM GUIDANCE (4.204) with IPHASE < 4] or A/L GUID (4.10) or GRTLS A/L GUID (4.234) is active:

Determine Definition of Horizontal Scale (PFS only)

If ALT\_WHEELS < H\_BLANK

```
then DO_TGO_DISPLAY = OFF
      DO_RERRC_DISPLAY = OFF
      DO_Y_DISPLAY = OFF
      DO_HERROR_DISPLAY = OFF
```

If DO\_TGO\_DISPLAY = ON and IPHASE = 2 then

```
If HAC_TIME_SNAPPED = OFF
  then HAC_TIME = T_STATE
       HAC_TIME_SNAPPED = ON
```

```
If T_STATE > HAC_TIME + ROLL_STOW_DELAY_TIME
  then DO_TGO_DISPLAY = OFF
       DO_RERRC_DISPLAY = ON
       RERRC_SCALE_FACTOR = (HORIZ_SCALE_X2 - HORIZ_SCALE_X1)/
                             (2 RERRCSC)
       XTRACK_LABEL = RERRC_LABEL
       DO FOR I = 1, XTRACK_NO_DIV + 1
         XTRACK_TIC_LOC(I) = INTEGER(HORIZ_SCALE_X1 +
                                     (I-1) ((HORIZ_SCALE_X2 - HORIZ_
                                             SCALE_X1)/XTRACK_NO_DIV))
       END DO
```

Note that if the Horizontal Situation Display becomes active during the Heading Alignment phase, the horizontal scale will be initialized to display time to HAC intercept. After the I-Loaded time delay has expired, the time to HAC intercept display will be replaced with the radial error display.

If (DO\_TGO\_DISPLAY = ON or DO\_RERRC\_DISPLAY = ON) and IPHASE = 3

```
then DO_TGO_DISPLAY = OFF
      DO_RERRC_DISPLAY = OFF
      DO_Y_DISPLAY = ON
      Y_SCALE_FACTOR = (HORIZ_SCALE_X2 - HORIZ_SCALE_X1)/(2 YSC)
      XTRACK_LABEL = YSC_LABEL
      DO FOR I = 1, XTRACK_NO_DIV + 1
        XTRACK_TIC_LOC(I) = INTEGER(HORIZ_SCALE_X1 +
                                     (I-1) ((HORIZ_SCALE_X2 -
                                             HORIZ_SCALE_X1)/XTRACK_NO_DIV))
      END DO
```

Computation of the Time to HAC Intercept Predictor (PFS only)

The logical discrete DO\_TGO\_DISPLAY shall be tested to determine if the time to HAC intercept equations shall be executed. If the logical test is passed, then the time to HAC intercept is computed. If the time to HAC intercept is less than or equal to an I-Loaded number of seconds, then the location of the time to HAC intercept display parameter shall be computed. Otherwise, the location of the time to HAC intercept display parameter is assigned an off-screen value.

If DO\_TGO\_DISPLAY = ON, then perform the following:

$$TGO\_HAC = (RTAN - RTURN \sqrt{P2TRNC1^2 - 1.}) / (V\_GROUNDSPEED)$$

If TGO\_HAC ≤ TGO\_DISPLAY\_CHAR, then perform the following:

$$TGO\_XTRACK\_DISP = HORIZ\_SCALE\_X1 + (TGO\_HAC - TGO\_MIN) TGO\_SCALE\_FACTOR$$

$$TGO\_XTRACK\_FLASH = OFF$$

IF TGO\_XTRACK\_DISP < HORIZ\_SCALE\_X1 or  
TGO\_XTRACK\_DISP > HORIZ\_SCALE\_X2  
then TGO\_XTRACK\_FLASH = ON

$$TGO\_XTRACK\_DISP = MIDVAL(HORIZ\_SCALE\_X1, TGO\_XTRACK\_DISP, HORIZ\_SCALE\_X2)$$

Otherwise, set TGO\_XTRACK\_DISP to an off-screen location.

Computation of the HAC Radial Error Indicator (PFS only)

The logical discrete DO\_RERRC\_DISPLAY shall be tested to determine if the radial error equations shall be executed. If the logical test is passed, then the location of the radial error display parameter shall be computed.

If DO\_RERRC\_DISPLAY = ON, then perform the following:

$$TGO\_XTRACK\_DISP = HORIZ\_SCALE\_X1 + (RERRCSC - YSGNP\_RERRC) RERRC\_SCALE\_FACTOR$$

$$TGO\_XTRACK\_FLASH = OFF$$

IF TGO\_XTRACK\_DISP < HORIZ\_SCALE\_X1 or  
TGO\_XTRACK\_DISP > HORIZ\_SCALE\_X2  
then TGO\_XTRACK\_FLASH = ON

$$TGO\_XTRACK\_DISP = MIDVAL(HORIZ\_SCALE\_X1, TGO\_XTRACK\_DISP, HORIZ\_SCALE\_X2)$$

Computation of the Y Position Indicator (PFS only)

The logical discrete DO\_Y\_DISPLAY shall be tested to determine if the y position equations shall be executed. If the logical test is passed, then the location of the y position display parameter shall be computed.

If DO\_Y\_DISPLAY = ON, then perform the following:

TGO\_XTRACK\_DISP = HORIZ\_SCALE\_X1 + (Y + YSC) Y\_SCALE\_FACTOR

TGO\_XTRACK\_FLASH = OFF

IF TGO\_XTRACK\_DISP < HORIZ\_SCALE\_X1 or  
TGO\_XTRACK\_DISP > HORIZ\_SCALE\_X2  
then TGO\_XTRACK\_FLASH = ON

TGO\_XTRACK\_DISP = MIDVAL(HORIZ\_SCALE\_X1, TGO\_XTRACK\_DISP,  
HORIZ\_SCALE\_X2)

Computation of the Altitude Error Indicator (PFS only)

The logical discrete DO\_HERROR\_DISPLAY shall be tested to determine if altitude error equations shall be executed. If the logical test is passed, then the location of the altitude error display parameter shall be computed.

If DO\_HERROR\_DISPLAY = ON, then perform the following:

IF IPHASE = 3 or TG\_END = TRUE,  
then HERROR\_MAX = HERRSC2

HERROR\_LABEL = HERROR\_SC2\_LABEL  
HERROR\_SCALE\_FACTOR = (HERROR\_SCALE\_Y2 -  
HERROR\_SCALE\_Y1)/(2 HERROR\_MAX)

If TAEM\_GUID or GRTLS\_TAEM\_GUID is active,  
then HERR\_GUID = HERROR

If A/L\_GUID or GRTLS\_A/L\_GUID is active,  
then HERR\_GUID = H\_ERROR

HERROR\_DISP = HERROR\_SCALE\_Y1 + (HERR\_GUID + HERROR\_MAX) HERROR\_  
SCALE\_FACTOR

HERROR\_FLASH = OFF

If HERROR\_DISP > HERROR\_SCALE\_Y1 or  
HERROR\_DISP < HERROR\_SCALE\_Y2  
then HERROR\_FLASH = ON

HERROR\_DISP = MIDVAL(HERROR\_SCALE\_Y1, HERROR\_DISP, HERROR\_SCALE\_Y2)

The Computation of Status Indicators

The status indicators for the TACAN Parameters shall be determined as shown in the following logic chart:

O U T P U T	TACAN “X” “YYY” Display Status Indicator	M	↓	?	(blank)	
I N P U T S	TAC “X” “YYY” Commfault/Lockon Flag	Bad	Good	Good	Good	
	TAC “X” “YYY” Fail	—	and	and	and	
			Fail	Good	Good	
	TAC “X” Deselect	—	—(or)—	and	and	and
			Deselect	Select	Select	Select
			and	and	and	and
TAC “YYY” Disagree	—	—	Disagree	Good	Good	

where “X” =1,2,3 and  
 “YYY”= Bearing,Range

For the PFS, the status indicator for the GPS LRU's Parameters shall be determined as shown in the following logic:

O U T P U T	GPS "x" Display Status Indicator	M	↓	?	(blank)
I N P U T S	GPS_COMMFAULT(x)	Fault	Good	Good	Good
			and	and	and
	SEL_CMD(x)	—	Fail (off)	Fail (off)	Good (on)
			and	and	
	GPS_DISP_DILEMMA(x)	—	Good (off)	Dilemma (on)	—

where "x" = 1, 2, 3

The GPS Display Status Indicator shall be computed at all times. The GPS Display Status Indicator is displayed on the HORIZ SIT DISPLAY (G6.21) when three GPS receivers are installed.

RTLS/TAL Targeting Check

INITIALIZE: ABORT\_FIRST\_PASS = ON

The following processing will be done in OPS 1 and OPS 6. If a 2 EO or 3EO CONTINGENCY ABORT or a TAL ABORT has been declared execute (2), otherwise execute (1).

- |   |  |
|---|--|
| <p>(1) IF TARGET_INDEX (AREA_SEL_CMD) &lt; 0<br/>THEN RTLS_TGT_ERR = 0<br/>ELSE RTLS_TGT_ERR = 1</p> <p>IF TARGET_INDEX (TAL_SELECT_CMD) &gt; 0<br/>THEN TAL_TGT_ERR = 0<br/>ELSE TAL_TGT_ERR = 1</p> | <p>(1)(2) IF a 2 EO or 3EO CONTINGENCY ABORT or a TAL ABORT or an RTLS ABORT have been declared</p> <p>THEN UPDATE_FLAG = 0<br/>IF ABORT_FIRST_PASS = ON<br/>THEN AREA_SEL_CMD = AREA_SEL<br/>TAL_SELECT_CMD = TAL_SEL<br/>ABORT_FIRST_PASS = OFF<br/>ELSE UPDATE_FLAG =<br/>RTLS_TGT_ERR or TAL_TGT_ERR</p> |
|---|--|

```
(2) IF CONT_2EO_START = 1 or          IF UPDATE_FLAG = 0
    CONT_3EO_START = 1 or          THEN AREA_SEL = AREA_SEL_CMD
    TARGET_INDEX (AREA_SEL_CMD) > 0  TAL_SELECT = TAL_SELECT_CMD
    THEN TAL_TGT_ERR = 0
    ELSE TAL_TGT_ERR = 1
```

**B.5.7.1 Horizontal Situation Display Interface Support Functions**

Table B.5.7-5 Input Functional Parameters

Table B.5.7-6 Output Functional Parameters

Table B.5.7-7 I-Loads

Table B.5.7-8 K-Loads N/A

Table B.5.7-9 Constants PFS only

TABLE B.5.7-5. INPUT FUNCTIONAL PARAMETERS FOR HORIZ SIT SPEC FUNCTION (REF DISP 6.21) (G5.7)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
ALT_WHEELS	V95H0165CA	ALT TO REAR WHEELS/NAV BASE(ENTRY)	RTLS UPP	FT			93017G	*
ALT_WHEELS	V95H0165CB	ALT TO REAR WHEELS/NAV BASE(ENTRY)	ENT UPP	FT	DPL		93017G	*
ALT_WHEELS	V95H0165CC	ALT TO REAR WHEELS/NAV BASE(ENTRY)	TAEM UPP	FT	DPL		93017G	*
ALT_WHEELS	V95H0165CD	ALT TO REAR WHEELS/NAV BASE(ENTRY)	A/L UPP	FT	DPL		93017G	*
BETA_N	V90H2249C	INERTIAL SIDESLIP ANGLE	A/E ATT PROC	DEG	SPL		93017G	*
BRGDIL	V90X3603X	TACAN BEARING DILEMMA FLAG	TACAN RM		BD		93017G	*
BRGFAIL(1)	V90X3608X	TACAN BEARING 1 FAIL	TACAN RM		BD		93017G	*
BRGFAIL(2)	V90X3708X	TACAN BEARING 2 FAIL	TACAN RM		BD		93017G	*
BRGFAIL(3)	V90X3808X	TACAN BEARING 3 FAIL	TACAN RM		BD		93017G	*
CONT_2EO_START	V93X6681XA	CONTINGENCY 2-ENG OUT START FLAG	XXXXXX TRAJ 1 DISP		BD		93017G	*
CONT_2EO_START	V93X6681XB	CONTINGENCY 2-ENG OUT START FLAG	PW CONT GUID		BD		93090E	
CONT_2EO_START	V93X6681XC	CONTINGENCY 2-ENG OUT START FLAG	XXXXXX TRAJ 2 DISP		BD		93017G	*
CONT_2EO_START	V93X6681XD	CONTINGENCY 2-ENG OUT START FLAG	RTLS TRAJ 2 DISP		BD		93017G	*
CONT_3EO_START	V90X0909X	CONTINGENCY 3 E/O START FLAG	CONT 3E/O GUID		BD		93017G	*
COURSE_WRT_RW/PSD	V95H0225CB	COURSE WRT RW CENTERLINE	TAEM UPP	DEG			93017G	*
COURSE_WRT_RW/PSD	V95H0225CC	COURSE WRT RW CENTERLINE	A/L UPP	DEG			93017G	*
COURSE_WRT_RW/PSD	V95H0225CD	COURSE WRT RW CENTERLINE	RTLS UPP	DEG			93017G	*
GPS_COMMFAULT(1)	V91X0015X	FF1 GPS1 COMMFALT	FCOS		BD		92067D	
GPS_COMMFAULT(2)	V91X0016X	FF2 GPS2 COMMFALT	FCOS		BD		92067D	
GPS_COMMFAULT(3)	V91X0017X	FF3 GPS3 COMMFALT	FCOS		BD		92067D	
GPS_DISP_DILEMMA(1)	V94X0022X	GPS 1 DISPLAY DILEMMA FLAG	GPS RCVR STATE PROC		BD		92208C	
GPS_DISP_DILEMMA(2)	V94X0023X	GPS 2 DISPLAY DILEMMA FLAG	GPS RCVR STATE PROC		BD		92208C	
GPS_DISP_DILEMMA(3)	V94X0024X	GPS 3 DISPLAY DILEMMA FLAG	GPS RCVR STATE PROC		BD		92208C	
HERROR	V90H1115CA	ALTITUDE ERROR	TAEM GUID	FT			90960E	
HERROR	V90H1115CB	ALTITUDE ERROR	GRTLS TAEM GUID	FT			90960E	
H_ERROR	V90H1061CA	ALTITUDE ERROR	A/L GUID	FT			93017G	*
H_ERROR	V90H1061CB	ALTITUDE ERROR	GRTLS A/L GUID	FT			93017G	*
IPHASE	V90J1117CA	TAEM GUIDANCE PHASE INDICATOR	TAEM GUID	ND			93017G	*
IPHASE	V90J1117CB	TAEM GUIDANCE PHASE INDICATOR	GRTLS TAEM GUID	ND			93017G	*
LOAD_TOTAL	V95U0163CA	TOTAL LOAD FACTOR	ENT UPP	FT/S2			93017G	*
MECO_CONFIRMED	V90X8561X	MECO CONFIRMED FLAG	SSME OPS		BD		93017G	*
MM_CODE_304/MM_304	V90X8161X	MAJOR MODE 304 FLAG	MSC				92355B	
MM_CODE_305/MM_305	V90X8162X	MAJOR MODE 305 FLAG	MSC				92355B	
MM_CODE_602/MM_602	V90X8174X	MAJOR MODE 602 FLAG	MSC				92355B	
MM_CODE_603/MM_603	V90X8122X	MAJOR MODE 603 FLAG	MSC				92355B	
NAV_UPDATE_CMD	V93X5032X	NAV UPDATE CMD	HORIZ SIT DISP		BD			
NEP_FB	V90X1109XA	NEP/MEP FLAG	GRTLS TAEM GUID				93017G	*
NEP_FB	V90X1109XB	NEP/MEP FLAG	TAEM GUID				93017G	*
NZ	V90A5381C	SELECTED AA NORMAL ACCEL	SF	G	SPL		93017G	*
PHI/PHI_TOPO	V90H2202C	BODY ROLL ATTITUDE EULER ANGLE	A/E ATT PROC	DEG	SPL		93017G	*
POSN_WRT_RW(1)/X	V95H0220CA	DOWNRANGE DISTANCE WRT RW	RTLS UPP	FT			93017G	*
POSN_WRT_RW(1)/X	V95H0220CB	DOWNRANGE DISTANCE WRT RW	ENT UPP	FT			93017G	*
POSN_WRT_RW(1)/X	V95H0220CC	DOWNRANGE DISTANCE WRT RW	TAEM UPP	FT			93017G	*
POSN_WRT_RW(1)/X	V95H0220CD	DOWNRANGE DISTANCE WRT RW	A/L UPP	FT			93017G	*
POSN_WRT_RW(2)/Y	V95H0221CA	CROSSRANGE DISTANCE WRT RW	RTLS UPP	FT			93017G	*
POSN_WRT_RW(2)/Y	V95H0221CB	CROSSRANGE DISTANCE WRT RW	ENT UPP	FT			93017G	*

TABLE B.5.7-5. INPUT FUNCTIONAL PARAMETERS FOR HORIZ SIT SPEC FUNCTION (REF DISP 6.21) (G5.7)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
POSN_WRT_RW(2)/Y	V95H0221CC	CROSSRANGE DISTANCE WRT RW	TAEM UPP	FT			93017G	*
POSN_WRT_RW(2)/Y	V95H0221CD	CROSSRANGE DISTANCE WRT RW	A/L UPP	FT			93017G	*
PTI_ACT_D	V90X3249X	PTI ACTIVE FLAG	PTI		BD		93017G	*
PTI_WINDOW	V90X2401X	VEHICLE IN PTI WINDOW	PTI				89740B	
RERRC	V90H1128CA	ROLL CMD COMP-RADIAL ERR FROM HAC	TAEM GUID	FT			90960E	
RERRC	V90H1128CB	ROLL CMD COMP-RADIAL ERR FROM HAC	GRTLS TAEM GUID	FT			90960E	
RF	V90H1158CA	FINAL TURN RADIUS OF SPIRAL	TAEM GUID	FT			92389C	
RF	V90H1158CB	FINAL TURN RADIUS OF SPIRAL	GRTLS TAEM GUID	FT			92389C	
RNGDIL	V90X3604X	TACAN RANGE DILEMMA FLAG	TACAN RM		BD		93017G	*
RNGFAIL(1)	V90X3611X	TACAN RANGE 1 FAIL	TACAN RM		BD		93017G	*
RNGFAIL(2)	V90X3711X	TACAN RANGE 2 FAIL	TACAN RM		BD		93017G	*
RNGFAIL(3)	V90X3811X	TACAN RANGE 3 FAIL	TACAN RM		BD		93017G	*
RNG_TO_RW_THRESH	V95H0176CA	RANGE TO RUNWAY THRESHOLD VIA WP1	ENT UPP	NM			93017G	*
RPRED	V90H1103CA	RANGE TO RUNWAY THRESHOLD VIA WP1	GRTLS TAEM GUID	FT			93017G	*
RPRED	V90H1103CB	RANGE TO RUNWAY THRESHOLD VIA WP1	TAEM GUID	FT			93017G	*
RTAN	V90H0115CA	STRT LINE DIST TO TANGENCY POINT	TAEM GUID	FT			90960E	
RTAN	V90H0115CB	STRT LINE DIST TO TANGENCY POINT	GRTLS TAEM GUID	FT			90960E	
RTURN	V90H1159CA	SPIRAL TURN RADIUS	TAEM GUID	FT			92389C	
RTURN	V90H1159CB	SPIRAL TURN RADIUS	GRTLS TAEM GUID	FT			92389C	
R_GND_AP	V90H1034CA	RANGE TO RUNWAY TARGET	A/L GUID	FT				
R_GND_AP	V90H1034CB	RANGE TO RUNWAY TARGET	GRTLS A/L GUID	FT				
SEL_CMD(1)	V94X1034X	GPS 1 SEL FILTER CANDIDATE	GPS RCVR STATE PROC		BD		92067D	
SEL_CMD(2)	V94X1035X	GPS 2 SEL FILTER CANDIDATE	GPS RCVR STATE PROC		BD		92067D	
SEL_CMD(3)	V94X1036X	GPS 3 SEL FILTER CANDIDATE	GPS RCVR STATE PROC		BD		92067D	
TBRG_CMLK(1)	V95X5141XA	TACAN 1 BEAR COMFAULT/LOCKON FLAG	TACAN SOP				93017G	*
TBRG_CMLK(2)	V95X5241XA	TACAN 2 BEAR COMFAULT/LOCKON FLAG	TACAN SOP				93017G	*
TBRG_CMLK(3)	V95X5341XA	TACAN 3 BEAR COMFAULT/LOCKON FLAG	TACAN SOP				93017G	*
TG_END	V90X1108XA	TAEM GUIDANCE TERMINATION FLAG	TAEM GUID				93017G	*
TG_END	V90X1108XB	TAEM GUIDANCE TERMINATION FLAG	GRTLS TAEM GUID				92355B	
TRNG_CMLK(1)	V95X5140XA	TACAN 1 RANGE COMFAULT/LOCKON FLAG	TACAN SOP				93017G	*
TRNG_CMLK(2)	V95X5240XA	TACAN 2 RANGE COMFAULT/LOCKON FLAG	TACAN SOP				93017G	*
TRNG_CMLK(3)	V95X5340XA	TACAN 3 RANGE COMFAULT/LOCKON FLAG	TACAN SOP				93017G	*
T_STATE	V95W0200CA	TIME TAG ASSOC WITH CURRENT STATE	TAEM UPP	S			93017G	*
T_STATE	V95W0200CB	TIME TAG ASSOC WITH CURRENT STATE	A/L UPP	S			93017G	*
T_STATE	V95W0200CC	TIME TAG ASSOC WITH CURRENT STATE	RTLS UPP	S			93017G	*
V_GROUNDSPEED/VH	V95L0178CA	GROUNDSPPEED	RTLS UPP	FT/S			92389C	
V_GROUNDSPEED/VH	V95L0178CB	GROUNDSPPEED	ENT UPP	FT/S			92389C	
V_GROUNDSPEED/VH	V95L0178CC	GROUNDSPPEED	TAEM UPP	FT/S			92389C	
V_GROUNDSPEED/VH	V95L0178CD	GROUNDSPPEED	A/L UPP	FT/S			92450C	
XHAC	V90U1146CA	X-COORDINATE OF HAC CENTER	TAEM GUID	FT			93090E	
XHAC	V90U1146CB	X-COORDINATE OF HAC CENTER	GRTLS TAEM GUID	FT			93090E	
YSGNP/YSGN	V95J0153CA	R/L CONE IND PRI RW	ENT UPP		SPL		93017G	*
YSGNP/YSGN	V95J0153CB	R/L CONE IND PRI RW	TAEM UPP		SPL		93017G	*
YSGNP/YSGN	V95J0153CC	R/L CONE IND PRI RW	RTLS UPP		SPL		93017G	*
	V93X4411XA	TACAN 1 DES CMD	HORIZ SIT DISP				93017G	*
	V93X4411XB	TACAN 1 DES CMD	SENSOR SELF TEST DISP				93017G	*



TABLE B.5.7-5. INPUT FUNCTIONAL PARAMETERS FOR HORIZ SIT SPEC FUNCTION (REF DISP 6.21) (G5.7)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V93X4413XA	TACAN 2 DES CMD	HORIZ SIT DISP				93017G	*
	V93X4413XB	TACAN 2 DES CMD	SENSOR SELF TEST DISP				93017G	*
	V93X4415XA	TACAN 3 DES CMD	HORIZ SIT DISP				93017G	*
	V93X4415XB	TACAN 3 DES CMD	SENSOR SELF TEST DISP				93017G	*

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.5.7-6. OUTPUT FUNCTIONAL PARAMETERS FROM HORIZ SIT SPEC FUNCTION (REF DISP 6.21) (G5.7)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
DO_HERROR_DISPLAY	V90X0369X	DISPLAY HERROR FLAG	HORIZ SIT DISP		BD		90960E	
DO_RERRC_DISPLAY	V90X0184X	DISPLAY RADIAL ERROR FLAG	HORIZ SIT DISP		BD		90960E	
DO_TGO_DISPLAY	V90X0368X	DISPLAY TIME TO HAC INTERCEPT FLAG	HORIZ SIT DISP		BD		90960E	
DO_Y_DISPLAY	V90X0185X	DISPLAY Y POSITION FLAG	HORIZ SIT DISP		BD		90960E	
GPS_DISP_FAIL_DIL(1)	V94J6090CA	GPS 1 DISPLAY STATUS	HORIZ SIT DISP		VAR		92067D	
GPS_DISP_FAIL_DIL(2)	V94J6091CA	GPS 2 DISPLAY STATUS	HORIZ SIT DISP		VAR		92067D	
GPS_DISP_FAIL_DIL(3)	V94J6092CA	GPS 3 DISPLAY STATUS	HORIZ SIT DISP		VAR		92067D	
HERROR_DISP	V90U0171C	ALTITUDE ERROR Y-POS	HORIZ SIT DISP	AU			90960E	
HERROR_FLASH	V90X0172X	ALTITUDE ERROR FLASH FLAG	HORIZ SIT DISP		BD		90960E	
HERROR_LABEL	V90U0183C	ALTITUDE ERROR LABEL	HORIZ SIT DISP		ND		90960E	
HERROR_TICK_LOC(1)	V90U0298C	ALTITUDE ERROR TICK Y LOCATION 1	HORIZ SIT DISP	AU			90960E	
HERROR_TICK_LOC(10)	V90U0366C	ALTITUDE ERROR TICK Y LOCATION 10	HORIZ SIT DISP	AU			90960E	
HERROR_TICK_LOC(11)	V90U0367C	ALTITUDE ERROR TICK Y LOCATION 11	HORIZ SIT DISP	AU			90960E	
HERROR_TICK_LOC(2)	V90U0299C	ALTITUDE ERROR TICK Y LOCATION 2	HORIZ SIT DISP	AU			90960E	
HERROR_TICK_LOC(3)	V90U0301C	ALTITUDE ERROR TICK Y LOCATION 3	HORIZ SIT DISP	AU			90960E	
HERROR_TICK_LOC(4)	V90U0302C	ALTITUDE ERROR TICK Y LOCATION 4	HORIZ SIT DISP	AU			90960E	
HERROR_TICK_LOC(5)	V90U0303C	ALTITUDE ERROR TICK Y LOCATION 5	HORIZ SIT DISP	AU			90960E	
HERROR_TICK_LOC(6)	V90U0304C	ALTITUDE ERROR TICK Y LOCATION 6	HORIZ SIT DISP	AU			90960E	
HERROR_TICK_LOC(7)	V90U0363C	ALTITUDE ERROR TICK Y LOCATION 7	HORIZ SIT DISP	AU			90960E	
HERROR_TICK_LOC(8)	V90U0364C	ALTITUDE ERROR TICK Y LOCATION 8	HORIZ SIT DISP	AU			90960E	
HERROR_TICK_LOC(9)	V90U0365C	ALTITUDE ERROR TICK Y LOCATION 9	HORIZ SIT DISP	AU			90960E	
PTI_IND	V90X3220XA	PTI INDICATOR	HORIZ SIT DISP		BD		79994C	
RAD_HAC	V94H2052C	RADIUS OF SEL HAC	HORIZ SIT DISP	AU	VAR			
RTLS_TGT_ERR	V94X2463X	RTLS TARGET ERROR INDICATOR	GAX					
TAL_TGT_ERR	V94X2462X	TAL TARGET ERROR INDICATOR	GAX					
TGO_TICK_LOC(1)	V90U0166C	TIME TO HAC INTERCEPT TICK X LOC 1	HORIZ SIT DISP	AU			90960E	
TGO_TICK_LOC(2)	V90U0167C	TIME TO HAC INTERCEPT TICK X LOC 2	HORIZ SIT DISP	AU			90960E	
TGO_TICK_LOC(3)	V90U0168C	TIME TO HAC INTERCEPT TICK X LOC 3	HORIZ SIT DISP	AU			90960E	
TGO_TICK_LOC(4)	V90U0169C	TIME TO HAC INTERCEPT TICK X LOC 4	HORIZ SIT DISP	AU			90960E	
TGO_TICK_LOC(5)	V90U0170C	TIME TO HAC INTERCEPT TICK X LOC 5	HORIZ SIT DISP	AU			90960E	
TGO_XTRACK_DISP	V90U0173C	TGO/XTRACK X-POS	HORIZ SIT DISP	AU			90960E	
TGO_XTRACK_FLASH	V90X0174X	TGO/XTRACK FLASH FLAG	HORIZ SIT DISP		BD		90960E	
XTRACK_LABEL	V90U0182C	XTRACK ERROR LABEL	HORIZ SIT DISP		ND		90960E	
XTRACK_TICK_LOC(1)	V90U0283C	XTRACK ERROR TICK X LOCATION 1	HORIZ SIT DISP	AU			90960E	
XTRACK_TICK_LOC(10)	V90U0296C	XTRACK ERROR TICK X LOCATION 10	HORIZ SIT DISP	AU			90960E	
XTRACK_TICK_LOC(11)	V90U0297C	XTRACK ERROR TICK X LOCATION 11	HORIZ SIT DISP	AU			90960E	
XTRACK_TICK_LOC(2)	V90U0284C	XTRACK ERROR TICK X LOCATION 2	HORIZ SIT DISP	AU			90960E	
XTRACK_TICK_LOC(3)	V90U0286C	XTRACK ERROR TICK X LOCATION 3	HORIZ SIT DISP	AU			90960E	
XTRACK_TICK_LOC(4)	V90U0287C	XTRACK ERROR TICK X LOCATION 4	HORIZ SIT DISP	AU			90960E	
XTRACK_TICK_LOC(5)	V90U0288C	XTRACK ERROR TICK X LOCATION 5	HORIZ SIT DISP	AU			90960E	
XTRACK_TICK_LOC(6)	V90U0289C	XTRACK ERROR TICK X LOCATION 6	HORIZ SIT DISP	AU			90960E	
XTRACK_TICK_LOC(7)	V90U0293C	XTRACK ERROR TICK X LOCATION 7	HORIZ SIT DISP	AU			90960E	
XTRACK_TICK_LOC(8)	V90U0294C	XTRACK ERROR TICK X LOCATION 8	HORIZ SIT DISP	AU			90960E	
XTRACK_TICK_LOC(9)	V90U0295C	XTRACK ERROR TICK X LOCATION 9	HORIZ SIT DISP	AU			90960E	
X_20PRED	V94H2030C	GRAPHIC X-POS OF 20-SEC PREDICTOR	HORIZ SIT DISP	AU	VAR			
X_40PRED	V94H2035C	GRAPHIC X-POS OF 40-SEC PREDICTOR	HORIZ SIT DISP	AU	VAR			

TABLE B.5.7-6. OUTPUT FUNCTIONAL PARAMETERS FROM HORIZ SIT SPEC FUNCTION (REF DISP 6.21) (G5.7)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
X_60PRED	V94H2040C	GRAPHIC X-POS OF 60 SEC PREDICTOR	HORIZ SIT DISP	AU	VAR			
X_HAC	V94H2050C	GRAPHIC X_POS OF SELECTED HAC	HORIZ SIT DISP	AU	VAR			
X_HEAD_COORD	V94U2046C	GRAPHIC X-POS OF HAC INTERSECTION	HORIZ SIT DISP	AU	VAR			
X_TAIL_COORD	V94U2044C	GRAPHIC X-POS OF WP2	HORIZ SIT DISP	AU	VAR			
Y_20PRED	V94H2031C	GRAPHIC Y-POS OF 20-SEC PREDICTOR	HORIZ SIT DISP	AU	VAR			
Y_40PRED	V94H2036C	GRAPHIC Y-POS OF 40-SEC PREDICTOR	HORIZ SIT DISP	AU	VAR			
Y_60PRED	V94H2041C	GRAPHIC Y-POS OF 60 SEC PREDICTOR	HORIZ SIT DISP	AU	VAR			
Y_HAC	V94H2051C	GRAPHIC Y_POS OF SELECTED HAC	HORIZ SIT DISP	AU	VAR			
Y_HEAD_COORD	V94U2047C	GRAPHIC Y-POS OF HAC INTERSECTION	HORIZ SIT DISP	AU	VAR			
Y_TAIL_COORD	V94U2045C	GRAPHIC Y-POS OF WP2	HORIZ SIT DISP	AU	VAR			
	V94J2014C	TACAN 1 AZIMUTH STATUS	HORIZ SIT DISP		VAR			
	V94J2015C	TACAN 2 AZIMUTH STATUS	HORIZ SIT DISP		VAR			
	V94J2016C	TACAN 3 AZIMUTH STATUS	HORIZ SIT DISP		VAR			
	V94J2024C	TACAN 1 RANGE STATUS	HORIZ SIT DISP		VAR			
	V94J2025C	TACAN 2 RANGE STATUS	HORIZ SIT DISP		VAR			
	V94J2026C	TACAN 3 RANGE STATUS	HORIZ SIT DISP		VAR			

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE B.5.7-7. HORIZ SIT SPEC FUNCTION (REF DISP 6.21) (G5.7) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
HDT1	V97U6811C	SEC	F	S	M	C	G5.7	00	ZFG	90593A	
HDT2	V97U6812C	SEC	F	S	M	C	G5.7	00	ZFG	90593A	
HDT3	V97U6813C	SEC	F	S	M	C	G5.7	00	ZFG	90593A	
HERROR_NO_DIV	V97U6317C	ND	I	S	D	P	G5.7	00	ZFG	90960E	
HERROR_SC1_LABEL	V97U6318C	ND	CH		D	P	G5.7	00	ZFG	90960E	
HERROR_SC2_LABEL	V97U6319C	ND	CH		D	P	G5.7	00	ZFG	90960E	
HERRSC1	V97U8672C	FT	F	S	D	C	G4.103 G5.7	00	ZFG	90960E	
HERRSC2	V97U8673C	FT	F	S	D	C	G4.103 G5.7	00	ZFG	90960E	
HS_ALT	V97U6816C	FT	F	S	M	C	G5.7	00	ZFG	90593A	
HS_N_X	V97U6817C	AU	F	S	M	C	G5.7	00	ZFG	90593A	
HS_N_Y	V97U6818C	AU	F	S	M	C	G5.7	00	ZFG	90593A	
HS_Y_RANGE	V97U6819C	AU	F	S	M	C	G5.7	00	ZFG	90593A	
H_BLANK	V97U6316C	FT	F	S	D	C	G4.103 G5.7	00	ZFG	90960E	
P2TRNC1	V97U0351C	ND	F	S	D	C	G4.103 G4.204 G4.9 G5.7	00	ZSU	90960E	
R1	V96U8263C	FT/DEG	F	S	D	X	G4.204 G4.220 G4.23 G4.237 G4.24 G4.25 G4.9 G5.27 G5.7	00	ZSU	93090E	
R2	V96U8264C	FT/DEG**2	F	S	D	X	G4.204 G4.220 G4.23 G4.237 G4.24 G4.25 G4.9 G5.27 G5.7	00	ZSU	93090E	
RERRCSC	V97U8674C	FT	F	S	D	C	G4.103 G5.7	00	ZFG	90960E	
RERRC_LABEL	V97U6338C	ND	CH		D	P	G5.7	00	ZFG	90960E	

TABLE B.5.7-7. HORIZ SIT SPEC FUNCTION (REF DISP 6.21) (G5.7) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RFO	V96U8262C	FT	F	S	D	X	G4.204 G4.220 G4.23 G4.237 G4.24 G4.25 G4.9 G5.27 G5.7	00	ZSU	93090E	
ROLL_STOW_DELAY_TIME	V97U6322C	SEC	I	S	D	C	G4.103 G5.7	00	ZFG	90960E	
TARGET_INDEX(1)	V99U8901C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(10)	V98U8276C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(11)	V98U8567C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(12)	V98U8568C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(13)	V98U8569C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(14)	V98U8570C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(15)	V98U8571C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(16)	V98U8572C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(17)	V98U8573C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	

TABLE B.5.7-7. HORIZ SIT SPEC FUNCTION (REF DISP 6.21) (G5.7) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TARGET_INDEX(18)	V98U8574C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(19)	V98U8575C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(2)	V99U8913C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(20)	V98U8576C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(21)	V98U8577C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(22)	V98U8578C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(23)	V98U8579C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(24)	V98U8580C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(25)	V98U8581C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(26)	V97U9927C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(27)	V97U9928C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	

TABLE B.5.7-7. HORIZ SIT SPEC FUNCTION (REF DISP 6.21) (G5.7) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TARGET_INDEX( 28)	V97U9929C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX( 29)	V97U9930C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX( 3)	V99U8925C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX( 30)	V97U9931C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX( 31)	V97U9932C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX( 32)	V97U9933C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX( 33)	V97U9934C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX( 34)	V97U9935C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX( 35)	V97U9936C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX( 36)	V97U9937C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX( 37)	V97U9938C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	

TABLE B.5.7-7. HORIZ SIT SPEC FUNCTION (REF DISP 6.21) (G5.7) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TARGET_INDEX(38)	V97U9939C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(39)	V97U9940C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(4)	V99U8937C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(40)	V97U9941C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(41)	V97U9942C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(42)	V97U9943C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(43)	V97U9944C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(44)	V97U9945C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(45)	V97U9946C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(5)	V99U8949C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(6)	V98U8272C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	



TABLE B.5.7-7. HORIZ SIT SPEC FUNCTION (REF DISP 6.21) (G5.7) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TARGET_INDEX(7)	V98U8273C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(8)	V98U8274C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TARGET_INDEX(9)	V98U8275C	ND	I	S	M	C	G4.2 G4.4 G5.7 G6.55	00	AID	93090E	
TGOSC	V97U8676C	SEC	F	S	D	C	G4.103 G5.7	00	ZFG	90960E	
TGO_DISPLAY_CHAR	V97U6327C	SEC	F	S	D	P	G5.7	00	ZFG	90960E	
TGO_TICK_MARK(1)	V97U6333C	SEC	F	S	D	P	G5.7	00	ZFG	90960E	
TGO_TICK_MARK(2)	V97U6334C	SEC	F	S	D	P	G5.7	00	ZFG	90960E	
TGO_TICK_MARK(3)	V97U6335C	SEC	F	S	D	P	G5.7	00	ZFG	90960E	
TGO_TICK_MARK(4)	V97U6336C	SEC	F	S	D	P	G5.7	00	ZFG	90960E	
TGO_TICK_MARK(5)	V97U6337C	SEC	F	S	D	P	G5.7	00	ZFG	90960E	
XTRACK_NO_DIV	V97U6341C	ND	I	S	D	P	G5.7	00	ZFG	90960E	
X_AIM_PT	V97U0445C	FT	F	S	M	C	G4.10 G4.154 G4.220 G4.234 G4.237 G4.252 G5.27 G5.7	01 03	GL1 GL3	93090E	
X_NEP	V97U5575C	FT	F	S	M	X	G4.19 G4.20 G4.4 G5.7	01 03	XS6 XS6	DC2748	
YSC	V97U8675C	FT	F	S	D	C	G4.103 G5.7	00	ZFG	90960E	
YSC_LABEL	V97U6339C	ND	CH		D	P	G5.7	00	ZFG	90960E	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

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TABLE B.5.7-8. HORIZ SIT SPEC FUNCTION (REF DISP 6.21) (G5.7) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.5.7-9. HORIZ SIT SPEC FUNCTION (REF DISP 6.21) (G5.7) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
HERROR_SCALE_Y1	V97U6312C	00	+4.19	E+02 AU	F	S	P	G5.7	90960E	
HERROR_SCALE_Y2	V97U6313C	00	+1.75	E+02 AU	F	S	P	G5.7	90960E	
HORIZ_SCALE_X1	V97U6314C	00	+4.50	E+02 AU	F	S	P	G5.7	90960E	
HORIZ_SCALE_X2	V97U6315C	00	+7.70	E+02 AU	F	S	P	G5.7	90960E	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

## **B.5.16 RM/RCS DISPLAY PROCESSING (PFS)**

The RM/RCS special processing function shall provide a switching function between the RM/RCS display function and the related RCS hardware and software. The RM/RCS spec function shall be available when required by the RM/RCS display in OPS 1 (Ascent), OPS 6 (RTLS), OPS 2 (on-orbit), OPS 8 (GNC 8), and OPS 3 (entry). The displays and controls associated with the RM/RCS display apply to one of three RCS modules (any one, but only one at a time).

The crew may select an RCS module via the RM/RCS display – this selection is indicated to the RM/RCS special processing function which selects the appropriate data for display and converts the crew commands into specific commands to the selected RCS module.

The RM/RCS special processing function shall also perform the support processing required to convert input data into suitable format for CRT display. The various types of support processing required for this display are:

- RCS jet manifold status
- RCS temperature conversion and status
- RCS helium tank pressure conversion and status
- RCS propellant conversion and status
- RCS manifold pressure conversion and status
- RCS manifold isolation valve position and status
- OMS AFT XFD pressure conversion and status

The K-Load constants associated with this processing are defined in Table B.5.16-8. Paragraph B.5.16.4 contains the equations that are common to several functions of the RM/RCS spec function. This section is referenced when required by the associated support processing functions.

### **B.5.16.1 SELECTION OF RCS MODULE DATA FOR DISPLAY**

The data required for each of the three RCS modules may be organized into data structures. For the purposes of writing the requirements in compact form, assume that D\_RCS(left), D\_RCS (right) and D\_RCS (fwd) are data structures representing the input left, right and forward RCS modules, and that D\_RCS (disp) is the data structure to be output to the RM/RCS display function. The output structure to the display is dependent on the crew selected input structure and shall be determined as follows:

- If FWD\_RCS\_REQ then D\_RCS (disp) = D\_RCS (fwd).
- If LEFT\_RCS\_REQ then D\_RCS (disp) = D\_RCS (left).
- If RIGHT\_RCS\_REQ then D\_RCS (disp) = D\_RCS (right).

**B.5.16.2 SELECTION OF RCS MODULE FOR CONTROL**

The control flags associated with the RM/RCS display notify FDI which thrusters have been either inhibited, manually overridden or are available for normal FDI processing. These control flags required for each of the RCS modules may be organized into arrays. For the purposes of writing the requirements in compact form, assume C\_RCS (left), C\_RCS (right), and C\_RCS (fwd) are arrays representing the left, right and forward RCS controls, and that C\_RCS (disp) is the corresponding array received from the RM/RCS display function. The output array to FDI is dependent on the crew selected input structure and shall be determined as follows:

If FWD\_RCS\_REQ then C\_RCS (fwd) = C\_RCS (disp).  
 If LEFT\_RCS\_REQ then C\_RCS (left) = C\_RCS (disp).  
 If RIGHT\_RCS\_REQ then C\_RCS (right) = C\_RCS (disp).

**B.5.16.3 RM/RCS SUPPORT PROCESSING**

The processing required to support the RM/RCS display is identical for each of the RCS modules. The processing will be performed on the crew selected input module. The support processing functions are defined in the following paragraphs.

RCS Jet Manifold Status

This function shall generate the RCS jet manifold status indicators for the selected left, right, or forward manifold. The individual jets each have three status flags. These status flags are defined as follows:

1. Jet Failed-On Flag indicating failure of an individual thruster to shut down upon command.
2. Jet Leaking Flag indicating a leaking thruster.
3. Jet Failed-off Flag indicating failure of an individual thruster to fire upon command.

The display jet manifold status indicators for the selected manifold are “ON”, “LK”, “OFF”, or (blank) and shall be determined as follows:

INPUTS			OUTPUT
RCS Fail-On FLAG (X,jet)	RCS Leaking FLAG (X,jet)	RCS Fail-Off FLAG (X,jet)	RCS JET DISPLAY STATUS IND (jet)
Fail	---	---	“ON”
Good	Fail	---	“LK”
Good	Good	Fail	“OFF”
Good	Good	Good	(BLANK)

where X = left or right or forward,  
 jet = 1 to 17.

In the event of multiple failures for a given jet, the last detected failure status shall be output.

RCS Temperature Conversion and Status

The function shall display the converted (VDC to Deg F) RCS jet fuel and oxidizer temperatures for the selected left, right or forward manifold. This function shall also determine the status associated with each of these selected temperatures. The selected temperatures shall be converted as defined in the conversion processing portion of paragraph B.5.16.4. The converted temperatures shall be tested against a lower limit. The limit check processing is defined in paragraph B.5.16.4 and the K-loadable scale factor and low limit constant values are defined in Table B.5.16-8.

The displayed RCS jet temperature status indicators are dependent on the FCOS commfault associated with selected RCS module and the limit test status of the selected converted input temperatures. If a communication failure condition occurs, the limit check processing for the associated parameter shall be discontinued until the commfault is cleared. These indicators shall be determined as follows:

RCS Temp COMMFAULT (X,Y, jet)	RCS Temp Limit Status (Y, jet)	RCS Temp DISPLAY STATUS IND (Y, jet)
Fault	---	M
Good	"Below" limit	↓
Good	"Within" limit	(blank)

where X = left or right or forward  
Y = fuel, oxidizer  
jet = 1 to 17

RCS Helium Tank Pressure Conversion and Status

This function shall display the converted (VDC to PSIA) fuel pressure 1, fuel pressure 2, oxidizer pressure 1, and oxidizer pressure 2 for the selected left, right or forward RCS module. This function shall also determine the status associated with each of these selected pressures. The selected pressures shall be converted as defined in paragraph B.5.16.4. The converted pressures shall be tested against a low limit. The limit check processing is defined in paragraph B.5.16.4 and the K-loadable scale factor and low limit constant values are defined in Table B.5.16-8.

The displayed RCS pressure status indicators are dependent on the FCOS commfaults associated with selected RCS module and the low limit test status of the selected converted input pressure. If a communication failure condition occurs, the limit check processing for the corresponding parameter shall be discontinued until the commfault is cleared. These indicators shall be determined as follows:

RCS He P COMMFAULT (X,Y)	RCS He P Limit Status (Y)	RCS He P DISPLAY IND (Y)
Fault	---	M
Good	"Below" limit	↓
Good	"Within" limit	(blank)

where X = left or right or forward  
Y = fuel 1, fuel 2, oxidizer 1, oxidizer 2.

RCS Propellant Conversion and Status

This function shall display the converted (VDC to PSIA) fuel tank ullage pressure, oxidizer tank ullage pressure, fuel tank outlet pressure and oxidizer tank outlet pressure for the selected left, right or forward RCS module. This function shall also display the converted (VDC to DEG F) oxidizer tank temperature and fuel tank temperature for the selected left, right or forward RCS module. The status of each of these parameters shall also be determined. The selected pressures and temperatures shall be converted as defined in paragraph B.5.16.4. The converted pressures and temperatures shall be tested against both a lower and upper limit. The limit check processing is defined in paragraph B.5.16.4 and the K-loadable scale factor, low limit and high limit check constant values are defined in Table B.5.16-8.

The displayed RCS propellant pressure and temperature status indications are dependent on the FCOS commfaults associated with the selected RCS module and the limit test status of the selected converted input parameter. If a communication failure condition occurs, the limit check processing for the corresponding parameter shall be discontinued until the commfault is cleared. These indicators shall be determined as follows:

RCS COMMFAULT (X,Y)	RCS Limit Status (Y)	RCS DISPLAY STATUS INDICATOR (Y)
Fault	---	M
Good	“Exceeds” limit	↑
Good	“Below” limit	↓
Good	“Within” limit	(blank)

where X = left or right or forward  
 Y = Ox tank ullage press, ox tank outlet press, fuel tank ullage press, fuel tank outlet press, ox tank temp, fuel tank temp.

This function shall also display the RCS fuel quantity remaining and oxidizer quantity remaining in percent for the selected left, right or forward module. The status associated with the selected quantities are dependent on the quantity alert and the leak flags. These display status indicators shall be determined as follows:



O U T P U T	RCS QTY DISP STATUS IND (Y)	↓	(BLANK)
I N P U T	RCS (X, Y) Leak flag	Fail —(or)—	Good —(and)—
	RCS X Quantity Alert	Fail	Good

where X = left or right or forward  
Y = fuel, oxidizer

RCS Manifold Pressure Conversion & Status

This function shall display the converted (VDC to PSIA) manifold pressures for the selected left, right or forward RCS module. There is an individual transducer associated with each manifold 1, 2, 3, and 4. Each transducer has a fuel and oxidizer pressure associated with it. The status associated with each of these pressures shall also be determined. The selected pressures shall be converted as defined in paragraph B.5.16.4.

The displayed RCS manifold pressure status indicators are dependent on the FCOS manifold pressure commfaults associated with the selected RCS module. This status shall be determined as follows:

INPUT	OUTPUT
RCS COMMFAULT (X,Y)	RCS MANF P DISP STATUS IND (Y)
Fault	M
Good	(blank)

where X = Forward Left or Right  
And y = Fu manifold 1 press,  
Fu manifold 2 press,  
Fu manifold 3 press,  
Fu manifold 4 press,  
Ox manifold 1 press,  
Ox manifold 2 press,  
Ox manifold 3 press,  
Ox manifold 4 press.

RCS Manifold OP/CL I/O Status

This function shall determine the I/O status indicator associated with the selected manifold. The I/O status is dependent on the commfaults for the fuel and oxidizer isolation valve closed discrettes and the RCS MANF “XX” RM DILEMMA FLAGS as follows:

INPUTS			OUTPUT
RCS OX “XX” Is Vlv CL COMMFAULT	RCS FU “XX” Is Vlv CL COMMFAULT	RCS MANF “XX” DILEMMA FLAG	RCS “XX” Is Vlv OP/CL DISPLAY STATUS INDICATOR
FAULT (or)	FAULT (and)	1 or 0	M
GOOD (and)	GOOD (and)	1	?
GOOD (and)	GOOD (and)	0	∅

where “XX” = F1, F2, F3, F4, F5, L1, L2, L3, L4, L5, R1, R2, R3, R4, R5

OMS AFT Crossfeed (XFD) Pressure Conversion & Status

This function will display the converted (VDC to psia) crossfeed pressure for the selected aft left and aft right RCS module as defined in paragraph B.5.16.4. The status associated with each of the two pressures will be determined based on the FCOS OMS crossfeed pressure commfault as follows:

INPUT	OUTPUT
RCS/OMS XFD COMMFAULT (X)	RCS XFD P DISP STATUS IND (Y)
Fault	M
Good	(blank)

where: X = left or right  
 Y = OX OMS AFT XFD P or  
 FU OMS AFT XFD P

#### **B.5.16.4 RM/RCS Special Processing**

The RM/RCS function requires special processing equations which are common to multiple RCS display support requirements. To eliminate repetition of these common equation types, they have been grouped into the following paragraphs and referenced when required by the associated functions of RM/RCS.

##### CONVERSION EQUATIONS

$$\text{CONV} = \text{SCALE\_FACTOR} (\text{VDC})$$

where 'VDC' represents the input signal from the appropriate hardware.  
SCALE FACTOR represents the corresponding slope of the conversion equation.  
CONV represents the input hardware signal converted to engineering units.

##### LOW LIMIT CHECK EQUATIONS

If  $\text{CONV} < \text{LOWER\_LIMIT}$   
Then CONV status = below limit  
Else CONV status = within limit

where CONV represents the input hardware signal converted to engineering units.  
CONV status represents the limit check status associated with the converted input signal.  
LOWER\_LIMIT represents the lower limit check constant value associated with the converted input signal.

The lower limit K-Load constant values for the associated converted input signals are defined in Table B.5.16-8. Although the limit check constant values and associated limit check processing have been defined in engineering units for requirements purposes, the programmer shall have the flexibility to perform the equivalent limit check on the unconverted hardware input signal in VDC.

##### HIGH/LOW LIMIT CHECK EQUATIONS

If  $\text{CONV} < \text{LOWER\_LIMIT}$   
Then CONV status = below limit  
Else If  $\text{CONV} > \text{UPPER\_LIMIT}$   
Then CONV status = exceeds limit  
Else CONV status = within limit

where CONV, CONV status, and LOWER LIMIT  
are as defined above  
UPPER\_LIMIT represents the upper limit check constant  
value associated with the converted input signal.

The lower and upper limit K-Load constant values for the associated converted input signals are defined in Table B.5.16-8. Although the limit check constant values and associated limit check processing have been defined in engineering units for requirements purposes, the programmer shall have the flexibility to perform the equivalent limit check on the unconverted hardware input signal in VDC.

**B.5.16.5 RM/RCS Display Interface Support Functions**

Table B.5.16-5 Input Functional Parameters

Table B.5.16-6 Output Functional Parameters

Table B.5.16-7 I-Loads

Table B.5.16-8 K-Loads

Table B.5.16-9 Constants

TABLE B.5.16-5. INPUT FUNCTIONAL PARAMETERS FOR RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
AVAILABLE_JET_AFT(01)	V90X4520X	JET L1A AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(02)	V90X4521X	JET L1L AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(03)	V90X4522X	JET L1U AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(04)	V90X4534X	JET R1A AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(05)	V90X4535X	JET R1R AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(06)	V90X4536X	JET R1U AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(07)	V90X4532X	JET L5D AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(08)	V90X4533X	JET L5L AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(09)	V90X4526X	JET L3A AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(10)	V90X4527X	JET L3L AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(11)	V90X4528X	JET L3D AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(12)	V90X4540X	JET R3A AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(13)	V90X4541X	JET R3R AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(14)	V90X4542X	JET R3D AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(15)	V90X4547X	JET R5R AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(16)	V90X4546X	JET R5D AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(17)	V90X4523X	JET L2L AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(18)	V90X4524X	JET L2U AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(19)	V90X4525X	JET L2D AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(20)	V90X4537X	JET R2R AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(21)	V90X4538X	JET R2U AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(22)	V90X4539X	JET R2D AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(23)	V90X4529X	JET L4L AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(24)	V90X4530X	JET L4U AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(25)	V90X4531X	JET L4D AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(26)	V90X4543X	JET R4R AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(27)	V90X4544X	JET R4U AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_AFT(28)	V90X4545X	JET R4D AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(01)	V90X4548X	JET F1F AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(02)	V90X4549X	JET F1L AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(03)	V90X4550X	JET F1U AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(04)	V90X4551X	JET F1D AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(05)	V90X4552X	JET F2F AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(06)	V90X4553X	JET F2R AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(07)	V90X4554X	JET F2U AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(08)	V90X4555X	JET F2D AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(09)	V90X4560X	JET F4R AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(10)	V90X4561X	JET F4D AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(11)	V90X4562X	JET F5L AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(12)	V90X4563X	JET F5R AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(13)	V90X4556X	JET F3F AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(14)	V90X4557X	JET F3L AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(15)	V90X4558X	JET F3U AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(16)	V90X4559X	JET F3D AVAILABLE	RCS RM		BD		93017G	*
LRCS_FUTK_TEMP_CF	V91X5233X	RCS L AFT FU TK TEMP 1 COMMFAULT	FCOS				90897D	
LRCS_HEFUP_CF(1)	V91X5228X	RCS L AFT HE FU TK PRES 1 COM FLT	FCOS					

TABLE B.5.16-5. INPUT FUNCTIONAL PARAMETERS FOR RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
LRCS_HEOXP_CF(1)	V91X5234X	RCS L AFT HE OX TK PRES 1 COM FLT	FCOS					
LRCS_OXTK_TEMP_CF	V91X5239X	RCS L AFT OX TK TEMP 1 COMMFAULT	FCOS				90897D	
LRCS_TKFUP_CF(2)	V91X5211X	RCS L AFT FU TK ULLAGE P COMMFAULT	FCOS				90897D	
LRCS_TKOXP_CF(2)	V91X5210X	RCS L AFT OX TK ULLAGE P COMMFAULT	FCOS				90897D	
RCS_FFU_MIV_CL_CF(1)	V91X5181X	RCS F FU MAN IS VLV 1 CL COM FLT	FCOS					
RCS_FFU_MIV_CL_CF(2)	V91X5183X	RCS F FU MAN IS VLV 2 CL COM FLT	FCOS					
RCS_FFU_MIV_CL_CF(3)	V91X5185X	RCS F FU MAN IS VLV 3 CL COM FLT	FCOS					
RCS_FFU_MIV_CL_CF(4)	V91X5187X	RCS F FU MAN IS VLV 4 CL COM FLT	FCOS					
RCS_FFU_MIV_CL_CF(5)	V91X2585X	RCS F FU MAN IS VLV 5 CL COM FLT	FCOS					
RCS_FOX_MIV_CL_CF(1)	V91X5180X	RCS F OX MAN IS VLV 1 CL COM FLT	FCOS					
RCS_FOX_MIV_CL_CF(2)	V91X5182X	RCS F OX MAN IS VLV 2 CL COM FLT	FCOS					
RCS_FOX_MIV_CL_CF(3)	V91X5184X	RCS F OX MAN IS VLV 3 CL COM FLT	FCOS					
RCS_FOX_MIV_CL_CF(4)	V91X5186X	RCS F OX MAN IS VLV 4 CL COM FLT	FCOS					
RCS_FOX_MIV_CL_CF(5)	V91X2584X	RCS F OX MAN IS VLV 5 CL COM FLT	FCOS					
RCS_FWD_JET_FAIL_LT	V90J4452CB	RCS FWD JET FAIL LIMIT	RCS RM					
RCS_HEOX_TEMP_CF	V91X5251X	RCS R AFT OX TK TEMP 1 COMMFAULT	FCOS				90897D	
RCS_LFU_MIV_CL_CF(1)	V91X5189X	RCS L FU MAN IS VLV 1 CL COM FLT	FCOS					
RCS_LFU_MIV_CL_CF(2)	V91X5191X	RCS L FU MAN IS VLV 2 CL COM FLT	FCOS					
RCS_LFU_MIV_CL_CF(3)	V91X5193X	RCS L FU MAN IS VLV 3 CL COM FLT	FCOS					
RCS_LFU_MIV_CL_CF(4)	V91X5195X	RCS L FU MAN IS VLV 4 CL COM FLT	FCOS					
RCS_LFU_MIV_CL_CF(5)	V91X2597X	RCS L FU MAN IS VLV 5 CL COM FLT	FCOS					
RCS_LOX_MIV_CL_CF(1)	V91X5188X	RCS L OX MAN IS VLV 1 CL COM FLT	FCOS					
RCS_LOX_MIV_CL_CF(2)	V91X5190X	RCS L OX MAN IS VLV 2 CL COM FLT	FCOS					
RCS_LOX_MIV_CL_CF(3)	V91X5192X	RCS L OX MAN IS VLV 3 CL COM FLT	FCOS					
RCS_LOX_MIV_CL_CF(4)	V91X5194X	RCS L OX MAN IS VLV 4 CL COM FLT	FCOS					
RCS_LOX_MIV_CL_CF(5)	V91X2596X	RCS L OX MAN IS VLV 5 CL COM FLT	FCOS					
RCS_L_JET_FAIL_LT	V90J4453CB	RCS L JET FAIL LIMIT	RCS RM					
RCS_RFU_MIV_CL_CF(1)	V91X5197X	RCS R FU MAN IS VLV 1 CL COM FLT	FCOS					
RCS_RFU_MIV_CL_CF(2)	V91X5199X	RCS R FU MAN IS VLV 2 CL COM FLT	FCOS					
RCS_RFU_MIV_CL_CF(3)	V91X5201X	RCS R FU MAN IS VLV 3 CL COM FLT	FCOS					
RCS_RFU_MIV_CL_CF(4)	V91X5202X	RCS R FU MAN IS VLV 4 CL COM FLT	FCOS					
RCS_RFU_MIV_CL_CF(5)	V91X2599X	RCS R FU MAN IS VLV 5 CL COM FLT	FCOS					
RCS_ROX_MIV_CL_CF(1)	V91X5196X	RCS R OX MAN IS VLV 1 CL COM FLT	FCOS					
RCS_ROX_MIV_CL_CF(2)	V91X5198X	RCS R OX MAN IS VLV 2 CL COM FLT	FCOS					
RCS_ROX_MIV_CL_CF(3)	V91X5200X	RCS R OX MAN IS VLV 3 CL COM FLT	FCOS					
RCS_ROX_MIV_CL_CF(4)	V91X5203X	RCS R OX MAN IS VLV 4 CL COM FLT	FCOS					
RCS_ROX_MIV_CL_CF(5)	V91X2598X	RCS R OX MAN IS VLV 5 CL COM FLT	FCOS					
RCS_R_JET_FAIL_LT	V90J4454CB	RCS R JET FAIL LIMIT	RCS RM					
RRCS_FUTK_TEMP_CF	V91X5245X	RCS R AFT FU TK TEMP 1 COMMFAULT	FCOS				90897D	
RRCS_HEFUP_CF(1)	V91X5240X	RCS R AFT HE FU TK PRES 1 COM FLT	FCOS					
RRCS_HEOXP_CF(1)	V91X5246X	RCS R AFT HE OX TK PRES 1 COM FLT	FCOS					
RRCS_TKFUP_CF(2)	V91X5215X	RCS R AFT FU TK ULLAGE P COMMFAULT	FCOS				90897D	
RRCS_TKOXP_CF(2)	V91X5214X	RCS R AFT OX TK ULLAGE P COMMFAULT	FCOS				90897D	
RWFD(1)	V90Q2360C	RCS FWD OX QUANTITY REMAINING DISP	RCS QTY MON	PCT	VAR		92354	
RWFD(2)	V90Q2361C	RCS FWD FU QUANTITY REMAINING DISP	RCS QTY MON	PCT	VAR		92354	
RWFD(3)	V90Q2362C	RCS-L AFT OX QTY REMAINING DISP	RCS QTY MON	PCT	VAR		92354	

TABLE B.5.16-5. INPUT FUNCTIONAL PARAMETERS FOR RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
RWFD(4)	V90Q2363C	RCS-L AFT FUEL QTY REMAINING DISP	RCS QTY MON	PCT	VAR		92354	
RWFD(5)	V90Q2364C	RCS-R AFT OX QTY REMAINING DISP	RCS QTY MON	PCT	VAR		92354	
RWFD(6)	V90Q2365C	RCS-R AFT FUEL QTY REMAINING DISP	RCS QTY MON	PCT	VAR		92354	
	V42P1110C	RCS FWD HE OX TANK PRESS-1	DSC F2	PSIA	AMU		93017G	*
	V42P1113C	RCS FWD HE FU TANK PRESS-1	DSC F4	PSIA	AMU		93017G	*
	V42P1115C	RCS FWD OX TANK ULLAGE PRESS	DSC F4	PSIA	AMU		93017G	*
	V42P1116C	RCS FWD FU TANK ULLAGE PRESS	DSC F2	PSIA	AMU		93017G	*
	V42P1212C	RCS-FWD OX MANF PRESS-1	DSC F4		AMU		93017G	*
	V42P1214C	RCS-FWD OX MANF PRESS-2	DSC F4	PSIA	AMU		93017G	*
	V42P1216C	RCS-FWD OX MANF PRESS-3	DSC F2		AMU		93017G	*
	V42P1218C	RCS-FWD OX MANF PRESS-4	DSC F2	PSIA	AMU		93017G	*
	V42P1312C	RCS-FWD FU MANF PRESS-1	DSC F4		AMU		93017G	*
	V42P1314C	RCS-FWD FU MANF PRESS-2	DSC F4	PSIA	AMU		93017G	*
	V42P1316C	RCS-FWD FU MANF PRESS-3	DSC F2		AMU		93017G	*
	V42P1318C	RCS-FWD FU MANF PRESS-4	DSC F2	PSIA	AMU		93017G	*
	V42P2110C	RCS L AFT HE OX TANK PRESS-1	DSC OL1	PSIA	AMU		93017G	*
	V42P2113C	RCS L AFT HE FU TANK PRESS-1	DSC OL1	PSIA	AMU		93017G	*
	V42P2115C	RCS L AFT OX TANK ULLAGE PRESS	DSC OL1	PSIA	AMU		93017G	*
	V42P2116C	RCS L AFT FU TANK ULLAGE PRESS	DSC OL2	PSIA	AMU		93017G	*
	V42P2210C	RCS L AFT OX TANK OUT PRESS	DSC OL1	PSIA	AMU		93017G	*
	V42P2212C	RCS-L AFT OX MANF PRESS-1	DSC OL1	VDC	AMU		93017G	*
	V42P2214C	RCS-L AFT OX MANF PRESS 2	DSC OL1	VDC	AMU		93017G	*
	V42P2216C	RCS-L AFT OX MANF PRESS-3	DSC OL2	VDC	AMU		93017G	*
	V42P2218C	RCS-L AFT OX MANF PRESS 4	DSC OL2	VDC	AMU		93017G	*
	V42P2312C	RCS-L AFT FU MANF PRESS 1	DSC OL1	VDC	AMU		93017G	*
	V42P2314C	RCS-L AFT FU MANF PRESS 2	DSC OL1	VDC	AMU		93017G	*
	V42P2316C	RCS-L AFT FU MANF PRESS 3	DSC OL2	VDC	AMU		93017G	*
	V42P2318C	RCS-L AFT FU MANF PRESS 4	DSC OL2	VDC	AMU		93017G	*
	V42P3110C	RCS R AFT HE OX TANK PRESS-1	DSC OR1	PSIA	AMU		93017G	*
	V42P3113C	RCS R AFT HE FU TANK PRESS-1	DSC OR2	PSIA	AMU		93017G	*
	V42P3115C	RCS R AFT OX TANK ULLAGE PRESS	DSC OR1	PSIA	AMU		93017G	*
	V42P3116C	RCS R AFT FU TANK ULLAGE PRESS	DSC OR2	PSIA	AMU		93017G	*
	V42P3212C	RCS-R AFT OX MANF PRESS 1	DSC OR1	VDC	AMU		93017G	*
	V42P3214C	RCS-R AFT OX MANF PRESS 2	DSC OR1	VDC	AMU		93017G	*
	V42P3216C	RCS-R AFT OX MANF PRESS 3	DSC OR2	VDC	AMU		93017G	*
	V42P3218C	RCS-R AFT OX MANF PRESS 4	DSC OR2	VDC	AMU		93017G	*
	V42P3310C	RCS R AFT FU TANK OUT PRESS	DSC OR2	PSIA	AMU		93017G	*
	V42P3312C	RCS-R AFT FU MANF PRESS 1	DSC OR1	VDC	AMU		93017G	*
	V42P3314C	RCS-R AFT FU MANF PRESS 2	DSC OR1	VDC	AMU		93017G	*
	V42P3316C	RCS-R AFT FU MANF PRESS 3	DSC OR2	VDC	AMU		93017G	*
	V42P3318C	RCS-R AFT FU MANF PRESS 4	DSC OR2	VDC	AMU		93017G	*
	V42T1200C	RCS FWD OX TANK TEMP-1	DSC F4	DEGF	AMU		93017G	*
	V42T1300C	RCS FWD FU TANK TEMP-1	DSC F2	DEGF	AMU		93017G	*
	V42T1501C	RCS-FWD OX THRUST INJ TEMP-F1F	DSC F4	VDC	AMU		93017G	*
	V42T1502C	RCS-FWD FU THRUST INJ TEMP-F1F	DSC F4	VDC	AMU		93017G	*
	V42T1503C	RCS-FWD OX THRUST INJ TEMP-F2F	DSC F4	VDC	AMU		93017G	*

TABLE B.5.16-5. INPUT FUNCTIONAL PARAMETERS FOR RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V42T1504C	RCS-FWD FU THRUST INJ TEMP-F2F	DSC F4	VDC	AMU		93017G	*
	V42T1505C	RCS-FWD OX THRUST INJ TEMP-F3F	DSC F2	VDC	AMU		93017G	*
	V42T1506C	RCS-FWD FU THRUST INJ TEMP-F3F	DSC F2	VDC	AMU		93017G	*
	V42T1507C	RCS-FWD OX THRUST INJ TEMP-F1L	DSC F4	VDC	AMU		93017G	*
	V42T1508C	RCS-FWD FU THRUST INJ TEMP-F1L	DSC F4	VDC	AMU		93017G	*
	V42T1509C	RCS-FWD OX THRUST INJ TEMP-F2R	DSC F4	VDC	AMU		93017G	*
	V42T1510C	RCS-FWD FU THRUST INJ TEMP-F2R	DSC F4	VDC	AMU		93017G	*
	V42T1511C	RCS-FWD OX THRUST INJ TEMP-F3L	DSC F2	VDC	AMU		93017G	*
	V42T1512C	RCS-FWD FU THRUST INJ TEMP-F3L	DSC F2	VDC	AMU		93017G	*
	V42T1513C	RCS-FWD OX THRUST INJ TEMP-F4R	DSC F2	VDC	AMU		93017G	*
	V42T1514C	RCS-FWD FU THRUST INJ TEMP-F4R	DSC F2	VDC	AMU		93017G	*
	V42T1515C	RCS-FWD OX THRUST INJ TEMP-F1U	DSC F4	VDC	AMU		93017G	*
	V42T1516C	RCS-FWD FU THRUST INJ TEMP-F1U	DSC F4	VDC	AMU		93017G	*
	V42T1517C	RCS-FWD OX THRUST INJ TEMP-F2U	DSC F4	VDC	AMU		93017G	*
	V42T1518C	RCS-FWD FU THRUST INJ TEMP-F2U	DSC F4	VDC	AMU		93017G	*
	V42T1519C	RCS-FWD OX THRUST INJ TEMP-F3U	DSC F2	VDC	AMU		93017G	*
	V42T1520C	RCS-FWD FU THRUST INJ TEMP-F3U	DSC F2	VDC	AMU		93017G	*
	V42T1521C	RCS-FWD OX THRUST INJ TEMP-F1D	DSC F4	VDC	AMU		93017G	*
	V42T1522C	RCS-FWD FU THRUST INJ TEMP-F1D	DSC F4	VDC	AMU		93017G	*
	V42T1523C	RCS-FWD OX THRUST INJ TEMP-F2D	DSC F4	VDC	AMU		93017G	*
	V42T1524C	RCS-FWD FU THRUST INJ TEMP-F2D	DSC F4	VDC	AMU		93017G	*
	V42T1525C	RCS-FWD OX THRUST INJ TEMP-F3D	DSC F2	VDC	AMU		93017G	*
	V42T1526C	RCS-FWD FU THRUST INJ TEMP-F3D	DSC F2	VDC	AMU		93017G	*
	V42T1527C	RCS-FWD OX THRUST INJ TEMP-F4D	DSC F2	VDC	AMU		93017G	*
	V42T1528C	RCS-FWD FU THRUST INJ TEMP-F4D	DSC F2	VDC	AMU		93017G	*
	V42T1529C	RCS-FWD OX THRUST INJ TEMP-F5L	DSC F2	VDC	AMU		93017G	*
	V42T1530C	RCS-FWD FU THRUST INJ TEMP-F5L	DSC F2	VDC	AMU		93017G	*
	V42T1531C	RCS-FWD OX THRUST INJ TEMP-F5R	DSC F2	VDC	AMU		93017G	*
	V42T1532C	RCS-FWD FU THRUST INJ TEMP-F5R	DSC F2	VDC	AMU		93017G	*
	V42T2200C	RCS L AFT OX TANK TEMP-1	DSC OL2	DEGF	AMU		93017G	*
	V42T2300C	RCS L AFT FU TANK TEMP-1	DSC OL1	DEGF	AMU		93017G	*
	V42T2501C	RCS-L AFT OX THRUST INJ TEMP-L1A	DSC OL1	VDC	AMU		93017G	*
	V42T2502C	RCS-L AFT FU THRUST INJ TEMP-L1A	DSC OL1	VDC	AMU		93017G	*
	V42T2503C	RCS-L AFT OX THRUST INJ TEMP-L3A	DSC OL2	VDC	AMU		93017G	*
	V42T2504C	RCS-L AFT FU THRUST INJ TEMP-L3A	DSC OL2	VDC	AMU		93017G	*
	V42T2505C	RCS-L AFT OX THRUST INJ TEMP-L1L	DSC OL1	VDC	AMU		93017G	*
	V42T2506C	RCS-L AFT FU THRUST INJ TEMP-L1L	DSC OL1	VDC	AMU		93017G	*
	V42T2507C	RCS-L AFT OX THRUST INJ TEMP-L2L	DSC OL1	VDC	AMU		93017G	*
	V42T2508C	RCS-L AFT FU THRUST INJ TEMP-L2L	DSC OL1	VDC	AMU		93017G	*
	V42T2509C	RCS-L AFT OX THRUST INJ TEMP-L3L	DSC OL2	VDC	AMU		93017G	*
	V42T2510C	RCS-L AFT FU THRUST INJ TEMP-L3L	DSC OL2	VDC	AMU		93017G	*
	V42T2511C	RCS-L AFT OX THRUST INJ TEMP-L4L	DSC OL2	VDC	AMU		93017G	*
	V42T2512C	RCS-L AFT FU THRUST INJ TEMP-L4L	DSC OL2	VDC	AMU		93017G	*
	V42T2513C	RCS-L AFT OX THRUST INJ TEMP-L1U	DSC OL1	VDC	AMU		93017G	*
	V42T2514C	RCS-L AFT FU THRUST INJ TEMP-L1U	DSC OL1	VDC	AMU		93017G	*
	V42T2515C	RCS-L AFT OX THRUST INJ TEMP-L2U	DSC OL1	VDC	AMU		93017G	*



TABLE B.5.16-5. INPUT FUNCTIONAL PARAMETERS FOR RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V42T2516C	RCS-L AFT FU THRUST INJ TEMP-L2U	DSC OL1	VDC	AMU		93017G	*
	V42T2517C	RCS-L AFT OX THRUST INJ TEMP-L4U	DSC OL2	VDC	AMU		93017G	*
	V42T2518C	RCS-L AFT FU THRUST INJ TEMP-L4U	DSC OL2	VDC	AMU		93017G	*
	V42T2519C	RCS-L AFT OX THRUST INJ TEMP-L2D	DSC OL1	VDC	AMU		93017G	*
	V42T2520C	RCS-L AFT FU THRUST INJ TEMP-L2D	DSC OL1	VDC	AMU		93017G	*
	V42T2521C	RCS-L AFT OX THRUST INJ TEMP-L3D	DSC OL2	VDC	AMU		93017G	*
	V42T2522C	RCS-L AFT FU THRUST INJ TEMP-L3D	DSC OL2	VDC	AMU		93017G	*
	V42T2523C	RCS-L AFT OX THRUST INJ TEMP-L4D	DSC OL2	VDC	AMU		93017G	*
	V42T2524C	RCS-L AFT FU THRUST INJ TEMP-L4D	DSC OL2	VDC	AMU		93017G	*
	V42T2525C	RCS-L AFT OX THRUST INJ TEMP-L5D	DSC OL1	VDC	AMU		93017G	*
	V42T2526C	RCS-L AFT FU THRUST INJ TEMP-L5D	DSC OL1	VDC	AMU		93017G	*
	V42T2527C	RCS-L AFT OX THRUST INJ TEMP-L5L	DSC OL1	VDC	AMU		93017G	*
	V42T2528C	RCS-L AFT FU THRUST INJ TEMP-L5L	DSC OL1	VDC	AMU		93017G	*
	V42T3200C	RCS R AFT OX TANK TEMP-1	DSC OR2	DEGF	AMU		93017G	*
	V42T3300C	RCS R AFT FU TANK TEMP-1	DSC OR1	DEGF	AMU		93017G	*
	V42T3501C	RCS-R AFT OX THRUST INJ TEMP-R1A	DSC OR1	VDC	AMU		93017G	*
	V42T3502C	RCS-R AFT FU THRUST INJ TEMP-R1A	DSC OR1	VDC	AMU		93017G	*
	V42T3503C	RCS-R AFT OX THRUST INJ TEMP-R3A	DSC OR2	VDC	AMU		93017G	*
	V42T3504C	RCS-R AFT FU THRUST INJ TEMP-R3A	DSC OR2	VDC	AMU		93017G	*
	V42T3505C	RCS-R AFT OX THRUST INJ TEMP-R1R	DSC OR1	VDC	AMU		93017G	*
	V42T3506C	RCS-R AFT FU THRUST INJ TEMP-R1R	DSC OR1	VDC	AMU		93017G	*
	V42T3507C	RCS-R AFT OX THRUST INJ TEMP-R2R	DSC OR1	VDC	AMU		93017G	*
	V42T3508C	RCS-R AFT FU THRUST INJ TEMP-R2R	DSC OR1	VDC	AMU		93017G	*
	V42T3509C	RCS-R AFT OX THRUST INJ TEMP-R3R	DSC OR2	VDC	AMU		93017G	*
	V42T3510C	RCS-R AFT FU THRUST INJ TEMP-R3R	DSC OR2	VDC	AMU		93017G	*
	V42T3511C	RCS-R AFT OX THRUST INJ TEMP-R4R	DSC OR2	VDC	AMU		93017G	*
	V42T3512C	RCS-R AFT FU THRUST INJ TEMP-R4R	DSC OR2	VDC	AMU		93017G	*
	V42T3513C	RCS-R AFT OX THRUST INJ TEMP-R1U	DSC OR1	VDC	AMU		93017G	*
	V42T3514C	RCS-R AFT FU THRUST INJ TEMP-R1U	DSC OR1	VDC	AMU		93017G	*
	V42T3515C	RCS-R AFT OX THRUST INJ TEMP-R2U	DSC OR1	VDC	AMU		93017G	*
	V42T3516C	RCS-R AFT FU THRUST INJ TEMP-R2U	DSC OR1	VDC	AMU		93017G	*
	V42T3517C	RCS-R AFT OX THRUST INJ TEMP-R4U	DSC OR2	VDC	AMU		93017G	*
	V42T3518C	RCS-R AFT FU THRUST INJ TEMP-R4U	DSC OR2	VDC	AMU		93017G	*
	V42T3519C	RCS-R AFT OX THRUST INJ TEMP-R2D	DSC OR1	VDC	AMU		93017G	*
	V42T3520C	RCS-R AFT FU THRUST INJ TEMP-R2D	DSC OR1	VDC	AMU		93017G	*
	V42T3521C	RCS-R AFT OX THRUST INJ TEMP-R3D	DSC OR2	VDC	AMU		93017G	*
	V42T3522C	RCS-R AFT FU THRUST INJ TEMP-R3D	DSC OR2	VDC	AMU		93017G	*
	V42T3523C	RCS-R AFT OX THRUST INJ TEMP-R4D	DSC OR2	VDC	AMU		93017G	*
	V42T3524C	RCS-R AFT FU THRUST INJ TEMP-R4D	DSC OR2	VDC	AMU		93017G	*
	V42T3525C	RCS-R AFT OX THRUST INJ TEMP-R5D	DSC OR1	VDC	AMU		93017G	*
	V42T3526C	RCS-R AFT FU THRUST INJ TEMP-R5D	DSC OR1	VDC	AMU		93017G	*
	V42T3527C	RCS-R AFT OX THRUST INJ TEMP-R5R	DSC OR1	VDC	AMU		93017G	*
	V42T3528C	RCS-R AFT FU THRUST INJ TEMP-R5R	DSC OR1	VDC	AMU		93017G	*
	V43P6245C	OMS FU AFT XFD LN PRESS	HDWR	VDC	AMU		93017G	*
	V43P6246C	OMS OX AFT XFD LN PRESS	HDWR	VDC	AMU		93017G	*
	V79X2601X	RJDF 1 JET F1F DRIVER	RJDF 1		BD		93017G	*

TABLE B.5.16-5. INPUT FUNCTIONAL PARAMETERS FOR RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V79X2602X	RJDF 1 JET F1L DRIVER	RJDF 1		BD		93017G	*
	V79X2603X	RJDF 1 JET F1U DRIVER	RJDF 1		BD		93017G	*
	V79X2604X	RJDF 1 JET F1D DRIVER	RJDF 1		BD		93017G	*
	V79X2605X	RJDF 1 JET F2F DRIVER	RJDF 1		BD		93017G	*
	V79X2606X	RJDF 1 JET F2R DRIVER	RJDF 1		BD		93017G	*
	V79X2607X	RJDF 1 JET F2U DRIVER	RJDF 1		BD		93017G	*
	V79X2608X	RJDF 1 JET F2D DRIVER	RJDF 1		BD		93017G	*
	V79X2609X	RJDF 2 JET F3F DRIVER	RJDF 2		BD		93017G	*
	V79X2610X	RJDF 2 JET F3L DRIVER	RJDF 2		BD		93017G	*
	V79X2611X	RJDF 2 JET F3U DRIVER	RJDF 2		BD		93017G	*
	V79X2612X	RJDF 2 JET F3D DRIVER	RJDF 2		BD		93017G	*
	V79X2613X	RJDF 2 JET F4R DRIVER	RJDF 2		BD		93017G	*
	V79X2614X	RJDF 2 JET F4D DRIVER	RJDF 2		BD		93017G	*
	V79X2615X	RJDF 2 JET F5L DRIVER	RJDF 2		BD		93017G	*
	V79X2616X	RJDF 2 JET F5R DRIVER	RJDF 2		BD		93017G	*
	V79X2617X	RJDA 1 JET L1A DRIVER	RJDA 1		BD		93017G	*
	V79X2618X	RJDA 1 JET L1L DRIVER	RJDA 1		BD		93017G	*
	V79X2619X	RJDA 1 JET L1U DRIVER	RJDA 1		BD		93017G	*
	V79X2620X	RJDA 1 JET L2L DRIVER	RJDA 1		BD		93017G	*
	V79X2621X	RJDA 1 JET L2U DRIVER	RJDA 1		BD		93017G	*
	V79X2622X	RJDA 1 JET L2D DRIVER	RJDA 1		BD		93017G	*
	V79X2623X	RJDA 2 JET L3A DRIVER	RJDA 2		BD		93017G	*
	V79X2624X	RJDA 2 JET L3L DRIVER	RJDA 2		BD		93017G	*
	V79X2625X	RJDA 2 JET L3D DRIVER	RJDA 2		BD		93017G	*
	V79X2626X	RJDA 2 JET L4L DRIVER	RJDA 2		BD		93017G	*
	V79X2627X	RJDA 2 JET L4U DRIVER	RJDA 2		BD		93017G	*
	V79X2628X	RJDA 2 JET L4D DRIVER	RJDA 2		BD		93017G	*
	V79X2629X	RJDA 1 JET L5D DRIVER	RJDA 1		BD		93017G	*
	V79X2630X	RJDA 1 JET L5L DRIVER	RJDA 1		BD		93017G	*
	V79X2631X	RJDA 1 JET R1A DRIVER	RJDA 1		BD		93017G	*
	V79X2632X	RJDA 1 JET R1R DRIVER	RJDA 1		BD		93017G	*
	V79X2633X	RJDA 1 JET R1U DRIVER	RJDA 1		BD		93017G	*
	V79X2634X	RJDA 1 JET R2R DRIVER	RJDA 1		BD		93017G	*
	V79X2635X	RJDA 1 JET R2U DRIVER	RJDA 1		BD		93017G	*
	V79X2636X	RJDA 1 JET R2D DRIVER	RJDA 1		BD		93017G	*
	V79X2637X	RJDA 2 JET R3A DRIVER	RJDA 2		BD		93017G	*
	V79X2638X	RJDA 2 JET R3R DRIVER	RJDA 2		BD		93017G	*
	V79X2639X	RJDA 2 JET R3D DRIVER	RJDA 2		BD		93017G	*
	V79X2640X	RJDA 2 JET R4R DRIVER	RJDA 2		BD		93017G	*
	V79X2641X	RJDA 2 JET R4U DRIVER	RJDA 2		BD		93017G	*
	V79X2642X	RJDA 2 JET R4D DRIVER	RJDA 2		BD		93017G	*
	V79X2643X	RJDA 2 JET R5R DRIVER	RJDA 2		BD		93017G	*
	V79X2644X	RJDA 2 JET R5D DRIVER	RJDA 2		BD		93017G	*
	V79X2701X	RJDF 1 JET F1F CHAMBER PRESS IND	RJDF 1		BD		93017G	*
	V79X2702X	RJDF 1 JET F1L CHAMBER PRESS IND	RJDF 1		BD		93017G	*
	V79X2703X	RJDF 1 JET F1U CHAMBER PRESS IND	RJDF 1		BD		93017G	*

TABLE B.5.16-5. INPUT FUNCTIONAL PARAMETERS FOR RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V79X2704X	RJDF 1 JET F1D CHAMBER PRESS IND	RJDF 1		BD		93017G	*
	V79X2705X	RJDF 1 JET F2F CHAMBER PRESS IND	RJDF 1		BD		93017G	*
	V79X2706X	RJDF 1 JET F2R CHAMBER PRESS IND	RJDF 1		BD		93017G	*
	V79X2707X	RJDF 1 JET F2U CHAMBER PRESS IND	RJDF 1		BD		93017G	*
	V79X2708X	RJDF 1 JET F2D CHAMBER PRESS IND	RJDF 1		BD		93017G	*
	V79X2709X	RJDF 2 JET F3F CHAMBER PRESS IND	RJDF 2		BD		93017G	*
	V79X2710X	RJDF 2 JET F3L CHAMBER PRESS IND	RJDF 2		BD		93017G	*
	V79X2711X	RJDF 2 JET F3U CHAMBER PRESS IND	RJDF 2		BD		93017G	*
	V79X2712X	RJDF 2 JET F3D CHAMBER PRESS IND	RJDF 2		BD		93017G	*
	V79X2713X	RJDF 2 JET F4R CHAMBER PRESS IND	RJDF 2		BD		93017G	*
	V79X2714X	RJDF 2 JET F4D CHAMBER PRESS IND	RJDF 2		BD		93017G	*
	V79X2715X	RJDF 2 JET F5L CHAMBER PRESS IND	RJDF 2		BD		93017G	*
	V79X2716X	RJDF 2 JET F5R CHAMBER PRESS IND	RJDF 2		BD		93017G	*
	V79X2717X	RJDA 1 JET L1A CHAMBER PRESS IND	RJDA 1		BD		93017G	*
	V79X2718X	RJDA 1 JET L1L CHAMBER PRESS IND	RJDA 1		BD		93017G	*
	V79X2719X	RJDA 1 JET L1U CHAMBER PRESS IND	RJDA 1		BD		93017G	*
	V79X2720X	RJDA 1 JET L2L CHAMBER PRESS IND	RJDA 1		BD		93017G	*
	V79X2721X	RJDA 1 JET L2U CHAMBER PRESS IND	RJDA 1		BD		93017G	*
	V79X2722X	RJDA 1 JET L2D CHAMBER PRESS IND	RJDA 1		BD		93017G	*
	V79X2723X	RJDA 2 JET L3A CHAMBER PRESS IND	RJDA 2		BD		93017G	*
	V79X2724X	RJDA 2 JET L3L CHAMBER PRESS IND	RJDA 2		BD		93017G	*
	V79X2725X	RJDA 2 JET L3D CHAMBER PRESS IND	RJDA 2		BD		93017G	*
	V79X2726X	RJDA 2 JET L4L CHAMBER PRESS IND	RJDA 2		BD		93017G	*
	V79X2727X	RJDA 2 JET L4U CHAMBER PRESS IND	RJDA 2		BD		93017G	*
	V79X2728X	RJDA 2 JET L4D CHAMBER PRESS IND	RJDA 2		BD		93017G	*
	V79X2729X	RJDA 1 JET L5D CHAMBER PRESS IND	RJDA 1		BD		93017G	*
	V79X2730X	RJDA 1 JET L5L CHAMBER PRESS IND	RJDA 1		BD		93017G	*
	V79X2731X	RJDA 1 JET R1A CHAMBER PRESS IND	RJDA 1		BD		93017G	*
	V79X2732X	RJDA 1 JET R1R CHAMBER PRESS IND	RJDA 1		BD		93017G	*
	V79X2733X	RJDA 1 JET R1U CHAMBER PRESS IND	RJDA 1		BD		93017G	*
	V79X2734X	RJDA 1 JET R2R CHAMBER PRESS IND	RJDA 1		BD		93017G	*
	V79X2735X	RJDA 1 JET R2U CHAMBER PRESS IND	RJDA 1		BD		93017G	*
	V79X2736X	RJDA 1 JET R2D CHAMBER PRESS IND	RJDA 1		BD		93017G	*
	V79X2737X	RJDA 2 JET R3A CHAMBER PRESS IND	RJDA 2		BD		93017G	*
	V79X2738X	RJDA 2 JET R3R CHAMBER PRESS IND	RJDA 2		BD		93017G	*
	V79X2739X	RJDA 2 JET R3D CHAMBER PRESS IND	RJDA 2		BD		93017G	*
	V79X2740X	RJDA 2 JET R4R CHAMBER PRESS IND	RJDA 2		BD		93017G	*
	V79X2741X	RJDA 2 JET R4U CHAMBER PRESS IND	RJDA 2		BD		93017G	*
	V79X2742X	RJDA 2 JET R4D CHAMBER PRESS IND	RJDA 2		BD		93017G	*
	V79X2743X	RJDA 2 JET R5R CHAMBER PRESS IND	RJDA 2		BD		93017G	*
	V79X2744X	RJDA 2 JET R5D CHAMBER PRESS IND	RJDA 2		BD		93017G	*
	V90X2374X	RCS L FU LEAKAGE ALERT DISP	RCS QTY MON					
	V90X2375X	RCS L OX LEAKAGE ALERT DISP	RCS QTY MON					
	V90X2376X	RCS R FU LEAKAGE ALERT DISP	RCS QTY MON					
	V90X2377X	RCS R OX LEAKAGE ALERT DISP	RCS QTY MON					
	V90X2378X	RCS FWD FU LEAKAGE ALERT DISP	RCS QTY MON					

TABLE B.5.16-5. INPUT FUNCTIONAL PARAMETERS FOR RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V90X2379X	RCS FWD OX LEAKAGE ALERT DISP	RCS QTY MON					
	V90X2392X	RCS-FWD QUANTITY ALERT	RCS QTY MON					
	V90X2393X	RCS-L QUANTITY ALERT	RCS QTY MON					
	V90X2394X	RCS-R QUANTITY ALERT	RCS QTY MON					
	V90X4420X	RCS MANIFOLD F1 OP/CL STATUS	RCS RM	EVENT	BD		93017G	*
	V90X4421X	RCS MANIFOLD F2 OP/CL STATUS	RCS RM	EVENT	BD		93017G	*
	V90X4422X	RCS MANIFOLD F3 OP/CL STATUS	RCS RM	EVENT	BD		93017G	*
	V90X4423X	RCS MANIFOLD F4 OP/CL STATUS	RCS RM	EVENT	BD		93017G	*
	V90X4424X	RCS MANIFOLD F5 OP/CL STATUS	RCS RM	EVENT	BD		93017G	*
	V90X4425X	RCS MANIFOLD L1 OP/CL STATUS	RCS RM	EVENT	BD		93017G	*
	V90X4426X	RCS MANIFOLD L2 OP/CL STATUS	RCS RM	EVENT	BD		93017G	*
	V90X4427X	RCS MANIFOLD L3 OP/CL STATUS	RCS RM	EVENT	BD		93017G	*
	V90X4428X	RCS MANIFOLD L4 OP/CL STATUS	RCS RM	EVENT	BD		93017G	*
	V90X4429X	RCS MANIFOLD L5 OP/CL STATUS	RCS RM	EVENT	BD		93017G	*
	V90X4430X	RCS MANIFOLD R1 OP/CL STATUS	RCS RM	EVENT	BD		93017G	*
	V90X4431X	RCS MANIFOLD R2 OP/CL STATUS	RCS RM	EVENT	BD		93017G	*
	V90X4432X	RCS MANIFOLD R3 OP/CL STATUS	RCS RM	EVENT	BD		93017G	*
	V90X4433X	RCS MANIFOLD R4 OP/CL STATUS	RCS RM	EVENT	BD		93017G	*
	V90X4434X	RCS MANIFOLD R5 OP/CL STATUS	RCS RM	EVENT	BD		93017G	*
	V90X4435X	RCS MANF F1 RM DILEMMA FLAG	RCS RM					
	V90X4436X	RCS MANF F2 RM DILEMMA FLAG	RCS RM					
	V90X4437X	RCS MANF F3 RM DILEMMA FLAG	RCS RM					
	V90X4438X	RCS MANF F4 RM DILEMMA FLAG	RCS RM					
	V90X4439X	RCS MANF F5 RM DILEMMA FLAG	RCS RM					
	V90X4440X	RCS MANF L1 RM DILEMMA FLAG	RCS RM					
	V90X4441X	RCS MANF L2 RM DILEMMA FLAG	RCS RM					
	V90X4442X	RCS MANF L3 RM DILEMMA FLAG	RCS RM					
	V90X4443X	RCS MANF L4 RM DILEMMA FLAG	RCS RM					
	V90X4444X	RCS MANF L5 RM DILEMMA FLAG	RCS RM					
	V90X4445X	RCS MANF R1 RM DILEMMA FLAG	RCS RM					
	V90X4446X	RCS MANF R2 RM DILEMMA FLAG	RCS RM					
	V90X4447X	RCS MANF R3 RM DILEMMA FLAG	RCS RM					
	V90X4448X	RCS MANF R4 RM DILEMMA FLAG	RCS RM					
	V90X4449X	RCS MANF R5 RM DILEMMA FLAG	RCS RM					
	V90X4564X	JET F2U LEAKING	RCS RM		BD		93017G	*
	V90X4565X	JET F2D LEAKING	RCS RM		BD		93017G	*
	V90X4566X	JET F3F LEAKING	RCS RM		BD		93017G	*
	V90X4567X	JET F3L LEAKING	RCS RM		BD		93017G	*
	V90X4568X	JET F3U LEAKING	RCS RM		BD		93017G	*
	V90X4569X	JET F3D LEAKING	RCS RM		BD		93017G	*
	V90X4570X	JET L1A FAILED OFF	RCS RM		BD		93017G	*
	V90X4571X	JET L1L FAILED OFF	RCS RM		BD		93017G	*
	V90X4572X	JET L1U FAILED OFF	RCS RM		BD		93017G	*
	V90X4573X	JET L2L FAILED OFF	RCS RM		BD		93017G	*
	V90X4574X	JET L2U FAILED OFF	RCS RM		BD		93017G	*
	V90X4575X	JET L2D FAILED OFF	RCS RM		BD		93017G	*

TABLE B.5.16-5. INPUT FUNCTIONAL PARAMETERS FOR RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V90X4576X	JET L3A FAILED OFF	RCS RM		BD		93017G	*
	V90X4577X	JET L3L FAILED OFF	RCS RM		BD		93017G	*
	V90X4578X	JET L3D FAILED OFF	RCS RM		BD		93017G	*
	V90X4579X	JET L4L FAILED OFF	RCS RM		BD		93017G	*
	V90X4580X	JET L4U FAILED OFF	RCS RM		BD		93017G	*
	V90X4581X	JET L4D FAILED OFF	RCS RM		BD		93017G	*
	V90X4582X	JET L5D FAILED OFF	RCS RM		BD		93017G	*
	V90X4583X	JET L5L FAILED OFF	RCS RM		BD		93017G	*
	V90X4584X	JET R1A FAILED OFF	RCS RM		BD		93017G	*
	V90X4585X	JET R1R FAILED OFF	RCS RM		BD		93017G	*
	V90X4586X	JET R1U FAILED OFF	RCS RM		BD		93017G	*
	V90X4587X	JET R2R FAILED OFF	RCS RM		BD		93017G	*
	V90X4588X	JET R2U FAILED OFF	RCS RM		BD		93017G	*
	V90X4589X	JET R2D FAILED OFF	RCS RM		BD		93017G	*
	V90X4590X	JET R3A FAILED OFF	RCS RM		BD		93017G	*
	V90X4591X	JET R3R FAILED OFF	RCS RM		BD		93017G	*
	V90X4592X	JET R3D FAILED OFF	RCS RM		BD		93017G	*
	V90X4593X	JET R4R FAILED OFF	RCS RM		BD		93017G	*
	V90X4594X	JET R4U FAILED OFF	RCS RM		BD		93017G	*
	V90X4595X	JET R4D FAILED OFF	RCS RM		BD		93017G	*
	V90X4596X	JET R5D FAILED OFF	RCS RM		BD		93017G	*
	V90X4597X	JET R5R FAILED OFF	RCS RM		BD		93017G	*
	V90X4598X	JET F1F FAILED OFF	RCS RM		BD		93017G	*
	V90X4599X	JET F1L FAILED OFF	RCS RM		BD		93017G	*
	V90X4601X	JET F1U FAILED OFF	RCS RM		BD		93017G	*
	V90X4602X	JET F1D FAILED OFF	RCS RM		BD		93017G	*
	V90X4603X	JET F2F FAILED OFF	RCS RM		BD		93017G	*
	V90X4604X	JET F2R FAILED OFF	RCS RM		BD		93017G	*
	V90X4605X	JET F2U FAILED OFF	RCS RM		BD		93017G	*
	V90X4606X	JET F2D FAILED OFF	RCS RM		BD		93017G	*
	V90X4607X	JET F3F FAILED OFF	RCS RM		BD		93017G	*
	V90X4608X	JET F3L FAILED OFF	RCS RM		BD		93017G	*
	V90X4609X	JET F3U FAILED OFF	RCS RM		BD		93017G	*
	V90X4610X	JET F3D FAILED OFF	RCS RM		BD		93017G	*
	V90X4611X	JET F4R FAILED OFF	RCS RM		BD		93017G	*
	V90X4612X	JET F4D FAILED OFF	RCS RM		BD		93017G	*
	V90X4613X	JET F5L FAILED OFF	RCS RM		BD		93017G	*
	V90X4614X	JET F5R FAILED OFF	RCS RM		BD		93017G	*
	V90X4615X	JET F4R LEAKING	RCS RM		BD		93017G	*
	V90X4616X	JET F4D LEAKING	RCS RM		BD		93017G	*
	V90X4617X	JET F5L LEAKING	RCS RM		BD		93017G	*
	V90X4618X	JET F5R LEAKING	RCS RM		BD		93017G	*
	V90X4620X	JET L1A FAILED ON	RCS RM		BD		93017G	*
	V90X4621X	JET L1L FAILED ON	RCS RM		BD		93017G	*
	V90X4622X	JET L1U FAILED ON	RCS RM		BD		93017G	*
	V90X4623X	JET L2L FAILED ON	RCS RM		BD		93017G	*

TABLE B.5.16-5. INPUT FUNCTIONAL PARAMETERS FOR RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V90X4624X	JET L2U FAILED ON	RCS RM		BD		93017G	*
	V90X4625X	JET L2D FAILED ON	RCS RM		BD		93017G	*
	V90X4626X	JET L3A FAILED ON	RCS RM		BD		93017G	*
	V90X4627X	JET L3L FAILED ON	RCS RM		BD		93017G	*
	V90X4628X	JET L3D FAILED ON	RCS RM		BD		93017G	*
	V90X4629X	JET L4L FAILED ON	RCS RM		BD		93017G	*
	V90X4630X	JET L4U FAILED ON	RCS RM		BD		93017G	*
	V90X4631X	JET L4D FAILED ON	RCS RM		BD		93017G	*
	V90X4632X	JET L5D FAILED ON	RCS RM		BD		93017G	*
	V90X4633X	JET L5L FAILED ON	RCS RM		BD		93017G	*
	V90X4634X	JET R1A FAILED ON	RCS RM		BD		93017G	*
	V90X4635X	JET R1R FAILED ON	RCS RM		BD		93017G	*
	V90X4636X	JET R1U FAILED ON	RCS RM		BD		93017G	*
	V90X4637X	JET R2R FAILED ON	RCS RM		BD		93017G	*
	V90X4638X	JET R2U FAILED ON	RCS RM		BD		93017G	*
	V90X4639X	JET R2D FAILED ON	RCS RM		BD		93017G	*
	V90X4641X	JET R3A FAILED ON	RCS RM		BD		93017G	*
	V90X4642X	JET R3R FAILED ON	RCS RM		BD		93017G	*
	V90X4643X	JET R3D FAILED ON	RCS RM		BD		93017G	*
	V90X4644X	JET R4R FAILED ON	RCS RM		BD		93017G	*
	V90X4645X	JET R4U FAILED ON	RCS RM		BD		93017G	*
	V90X4646X	JET R4D FAILED ON	RCS RM		BD		93017G	*
	V90X4647X	JET R5D FAILED ON	RCS RM		BD		93017G	*
	V90X4648X	JET R5R FAILED ON	RCS RM		BD		93017G	*
	V90X4649X	JET F1F FAILED ON	RCS RM		BD		93017G	*
	V90X4650X	JET F1L FAILED ON	RCS RM		BD		93017G	*
	V90X4651X	JET F1U FAILED ON	RCS RM		BD		93017G	*
	V90X4652X	JET F1D FAILED ON	RCS RM		BD		93017G	*
	V90X4653X	JET F2F FAILED ON	RCS RM		BD		93017G	*
	V90X4654X	JET F2R FAILED ON	RCS RM		BD		93017G	*
	V90X4655X	JET F2U FAILED ON	RCS RM		BD		93017G	*
	V90X4656X	JET F2D FAILED ON	RCS RM		BD		93017G	*
	V90X4657X	JET F3F FAILED ON	RCS RM		BD		93017G	*
	V90X4658X	JET F3L FAILED ON	RCS RM		BD		93017G	*
	V90X4659X	JET F3U FAILED ON	RCS RM		BD		93017G	*
	V90X4660X	JET F3D FAILED ON	RCS RM		BD		93017G	*
	V90X4661X	JET F4R FAILED ON	RCS RM		BD		93017G	*
	V90X4662X	JET F4D FAILED ON	RCS RM		BD		93017G	*
	V90X4663X	JET F5L FAILED ON	RCS RM		BD		93017G	*
	V90X4664X	JET F5R FAILED ON	RCS RM		BD		93017G	*
	V90X4665X	JET L1A LEAKING	RCS RM		BD		93017G	*
	V90X4666X	JET L1L LEAKING	RCS RM		BD		93017G	*
	V90X4667X	JET L1U LEAKING	RCS RM		BD		93017G	*
	V90X4668X	JET L2L LEAKING	RCS RM		BD		93017G	*
	V90X4669X	JET L2U LEAKING	RCS RM		BD		93017G	*
	V90X4670X	JET L2D LEAKING	RCS RM		BD		93017G	*

TABLE B.5.16-5. INPUT FUNCTIONAL PARAMETERS FOR RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V90X4671X	JET L3A LEAKING	RCS RM		BD		93017G	*
	V90X4672X	JET L3L LEAKING	RCS RM		BD		93017G	*
	V90X4673X	JET L3D LEAKING	RCS RM		BD		93017G	*
	V90X4674X	JET L4L LEAKING	RCS RM		BD		93017G	*
	V90X4675X	JET L4U LEAKING	RCS RM		BD		93017G	*
	V90X4676X	JET L4D LEAKING	RCS RM		BD		93017G	*
	V90X4677X	JET L5D LEAKING	RCS RM		BD		93017G	*
	V90X4678X	JET L5L LEAKING	RCS RM		BD		93017G	*
	V90X4679X	JET R1A LEAKING	RCS RM		BD		93017G	*
	V90X4681X	JET R1R LEAKING	RCS RM		BD		93017G	*
	V90X4682X	JET R1U LEAKING	RCS RM		BD		93017G	*
	V90X4683X	JET R2R LEAKING	RCS RM		BD		93017G	*
	V90X4684X	JET R2U LEAKING	RCS RM		BD		93017G	*
	V90X4685X	JET R2D LEAKING	RCS RM		BD		93017G	*
	V90X4686X	JET R3A LEAKING	RCS RM		BD		93017G	*
	V90X4687X	JET R3R LEAKING	RCS RM		BD		93017G	*
	V90X4688X	JET R3D LEAKING	RCS RM		BD		93017G	*
	V90X4689X	JET R4R LEAKING	RCS RM		BD		93017G	*
	V90X4690X	JET R4U LEAKING	RCS RM		BD		93017G	*
	V90X4691X	JET R4D LEAKING	RCS RM		BD		93017G	*
	V90X4692X	JET R5D LEAKING	RCS RM		BD		93017G	*
	V90X4693X	JET R5R LEAKING	RCS RM		BD		93017G	*
	V90X4694X	JET F1F LEAKING	RCS RM		BD		93017G	*
	V90X4695X	JET F1L LEAKING	RCS RM		BD		93017G	*
	V90X4696X	JET F1U LEAKING	RCS RM		BD		93017G	*
	V90X4697X	JET F1D LEAKING	RCS RM		BD		93017G	*
	V90X4698X	JET F2F LEAKING	RCS RM		BD		93017G	*
	V90X4699X	JET F2R LEAKING	RCS RM		BD		93017G	*
	V91X2283X	FF1 INPUT PROM SEG 1,2 STATUS(MFE)	FCOS		BD			
	V91X2284X	FF2 INPUT PROM SEG 1,2 STATUS(MFE)	FCOS		BD			
	V91X2285X	FF3 INPUT PROM SEG 1,2 STATUS(MFE)	FCOS		BD			
	V91X2287X	FF4 INPUT PROM SEG 1,2 STATUS(MFE)	FCOS		BD			
	V91X2441X	RCS F1F FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2442X	RCS F1F OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2443X	RCS F1L FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2444X	RCS F1L OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2445X	RCS F1U FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2446X	RCS F1U OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2447X	RCS F1D FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2448X	RCS F1D OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2449X	RCS F2F FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2450X	RCS F2F OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2451X	RCS F2R FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2452X	RCS F2R OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2453X	RCS F2U FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2454X	RCS F2U OX THRUST INJ TEMP COM FLT	FCOS					

TABLE B.5.16-5. INPUT FUNCTIONAL PARAMETERS FOR RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V91X2455X	RCS F2D FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2456X	RCS F2D OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2457X	RCS F3F FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2458X	RCS F3F OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2459X	RCS F3L FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2460X	RCS F3L OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2461X	RCS F3U FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2462X	RCS F3U OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2463X	RCS F3D FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2464X	RCS F3D OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2465X	RCS F4R FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2466X	RCS F4R OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2468X	OMS OX AFT XFD PRESS COMMFAULT	FCOS				92509C	
	V91X2469X	OMS FU AFT XFD PRESS COMMFAULT	FCOS				92509C	
	V91X2486X	RCS F4D FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2487X	RCS F4D OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2488X	RCS L1A FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2489X	RCS R4D FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2490X	RCS L1A OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2491X	RCS L1L FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2492X	RCS L1U OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2493X	RCS L1U FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2494X	RCS L1U OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2495X	RCS L2L FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2496X	RCS L2L OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2498X	RCS L2U OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2499X	RCS L2D FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2500X	RCS L2D OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2501X	RCS L3A FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2502X	RCS L3A OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2503X	RCS L3L FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2504X	RCS L3L OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2505X	RCS L3D FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2506X	RCS L3D OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2507X	RCS L4L FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2508X	RCS L4L OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2509X	RCS L4U FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2510X	RCS L4U OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2511X	RCS L4D FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2512X	RCS L4D OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2513X	RCS R1A FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2514X	RCS R1A OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2515X	RCS R1R FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2516X	RCS R1R OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2517X	RCS R1U FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2518X	RCS R1U OX THRUST INJ TEMP COM FLT	FCOS					



TABLE B.5.16-5. INPUT FUNCTIONAL PARAMETERS FOR RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V91X2519X	RCS R2R FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2520X	RCS R2R OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2522X	RCS R2U FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2523X	RCS R2U OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2524X	RCS R2D FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2525X	RCS R2D OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2526X	RCS R3A FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2527X	RCS R3A OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2528X	RCS R3R FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2529X	RCS R3R OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2530X	RCS R4U FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2531X	RCS R3D OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2532X	RCS R4R FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2533X	RCS R4R OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2535X	RCS R4U OX THRUST INJ TEMP COM FLT	FCOS					
	V91X2594X	RCS L2U FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2595X	RCS R3D FU THRUST INJ TEMP COM FLT	FCOS					
	V91X2841X	FA1 INPUT PROM SEG 1,2 STATUS(MFE)	SYS S/W				93017G	*
	V91X2842X	FA2 INPUT PROM SEG 1,2 STATUS(MFE)	SYS S/W				93017G	*
	V91X2843X	FA3 INPUT PROM SEG 1,2 STATUS(MFE)	SYS S/W				93017G	*
	V91X2844X	FA4 INPUT PROM SEG 1,2 STATUS(MFE)	SYS S/W				93017G	*
	V91X5206X	RCS FWD OX TK ULLAGE P COMMFAULT	FCOS					
	V91X5207X	RCS FWD FU TK ULLAGE P COMMFAULT	FCOS					
	V91X5216X	RCS FWD HE FU TK PRES 1 COMMFAULT	FCOS				90897D	
	V91X5221X	RCS FWD FU TK TEMP 1 COMMFAULT	FCOS				90897D	
	V91X5222X	RCS FWD HE OX TK PRES 1 COMMFAULT	FCOS				90897D	
	V91X5227X	RCS FWD OX TK TEMP 1 COMMFAULT	FCOS				90897D	
	V91X5252X	RCS L AFT OX MANF P1 COMMFAULT	FCOS		BD		90897D	
	V91X5253X	RCS L AFT OX MANF P2 COMMFAULT	FCOS		BD		90897D	
	V91X5254X	RCS L AFT OX MANF P3 COMMFAULT	FCOS		BD		90897D	
	V91X5255X	RCS L AFT OX MANF P4 COMMFAULT	FCOS		BD		90897D	
	V91X5256X	RCS L AFT FU MANF P1 COMMFAULT	FCOS		BD		90897D	
	V91X5257X	RCS L AFT FU MANF P2 COMMFAULT	FCOS		BD		90897D	
	V91X5258X	RCS L AFT FU MANF P3 COMMFAULT	FCOS		BD		90897D	
	V91X5259X	RCS L AFT FU MANF P4 COMMFAULT	FCOS		BD		90897D	
	V91X5260X	RCS R AFT OX MANF P1 COMMFAULT	FCOS		BD		90897D	
	V91X5261X	RCS R AFT OX MANF P2 COMMFAULT	FCOS		BD		90897D	
	V91X5262X	RCS R AFT OX MANF P3 COMMFAULT	FCOS		BD		90897D	
	V91X5263X	RCS R AFT OX MANF P4 COMMFAULT	FCOS		BD		90897D	
	V91X5264X	RCS R AFT FU MANF P1 COMMFAULT	FCOS		BD		90897D	
	V91X5265X	RCS R AFT FU MANF P2 COMMFAULT	FCOS		BD		90897D	
	V91X5266X	RCS R AFT FU MANF P3 COMMFAULT	FCOS		BD		90897D	
	V91X5267X	RCS R AFT FU MANF P4 COMMFAULT	FCOS		BD		90897D	
	V91X5869X	RCS R4D OX THRUST INJ TEMP COM FLT	FCOS					
	V91X5870X	RCS L5D OX THRUST INJ TEMP COM FLT	FCOS					
	V91X5871X	RCS R5D OX THRUST INJ TEMP COM FLT	FCOS					

TABLE B.5.16-5. INPUT FUNCTIONAL PARAMETERS FOR RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V91X5872X	RCS F5R OX THRUST INJ TEMP COM FLT	FCOS					
	V91X5873X	RCS L5L OX THRUST INJ TEMP COM FLT	FCOS					
	V91X5874X	RCS R5R OX THRUST INJ TEMP COM FLT	FCOS					
	V91X5875X	RCS F5L OX THRUST INJ TEMP COM FLT	FCOS					
	V91X5876X	RCS L5D FU THRUST INJ TEMP COM FLT	FCOS					
	V91X5877X	RCS R5D FU THRUST INJ TEMP COM FLT	FCOS					
	V91X5878X	RCS F5R FU THRUST INJ TEMP COM FLT	FCOS					
	V91X5879X	RCS L5L FU THRUST INJ TEMP COM FLT	FCOS					
	V91X5880X	RCS R5R FU THRUST INJ TEMP COM FLT	FCOS					
	V91X5881X	RCS F5L FU THRUST INJ TEMP COM FLT	FCOS					
	V93J5113C	SELECTED RCS JET FAIL LIMIT CMD	RM RCS DISP		VAR			
	V93X5110X	RCS-FWD RCS MODULE DSPL REQ	RM RCS DISP		BD			
	V93X5111X	RCS-LEFT RCS MODULE DSPL REQ	RM RCS DISP		BD			
	V93X5112X	RCS-RIGHT RCS MODULE DSPL REQ	RM RCS DISP		BD			
	V93X5120X	RCS-SEL JET 1 RM AUTO/INH FLAG	RM RCS DISP		BD			
	V93X5121X	RCS-SEL JET 2 RM AUTO/INH FLAG	RM RCS DISP		BD			
	V93X5122X	RCS-SEL JET 3 RM AUTO/INH FLAG	RM RCS DISP		BD			
	V93X5123X	RCS-SEL JET 4 RM AUTO/INH FLAG	RM RCS DISP		BD			
	V93X5124X	RCS-SEL JET 5 RM AUTO/INH FLAG	RM RCS DISP		BD			
	V93X5125X	RCS-SEL JET 6 RM AUTO/INH FLAG	RM RCS DISP		BD			
	V93X5126X	RCS-SEL JET 7 RM AUTO/INH FLAG	RM RCS DISP		BD			
	V93X5127X	RCS-SEL JET 8 RM AUTO/INH FLAG	RM RCS DISP		BD			
	V93X5128X	RCS-SEL JET 9 RM AUTO/INH FLAG	RM RCS DISP		BD			
	V93X5129X	RCS-SEL JET 10 RM AUTO/INH FLAG	RM RCS DISP		BD			
	V93X5130X	RCS-SEL JET 11 RM AUTO/INH FLAG	RM RCS DISP		BD			
	V93X5131X	RCS-SEL JET 12 RM AUTO/INH FLAG	RM RCS DISP		BD			
	V93X5132X	RCS-SEL JET 13 RM AUTO/INH FLAG	RM RCS DISP		BD			
	V93X5133X	RCS-SEL JET 14 RM AUTO/INH FLAG	RM RCS DISP		BD			
	V93X5134X	RCS-SEL JET 15 RM AUTO/INH FLAG	RM RCS DISP		BD			
	V93X5135X	RCS-SEL JET 16 RM AUTO/INH FLAG	RM RCS DISP		BD			
	V93X5150X	RCS-SEL JET 1 SEL/DES FLAG	RM RCS DISP		BD			
	V93X5151X	RCS-SEL JET 2 SEL/DES FLAG	RM RCS DISP		BD			
	V93X5152X	RCS-SEL JET 3 SEL/DES FLAG	RM RCS DISP		BD			
	V93X5153X	RCS-SEL JET 4 SEL/DES FLAG	RM RCS DISP		BD			
	V93X5154X	RCS-SEL JET 5 SEL/DES FLAG	RM RCS DISP		BD			
	V93X5155X	RCS-SEL JET 6 SEL/DES FLAG	RM RCS DISP		BD			
	V93X5156X	RCS-SEL JET 7 SEL/DES FLAG	RM RCS DISP		BD			
	V93X5157X	RCS-SEL JET 8 SEL/DES FLAG	RM RCS DISP		BD			
	V93X5158X	RCS-SEL JET 9 SEL/DES FLAG	RM RCS DISP		BD			
	V93X5159X	RCS-SEL JET 10 SEL/DES FLAG	RM RCS DISP		BD			
	V93X5160X	RCS-SEL JET 11 SEL/DES FLAG	RM RCS DISP		BD			
	V93X5161X	RCS-SEL JET 12 SEL/DES FLAG	RM RCS DISP		BD			
	V93X5162X	RCS-SEL JET 13 SEL/DES FLAG	RM RCS DISP		BD			
	V93X5163X	RCS-SEL JET 14 SEL/DES FLAG	RM RCS DISP		BD			
	V93X5164X	RCS-SEL JET 15 SEL/DES FLAG	RM RCS DISP		BD			
	V93X5165X	RCS-SEL JET 16 SEL/DES FLAG	RM RCS DISP		BD			

TABLE B.5.16-5. INPUT FUNCTIONAL PARAMETERS FOR RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V93X5167X	SELECTED RCS MANF1	OP/CL STAT OVRD	RM RCS DISP	BD			
	V93X5168X	SELECTED RCS MANF2	OP/CL STAT OVRD	RM RCS DISP	BD			
	V93X5169X	SELECTED RCS MANF3	OP/CL STAT OVRD	RM RCS DISP	BD			
	V93X5170X	SELECTED RCS MANF4	OP/CL STAT OVRD	RM RCS DISP	BD			
	V93X5171X	SELECTED RCS MANF5	OP/CL STAT OVRD	RM RCS DISP	BD			
	V93X5173X	RCS JET RESET		RM RCS DISP	BD			
	V95X8400XB	JET F1F DESELECT		RCS RM				
	V95X8401XB	JET F1L DESELECT		RCS RM				
	V95X8402XB	JET F1U DESELECT		RCS RM				
	V95X8403XB	JET F1D DESELECT		RCS RM				
	V95X8404XB	JET F2F DESELECT		RCS RM				
	V95X8405XB	JET F2R DESELECT		RCS RM				
	V95X8406XB	JET F2U DESELECT		RCS RM				
	V95X8407XB	JET F2D DESELECT		RCS RM				
	V95X8408XB	JET F3F DESELECT		RCS RM				
	V95X8409XB	JET F3L DESELECT		RCS RM				
	V95X8410XB	JET F3U DESELECT		RCS RM				
	V95X8411XB	JET F3D DESELECT		RCS RM				
	V95X8412XB	JET F4R DESELECT		RCS RM				
	V95X8413XB	JET F4D DESELECT		RCS RM				
	V95X8414XB	JET F5L DESELECT		RCS RM				
	V95X8415XB	JET F5R DESELECT		RCS RM				
	V95X8416XB	JET L1A DESELECT		RCS RM				
	V95X8417XB	JET L1L DESELECT		RCS RM				
	V95X8418XB	JET L1U DESELECT		RCS RM				
	V95X8419XB	JET L2L DESELECT		RCS RM				
	V95X8420XB	JET L2U DESELECT		RCS RM				
	V95X8421XB	JET L2D DESELECT		RCS RM				
	V95X8422XB	JET L3A DESELECT		RCS RM				
	V95X8423XB	JET L3L DESELECT		RCS RM				
	V95X8424XB	JET L3D DESELECT		RCS RM				
	V95X8425XB	JET L4L DESELECT		RCS RM				
	V95X8426XB	JET L4U DESELECT		RCS RM				
	V95X8427XB	JET L4D DESELECT		RCS RM				
	V95X8428XB	JET L5D DESELECT		RCS RM				
	V95X8429XB	JET L5L DESELECT		RCS RM				
	V95X8430XB	JET R1A DESELECT		RCS RM				
	V95X8431XB	JET R1R DESELECT		RCS RM				
	V95X8432XB	JET R1U DESELECT		RCS RM				
	V95X8433XB	JET R2R DESELECT		RCS RM				
	V95X8434XB	JET R2U DESELECT		RCS RM				
	V95X8435XB	JET R2D DESELECT		RCS RM				
	V95X8436XB	JET R3A DESELECT		RCS RM				
	V95X8437XB	JET R3R DESELECT		RCS RM				
	V95X8438XB	JET R3D DESELECT		RCS RM				
	V95X8439XB	JET R4R DESELECT		RCS RM				

TABLE B.5.16-5. INPUT FUNCTIONAL PARAMETERS FOR RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V95X8440XB	JET R4U DESELECT	RCS RM					
	V95X8441XB	JET R4D DESELECT	RCS RM					
	V95X8442XB	JET R5D DESELECT	RCS RM					
	V95X8443XB	JET R5R DESELECT	RCS RM					

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.5.16-6. OUTPUT FUNCTIONAL PARAMETERS FROM RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
RCS_FWD_JET_FAIL_LT	V90J4452CA	RCS FWD JET FAIL LIMIT	RCS RM					
RCS_L_JET_FAIL_LT	V90J4453CA	RCS L JET FAIL LIMIT	RCS RM					
RCS_R_JET_FAIL_LT	V90J4454CA	RCS R JET FAIL LIMIT	RCS RM					
	V95J8671C	SEL MODULE HE PRESS 1 OX STATUS	RM RCS DISP				90897D	
	V95J8675C	SEL MODULE HE PRESS 1 FU STATUS	RM RCS DISP				90897D	
	V95J8679C	SEL MODULE PROP PRESS-OX STATUS	RM RCS DISP				90897D	
	V95J8681C	SEL MODULE PROP PRESS-FU STATUS	RM RCS DISP				90897D	
	V95J8683C	SEL MODULE PROP TEMP-OX STATUS	RM RCS DISP				90897D	
	V95J8685C	SEL MODULE PROP TEMP-FU STATUS	RM RCS DISP				90897D	
	V95J8691C	SEL MODULE PROP QTY OX STATUS	RM RCS DISP				90897D	
	V95J8693C	SEL MODULE PROP QTY FU STATUS	RM RCS DISP				90897D	
	V95J8726C	SEL MANIFOLD 1 OX PRESS STATUS	RM RCS DISP				90897D	
	V95J8728C	SEL MANIFOLD 1 FU PRESS STATUS	RM RCS DISP				90897D	
	V95J8730C	SEL MANIFOLD 2 OX PRESS STATUS	RM RCS DISP				90897D	
	V95J8732C	SEL MANIFOLD 2 FU PRESS STATUS	RM RCS DISP				90897D	
	V95J8735C	SEL MANIFOLD 3 OX PRESS STATUS	RM RCS DISP				90897D	
	V95J8737C	SEL MANIFOLD 3 FU PRESS STATUS	RM RCS DISP				90897D	
	V95J8739C	SEL MANIFOLD 4 OX PRESS STATUS	RM RCS DISP				90897D	
	V95J8741C	SEL MANIFOLD 4 FU PRESS STATUS	RM RCS DISP				90897D	
	V95J8743C	SELECTED PRI RCS JET FAIL LIM FLAG	RM RCS DISP		VAR			
	V95J8767C	SELECTED RCS MANF 1 OP/CL I/O STAT	RM RCS DISP				90897D	
	V95J8768C	SELECTED RCS MANF 2 OP/CL I/O STAT	RM RCS DISP				90897D	
	V95J8769C	SELECTED RCS MANF 3 OP/CL I/O STAT	RM RCS DISP				90897D	
	V95J8770C	SELECTED RCS MANF 4 OP/CL I/O STAT	RM RCS DISP				90897D	
	V95J8771C	SELECTED RCS MANF 5 OP/CL I/O STAT	RM RCS DISP				90897D	
	V95J8796C	AFT XFD PRESS OX STATUS	RM RCS DISP				92320D	
	V95J8797C	AFT XFD PRESS FU STATUS	RM RCS DISP				92320D	
	V95P8670C	SEL MODULE HE PRESS 1 OX	RM RCS DISP	PSIA	VAR			
	V95P8674C	SEL MODULE HE PRESS 1 FU	RM RCS DISP	PSIA	VAR			
	V95P8678C	SEL MODULE PROP PRESS-OX	RM RCS DISP	PSIA	VAR			
	V95P8680C	SEL MODULE PROP PRESS-FU	RM RCS DISP	PSIA	VAR			
	V95P8725C	SEL MANIFOLD 1 OX PRESS	RM RCS DISP	PSIA	VAR			
	V95P8727C	SEL MANIFOLD 1 FU PRESS	RM RCS DISP	PSIA	VAR			
	V95P8729C	SEL MANIFOLD 2 OX PRESS	RM RCS DISP	PSIA	VAR			
	V95P8731C	SEL MANIFOLD 2 FU PRESS	RM RCS DISP	PSIA	VAR			
	V95P8734C	SEL MANIFOLD 3 OX PRESS	RM RCS DISP	PSIA	VAR			
	V95P8736C	SEL MANIFOLD 3 FU PRESS	RM RCS DISP	PSIA	VAR			
	V95P8738C	SEL MANIFOLD 4 OX PRESS	RM RCS DISP	PSIA	VAR			
	V95P8740C	SEL MANIFOLD 4 FU PRESS	RM RCS DISP	PSIA	VAR			
	V95P8794C	AFT XFD PRESS OX	RM RCS DISP	PSIA	SPL		92320D	
	V95P8795C	AFT XFD PRESS FU	RM RCS DISP	PSIA	SPL		92320D	
	V95Q8690C	SEL MODULE PROP-QTY OX	RM RCS DISP		PCT			
	V95Q8692C	SEL MODULE PROP-QTY FU	RM RCS DISP		PCT			
	V95T8682C	SEL MODULE PROP TEMP-OX	RM RCS DISP	DEG F	VAR			
	V95T8684C	SEL MODULE PROP TEMP-FU	RM RCS DISP	DEG F	VAR			
	V95U8778C	SELECTED JET 1 PRIORITY	RM RCS DISP		VAR			

TABLE B.5.16-6. OUTPUT FUNCTIONAL PARAMETERS FROM RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V95U8779C	SELECTED JET 2 PRIORITY	RM RCS DISP		VAR			
	V95U8780C	SELECTED JET 3 PRIORITY	RM RCS DISP		VAR			
	V95U8781C	SELECTED JET 4 PRIORITY	RM RCS DISP		VAR			
	V95U8782C	SELECTED JET 5 PRIORITY	RM RCS DISP		VAR			
	V95U8783C	SELECTED JET 6 PRIORITY	RM RCS DISP		VAR			
	V95U8784C	SELECTED JET 7 PRIORITY	RM RCS DISP		VAR			
	V95U8785C	SELECTED JET 8 PRIORITY	RM RCS DISP		VAR			
	V95U8786C	SELECTED JET 9 PRIORITY	RM RCS DISP		VAR			
	V95U8787C	SELECTED JET 10 PRIORITY	RM RCS DISP		VAR			
	V95U8788C	SELECTED JET 11 PRIORITY	RM RCS DISP		VAR			
	V95U8789C	SELECTED JET 12 PRIORITY	RM RCS DISP		VAR			
	V95U8790C	SELECTED JET 13 PRIORITY	RM RCS DISP		VAR			
	V95U8791C	SELECTED JET 14 PRIORITY	RM RCS DISP		VAR			
	V95U8792C	SELECTED JET 15 PRIORITY	RM RCS DISP		VAR			
	V95U8793C	SELECTED JET 16 PRIORITY	RM RCS DISP		VAR			
	V95X8400XA	JET F1F DESELECT	RCS RM					
	V95X8401XA	JET F1L DESELECT	RCS RM					
	V95X8402XA	JET F1U DESELECT	RCS RM					
	V95X8403XA	JET F1D DESELECT	RCS RM					
	V95X8404XA	JET F2F DESELECT	RCS RM					
	V95X8405XA	JET F2R DESELECT	RCS RM					
	V95X8406XA	JET F2U DESELECT	RCS RM					
	V95X8407XA	JET F2D DESELECT	RCS RM					
	V95X8408XA	JET F3F DESELECT	RCS RM					
	V95X8409XA	JET F3L DESELECT	RCS RM					
	V95X8410XA	JET F3U DESELECT	RCS RM					
	V95X8411XA	JET F3D DESELECT	RCS RM					
	V95X8412XA	JET F4R DESELECT	RCS RM					
	V95X8413XA	JET F4D DESELECT	RCS RM					
	V95X8414XA	JET F5L DESELECT	RCS RM					
	V95X8415XA	JET F5R DESELECT	RCS RM					
	V95X8416XA	JET L1A DESELECT	RCS RM					
	V95X8417XA	JET L1L DESELECT	RCS RM					
	V95X8418XA	JET L1U DESELECT	RCS RM					
	V95X8419XA	JET L2L DESELECT	RCS RM					
	V95X8420XA	JET L2U DESELECT	RCS RM					
	V95X8421XA	JET L2D DESELECT	RCS RM					
	V95X8422XA	JET L3A DESELECT	RCS RM					
	V95X8423XA	JET L3L DESELECT	RCS RM					
	V95X8424XA	JET L3D DESELECT	RCS RM					
	V95X8425XA	JET L4L DESELECT	RCS RM					
	V95X8426XA	JET L4U DESELECT	RCS RM					
	V95X8427XA	JET L4D DESELECT	RCS RM					
	V95X8428XA	JET L5D DESELECT	RCS RM					
	V95X8429XA	JET L5L DESELECT	RCS RM					
	V95X8430XA	JET R1A DESELECT	RCS RM					

TABLE B.5.16-6. OUTPUT FUNCTIONAL PARAMETERS FROM RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V95X8431XA	JET R1R DESELECT	RCS RM					
	V95X8432XA	JET R1U DESELECT	RCS RM					
	V95X8433XA	JET R2R DESELECT	RCS RM					
	V95X8434XA	JET R2U DESELECT	RCS RM					
	V95X8435XA	JET R2D DESELECT	RCS RM					
	V95X8436XA	JET R3A DESELECT	RCS RM					
	V95X8437XA	JET R3R DESELECT	RCS RM					
	V95X8438XA	JET R3D DESELECT	RCS RM					
	V95X8439XA	JET R4R DESELECT	RCS RM					
	V95X8440XA	JET R4U DESELECT	RCS RM					
	V95X8441XA	JET R4D DESELECT	RCS RM					
	V95X8442XA	JET R5D DESELECT	RCS RM					
	V95X8443XA	JET R5R DESELECT	RCS RM					
	V95X8450X	JET F1F INHIBIT	RCS RM					
	V95X8451X	JET F1L INHIBIT	RCS RM					
	V95X8452X	JET F1U INHIBIT	RCS RM					
	V95X8453X	JET F1D INHIBIT	RCS RM					
	V95X8454X	JET F2F INHIBIT	RCS RM					
	V95X8455X	JET F2R INHIBIT	RCS RM					
	V95X8456X	JET F2U INHIBIT	RCS RM					
	V95X8457X	JET F2D INHIBIT	RCS RM					
	V95X8458X	JET F3F INHIBIT	RCS RM					
	V95X8459X	JET F3L INHIBIT	RCS RM					
	V95X8460X	JET F3U INHIBIT	RCS RM					
	V95X8461X	JET F3D INHIBIT	RCS RM					
	V95X8462X	JET F4R INHIBIT	RCS RM					
	V95X8463X	JET F4D INHIBIT	RCS RM					
	V95X8464X	JET F5L INHIBIT	RCS RM					
	V95X8465X	JET F5R INHIBIT	RCS RM					
	V95X8466X	JET L1A INHIBIT	RCS RM					
	V95X8467X	JET L1L INHIBIT	RCS RM					
	V95X8468X	JET L1U INHIBIT	RCS RM					
	V95X8469X	JET L2L INHIBIT	RCS RM					
	V95X8470X	JET L2U INHIBIT	RCS RM					
	V95X8471X	JET L2D INHIBIT	RCS RM					
	V95X8472X	JET L3A INHIBIT	RCS RM					
	V95X8473X	JET L3L INHIBIT	RCS RM					
	V95X8474X	JET L3D INHIBIT	RCS RM					
	V95X8475X	JET L4L INHIBIT	RCS RM					
	V95X8476X	JET L4U INHIBIT	RCS RM					
	V95X8477X	JET L4D INHIBIT	RCS RM					
	V95X8478X	JET L5D INHIBIT	RCS RM					
	V95X8479X	JET L5L INHIBIT	RCS RM					
	V95X8480X	JET R1A INHIBIT	RCS RM					
	V95X8481X	JET R1R INHIBIT	RCS RM					
	V95X8482X	JET R1U INHIBIT	RCS RM					

TABLE B.5.16-6. OUTPUT FUNCTIONAL PARAMETERS FROM RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V95X8483X	JET R2R INHIBIT	RCS RM					
	V95X8484X	JET R2U INHIBIT	RCS RM					
	V95X8485X	JET R2D INHIBIT	RCS RM					
	V95X8486X	JET R3A INHIBIT	RCS RM					
	V95X8487X	JET R3R INHIBIT	RCS RM					
	V95X8488X	JET R3D INHIBIT	RCS RM					
	V95X8489X	JET R4R INHIBIT	RCS RM					
	V95X8490X	JET R4U INHIBIT	RCS RM					
	V95X8491X	JET R4D INHIBIT	RCS RM					
	V95X8492X	JET R5D INHIBIT	RCS RM					
	V95X8493X	JET R5R INHIBIT	RCS RM					
	V95X8500X	SEL JET 1 AVAIL FLAG	RM RCS DISP		BD			
	V95X8501X	SEL JET 2 AVAIL FLAG	RM RCS DISP		BD			
	V95X8502X	SEL JET 3 AVAIL FLAG	RM RCS DISP		BD			
	V95X8503X	SEL JET 4 AVAIL FLAG	RM RCS DISP		BD			
	V95X8504X	SEL JET 5 AVAIL FLAG	RM RCS DISP		BD			
	V95X8505X	SEL JET 6 AVAIL FLAG	RM RCS DISP		BD			
	V95X8506X	SEL JET 7 AVAIL FLAG	RM RCS DISP		BD			
	V95X8507X	SEL JET 8 AVAIL FLAG	RM RCS DISP		BD			
	V95X8508X	SEL JET 9 AVAIL FLAG	RM RCS DISP		BD			
	V95X8509X	SEL JET 10 AVAIL FLAG	RM RCS DISP		BD			
	V95X8510X	SEL JET 11 AVAIL FLAG	RM RCS DISP		BD			
	V95X8511X	SEL JET 12 AVAIL FLAG	RM RCS DISP		BD			
	V95X8512X	SEL JET 13 AVAIL FLAG	RM RCS DISP		BD			
	V95X8513X	SEL JET 14 AVAIL FLAG	RM RCS DISP		BD			
	V95X8514X	SEL JET 15 AVAIL FLAG	RM RCS DISP		BD			
	V95X8515X	SEL JET 16 AVAIL FLAG	RM RCS DISP		BD			
	V95X8525X	SEL JET 1 RM INH FLAG	RM RCS DISP		BD			
	V95X8526X	SEL JET 2 RM INH FLAG	RM RCS DISP		BD			
	V95X8527X	SEL JET 3 RM INH FLAG	RM RCS DISP		BD			
	V95X8528X	SEL JET 4 RM INH FLAG	RM RCS DISP		BD			
	V95X8529X	SEL JET 5 RM INH FLAG	RM RCS DISP		BD			
	V95X8530X	SEL JET 6 RM INH FLAG	RM RCS DISP		BD			
	V95X8531X	SEL JET 7 RM INH FLAG	RM RCS DISP		BD			
	V95X8532X	SEL JET 8 RM INH FLAG	RM RCS DISP		BD			
	V95X8533X	SEL JET 9 RM INH FLAG	RM RCS DISP		BD			
	V95X8534X	SEL JET 10 RM INH FLAG	RM RCS DISP		BD			
	V95X8535X	SEL JET 11 RM INH FLAG	RM RCS DISP		BD			
	V95X8536X	SEL JET 12 RM INH FLAG	RM RCS DISP		BD			
	V95X8537X	SEL JET 13 RM INH FLAG	RM RCS DISP		BD			
	V95X8538X	SEL JET 14 RM INH FLAG	RM RCS DISP		BD			
	V95X8539X	SEL JET 15 RM INH FLAG	RM RCS DISP		BD			
	V95X8540X	SEL JET 16 RM INH FLAG	RM RCS DISP		BD			
	V95X8570X	SELECTED JET 1 ON/LK/OFF FLAG	RM RCS DISP					
	V95X8571X	SELECTED JET 2 ON/LK/OFF FLAG	RM RCS DISP					
	V95X8572X	SELECTED JET 3 ON/LK/OFF FLAG	RM RCS DISP					



TABLE B.5.16-6. OUTPUT FUNCTIONAL PARAMETERS FROM RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V95X8573X	SELECTED JET 4 ON/LK/OFF FLAG	RM RCS DISP					
	V95X8574X	SELECTED JET 5 ON/LK/OFF FLAG	RM RCS DISP					
	V95X8575X	SELECTED JET 6 ON/LK/OFF FLAG	RM RCS DISP					
	V95X8576X	SELECTED JET 7 ON/LK/OFF FLAG	RM RCS DISP					
	V95X8577X	SELECTED JET 8 ON/LK/OFF FLAG	RM RCS DISP					
	V95X8578X	SELECTED JET 9 ON/LK/OFF FLAG	RM RCS DISP					
	V95X8579X	SELECTED JET 10 ON/LK/OFF FLAG	RM RCS DISP					
	V95X8580X	SELECTED JET 11 ON/LK/OFF FLAG	RM RCS DISP					
	V95X8581X	SELECTED JET 12 ON/LK/OFF FLAG	RM RCS DISP					
	V95X8582X	SELECTED JET 13 ON/LK/OFF FLAG	RM RCS DISP					
	V95X8583X	SELECTED JET 14 ON/LK/OFF FLAG	RM RCS DISP					
	V95X8584X	SELECTED JET 15 ON/LK/OFF FLAG	RM RCS DISP					
	V95X8585X	SELECTED JET 16 ON/LK/OFF FLAG	RM RCS DISP					
	V95X8747X	RCS MANF F1 OP/CL STAT OVRD	RCS RM					
	V95X8748X	RCS MANF F2 OP/CL STAT OVRD	RCS RM					
	V95X8749X	RCS MANF F3 OP/CL STAT OVRD	RCS RM					
	V95X8750X	RCS MANF F4 OP/CL STAT OVRD	RCS RM					
	V95X8751X	RCS MANF F5 OP/CL STAT OVRD	RCS RM					
	V95X8752X	RCS MANF L1 OP/CL STAT OVRD	RCS RM					
	V95X8753X	RCS MANF L2 OP/CL STAT OVRD	RCS RM					
	V95X8754X	RCS MANF L3 OP/CL STAT OVRD	RCS RM					
	V95X8755X	RCS MANF L4 OP/CL STAT OVRD	RCS RM					
	V95X8756X	RCS MANF L5 OP/CL STAT OVRD	RCS RM					
	V95X8757X	RCS MANF R1 OP/CL STAT OVRD	RCS RM					
	V95X8758X	RCS MANF R2 OP/CL STAT OVRD	RCS RM					
	V95X8759X	RCS MANF R3 OP/CL STAT OVRD	RCS RM					
	V95X8760X	RCS MANF R4 OP/CL STAT OVRD	RCS RM					
	V95X8761X	RCS MANF R5 OP/CL STAT OVRD	RCS RM					
	V95X8762X	SELECTED RCS MANF 1 OP/CL STATUS	RM RCS DISP		BD			
	V95X8763X	SELECTED RCS MANF 2 OP/CL STATUS	RM RCS DISP		BD			
	V95X8764X	SELECTED RCS MANF 3 OP/CL STATUS	RM RCS DISP		BD			
	V95X8765X	SELECTED RCS MANF 4 OP/CL STATUS	RM RCS DISP		BD			
	V95X8766X	SELECTED RCS MANF 5 OP/CL STATUS	RM RCS DISP		BD			
	V95X8775X	RCS RM JET FAIL RESET	RCS RM					

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
 (HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec

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TABLE B.5.16-7. RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.5.16-8. RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
RCS_AFT_TKTEMP_HI RCS AFT FU/OX TK TEMP HI LIMIT	V97U8756C	00	+1.00000	E+02 DEG F	F	S	P	G5.16	90450D	
RCS_FWD_TKTEMP_HI RCS FWD FU/OX TK TEMP HI LIMIT	V97U6873C	00	+9.00000	E+01 DEG F	F	S	P	G5.16	90450D	
RCS_HETKP_LO RCS FU/OX HE TK PRESS LO LIMIT	V97U6864C	00	+5.00000	E+02 LBS/IN**2 ABS	F	S	C	G4.110 G5.16	79967G	
RCS_HETKP_SF RCS FU/OX HE TK PRESS SCALE FACTOR	V97U6865C	00	+8.00000	E+02 (LBS/IN**2)/VDC	F	S	C	G4.110 G5.16	79967G	
RCS_MANFP_SF RCS FU/OX MANIF P 1/2, 3/4/5 SF	V97U6869C	00	+2.00000	E+02 (LBS/IN**2)/VDC	F	S	A	G4.110 G5.16	79967G	
RCS_OMSXFDF_SF	V97U6880C	00	+2.00	E+02 (LBS/IN**2)/VDC	F	S	P	G5.16	89161A	
RCS_OUTP_HI RCS FU/OX TK OUT PRESS HI LIMIT	V97U6870C	00	+3.0	E+02 LBS/IN**2 ABS	F	S	P	G4.110 G5.16	79967G	
RCS_OUTP_LO RCS FU/OX TK OUT PRESS LO LIMIT	V97U6871C	00	+2.2	E+02 LBS/IN**2 ABS	F	S	P	G4.110 G5.16	79967G	
RCS_OUTP_SF RCS FU/OX TK OUT PRESS SC FACTOR	V97U6872C	00	+8.00000	E+01 (LBS/IN**2)/VDC	F	S	P	G4.110 G5.16	79967G	
RCS_TKTEMP_LO RCS FU/OX TK TEMP LO LIMIT	V97U6874C	00	+5.00000	E+01 DEG F	F	S	P	G5.16	90450D	
RCS_TKTEMP_SF RCS FU/OX TK TEMP SCALE FACTOR	V97U6875C	00	+3.20000	E+01 DEG F/VDC	F	S	P	G4.110 G5.16	79967G	
RCS_ULLP_HI RCS FU/OX TK ULLAGE PRESS HI LIMIT	V97U6876C	00	+3.12000	E+02 LBS/IN**2 ABS	F	S	C	G4.110 G5.16	79967G	
RCS_ULLP_LO RCS FU/OX TK ULLAGE PRESS LO LIMIT	V97U6877C	00	+2.00000	E+02 LBS/IN**2 ABS	F	S	C	G4.110 G5.16	79967G	
RCS_ULLP_SF RCS FU/OX TK ULL PRESS SC FACTOR	V97U6878C	00	+8.00000	E+01 (LBS/IN**2)/VDC	F	S	C	G4.110 G5.16	79967G	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE B.5.16-9. RM/RCS SPEC FUNCTION (REF DISP 6.7) (G5.16) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

### **B.5.19 RM ORBIT DISPLAY PROCESSING (PFS)**

The RM Orbit specialist function supports the processing of RHC and THC parameters displayed on the RM Orbit and RM controllers displays. The description of the format of the RM Orbit display (OPS 2) and the RM controllers display (OPS 8) is contained in Vol. 1 of the Level C D&C FSSR.

The K-Load constant parameters required by RM/ORB SPEC are defined in Table B.5.19-8. The processing required to support the display is described in the following paragraphs.

#### **B.5.19.1 RHC Transducer Data Conversion.**

This function shall display the converted (VDC to PCT) data for the forward, left and right – roll 1, roll 2, roll 3, pitch 1, pitch 2, pitch 3, yaw 1, yaw 2, and yaw 3 axis. The RHC transducer input signal is in fixed point format representing the dc voltage output of the transducer. The RHC output signal to the display is in floating point format representing percent of full scale output. The output signal is limited to 99 percent. The general equation is:

$$\text{OUTPUT} = A * B$$

where A = transducer signal (VDC)  
B = conversion scale factor (PCT/VDC)  
= 100/Full Scale Transducer Voltage

Note: The output is limited to + 99%.

#### **B.5.19.2 RHC Status Processing.**

This function shall compute the RHC status indicators associated with the RHC inputs defined above. The status shall reflect the following types of information.

RM failure – indicate the automatic FDIR’s opinion of equipment failures on an LRU basis.

Communication fault – indicates whether valid updates of input parameters were performed by FCOS on a component basis.

Disagree – indicates failures between pairs of input parameters on a component basis.

The display status indicators associated with the RHC transducer axes defined above shall be generated. These indicators shall be determined as follows:

O U T P U T	AFT RHC “X” “Y” DISPLAY STATUS INDICATOR	M	↓	?	(BLANK)
I N P U T S	AFT RHC “X” “Y” COMMFAULT	FAULT	GOOD —(and)—	GOOD —(and)—	GOOD —(and)—
	AFT RHC “Y” FAIL	---	FAIL —(or)—	GOOD —(and)—	GOOD —(and)—
	AFT RHC “Y” DESELECT	---	DESELECT	SELECT —(and)—	SELECT —(and)—
	AFT RHC “X” “Y” DISAGREE	---	---	DISAGREE	AGREE

where “X” = roll, pitch, yaw  
“Y” = 1, 2, 3

for Left RHC – Substitute left for AFT and process as defined above.  
Right RHC – Substitute right for AFT and process as defined above.

**B.5.19.3 THC Status Processing.**

This function will compute the THC status. The status will reflect communication faults, RM failures, and RM disagrees. The status indicators for the X, Y, and Z axes associated with the forward and aft THC LRU's shall be computed. The status for the forward THC X axis shall be computed as follows:

O U T P U T	F THC "I" Display Status IND	M	↓	?	(blank)
I N P U T S	F THC +X "I" COMMFAULT	Fault —(or)—	Good —(and)—	Good —(and)—	Good —(and)—
	F THC -X "I" COMMFAULT	Fault	Good and	Good and	Good and
	F THC +X "I" Fail	---	Fail —(or)—	Good —(and)—	Good —(and)—
	F THC -X "I" Fail	---	Fail —(or)—	Good —(and)—	Good —(and)—
	F THC "I" Desel.	---	Desel.	Select	Select
	F THC +X Disagree	---	---	Disagree —(or)—	agree —(and)—
	F THC -X Disagree	---	---	Disagree	agree

where "I" = 1, 2, 3

- |         |   |        |   |
|---------|---|--------|---|
| For FWD | Y | Axis - | Substitute Y for X and process as defined above.          |
| FWD     | Z | Axis - | Substitute Z for X and process as defined above.          |
| AFT     | X | Axis - | Substitute A for F and process as defined above.          |
| AFT     | Y | Axis - | Substitute A for F, Y for X and process as defined above. |
| AFT     | Z | Axis - | Substitute A for F, Z for X and process as defined above. |



**B.5.19.4 RM Orbit Display Interface Support Functions**

Table B.5.19-5 Input Functional Parameters

Table B.5.19-6 Output Functional Parameters

Table B.5.19-7 I-Loads

Table B.5.19-8 K-Loads

Table B.5.19-9 Constants

TABLE B.5.19-5. INPUT FUNCTIONAL PARAMETERS FOR RM/ORBIT SPEC FUNCTION (REF DISP 6.45) (G5.19)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
DACC(1)	V72K1155C	LH RHC ROLL CMD-A	RHC 1	VDC	AMB		93017G	*
DACC(2)	V72K1170C	LH RHC ROLL CMD-B	RHC 1	VDC	AMB		93017G	*
DACC(3)	V72K1185C	LH RHC ROLL CMD-C	RHC 1	VDC	AMB		93017G	*
DACP(1)	V72K1205C	RH RHC ROLL CMD-A	RHC 2	VDC	AMB		93017G	*
DACP(2)	V72K1220C	RH RHC ROLL CMD-B	RHC 2	VDC	AMB		93017G	*
DACP(3)	V72K1235C	RH RHC ROLL CMD-C	RHC 2	VDC	AMB		93017G	*
DECC(1)	V72K1156C	LH RHC PITCH CMD-A	RHC 1	VDC	AMB		93017G	*
DECC(2)	V72K1171C	LH RHC PITCH CMD-B	RHC 1	VDC	AMB		93017G	*
DECC(3)	V72K1186C	LH RHC PITCH CMD-C	RHC 1	VDC	AMB		93017G	*
DECP(1)	V72K1206C	RH RHC PITCH CMD-A	RHC 2	VDC	AMB		93017G	*
DECP(2)	V72K1221C	RH RHC PITCH CMD-B	RHC 2	VDC	AMB		93017G	*
DECP(3)	V72K1236C	RH RHC PITCH CMD-C	RHC 2	VDC	AMB		93017G	*
FAILLHRHC1	V90X6201X	LEFT RHC 1 FAIL	RHC FDIR		BD		93017G	*
FAILLHRHC2	V90X6231X	LEFT RHC 2 FAIL	RHC FDIR		BD		93017G	*
FAILLHRHC3	V90X6261X	LEFT RHC 3 FAIL	RHC FDIR		BD		93017G	*
FAILRHRHC1	V90X6301X	RIGHT RHC 1 FAIL	RHC FDIR		BD		93017G	*
FAILRHRHC2	V90X6331X	RIGHT RHC 2 FAIL	RHC FDIR		BD		93017G	*
FAILRHRHC3	V90X6361X	RIGHT RHC 3 FAIL	RHC FDIR		BD		93017G	*
LRHCP_CF(1)	V91X6525X	LH RHC PITCH CMD A COMMFault	FCOS					
LRHCP_CF(2)	V91X6526X	LH RHC PITCH CMD B COMMFault	FCOS					
LRHCP_CF(3)	V91X6527X	LH RHC PITCH CMD C COMMFault	FCOS					
LRHCR_CF(1)	V91X6500X	LH RHC ROLL CMD A COMMFault	FCOS					
LRHCR_CF(2)	V91X6501X	LH RHC ROLL CMD B COMMFault	FCOS					
LRHCR_CF(3)	V91X6502X	LH RHC ROLL CMD C COMMFault	FCOS					
LRHCY_CF(1)	V91X6540X	LH RHC YAW CMD A COMMFault	FCOS					
LRHCY_CF(2)	V91X6541X	LH RHC YAW CMD B COMMFault	FCOS					
LRHCY_CF(3)	V91X6542X	LH RHC YAW CMD C COMMFault	FCOS					
RRHCP_CF(1)	V91X6575X	RH RHC PITCH CMD A COMMFault	FCOS					
RRHCP_CF(2)	V91X6576X	RH RHC PITCH CMD B COMMFault	FCOS					
RRHCP_CF(3)	V91X6577X	RH RHC PITCH CMD C COMMFault	FCOS					
RRHCR_CF(1)	V91X6550X	RH RHC ROLL CMD A COMMFault	FCOS					
RRHCR_CF(2)	V91X6551X	RH RHC ROLL CMD B COMMFault	FCOS					
RRHCR_CF(3)	V91X6552X	RH RHC ROLL CMD C COMMFault	FCOS					
RRHCY_CF(1)	V91X6590X	RH RHC YAW CMD A COMMFault	FCOS					
RRHCY_CF(2)	V91X6591X	RH RHC YAW CMD B COMMFault	FCOS					
RRHCY_CF(3)	V91X6592X	RH RHC YAW CMD C COMMFault	FCOS					
	V72K1157C	LH RHC YAW CMD-A	RHC 1	VDC	AMB		93017G	*
	V72K1172C	LH RHC YAW CMD-B	RHC 1	VDC	AMB		93017G	*
	V72K1187C	LH RHC YAW CMD-C	RHC 1	VDC	AMB		93017G	*
	V72K1207C	RH RHC YAW CMD-A	RHC 2	VDC	AMB		93017G	*
	V72K1222C	RH RHC YAW CMD-B	RHC 2	VDC	AMB		93017G	*
	V72K1237C	RH RHC YAW CMD-C	RHC 2	VDC	AMB		93017G	*
	V72K1245C	AFT RHC ROLL CMD-A	RHC AFT	VDC	AMB		93017G	*
	V72K1246C	AFT RHC PITCH CMD-A	RHC AFT	VDC	AMB		93017G	*
	V72K1247C	AFT RHC YAW CMD-A	RHC AFT	VDC	AMB		93017G	*
	V72K1255C	AFT RHC ROLL CMD-B	RHC AFT	VDC	AMB		93017G	*

TABLE B.5.19-5. INPUT FUNCTIONAL PARAMETERS FOR RM/ORBIT SPEC FUNCTION (REF DISP 6.45) (G5.19)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V72K1256C	AFT RHC PITCH CMD-B	RHC AFT	VDC	AMB		93017G	*
	V72K1257C	AFT RHC YAW CMD-B	RHC AFT	VDC	AMB		93017G	*
	V72K1265C	AFT RHC ROLL CMD-C	RHC AFT	VDC	AMB		93017G	*
	V72K1266C	AFT RHC PITCH CMD-C	RHC AFT	VDC	AMB		93017G	*
	V72K1267C	AFT RHC YAW CMD-C	RHC AFT	VDC	AMB		93017G	*
	V90X6005X	LEFT RHC ROLL DISAGREE	RHC FDIR					
	V90X6035X	LEFT RHC PITCH DISAGREE	RHC FDIR					
	V90X6065X	LEFT RHC YAW DISAGREE	RHC FDIR					
	V90X6105X	RIGHT RHC ROLL DISAGREE	RHC FDIR					
	V90X6135X	RIGHT RHC PITCH DISAGREE	RHC FDIR					
	V90X6165X	RIGHT RHC YAW DISAGREE	RHC FDIR					
	V90X6205X	AFT RHC ROLL DISAGREE	RHC FDIR					
	V90X6235X	AFT RHC PITCH DISAGREE	RHC FDIR		BD		93017G	*
	V90X6265X	AFT RHC YAW DISAGREE	RHC FDIR					
	V90X6362X	AFT RHC 1 FAIL	RHC FDIR					
	V90X6363X	AFT RHC 2 FAIL	RHC FDIR					
	V90X6364X	AFT RHC 3 FAIL	RHC FDIR					
	V90X7790X	AFT THC NEG X OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7791X	AFT THC NEG Y OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7792X	AFT THC NEG Z OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7793X	AFT THC NEG X OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7794X	AFT THC NEG Y OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7795X	AFT THC NEG Z OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7796X	AFT THC NEG X OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7797X	AFT THC NEG Y OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7798X	AFT THC NEG Z OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7799X	AFT THC POS X OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7800X	AFT THC POS Y OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7801X	AFT THC POS Z OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7802X	AFT THC POS X OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7803X	AFT THC POS Y OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7804X	AFT THC POS Z OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7805X	AFT THC POS X OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7806X	AFT THC POS Y OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7807X	AFT THC POS Z OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7820X	FWD THC NEG X OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7821X	FWD THC NEG Y OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7822X	FWD THC NEG Z OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7823X	FWD THC NEG X OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7824X	FWD THC NEG Y OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7825X	FWD THC NEG Z OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
	V90X7826X	FWD THC NEG X OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7827X	FWD THC NEG Y OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7828X	FWD THC NEG Z OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
	V90X7829X	FWD THC POS X OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
	V90X7830X	FWD THC POS Y OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*

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TABLE B.5.19-5. INPUT FUNCTIONAL PARAMETERS FOR RM/ORBIT SPEC FUNCTION (REF DISP 6.45) (G5.19)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
V90X7831X		FWD THC POS Z OUTPUT-A FAIL	GN&C SW RM		BD		93017G	*
V90X7832X		FWD THC POS X OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
V90X7833X		FWD THC POS Y OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
V90X7834X		FWD THC POS Z OUTPUT-B FAIL	GN&C SW RM		BD		93017G	*
V90X7835X		FWD THC POS X OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
V90X7836X		FWD THC POS Y OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
V90X7837X		FWD THC POS Z OUTPUT-C FAIL	GN&C SW RM		BD		93017G	*
V90X7891X		AFT THC NEG X OUTPUT-DIS	GN&C SW RM		GN&C SW RM			
V90X7892X		AFT THC NEG Y OUTPUT-DIS	GN&C SW RM		GN&C SW RM			
V90X7893X		AFT THC NEG Z OUTPUT-DIS	GN&C SW RM		GN&C SW RM			
V90X7894X		AFT THC POS X OUTPUT-DIS	GN&C SW RM		GN&C SW RM			
V90X7895X		AFT THC POS Y OUTPUT-DIS	GN&C SW RM		GN&C SW RM			
V90X7896X		AFT THC POS Z OUTPUT-DIS	GN&C SW RM		GN&C SW RM			
V90X8128X		FWD THC NEG X OUTPUT-DIS	GN&C SW RM		GN&C SW RM			
V90X8129X		FWD THC NEG Y OUTPUT-DIS	GN&C SW RM		GN&C SW RM			
V90X8130X		FWD THC NEG Z OUTPUT-DIS	GN&C SW RM		GN&C SW RM			
V90X8131X		FWD THC POS X OUTPUT-DIS	GN&C SW RM		GN&C SW RM			
V90X8132X		FWD THC POS Y OUTPUT-DIS	GN&C SW RM		GN&C SW RM			
V90X8133X		FWD THC POS Z OUTPUT-DIS	GN&C SW RM		GN&C SW RM			
V91X6600X		AFT THC POS X OUTPUT-A COMMFAULT	FCOS		FCOS			
V91X6601X		AFT THC POS Y OUTPUT-A COMMFAULT	FCOS		FCOS			
V91X6602X		AFT THC POS Z OUTPUT-A COMMFAULT	FCOS		FCOS			
V91X6604X		AFT THC POS X OUTPUT-B COMMFAULT	FCOS		FCOS			
V91X6605X		AFT THC POS Y OUTPUT-B COMMFAULT	FCOS		FCOS			
V91X6606X		AFT THC POS Z OUTPUT-B COMMFAULT	FCOS		FCOS			
V91X6608X		AFT THC POS X OUTPUT-C COMMFAULT	FCOS		FCOS			
V91X6609X		AFT THC POS Y OUTPUT-C COMMFAULT	FCOS		FCOS			
V91X6610X		AFT THC POS Z OUTPUT-C COMMFAULT	FCOS		FCOS			
V91X6615X		AFT THC NEG X OUTPUT-A COMMFAULT	FCOS		FCOS			
V91X6616X		AFT THC NEG Y OUTPUT-A COMMFAULT	FCOS		FCOS			
V91X6617X		AFT THC NEG Z OUTPUT-A COMMFAULT	FCOS		FCOS			
V91X6619X		AFT THC NEG X OUTPUT-B COMMFAULT	FCOS		FCOS			
V91X6620X		AFT THC NEG Y OUTPUT-B COMMFAULT	FCOS		FCOS			
V91X6621X		AFT THC NEG Z OUTPUT-B COMMFAULT	FCOS		FCOS			
V91X6623X		AFT THC NEG X OUTPUT-C COMMFAULT	FCOS		FCOS			
V91X6624X		AFT THC NEG Y OUTPUT-C COMMFAULT	FCOS		FCOS			
V91X6625X		AFT THC NEG Z OUTPUT-C COMMFAULT	FCOS		FCOS			
V91X6644X		FWD THC NEG X OUTPUT-A COMMFAULT	FCOS		FCOS			
V91X6645X		FWD THC NEG Y OUTPUT-A COMMFAULT	FCOS		FCOS			
V91X6646X		FWD THC NEG Z OUTPUT-A COMMFAULT	FCOS		FCOS			
V91X6647X		FWD THC NEG X OUTPUT-B COMMFAULT	FCOS		FCOS			
V91X6648X		FWD THC NEG Y OUTPUT-B COMMFAULT	FCOS		FCOS			
V91X6649X		FWD THC NEG Z OUTPUT-B COMMFAULT	FCOS		FCOS			
V91X6650X		FWD THC NEG X OUTPUT-C COMMFAULT	FCOS		FCOS			
V91X6651X		FWD THC NEG Y OUTPUT-C COMMFAULT	FCOS		FCOS			
V91X6652X		FWD THC NEG Z OUTPUT-C COMMFAULT	FCOS		FCOS			

TABLE B.5.19-5. INPUT FUNCTIONAL PARAMETERS FOR RM/ORBIT SPEC FUNCTION (REF DISP 6.45) (G5.19)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V91X6653X	FWD THC POS X OUTPUT-A COMMFault	FCOS					
	V91X6654X	FWD THC POS Y OUTPUT-A COMMFault	FCOS					
	V91X6655X	FWD THC POS Z OUTPUT-A COMMFault	FCOS					
	V91X6656X	FWD THC POS X OUTPUT-B COMMFault	FCOS					
	V91X6657X	FWD THC POS Y OUTPUT-B COMMFault	FCOS					
	V91X6658X	FWD THC POS Z OUTPUT-B COMMFault	FCOS					
	V91X6659X	FWD THC POS X OUTPUT-C COMMFault	FCOS					
	V91X6660X	FWD THC POS Y OUTPUT-C COMMFault	FCOS					
	V91X6661X	FWD THC POS Z OUTPUT-C COMMFault	FCOS					
	V91X7772X	AFT RHC YAW CMD-A COMMFault	FCOS					
	V91X7778X	AFT RHC PITCH CMD-B COMMFault	FCOS					
	V91X7780X	AFT RHC YAW CMD-B COMMFault	FCOS					
	V91X7782X	AFT RHC PITCH CMD-A COMMFault	FCOS					
	V91X7783X	AFT RHC ROLL CMD-B COMMFault	FCOS					
	V91X7784X	AFT RHC PITCH CMD-C COMMFault	FCOS					
	V91X7788X	AFT RHC ROLL CMD-C COMMFault	FCOS					
	V91X7791X	AFT RHC YAW CMD-C COMMFault	FCOS					
	V91X7792X	AFT RHC ROLL CMD-A COMMFault	FCOS					
	V93X4201XA	LH RHC 1 DES CMD	RM ORB DISP				93017G	*
	V93X4201XB	LH RHC 1 DES CMD	RM/CNTLR DISP				93017G	*
	V93X4203XA	LH RHC 2 DES CMD	RM ORB DISP				93017G	*
	V93X4203XB	LH RHC 2 DES CMD	RM/CNTLR DISP				93017G	*
	V93X4205XA	LH RHC 3 DES CMD	RM ORB DISP				93017G	*
	V93X4205XB	LH RHC 3 DES CMD	RM/CNTLR DISP				93017G	*
	V93X4207XA	FWD THC X,Y,Z OUT DES A	RM ORB DISP				93017G	*
	V93X4207XB	FWD THC X,Y,Z OUT DES A	RM/CNTLR DISP				93017G	*
	V93X4208XA	FWD THC X,Y,Z OUT DES B	RM ORB DISP				93017G	*
	V93X4208XB	FWD THC X,Y,Z OUT DES B	RM/CNTLR DISP				93017G	*
	V93X4209XA	FWD THC X,Y,Z OUT DES C	RM ORB DISP				93017G	*
	V93X4209XB	FWD THC X,Y,Z OUT DES C	RM/CNTLR DISP				93017G	*
	V93X4231XA	RH RHC 1 DES CMD	RM ORB DISP				93017G	*
	V93X4231XB	RH RHC 1 DES CMD	RM/CNTLR DISP				93017G	*
	V93X4233XA	RH RHC 2 DES CMD	RM ORB DISP				93017G	*
	V93X4233XB	RH RHC 2 DES CMD	RM/CNTLR DISP				93017G	*
	V93X4235XA	RH RHC 3 DES CMD	RM ORB DISP				93017G	*
	V93X4235XB	RH RHC 3 DES CMD	RM/CNTLR DISP				93017G	*
	V93X4237XA	AFT THC X,Y,Z OUT DES A	RM ORB DISP				93017G	*
	V93X4237XB	AFT THC X,Y,Z OUT DES A	RM/CNTLR DISP				93017G	*
	V93X4238XA	AFT THC X,Y,Z OUT DES B	RM ORB DISP				93017G	*
	V93X4238XB	AFT THC X,Y,Z OUT DES B	RM/CNTLR DISP				93017G	*
	V93X4239XA	AFT THC X,Y,Z OUT DES C	RM ORB DISP				93017G	*
	V93X4239XB	AFT THC X,Y,Z OUT DES C	RM/CNTLR DISP				93017G	*
	V93X4296XA	AFT RHC 1 DES CMD	RM ORB DISP				93017G	*
	V93X4296XB	AFT RHC 1 DES CMD	RM/CNTLR DISP				93017G	*
	V93X4297XA	AFT RHC 2 DES CMD	RM ORB DISP				93017G	*
	V93X4297XB	AFT RHC 2 DES CMD	RM/CNTLR DISP				93017G	*

TABLE B.5.19-5. INPUT FUNCTIONAL PARAMETERS FOR RM/ORBIT SPEC FUNCTION (REF DISP 6.45) (G5.19)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V93X4298XA	AFT RHC 3 DES CMD	RM ORB DISP				93017G	*
	V93X4298XB	AFT RHC 3 DES CMD	RM/CNTLR DISP				93017G	*

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.5.19-6. OUTPUT FUNCTIONAL PARAMETERS FROM RM/ORBIT SPEC FUNCTION (REF DISP 6.45) (G5.19)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V95H7683C	RH RHC 1 PITCH CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7684C	RH RHC 2 PITCH CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7685C	RH RHC 3 PITCH CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7686C	RH RHC 1 ROLL CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7687C	RH RHC 2 ROLL CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7688C	RH RHC 3 ROLL CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7702C	LH RHC 1 PITCH CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7703C	LH RHC 2 PITCH CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7704C	LH RHC 3 PITCH CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7705C	LH RHC 1 ROLL CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7706C	LH RHC 2 ROLL CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7707C	LH RHC 3 ROLL CMD	RM ORB DISP RM/CNTLR DISP	PCT	VAR			
	V95H7712C	LH RHC 1 YAW CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7713C	LH RHC 2 YAW CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7714C	LH RHC 3 YAW CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7715C	RH RHC 1 YAW CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7716C	RH RHC 2 YAW CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7717C	RH RHC 3 YAW CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7719C	AFT RHC 1 PITCH CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7720C	AFT RHC 2 PITCH CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7721C	AFT RHC 3 PITCH CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7722C	AFT RHC 1 YAW CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			
	V95H7723C	AFT RHC 2 YAW CMD	RM ORB DISP RM/CNTLR DISP	PCT	BSS			

TABLE B.5.19-6. OUTPUT FUNCTIONAL PARAMETERS FROM RM/ORBIT SPEC FUNCTION (REF DISP 6.45) (G5.19)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V95H7724C	AFT RHC 3 YAW CMD	RM ORB DISP	PCT	BSS			
	V95H7725C	AFT RHC 1 ROLL CMD	RM/CNTLR DISP					
	V95H7726C	AFT RHC 2 ROLL CMD	RM ORB DISP	PCT	BSS			
	V95H7727C	AFT RHC 3 ROLL CMD	RM/CNTLR DISP					
	V95J7729C	FWD THC X CHANNEL 1 STATUS	RM ORB DISP		VAR			
	V95J7730C	FWD THC Y CHANNEL 1 STATUS	RM/CNTLR DISP					
	V95J7731C	FWD THC Z CHANNEL 1 STATUS	RM ORB DISP		VAR			
	V95J7732C	FWD THC X CHANNEL 2 STATUS	RM/CNTLR DISP					
	V95J7733C	FWD THC Y CHANNEL 2 STATUS	RM ORB DISP		VAR			
	V95J7734C	FWD THC Z CHANNEL 2 STATUS	RM/CNTLR DISP					
	V95J7735C	FWD THC X CHANNEL 3 STATUS	RM ORB DISP		VAR			
	V95J7736C	FWD THC Y CHANNEL 3 STATUS	RM/CNTLR DISP					
	V95J7737C	FWD THC Z CHANNEL 3 STATUS	RM ORB DISP		VAR			
	V95J7738C	AFT THC X CHANNEL 1 STATUS	RM/CNTLR DISP					
	V95J7739C	AFT THC Y CHANNEL 1 STATUS	RM ORB DISP		VAR			
	V95J7740C	AFT THC Z CHANNEL 1 STATUS	RM/CNTLR DISP					
	V95J7741C	AFT THC X CHANNEL 2 STATUS	RM ORB DISP		VAR			
	V95J7742C	AFT THC Y CHANNEL 2 STATUS	RM/CNTLR DISP					
	V95J7743C	AFT THC Z CHANNEL 2 STATUS	RM ORB DISP		VAR			
	V95J7744C	AFT THC X CHANNEL 3 STATUS	RM/CNTLR DISP					
	V95J7745C	AFT THC Y CHANNEL 3 STATUS	RM ORB DISP		VAR			
	V95J7746C	AFT THC Z CHANNEL 3 STATUS	RM/CNTLR DISP					
	V95J7747C	L RHC ROLL 1 STATUS	RM ORB DISP		VAR			
			RM/CNTLR DISP					



TABLE B.5.19-6. OUTPUT FUNCTIONAL PARAMETERS FROM RM/ORBIT SPEC FUNCTION (REF DISP 6.45) (G5.19)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V95J7748C	L RHC ROLL 2 STATUS	RM ORB DISP		VAR			
	V95J7749C	L RHC ROLL 3 STATUS	RM/CNTLR DISP		VAR			
	V95J7750C	L RHC PITCH 1 STATUS	RM ORB DISP		VAR			
	V95J7751C	L RHC PITCH 2 STATUS	RM/CNTLR DISP		VAR			
	V95J7752C	L RHC PITCH 3 STATUS	RM ORB DISP		VAR			
	V95J7753C	L RHC YAW 1 STATUS	RM/CNTLR DISP		VAR			
	V95J7754C	L RHC YAW 2 STATUS	RM ORB DISP		VAR			
	V95J7755C	L RHC YAW 3 STATUS	RM/CNTLR DISP		VAR			
	V95J7756C	R RHC ROLL 1 STATUS	RM ORB DISP		VAR			
	V95J7757C	R RHC ROLL 2 STATUS	RM/CNTLR DISP		VAR			
	V95J7758C	R RHC ROLL 3 STATUS	RM ORB DISP		VAR			
	V95J7759C	R RHC PITCH 1 STATUS	RM/CNTLR DISP		VAR			
	V95J7760C	R RHC PITCH 2 STATUS	RM ORB DISP		VAR			
	V95J7761C	R RHC PITCH 3 STATUS	RM/CNTLR DISP		VAR			
	V95J7762C	R RHC YAW 1 STATUS	RM ORB DISP		VAR			
	V95J7763C	R RHC YAW 2 STATUS	RM/CNTLR DISP		VAR			
	V95J7764C	R RHC YAW 3 STATUS	RM ORB DISP		VAR			
	V95J7765C	AFT RHC ROLL 1 STATUS	RM/CNTLR DISP		VAR			
	V95J7766C	AFT RHC ROLL 2 STATUS	RM ORB DISP		VAR			
	V95J7767C	AFT RHC ROLL 3 STATUS	RM/CNTLR DISP		VAR			
	V95J7768C	AFT RHC PITCH 1 STATUS	RM ORB DISP		VAR			
	V95J7769C	AFT RHC PITCH 2 STATUS	RM/CNTLR DISP		VAR			
	V95J7770C	AFT RHC PITCH 3 STATUS	RM ORB DISP		VAR			
			RM/CNTLR DISP					

TABLE B.5.19-6. OUTPUT FUNCTIONAL PARAMETERS FROM RM/ORBIT SPEC FUNCTION (REF DISP 6.45) (G5.19)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V95J7771C	AFT RHC YAW 1 STATUS	RM ORB DISP		VAR			
	V95J7772C	AFT RHC YAW 2 STATUS	RM/CNTRLR DISP		VAR			
	V95J7773C	AFT RHC YAW 3 STATUS	RM ORB DISP		VAR			
			RM/CNTRLR DISP					

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE B.5.19-7. RM/ORBIT SPEC FUNCTION (REF DISP 6.45) (G5.19) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.5.19-8. RM/ORBIT SPEC FUNCTION (REF DISP 6.45) (G5.19) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
B RM ORBIT-RHC SCALE FACTOR PCT/VDC	V97U6746C	00	+1.9569470	E+01	PCT/VDC	F	S	P G5.19	79967G	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.5.19-9. RM/ORBIT SPEC FUNCTION (REF DISP 6.45) (G5.19) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

### B.5.21 OVERRIDE SPECIALIST FUNCTION (PFS)

The override specialist function supports processing of requirements initiated outside of the override display. The description of the format of the override display is contained in Volume 1 section 4.2.31.

The I-Load values are defined in the STS Flight Software Initialization Load (JSC-19350) and in Table B.5.21-7.

#### B.5.21.1 ABORT SELECT PROCESSING

This function shall monitor the BACKUP TAL ABORT SEL, BACKUP ATO ABORT SEL, and BACKUP ABORT CMD discretes from the override display.

- If the BACKUP TAL ABORT SEL and the BACKUP ABORT CMD are set, the BACKUP TAL ABORT REQUEST will be set and sent to MSC.
- If the BACKUP ATO ABORT SEL and the BACKUP ABORT CMD are set, the BACKUP ATO ABORT REQUEST CMD is set and sent to MSC.

#### B.5.21.2 ORBITER OMS DUMP COMPUTATIONS AND PROCESSING

##### B.5.21.2.1 OMS DUMP COMPUTATIONS

Upon OPS 1 initialization, set V90W8325C (OMS DELTA T COMPUTED) equal to V99U9717C (MANUAL\_OMS\_DT) and set V93Q6280C (OMS\_DUMP\_QTY) equal to V90W8325C (OMS DELTA T COMPUTED) \* 0.14971 Pct/Sec. Upon transition to OPS 3, set V90W8325C (OMS DELTA T COMPUTED) equal to V99U9717C (MANUAL\_OMS\_DT). This function shall monitor the OMS DELTA T COMPUTED input from the ABORT CONTROL SEQUENCE (4.192).

The OMS Time-To-Go and OMS DUMP QTY shall be computed as follows:

$$V93W8202C (OMS\_TTG) = \frac{V90W8325C (OMS\ DELTA\ T\ COMPUTED) - V90W8320C (OMS\ EQUIVALENT\ ON\ TIME)}$$

$$V93Q6280C (OMS\_DUMP\_QTY) = V90W8325C (OMS\ DELTA\ T\ COMPUTED) * 0.14971\ Pct/Sec.$$

The OMS TIME SCALE FACTOR (V94J3755C) shall be initialized to 1. Thereafter, any changes to the initial value will be supplied by the ABORT CONTROL SEQUENCER (4.192).

If Override display Item 9 (V93Q6280C) is executed, OMS Time-To-Go shall be computed as follows:

$$V90W8325C (OMS\ DELTA\ T\ COMPUTED) = V93Q6280C (OMS\_DUMP\_QTY) * 6.6794\ Sec/Pct.$$

$$V93W8202C (OMS\_TTG) = V90W8325C (OMS\ DELTA\ T\ COMPUTED)$$

$$\text{In OPS 1/6, } V99U9717C (MANUAL\_OMS\_DT) = V90W8325C (OMS\ DELTA\ T\ COMPUTED)$$

### **B.5.21.2.2 OMS DUMP PROCESSING**

This function shall monitor the PRPLT DUMP ARM, PRPLT DUMP START and PRPLT DUMP STOP discretes resulting from item entries on the Override display. It shall also monitor the PRPLT DUMP ARM, PRPLT DUMP START, PRPLT DUMP STOP, and ORBITER DUMP ENABLE discretes which also may be set ON or OFF as a result of crew manual initiation of a contingency abort from the XXXXXX TRAJ 1 (6.52), XXXXXX TRAJ 2 (6.53), or RTLS TRAJ 2 (6.54) display.

- If the PRPLT DUMP ARM and PRPLT DUMP START discretes are set, the ORBITER DUMP ENABLE discrete shall be set, if not already set, and the ORBITER DUMP INHIBIT and PRPLT DUMP STOP discretes shall be reset.
- If the PRPLT DUMP STOP discrete is set, the ORBITER DUMP ENABLE discrete shall be reset and the ORBITER DUMP INHIBIT discrete shall be set.

This function shall monitor the ORBITER DUMP ENABLE discrete input from the ABORT CONTROL SEQUENCER. The ORBITER DUMP ENABLE can also be set ON by CONT 3E/O GUID.

- Whenever the ORBITER DUMP ENABLE discrete is reset by the ABT CNTL SEQ and the PRPLT DUMP START discrete is ON, the PRPLT DUMP ARM and PRPLT DUMP START discretes shall be reset, blanking the ARM and START \*'s on the Override Display.
- Whenever the ORBITER DUMP ENABLE discrete is set by CONT 3E/O GUID, the PRPLT DUMP STOP discrete shall be reset, blanking the STOP \* on the Override Display.

### **B.5.21.3 OVERRIDE Specialist Function Interface Support Functions**

Table B.5.21-5 Input Functional Parameters

Table B.5.21-6 Output Functional Parameters

Table B.5.21-7 I-Loads

Table B.5.21-8 K-Loads

Table B.5.21-9 Constants

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TABLE B.5.21-5. INPUT FUNCTIONAL PARAMETERS FOR OVERRIDE SPEC FUNCTION (REF DISP 6.47) (G5.21)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
AFT_RCS_DUMP_CNTR	V90W8229C	AFT RCS DUMP COUNTER	ABT CNTL SEQ	S			90114B	
AFT_RCS_TTG_SF	V94J3757CA	AFT RCS TIME SCALE FACTOR	E/L RCS CMD SOP				90114B	
FWD_RCS_DUMP_CNTR	V90W8228CA	FWD RCS DUMP COUNTER	E/L RCS CMD SOP	S				
FWD_RCS_DUMP_CNTR	V90W8228CB	FWD RCS DUMP COUNTER	ASC RCS CMD SOP	S				
FWD_RCS_TTG_SF	V94J3756CA	FWD RCS TIME SCALE FACTOR	E/L RCS CMD SOP					
FWD_RCS_TTG_SF	V94J3756CB	FWD RCS TIME SCALE FACTOR	ASC RCS CMD SOP					
MANUAL_OMS_DT	V99U9717C	MANUAL OMS DUMP TIMER	UL	S	SPL	S	92175D	
MECO_CMD	V90X8569XA	MECO COMMAND FLAG	SSME OPS		BD		93017G	*
OMS_DUMP_QTY	V93Q6280CA	OMS DUMP QUANTITY PERCENT PER POD	OVERRIDE DISP	PCT			90114B	
OMS_L_ON_CMD_IND	V90X8271X	OMS-L ON CMD IND	OMS FIRE SEQ				90120B	
OMS_R_ON_CMD_IND	V90X8272X	OMS-R ON CMD IND	OMS FIRE SEQ				90120B	
ORBITER_DUMP_ENA	V93X6980XC	ORBITER DUMP ENABLE	CONT 3E/O GUID		BD		90964	
ORBITER_DUMP_ENA	V93X6980XD	ORBITER DUMP ENABLE	XXXXXX TRAJ 1 DISP				93012D	
ORBITER_DUMP_ENA	V93X6980XE	ORBITER DUMP ENABLE	XXXXXX TRAJ 2 DISP				93012D	
ORBITER_DUMP_ENA	V93X6980XF	ORBITER DUMP ENABLE	RTLS TRAJ 2 DISP				93012D	
PRPLT_DUMP_ARM	V93X5350XA	ORB PRPLNT DUMP ARM CMD	OVERRIDE DISP				89990E	
PRPLT_DUMP_ARM	V93X5350XC	ORB PRPLNT DUMP ARM CMD	XXXXXX TRAJ 1 DISP				93012D	
PRPLT_DUMP_ARM	V93X5350XD	ORB PRPLNT DUMP ARM CMD	XXXXXX TRAJ 2 DISP				93012D	
PRPLT_DUMP_ARM	V93X5350XE	ORB PRPLNT DUMP ARM CMD	RTLS TRAJ 2 DISP				93012D	
PRPLT_DUMP_START	V93X5351XA	ORB PRPLNT DUMP START CMD	OVERRIDE DISP				89990E	
PRPLT_DUMP_START	V93X5351XC	ORB PRPLNT DUMP START CMD	XXXXXX TRAJ 1 DISP				93012D	
PRPLT_DUMP_START	V93X5351XD	ORB PRPLNT DUMP START CMD	XXXXXX TRAJ 2 DISP				93012D	
PRPLT_DUMP_START	V93X5351XE	ORB PRPLNT DUMP START CMD	RTLS TRAJ 2 DISP				93012D	
PRPLT_DUMP_STOP	V93X5352XA	ORB PRPLNT DUMP STOP CMD	OVERRIDE DISP				89990E	
PRPLT_DUMP_STOP	V93X5352XC	ORB PRPLNT DUMP STOP CMD	XXXXXX TRAJ 1 DISP				93012D	
PRPLT_DUMP_STOP	V93X5352XD	ORB PRPLNT DUMP STOP CMD	XXXXXX TRAJ 2 DISP				93012D	
PRPLT_DUMP_STOP	V93X5352XE	ORB PRPLNT DUMP STOP CMD	RTLS TRAJ 2 DISP				93012D	
T1	V90W8320C	OMS EQUIVALENT ON TIME	ABT CNTL SEQ	S	SPL		93017G	*
	V90W8325CA	OMS DELTA T COMPUTED	ABT CNTL SEQ	S	SPL		93017G	*
	V93W6957C	FWD RCS DUMP DURATION	OVERRIDE DISP	S			92392C	
	V93W6958C	AFT RCS DUMP DURATION	OVERRIDE DISP	S			92392C	
	V93X5334X	BACKUP TAL ABORT SEL	OVERRIDE DISP		BD		89245D	
	V93X5335X	BACKUP ATO ABORT SEL	OVERRIDE DISP		BD			
	V93X5336X	BACKUP ABORT CMD	OVERRIDE DISP		BD			
	V93X5354X	NOMINAL ATMOSPHERE SELECT CMD	OVERRIDE DISP		BD			
	V93X5355X	NORTH POLAR ATMOSPHERE SELECT CMD	OVERRIDE DISP		BD			
	V93X5356X	SOUTH POLAR ATMOSPHERE SELECT CMD	OVERRIDE DISP		BD			
	V94J3755CA	OMS TIME SCALE FACTOR	ABT CNTL SEQ				90122E	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE B.5.21-6. OUTPUT FUNCTIONAL PARAMETERS FROM OVERRIDE SPEC FUNCTION (REF DISP 6.47) (G5.21)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
ATM_INDEX	V93J5353C	SELECTED ATMOSPHERE MODEL INDEX	DL FMT 23/1 ENT NAV		HXS		93017G	*
MANUAL_OMS_DT	V99U9717CA	MANUAL OMS DUMP TIMER	ABT CNTL SEQ CONT 3E/O GUID	S			92175D	
OMS_DUMP_QTY	V93Q6280CB	OMS DUMP QUANTITY PERCENT PER POD	OVERVERRIDE DISP	PCT			90114B	
OMS_TTG	V93W8202C	OMS TIME TO GO	OVERVERRIDE DISP	S			92392C	
ORBITER_DUMP_ENA	V93X6980XA	ORBITER DUMP ENABLE	ABT CNTL SEQ MSC				89449	
ORBITER_DUMP_INH	V93X6981XA	ORBITER DUMP INHIBIT	ABT CNTL SEQ MSC				89449	
PRPLT_DUMP_ARM	V93X5350XB	ORB PRPLNT DUMP ARM CMD	OVERVERRIDE DISP				89990E	
PRPLT_DUMP_START	V93X5351XB	ORB PRPLNT DUMP START CMD	OVERVERRIDE DISP				89990E	
PRPLT_DUMP_STOP	V93X5352XB	ORB PRPLNT DUMP STOP CMD	OVERVERRIDE DISP				89990E	
	V90W8325CB	OMS DELTA T COMPUTED	ABT CNTL SEQ ASC 2STG GUID	S	SPL		90122E	
	V93W8325CB	OMS DELTA T COMPUTED	ABT CNTL SEQ				90114B	
	V94J3755CB	OMS TIME SCALE FACTOR	ASC 2STG GUID				90122E	
	V94X7841X	BACKUP TAL ABORT REQUEST	MSC				89245D	
	V94X7842X	BACKUP ATO ABORT REQUEST	MSC					

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE B.5.21-7. OVERRIDE SPEC FUNCTION (REF DISP 6.47) (G5.21) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
MANUAL_OMS_DT	V99U9717C	SEC	F	S	M	C	G4.192 G4.6 G5.21 G6.47	00	QRP	90705H	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.5.21-8. OVERRIDE SPEC FUNCTION (REF DISP 6.47) (G5.21) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.5.21-9. OVERRIDE SPEC FUNCTION (REF DISP 6.47) (G5.21) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**B.5.22 DELETED**

**B.5.25 CONTROLS SPECIALIST FUNCTION (PFS)**

This function shall: generate the required commands and status data to perform an aerosurface secondary actuator check, and generate the status data for the AA, RGA, and SURF FDBK RM controls.

**B.5.25.1 SECONDARY ACTUATOR CHECK**

Upon detection of any secondary actuator channel select item entry and a secondary actuator check START item entry, the software shall issue a hardover command of the selected actuator channel to the appropriate aerosurfaces (LIE, LOE, RIE, ROE, RUD, and SPDBRK). This command shall be an I-Loaded delta from the current aerosurface positions and will cause the ports to bypass. Provisions will be made for allowing a different delta to be applied to the Elevons, Rudder and Speedbrake. The polarity of the delta to be applied will be selected by item entry. PORT status indicators for all appropriate aerosurfaces shall then be made available for display as follows: the output values shall be blank to indicate no bypass occurred, a down-arrow (↓) shall indicate a bypass and an 'M' shall indicate missing data. An item entry of 'STOP' shall cause any stimulus being applied to a selected actuator channel to be removed, the secondary actuator channel select item entry statuses to be blanked and the secondary actuator test to be terminated. An item entry of a different secondary actuator channel shall cause any stimulus being applied to a previously selected actuator channel to be removed and its secondary actuator channel item entry status and the START item entry status to be blanked as well as cause an '\*' to be displayed by the stop item entry status.

When a 'SEC ACT RESET' item is received, commands will be issued to reset the bypass discrete and to reset the bypassed secondary actuator channel based on the channel/actuator ID entries as defined in Table B.5.25.1-2.

**B.5.25.1.1 PORT STATUS INDICATORS**

The Port Status indicators will be generated as follows:

X Y i COMMFAULT	X Y ACTR i FAIL	STATUS
GOOD AND	GOOD	∅
FAULT AND	GOOD OR FAIL	M
GOOD AND	FAIL	↓

Where: AEROSURFACE  
 X = LOB, LIB, RIB, ROB, ∅  
 Y = ELEVON, RUDDER, SPDBRK  
 i = 1, 2, 3, 4

Where: SSME:  
 X = 1, 2, 3  
 Y = P, Y  
 i = A, B, C, D

The Port Status indicators shall be generated and made available to the display cyclically, at .5 HZ whenever the display is active. A down-arrow (↓) is displayed when hardware indicates failed regardless of RM Status.

NOTE: For the SSME actuators, the input parameters nomenclature use numbers to identify the SSME'S and alpha letters to identify the FCS channels. MPS ENG 1, 2, and 3 correspond to the C (Center), L (Left), and R (Right) SSME's, respectively; ACT/ A, B, C and D correspond to channels 1, 2, 3, and 4, respectively.

**B.5.25.2 RM STATUS**

This function shall generate the I/O status for the AA's and RGA's and the RM status, for the aerosurface, elevons and body flap, position feedback transducer strings at a rate of .5 HZ.

**B.5.25.2.1 AA I/O STATUS**

The AA I/O status shall be generated as follows.

AA i LATT ACCEL COMMFAULT	AA i NORM ACCEL COMMFAULT	I/O STATUS
GOOD AND	GOOD	∅
FAULT OR	FAULT	M

Where i = 1, 2, 3, 4

**B.5.25.2.2 RGA I/O STATUS**

RGA i Pitch COMMFAULT	RGA i Roll COMMFAULT	RGA i Yaw COMMFAULT	I/O STATUS
GOOD AND	GOOD AND	GOOD	∅
FAULT OR	FAULT OR	FAULT	M

Where i = 1, 2, 3, 4

**B.5.25.2.3 Aerosurface Position Feedback RM Status**

The RM Status of the Aerosurface Position feedback transducer strings shall be determined as follows:

X Y FDBK i COMMFAULT	X Y FDBK i FAIL	STATUS
GOOD AND	GOOD	∅
FAULT AND	GOOD OR FAIL	M
GOOD AND	FAIL	↓

Where

X = LOB, LIB, RIB, ROB, ∅

Y = ELEVON, BODY FLAP, RUDDER, SPDBRK

i = 1, 2, 3, 4

NOTE: Since FDIR for Elevon, Rudder, and Speedbrake position feedbacks is not present in MM101 through MM106 or MM601, the RM status in these Major Modes will reflect only body flap transducer status.



Table B.5.25.1-1. SECONDARY ACTUATOR SINGLE CHANNEL BYPASS COMMANDS

SEC ACT BYPASS ITEM 21 ENTRIES (V93X3973X)	AEROSURFACE ACTUATOR BYPASSED	BYPASS CMD SENT FROM 5.25
11	LOB ELEVON ACTR CH 1	V79K3231X (SET TO 1)
12	LOB ELEVON ACTR CH 2	V79K3233X (SET TO 1)
13	LOB ELEVON ACTR CH 3	V79K3235X (SET TO 1)
14	LOB ELEVON ACTR CH 4	V79K3237X (SET TO 1)
21	LIB ELEVON ACTR CH 1	V79K3221X (SET TO 1)
22	LIB ELEVON ACTR CH 2	V79K3223X (SET TO 1)
23	LIB ELEVON ACTR CH 3	V79K3225X (SET TO 1)
24	LIB ELEVON ACTR CH 4	V79K3227X (SET TO 1)
31	RIB ELEVON ACTR CH 1	V79K3241X (SET TO 1)
32	RIB ELEVON ACTR CH 2	V79K3243X (SET TO 1)
33	RIB ELEVON ACTR CH 3	V79K3245X (SET TO 1)
34	RIB ELEVON ACTR CH 4	V79K3247X (SET TO 1)
41	ROB ELEVON ACTR CH 1	V79K3251X (SET TO 1)
42	ROB ELEVON ACTR CH 2	V79K3253X (SET TO 1)
43	ROB ELEVON ACTR CH 3	V79K3255X (SET TO 1)
44	ROB ELEVON ACTR CH 4	V79K3257X (SET TO 1)
51	RUD ACTR CH 1	V79K3365X (SET TO 1)
52	RUD ACTR CH 2	V79K3366X (SET TO 1)
53	RUD ACTR CH 3	V79K3367X (SET TO 1)
54	RUB ACTR CH 4	V79K3368X (SET TO 1)
61	SPDBK ACTR CH 1	V79K3375X (SET TO 1)
62	SPDBK ACTR CH 2	V79K3376X (SET TO 1)
63	SPDBK ACTR CH 3	V79K3377X (SET TO 1)
64	SPDBK ACTR CH 4	V79K3378X (SET TO 1)

Table B.5.25.1-2. SECONDARY ACTUATOR SINGLE CHANNEL RESET COMMANDS

SEC ACT RESET ITEM 22 ENTRIES (V93X3974X)	AEROSURFACE ACTUATOR  RESET	COMMANDS SENT FROM	
		BYPASS RESET CMD	RESET CMD
11	LOB ELEVON ACTR CH 1	V79K3231X (SET TO 0)	V79K3230X (SET TO 1 MOMENTARILY)
12	LOB ELEVON ACTR CH 2	V79K3233X (SET TO 0)	V79K3232X (SET TO 1 MOMENTARILY)
13	LOB ELEVON ACTR CH 3	V79K3235X (SET TO 0)	V79K3234X (SET TO 1 MOMENTARILY)
14	LOB ELEVON ACTR CH 4	V79K3237X (SET TO 0)	V79K3236X (SET TO 1 MOMENTARILY)
21	LIB ELEVON ACTR CH 1	V79K3221X (SET TO 0)	V79K3220X (SET TO 1 MOMENTARILY)
22	LIB ELEVON ACTR CH 2	V79K3223X (SET TO 0)	V79K3222X (SET TO 1 MOMENTARILY)
23	LIB ELEVON ACTR CH 3	V79K3225X (SET TO 0)	V79K3224X (SET TO 1 MOMENTARILY)
24	LIB ELEVON ACTR CH 4	V79K3227X (SET TO 0)	V79K3226X (SET TO 1 MOMENTARILY)
31	RIB ELEVON ACTR CH 1	V79K3241X (SET TO 0)	V79K3240X (SET TO 1 MOMENTARILY)
32	RIB ELEVON ACTR CH 2	V79K3243X (SET TO 0)	V79K3242X (SET TO 1 MOMENTARILY)
33	RIB ELEVON ACTR CH 3	V79K3245X (SET TO 0)	V79K3244X (SET TO 1 MOMENTARILY)
34	RIB ELEVON ACTR CH 4	V79K3247X (SET TO 0)	V79K3246X (SET TO 1 MOMENTARILY)
41	ROB ELEVON ACTR CH 1	V79K3251X (SET TO 0)	V79K3250X (SET TO 1 MOMENTARILY)
42	ROB ELEVON ACTR CH 2	V79K3253X (SET TO 0)	V79K3252X (SET TO 1 MOMENTARILY)
43	ROB ELEVON ACTR CH 3	V79K3255X (SET TO 0)	V79K3254X (SET TO 1 MOMENTARILY)
44	ROB ELEVON ACTR CH 4	V79K3257X (SET TO 0)	V79K3256X (SET TO 1 MOMENTARILY)
51	RUD ACTR CH 1	V79K3365X (SET TO 0)	V79K3345X (SET TO 1 MOMENTARILY)
52	RUD ACTR CH 2	V79K3366X (SET TO 0)	V79K3346X (SET TO 1 MOMENTARILY)
53	RUD ACTR CH 3	V79K3367X (SET TO 0)	V79K3347X (SET TO 1 MOMENTARILY)
54	RUD ACTR CH 4	V79K3368X (SET TO 0)	V79K3348X (SET TO 1 MOMENTARILY)
61	SPDBK ACTR CH 1	V79K3375X (SET TO 0)	V79K3355X (SET TO 1 MOMENTARILY)
62	SPDBK ACTR CH 2	V79K3376X (SET TO 0)	V79K3356X (SET TO 1 MOMENTARILY)
63	SPDBK ACTR CH 3	V79K3377X (SET TO 0)	V79K3357X (SET TO 1 MOMENTARILY)
64	SPDBK ACTR CH 4	V79K3378X (SET TO 0)	V79K3358X (SET TO 1 MOMENTARILY)

**B.5.25.3 Controls Specialist Interface Support Functions**

Table B.5.25-5 Input Functional Parameters

Table B.5.25-6 Output Functional Parameters

Table B.5.25-7 I-Loads

Table B.5.25-8 K-Loads

Table B.5.25-9 Constants

TABLE B.5.25-5. INPUT FUNCTIONAL PARAMETERS FOR CONTROLS SPEC FUNCTION (REF DISP 6.46) (G5.25)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
AA_LAT_CF(1)	V91X3650X	AA 1 LATERAL ACCEL COMMFault	FCOS				79556D	
AA_LAT_CF(2)	V91X3660X	AA 2 LATERAL ACCEL COMMFault	FCOS				79556D	
AA_LAT_CF(3)	V91X3670X	AA 3 LATERAL ACCEL COMMFault	FCOS				79556D	
AA_LAT_CF(4)	V91X3680X	AA 4 LATERAL ACCEL COMMFault	FCOS				79556D	
AA_NOR_CF(1)	V91X3651X	AA 1 NORMAL ACCEL COMMFault	FCOS				79556D	
AA_NOR_CF(2)	V91X3661X	AA 2 NORMAL ACCEL COMMFault	FCOS				79556D	
AA_NOR_CF(3)	V91X3671X	AA 3 NORMAL ACCEL COMMFault	FCOS				79556D	
AA_NOR_CF(4)	V91X3681X	AA 4 NORMAL ACCEL COMMFault	FCOS				79556D	
BF_FBK_CF(1)	V91X7900X	BODY FLAP FDBK 1 COMMFault	FCOS		BD		79556D	
BF_FBK_CF(2)	V91X7901X	BODY FLAP FDBK 2 COMMFault	FCOS		BD		79556D	
BF_FBK_CF(3)	V91X7902X	BODY FLAP FDBK 3 COMMFault	FCOS		BD		79556D	
BF_FBK_CF(4)	V91X7904X	BODY FLAP FDBK 4 COMMFault	FCOS		BD		79556D	
LIB_CF(1)	V91X7010X	LIB ELEVON 1 COMMFault	FCOS				79556D	
LIB_CF(2)	V91X7011X	LIB ELEVON 2 COMMFault	FCOS				79556D	
LIB_CF(3)	V91X7012X	LIB ELEVON 3 COMMFault	FCOS				79556D	
LIB_CF(4)	V91X7013X	LIB ELEVON 4 COMMFault	FCOS				79556D	
LIB_FBK_CF(1)	V91X7000X	LIB ELEVON FDBK 1 COMMFault	FCOS		BD		79556D	
LIB_FBK_CF(2)	V91X7001X	LIB ELEVON FDBK 2 COMMFault	FCOS		BD		79556D	
LIB_FBK_CF(3)	V91X7002X	LIB ELEVON FDBK 3 COMMFault	FCOS		BD		79556D	
LIB_FBK_CF(4)	V91X7003X	LIB ELEVON FDBK 4 COMMFault	FCOS		BD		79556D	
LOB_CF(1)	V91X7060X	LOB ELEVON 1 COMMFault	FCOS				79556D	
LOB_CF(2)	V91X7061X	LOB ELEVON 2 COMMFault	FCOS				79556D	
LOB_CF(3)	V91X7062X	LOB ELEVON 3 COMMFault	FCOS				79556D	
LOB_CF(4)	V91X7063X	LOB ELEVON 4 COMMFault	FCOS				79556D	
LOB_FBK_CF(1)	V91X7050X	LOB ELEVON FDBK 1 COMMFault	FCOS		BD		79556D	
LOB_FBK_CF(2)	V91X7051X	LOB ELEVON FDBK 2 COMMFault	FCOS		BD		79556D	
LOB_FBK_CF(3)	V91X7052X	LOB ELEVON FDBK 3 COMMFault	FCOS		BD		79556D	
LOB_FBK_CF(4)	V91X7053X	LOB ELEVON FDBK 4 COMMFault	FCOS		BD		79556D	
RGA_PIT_CF(1)	V91X3701X	RGA 1 PITCH COMMFault	FCOS				79556D	
RGA_PIT_CF(2)	V91X3731X	RGA 2 PITCH COMMFault	FCOS				79556D	
RGA_PIT_CF(3)	V91X3761X	RGA 3 PITCH COMMFault	FCOS				79556D	
RGA_PIT_CF(4)	V91X3791X	RGA 4 PITCH COMMFault	FCOS				79556D	
RGA_ROLL_CF(1)	V91X3700X	RGA 1 ROLL COMMFault	FCOS				79556D	
RGA_ROLL_CF(2)	V91X3730X	RGA 2 ROLL COMMFault	FCOS				79556D	
RGA_ROLL_CF(3)	V91X3760X	RGA 3 ROLL COMMFault	FCOS				79556D	
RGA_ROLL_CF(4)	V91X3790X	RGA 4 ROLL COMMFault	FCOS				79556D	
RGA_YAW_CF(1)	V91X3702X	RGA 1 YAW COMMFault	FCOS				79556D	
RGA_YAW_CF(2)	V91X3732X	RGA 2 YAW COMMFault	FCOS				79556D	
RGA_YAW_CF(3)	V91X3762X	RGA 3 YAW COMMFault	FCOS				79556D	
RGA_YAW_CF(4)	V91X3792X	RGA 4 YAW COMMFault	FCOS				79556D	
RIB_CF(1)	V91X7110X	RIB ELEVON 1 COMMFault	FCOS				79556D	
RIB_CF(2)	V91X7111X	RIB ELEVON 2 COMMFault	FCOS				79556D	
RIB_CF(3)	V91X7112X	RIB ELEVON 3 COMMFault	FCOS				79556D	
RIB_CF(4)	V91X7113X	RIB ELEVON 4 COMMFault	FCOS				79556D	
RIB_FBK_CF(1)	V91X7100X	RIB ELEVON FDBK 1 COMMFault	FCOS		BD		79556D	
RIB_FBK_CF(2)	V91X7101X	RIB ELEVON FDBK 2 COMMFault	FCOS		BD		79556D	

TABLE B.5.25-5. INPUT FUNCTIONAL PARAMETERS FOR CONTROLS SPEC FUNCTION (REF DISP 6.46) (G5.25)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
RIB_FBK_CF(3)	V91X7102X	RIB ELEVON FDBK 3 COMMFAULT	FCOS		BD		79556D	
RIB_FBK_CF(4)	V91X7103X	RIB ELEVON FDBK 4 COMMFAULT	FCOS		BD		79556D	
ROB_CF(1)	V91X7160X	ROB ELEVON 1 COMMFAULT	FCOS				79556D	
ROB_CF(2)	V91X7161X	ROB ELEVON 2 COMMFAULT	FCOS				79556D	
ROB_CF(3)	V91X7162X	ROB ELEVON 3 COMMFAULT	FCOS				79556D	
ROB_CF(4)	V91X7163X	ROB ELEVON 4 COMMFAULT	FCOS				79556D	
ROB_FBK_CF(1)	V91X7150X	ROB ELEVON FDBK 1 COMMFAULT	FCOS		BD		79556D	
ROB_FBK_CF(2)	V91X7151X	ROB ELEVON FDBK 2 COMMFAULT	FCOS		BD		79556D	
ROB_FBK_CF(3)	V91X7152X	ROB ELEVON FDBK 3 COMMFAULT	FCOS		BD		79556D	
ROB_FBK_CF(4)	V91X7153X	ROB ELEVON FDBK 4 COMMFAULT	FCOS		BD		79556D	
RUD_CF(1)	V91X3851X	RUDDER 1 COMMFAULT	FCOS				79556D	
RUD_CF(2)	V91X3852X	RUDDER 2 COMMFAULT	FCOS				79556D	
RUD_CF(3)	V91X3853X	RUDDER 3 COMMFAULT	FCOS				79556D	
RUD_CF(4)	V91X3854X	RUDDER 4 COMMFAULT	FCOS				79556D	
SB_CF(1)	V91X3801X	SPEEDBRAKE 1 COMMFAULT	FCOS				79556D	
SB_CF(2)	V91X3802X	SPEEDBRAKE 2 COMMFAULT	FCOS				79556D	
SB_CF(3)	V91X3803X	SPEEDBRAKE 3 COMMFAULT	FCOS				79556D	
SB_CF(4)	V91X3804X	SPEEDBRAKE 4 COMMFAULT	FCOS				79556D	
V79X1170X	V79X1170X	MPS ENG 1 P ACTR A FAIL	ATVC 1		BD		93017G	*
V79X1171X	V79X1171X	MPS ENG 1 Y ACTR A FAIL	ATVC 1		BD		93017G	*
V79X1173X	V79X1173X	MPS ENG 1 P ACTR B FAIL	ATVC 2		BD		93017G	*
V79X1174X	V79X1174X	MPS ENG 1 Y ACTR B FAIL	ATVC 2		BD		93017G	*
V79X1176X	V79X1176X	MPS ENG 1 P ACTR C FAIL	ATVC 3		BD		93017G	*
V79X1177X	V79X1177X	MPS ENG 1 Y ACTR C FAIL	ATVC 3		BD		93017G	*
V79X1178X	V79X1178X	MPS ENG 1 P ACTR D FAIL	ATVC 4		BD		93017G	*
V79X1179X	V79X1179X	MPS ENG 1 Y ACTR D FAIL	ATVC 4		BD		93017G	*
V79X1270X	V79X1270X	MPS ENG 2 P ACTR A FAIL	ATVC 1		BD		93017G	*
V79X1271X	V79X1271X	MPS ENG 2 Y ACTR A FAIL	ATVC 1		BD		93017G	*
V79X1273X	V79X1273X	MPS ENG 2 P ACTR B FAIL	ATVC 2		BD		93017G	*
V79X1274X	V79X1274X	MPS ENG 2 Y ACTR B FAIL	ATVC 2		BD		93017G	*
V79X1276X	V79X1276X	MPS ENG 2 P ACTR C FAIL	ATVC 3		BD		93017G	*
V79X1277X	V79X1277X	MPS ENG 2 Y ACTR C FAIL	ATVC 3		BD		93017G	*
V79X1278X	V79X1278X	MPS ENG 2 P ACTR D FAIL	ATVC 4		BD		93017G	*
V79X1279X	V79X1279X	MPS ENG 2 Y ACTR D FAIL	ATVC 4		BD		93017G	*
V79X1370X	V79X1370X	MPS ENG 3 P ACTR A FAIL	ATVC 1		BD		93017G	*
V79X1371X	V79X1371X	MPS ENG 3 Y ACTR A FAIL	ATVC 1		BD		93017G	*
V79X1373X	V79X1373X	MPS ENG 3 P ACTR B FAIL	ATVC 2		BD		93017G	*
V79X1374X	V79X1374X	MPS ENG 3 Y ACTR B FAIL	ATVC 2		BD		93017G	*
V79X1376X	V79X1376X	MPS ENG 3 P ACTR C FAIL	ATVC 3		BD		93017G	*
V79X1377X	V79X1377X	MPS ENG 3 Y ACTR C FAIL	ATVC 3		BD		93017G	*
V79X1378X	V79X1378X	MPS ENG 3 P ACTR D FAIL	ATVC 4		BD		93017G	*
V79X1379X	V79X1379X	MPS ENG 3 Y ACTR D FAIL	ATVC 4		BD		93017G	*
V79X3260X	V79X3260X	L INBOARD ELEVON ACTR 1 FAIL	ASA 1		BD		93017G	*
V79X3261X	V79X3261X	L INBOARD ELEVON ACTR 2 FAIL	ASA 2		BD		93017G	*
V79X3262X	V79X3262X	L INBOARD ELEVON ACTR 3 FAIL	ASA 3		BD		93017G	*
V79X3263X	V79X3263X	L INBOARD ELEVON ACTR 4 FAIL	ASA 4		BD		93017G	*

TABLE B.5.25-5. INPUT FUNCTIONAL PARAMETERS FOR CONTROLS SPEC FUNCTION (REF DISP 6.46) (G5.25)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V79X3265X	L OTBOARD ELEVON ACTR 1 FAIL	ASA 1		BD		93017G	*
	V79X3266X	L OTBOARD ELEVON ACTR 2 FAIL	ASA 2		BD		93017G	*
	V79X3267X	L OTBOARD ELEVON ACTR 3 FAIL	ASA 3		BD		93017G	*
	V79X3268X	L OTBOARD ELEVON ACTR 4 FAIL	ASA 4		BD		93017G	*
	V79X3270X	R INBOARD ELEVON ACTR 1 FAIL	ASA 1		BD		93017G	*
	V79X3271X	R INBOARD ELEVON ACTR 2 FAIL	ASA 2		BD		93017G	*
	V79X3272X	R INBOARD ELEVON ACTR 3 FAIL	ASA 3		BD		93017G	*
	V79X3273X	R INBOARD ELEVON ACTR 4 FAIL	ASA 4		BD		93017G	*
	V79X3275X	R OTBOARD ELEVON ACTR 1 FAIL	ASA 1		BD		93017G	*
	V79X3276X	R OTBOARD ELEVON ACTR 2 FAIL	ASA 2		BD		93017G	*
	V79X3277X	R OTBOARD ELEVON ACTR 3 FAIL	ASA 3		BD		93017G	*
	V79X3278X	R OTBOARD ELEVON ACTR 4 FAIL	ASA 4		BD		93017G	*
	V79X3331X	RUDDER ACTR 1 FAIL OUTPUT	ASA 1		BD		93017G	*
	V79X3332X	RUDDER ACTR 2 FAIL OUTPUT	ASA 2		BD		93017G	*
	V79X3333X	RUDDER ACTR 3 FAIL OUTPUT	ASA 3		BD		93017G	*
	V79X3334X	RUDDER ACTR 4 FAIL OUTPUT	ASA 4		BD		93017G	*
	V79X3336X	SPEED BRAKE ACTR 1 FAIL	ASA 1		BD		93017G	*
	V79X3337X	SPEED BRAKE ACTR 2 FAIL	ASA 2		BD		93017G	*
	V79X3338X	SPEED BRAKE ACTR 3 FAIL	ASA 3		BD		93017G	*
	V79X3339X	SPEED BRAKE ACTR 4 FAIL	ASA 4		BD		93017G	*
	V90X6415X	BODY FLAP FDBK 1 FAIL	BF PFB FDIR		BD		93017G	*
	V90X6416X	BODY FLAP FDBK 2 FAIL	BF PFB FDIR		BD		93017G	*
	V90X6417X	BODY FLAP FDBK 3 FAIL	BF PFB FDIR		BD		93017G	*
	V90X6418X	BODY FLAP FDBK 4 FAIL	BF PFB FDIR		BD		93017G	*
	V90X6715X	SPEEDBRAKE FDBK 1 FAIL	SB PFB FDIR		BD		93017G	*
	V90X6716X	SPEEDBRAKE FDBK 2 FAIL	SB PFB FDIR		BD		93017G	*
	V90X6717X	SPEEDBRAKE FDBK 3 FAIL	SB PFB FDIR		BD		93017G	*
	V90X6718X	SPEEDBRAKE FDBK 4 FAIL	SB PFB FDIR		BD		93017G	*
	V90X7015X	RUDDER FDBK 1 FAIL	RUD PFB FDIR		BD		93017G	*
	V90X7016X	RUDDER FDBK 2 FAIL	RUD PFB FDIR		BD		93017G	*
	V90X7017X	RUDDER FDBK 3 FAIL	RUD PFB FDIR		BD		93017G	*
	V90X7018X	RUDDER FDBK 4 FAIL	RUD PFB FDIR		BD		93017G	*
	V90X7510X	LIB ELEVON FDBK 1 FAIL	ELVN PFB FDIR		BD		93017G	*
	V90X7511X	LIB ELEVON FDBK 2 FAIL	ELVN PFB FDIR		BD		93017G	*
	V90X7512X	LIB ELEVON FDBK 3 FAIL	ELVN PFB FDIR		BD		93017G	*
	V90X7513X	LIB ELEVON FDBK 4 FAIL	ELVN PFB FDIR		BD		93017G	*
	V90X7530X	LOB ELEVON FDBK 1 FAIL	ELVN PFB FDIR		BD		93017G	*
	V90X7531X	LOB ELEVON FDBK 2 FAIL	ELVN PFB FDIR		BD		93017G	*
	V90X7532X	LOB ELEVON FDBK 3 FAIL	ELVN PFB FDIR		BD		93017G	*
	V90X7533X	LOB ELEVON FDBK 4 FAIL	ELVN PFB FDIR		BD		93017G	*
	V90X7560X	RIB ELEVON FDBK 1 FAIL	ELVN PFB FDIR		BD		93017G	*
	V90X7561X	RIB ELEVON FDBK 2 FAIL	ELVN PFB FDIR		BD		93017G	*
	V90X7562X	RIB ELEVON FDBK 3 FAIL	ELVN PFB FDIR		BD		93017G	*
	V90X7563X	RIB ELEVON FDBK 4 FAIL	ELVN PFB FDIR		BD		93017G	*
	V90X7580X	ROB ELEVON FDBK 1 FAIL	ELVN PFB FDIR		BD		93017G	*
	V90X7581X	ROB ELEVON FDBK 2 FAIL	ELVN PFB FDIR		BD		93017G	*

TABLE B.5.25-5. INPUT FUNCTIONAL PARAMETERS FOR CONTROLS SPEC FUNCTION (REF DISP 6.46) (G5.25)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V90X7582X	ROB ELEVON FDBK 3 FAIL	ELVN PFB FDIR		BD		93017G	*
	V90X7583X	ROB ELEVON FDBK 4 FAIL	ELVN PFB FDIR		BD		93017G	*
	V91X2544X	MPS ENG 1 P ACTR A COMMFAULT	FCOS				79556D	
	V91X2545X	MPS ENG 1 Y ACTR A COMMFAULT	FCOS				79556D	
	V91X2546X	MPS ENG 1 P ACTR B COMMFAULT	FCOS				79556D	
	V91X2547X	MPS ENG 1 Y ACTR B COMMFAULT	FCOS				79556D	
	V91X2548X	MPS ENG 1 P ACTR C COMMFAULT	FCOS				79556D	
	V91X2549X	MPS ENG 1 Y ACTR C COMMFAULT	FCOS				79556D	
	V91X2550X	MPS ENG 1 P ACTR D COMMFAULT	FCOS				79556D	
	V91X2551X	MPS ENG 1 Y ACTR D COMMFAULT	FCOS				79556D	
	V91X2552X	MPS ENG 2 P ACTR A COMMFAULT	FCOS				79556D	
	V91X2553X	MPS ENG 2 Y ACTR A COMMFAULT	FCOS				79556D	
	V91X2554X	MPS ENG 2 P ACTR B COMMFAULT	FCOS				79556D	
	V91X2555X	MPS ENG 2 Y ACTR B COMMFAULT	FCOS				79556D	
	V91X2556X	MPS ENG 2 P ACTR C COMMFAULT	FCOS				79556D	
	V91X2557X	MPS ENG 2 Y ACTR C COMMFAULT	FCOS				79556D	
	V91X2558X	MPS ENG 2 P ACTR D COMMFAULT	FCOS				79556D	
	V91X2559X	MPS ENG 2 Y ACTR D COMMFAULT	FCOS				79556D	
	V91X2560X	MPS ENG 3 P ACTR A COMMFAULT	FCOS				79556D	
	V91X2561X	MPS ENG 3 Y ACTR A COMMFAULT	FCOS				79556D	
	V91X2562X	MPS ENG 3 P ACTR B COMMFAULT	FCOS				79556D	
	V91X2563X	MPS ENG 3 Y ACTR B COMMFAULT	FCOS				79556D	
	V91X2564X	MPS ENG 3 P ACTR C COMMFAULT	FCOS				79556D	
	V91X2565X	MPS ENG 3 Y ACTR C COMMFAULT	FCOS				79556D	
	V91X2566X	MPS ENG 3 P ACTR D COMMFAULT	FCOS				79556D	
	V91X2567X	MPS ENG 3 Y ACTR D COMMFAULT	FCOS				79556D	
	V93J3973CA	SEC ACT BYPASS ITEM ENTRY	CNTLS DISP				79556D	
	V93J3974CA	SEC ACT RESET ITEM ENTRY	CNTLS DISP				79556D	
	V93X3979XA	NEG STIM ENA ITEM ENTRY	CNTLS DISP				79556D	
	V93X3994XA	SEC ACT INITIATE ITEM ENTRY IND	CNTLS DISP				79556D	
	V93X3995X	CHAN 1 SEC ACT CHECK ENA	CNTLS DISP		BD		79556D	
	V93X3996X	CHAN 2 SEC ACT CHECK ENA	CNTLS DISP		BD		79556D	
	V93X3997X	CHAN 3 SEC ACT CHECK ENA	CNTLS DISP		BD		79556D	
	V93X3998X	CHAN 4 SEC ACT CHECK ENA	CNTLS DISP		BD		79556D	
	V93X3999X	SEC ACT CHECK TERMINATE	CNTLS DISP		BD		79556D	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE B.5.25-6. OUTPUT FUNCTIONAL PARAMETERS FROM CONTROLS SPEC FUNCTION (REF DISP 6.46) (G5.25)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V93X3994XB	SEC ACT INITIATE ITEM ENTRY IND	CNTLS DISP				79556D	
	V95X6501X	L OTBOARD ELEVON ACTR 1 STATUS	CNTLS DISP		BD		79556D	
	V95X6502X	L OTBOARD ELEVON ACTR 2 STATUS	CNTLS DISP		BD		79556D	
	V95X6503X	L OTBOARD ELEVON ACTR 3 STATUS	CNTLS DISP		BD		79556D	
	V95X6504X	L OTBOARD ELEVON ACTR 4 STATUS	CNTLS DISP		BD		79556D	
	V95X6510X	L INBOARD ELEVON ACTR 1 STATUS	CNTLS DISP		BD		79556D	
	V95X6511X	L INBOARD ELEVON ACTR 2 STATUS	CNTLS DISP		BD		79556D	
	V95X6512X	L INBOARD ELEVON ACTR 3 STATUS	CNTLS DISP		BD		79556D	
	V95X6513X	L INBOARD ELEVON ACTR 4 STATUS	CNTLS DISP		BD		79556D	
	V95X6515X	R INBOARD ELEVON ACTR 1 STATUS	CNTLS DISP		BD		79556D	
	V95X6516X	R INBOARD ELEVON ACTR 2 STATUS	CNTLS DISP		BD		79556D	
	V95X6517X	R INBOARD ELEVON ACTR 3 STATUS	CNTLS DISP		BD		79556D	
	V95X6518X	R INBOARD ELEVON ACTR 4 STATUS	CNTLS DISP		BD		79556D	
	V95X6520X	R OTBOARD ELEVON ACTR 1 STATUS	CNTLS DISP		BD		79556D	
	V95X6521X	R OTBOARD ELEVON ACTR 2 STATUS	CNTLS DISP		BD		79556D	
	V95X6522X	R OTBOARD ELEVON ACTR 3 STATUS	CNTLS DISP		BD		79556D	
	V95X6523X	R OTBOARD ELEVON ACTR 4 STATUS	CNTLS DISP		BD		79556D	
	V95X6530X	RUDDER ACTR 1 STATUS	CNTLS DISP		BD		79556D	
	V95X6531X	RUDDER ACTR 2 STATUS	CNTLS DISP		BD		79556D	
	V95X6532X	RUDDER ACTR 3 STATUS	CNTLS DISP		BD		79556D	
	V95X6533X	RUDDER ACTR 4 STATUS	CNTLS DISP		BD		79556D	
	V95X6535X	SPD BRK ACTR 1 STATUS	CNTLS DISP		BD		79556D	
	V95X6536X	SPD BRK ACTR 2 STATUS	CNTLS DISP		BD		79556D	
	V95X6537X	SPD BRK ACTR 3 STATUS	CNTLS DISP		BD		79556D	
	V95X6538X	SPD BRK ACTR 4 STATUS	CNTLS DISP		BD		79556D	
	V95X6550X	AA 1 I/O STATUS	CNTLS DISP		BD		79556D	
	V95X6551X	AA 2 I/O STATUS	CNTLS DISP		BD		79556D	
	V95X6552X	AA 3 I/O STATUS	CNTLS DISP		BD		79556D	
	V95X6553X	AA 4 I/O STATUS	CNTLS DISP		BD		79556D	
	V95X6555X	RGA 1 I/O STATUS	CNTLS DISP		BD		79556D	
	V95X6556X	RGA 2 I/O STATUS	CNTLS DISP		BD		79556D	
	V95X6557X	RGA 3 I/O STATUS	CNTLS DISP		BD		79556D	
	V95X6558X	RGA 4 I/O STATUS	CNTLS DISP		BD		79556D	
	V95X6560X	SURF 1 XDUCER STATUS	CNTLS DISP		BD		79556D	
	V95X6561X	SURF 2 XDUCER STATUS	CNTLS DISP		BD		79556D	
	V95X6562X	SURF 3 XDUCER STATUS	CNTLS DISP		BD		79556D	
	V95X6563X	SURF 4 XDUCER STATUS	CNTLS DISP		BD		79556D	
	V95X6564X	L SSME PITCH ACTR 1 STATUS	CNTLS DISP		BD		79556D	
	V95X6565X	L SSME PITCH ACTR 2 STATUS	CNTLS DISP		BD		79556D	
	V95X6566X	L SSME PITCH ACTR 3 STATUS	CNTLS DISP		BD		79556D	
	V95X6567X	L SSME PITCH ACTR 4 STATUS	CNTLS DISP		BD		79556D	
	V95X6568X	L SSME YAW ACTR 1 STATUS	CNTLS DISP		BD		79556D	
	V95X6569X	L SSME YAW ACTR 2 STATUS	CNTLS DISP		BD		79556D	
	V95X6570X	L SSME YAW ACTR 3 STATUS	CNTLS DISP		BD		79556D	
	V95X6571X	L SSME YAW ACTR 4 STATUS	CNTLS DISP		BD		79556D	
	V95X6572X	C SSME PITCH ACTR 1 STATUS	CNTLS DISP		BD		79556D	



TABLE B.5.25-6. OUTPUT FUNCTIONAL PARAMETERS FROM CONTROLS SPEC FUNCTION (REF DISP 6.46) (G5.25)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
	V95X6573X	C SSME PITCH ACTR 2 STATUS	CNTLS DISP		BD		79556D	
	V95X6574X	C SSME PITCH ACTR 3 STATUS	CNTLS DISP		BD		79556D	
	V95X6575X	C SSME PITCH ACTR 4 STATUS	CNTLS DISP		BD		79556D	
	V95X6576X	C SSME YAW ACTR 1 STATUS	CNTLS DISP		BD		79556D	
	V95X6577X	C SSME YAW ACTR 2 STATUS	CNTLS DISP		BD		79556D	
	V95X6578X	C SSME YAW ACTR 3 STATUS	CNTLS DISP		BD		79556D	
	V95X6579X	C SSME YAW ACTR 4 STATUS	CNTLS DISP		BD		79556D	
	V95X6580X	R SSME PITCH ACTR 1 STATUS	CNTLS DISP		BD		79556D	
	V95X6581X	R SSME PITCH ACTR 2 STATUS	CNTLS DISP		BD		79556D	
	V95X6582X	R SSME PITCH ACTR 3 STATUS	CNTLS DISP		BD		79556D	
	V95X6583X	R SSME PITCH ACTR 4 STATUS	CNTLS DISP		BD		79556D	
	V95X6584X	R SSME YAW ACTR 1 STATUS	CNTLS DISP		BD		79556D	
	V95X6585X	R SSME YAW ACTR 2 STATUS	CNTLS DISP		BD		79556D	
	V95X6586X	R SSME YAW ACTR 3 STATUS	CNTLS DISP		BD		79556D	
	V95X6587X	R SSME YAW ACTR 4 STATUS	CNTLS DISP		BD		79556D	
	V99X4401X	CH 1 SEC ACT ITEM ENTRY IND	CNTLS DISP		BD		79556D	
	V99X4402X	CH 2 SEC ACT ITEM ENTRY IND	CNTLS DISP		BD		79556D	
	V99X4403X	CH 3 SEC ACT ITEM ENTRY IND	CNTLS DISP		BD		79556D	
	V99X4404X	CH 4 SEC ACT ITEM ENTRY IND	CNTLS DISP		BD		79556D	
	V99X4405X	SEC ACT TERM ITEM ENTRY IND	CNTLS DISP		BD		79556D	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

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TABLE B.5.25-7. CONTROLS SPEC FUNCTION (REF DISP 6.46) (G5.25) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.5.25-8. CONTROLS SPEC FUNCTION (REF DISP 6.46) (G5.25) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.5.25-9. CONTROLS SPEC FUNCTION (REF DISP 6.46) (G5.25) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

### B.5.26 ASCENT BEARING SPECIALIST FUNCTION (PFS)

The Ascent Bearing specialist function performs display processing in support of the Ascent Bearing display. Central plot area of the Ascent Bearing display shows one of two sets of longitude vs. geodetic latitude map plots. Each set is composed of a main plot and a plot inset window. The first set maps the launch range with an inset window further downrange. The second set maps further downrange with an inset window map for transoceanic aborts. Map sets automatically transition based on Shuttle symbol position across the first map.

The Ascent Bearing display shows digital readouts of the selected site index and indexes of two alternate sites associated with the selected site. Selected site runway name and primary runway name of the two alternate sites are also displayed. Alternate sites are I-Loaded, but are changeable via items entries on the display. An item entry to change the selected site index like that on the Horizontal Situation display is present on this display. The Ascent Bearing display also shows digital readouts of Shuttle heading error (delta azimuth) with respect to the selected site and each of the alternate sites.

Characteristics and formats of the Ascent Bearing display are specified in Section 4.2.41 of the Level C D&C FSSR 20 Volume 1.

#### B.5.26.1 Initialization

This section specifies initialization requirements for the Ascent Bearing specialist function.

##### B.5.26.1.1 At MM 101

1. Initialization requirements of this section shall be executed at entry into MM 101.
2. Two constants which are functions of the ellipticity constant ELLIPT shall be initialized:  
 $ELLIPT\_FAC = (1 - ELLIPT)^2$   
 $GEOD\_ELLIPT\_FAC = 1/ELLIPT\_FAC - ELLIPT\_FAC$
3. The map set index and plot index shall be initialized as follows:  
AB\_DISP\_IND = 1 (first map set)  
PLOT\_IND = 1 (main plot)
4. The map transition latch flag shall be set off:  
MAP\_TRANS\_LATCH = OFF
5. The "previous" variables for the Shuttle predictors shall be initialized:  
DO FOR I = 1 TO 3  
    LAT\_P(I) = NAVBASE\_LAT\_ZERO  
    LON\_P(I) = NAVBASE\_LONG\_ZERO  
ENDDO
6. Several blanking flags shall be initialized as follows:  
BLANK\_TGT\_INS\_LN\_MN = OFF  
BLANK\_TGT\_INS\_LN\_IS = OFF  
BLANK\_LCH\_WINDOW\_OPEN = ON  
BLANK\_LCH\_WINDOW\_CLOSE = ON  
BLANK\_IIP = ON  
BLANK\_TAL\_CRNG\_CIRCLE = ON

7. Display angles for the Shuttle inertial heading arrow and Shuttle steering angle shall be initialized:

AB\_HDG\_ARROW\_ANG\_S = 90.0  
AB\_DISP\_ANG\_S = 0.0

8. Previous values for alternate runway site lookup processing shall be initialized:

AREA\_SEL\_PREV = 0  
ALT\_SITE\_IDX\_P(1) = 0  
ALT\_SITE\_IDX\_P(2) = 0

9. The earth fixed unit vector normal to the target insertion plane shall be computed as follows:

- 9.1. If the discrete indicating the unit vector normal to the target insertion plane is in earth fixed coordinates, EF\_PLANE\_SW = ON, the earth fixed unit vector normal to the target insertion plane shall be set to the I-Loaded / uplinked parameter:

$$\bar{I}_{YEF} = \bar{I}_{YD}$$

- 9.2. Otherwise (EF\_PLANE\_SW = OFF), the following steps shall be executed:

- 9.2.1. The M50 to earth fixed transformation matrix at the current time (CLOCKTIME) shall be computed:

$$M\_TEMP\_TXPOS = EARTH\_FIXED\_TO\_M50\_COORD (CLOCKTIME)^T$$

- 9.2.2. The earth fixed unit vector normal to the target insertion plane shall be set to the transformed I-Loaded / uplinked parameter:

$$\bar{I}_{YEF} = M\_TEMP\_TXPOS \bar{I}_{YD}$$

10. The z component of the earth fixed unit vector normal to the target insertion plane shall be used to set the inclination type index as follows:

```
IF  $-\bar{I}_{YEF}_3 < AB\_INCL\_THRESH$  THEN  
    AB_INCL_IND = 1 (high inclination)  
ELSE  
    AB_INCL_IND = 2 (low inclination)  
ENDIF
```

11. Landing sites initialization requirements of Section B.5.26.2 shall be executed.

12. If AB\_INCL\_IND = 1 (high inclination), launch window initialization requirements of Section B.5.26.3 shall be executed.

13. If AB\_INCL\_IND = 1 (high inclination), launch window ground track computations requirements of Section B.5.26.9.3 shall be executed.

14. The delta inertial velocity between the two I-Loaded transition inertial velocities for the instantaneous impact point (IIP) shall be calculated:

$$\text{DELTA\_VI} = \text{IIP\_VI\_MAG\_HIGH} - \text{IIP\_VI\_MAG\_LOW}$$

15. PSI and BEAR\_VEH used in the delta azimuth computations shall be initialized:

$$\text{PSI} = 0.0$$

$$\text{BEAR\_VEH} = 0.0$$

#### **B.5.26.1.2 At Map Set Transition**

1. Initialization requirements of this section shall be executed at the transition of AB\_DISP\_IND from 1 (Map Set 1) to 2 (Map Set 2).
2. Landing sites initialization requirements of Section B.5.26.2 shall be executed.
3. If AB\_INCL\_IND = 1 (high inclination), launch window ground track computations requirements of Section B.5.26.9.3 shall be executed.

#### **B.5.26.2 Landing Sites Initialization (LANDING\_SITES\_INIT)**

This section specifies requirements to initialize the landing site positions, character strings and main plot / inset window indicators for each of the map sets when required.

1. Landing sites initialization requirements shall be executed on demand.
2. The landing sites blanking array shall be initialized as follows:

```
DO FOR J = 1 TO 20
    BLANK_LDG_SITE(J) = ON
ENDDO
```

3. The landing site index (J) shall be set initialized to 1.
4. Landing site initialization shall determine up to 20 primary runways ( $J \leq 20$ ) for display from unique sites  $M = 1$  TO 45 as follows:
  - a. The landing site initialization requirements shall set the site match flag and primary runway number as follows:

```
MATCH = OFF
L = 2*M - 1
```

- b. Landing site initialization shall identify if the current site indexed by J has been previously processed as follows:



```
IF J > 1 THEN
    DO FOR K = 1 TO J-1 WHILE MATCH = OFF
        IF FIRST 3 CHARS OF RUNWAY_NAME(L) =
            LDG_SITE_XYPOS_CHAR(K,3) THEN
            MATCH = ON
        ENDIF
    ENDDO
ENDIF

c. If the current site has not been processed, landing site initialization shall determine if the site
resides on either the main plot or inset window as follows:

IF MATCH = OFF THEN
    CALL: CHECK_CONV_INSET_DISP
    INLIST: RW_LAT(L), RW_LON(L)
    OUTLIST: LDG_SITE_XYPOS_CHAR(J,1), LDG_SITE_XYPOS_CHAR(J,2),
        BLANK_LDG_SITE(J)

    IF BLANK_LDG_SITE(J) = OFF THEN
        LDG_SITE_XYPOS_CHAR(J,3) = FIRST 3 CHARS OF
        RUNWAY_NAME(L)
        LDG_SITE_XYPOS_CHAR(J,4) = ON

        J = J + 1
    ELSE
        CALL: CHECK_CONV_MAIN_DISP
        INLIST: RW_LAT(L), RW_LON(L)
        OUTLIST: LDG_SITE_XYPOS_CHAR(J,1),
            LDG_SITE_XYPOS_CHAR(J,2)
            BLANK_LDG_SITE(J)

        IF BLANK_LDG_SITE(J) = OFF THEN
            LDG_SITE_XYPOS_CHAR(J,3) = FIRST 3 CHARS
            OF RUNWAY_NAME(L)

            LDG_SITE_XYPOS_CHAR(J,4) = OFF

            J = J + 1
        ENDIF
    ENDIF
ENDIF

ENDIF
```

A potential implementation is shown in the LANDING\_SITES\_INIT flowchart of Figure B.5.26-1.

**B.5.26.3 Launch Window Initialization (LAUNCH\_WINDOW\_INIT)**

This section specifies requirements to compute launch azimuth open and close parameters needed in computing launch window open and close ground tracks.

1. Launch window initialization requirements shall be executed on demand.
2. Geocentric latitude at the launch site and its sine and cosine shall be computed:

$$\begin{aligned} \text{LAT\_ZERO\_C} &= \text{ARCTAN}(\text{ELLIPT\_FAC} * \text{TAN}(\text{NAVBASE\_LAT\_ZERO})) \\ \text{COS\_LAT\_ZERO\_C} &= \text{COS}(\text{LAT\_ZERO\_C}) \\ \text{SIN\_LAT\_ZERO\_C} &= \text{SIN}(\text{LAT\_ZERO\_C}) \end{aligned}$$

3. If the cosine of the geocentric latitude at the launch site  $\text{COS\_LAT\_ZERO\_C}$  is less than the cosine of the inclination angle of the target insertion plane given by  $-\text{I\_YEF}_3$  (i.e., geocentric latitude at the launch site is greater than the inclination angle), launch azimuth ( $\text{LAUNCH\_AZ}$ ) shall be set to the default value of  $\text{PI} / 2$ .
4. Otherwise ( $\text{COS\_LAT\_ZERO\_C} \geq -\text{I\_YEF}_3$ ), launch azimuth shall be calculated as follows:

$$\text{LAUNCH\_AZ} = \text{ARCSIN}(-\text{I\_YEF}_3 / \text{COS\_LAT\_ZERO\_C})$$

5. A launch adjustment limit for open and close of the launch window shall be calculated:

$$\begin{aligned} \text{PSI} &= \text{TAN}(\text{LAUNCH\_AZ} / 4) \\ \text{DELTA\_PSI} &= \text{DELTA\_PSI\_FAC} * \text{DELTA\_PSI\_LIM} * (1 + \text{PSI}^2) / 4 \end{aligned}$$

6. Launch azimuth angles for open and close of the launch window shall be calculated:

$$\begin{aligned} \text{AZ\_OPEN} &= 4 * \text{ARCTAN}(\text{PSI} + \text{DELTA\_PSI}) \\ \text{AZ\_CLOSE} &= 4 * \text{ARCTAN}(\text{PSI} - \text{DELTA\_PSI}) \end{aligned}$$

A potential implementation is shown in the LAUNCH\_WINDOW\_INIT flowchart of Figure B.5.26-2.

**B.5.26.4 Common Processing**

This section specifies requirements for cyclic processing of the Ascent Bearing specialist function which precedes other processing on each cycle.

1. Common processing requirements shall be executed in MM 101 through MM 104 and MM 601.
2. Common processing requirements shall be executed at 0.52 Hz.
3. Common processing shall determine if transition to the second map set should occur, and if so execute the initialization requirements of Section B.5.26.1.2 at map set transition:

```

IF (MAP_TRANS_LATCH = OFF) AND ((LON_S >
AB_MAP_TRANS_LON(AB_INCL_IND)) OR
(LAT_S > AB_MAP_TRANS_LAT(AB_INCL_IND))) AND ((RTLS_ABORT_DECLARED
= OFF) OR (CONT_2EO_START = ON)) THEN
    AB_DISP_IND = 2 (second map set)
    MAP_TRANS_LATCH = ON
    Execute requirements of Section B.5.26.1.2
ENDIF

```

Note: This check is made on the previous cycle's values of Shuttle longitude and latitude.

4. If the Nav Init event has not occurred (ASC\_INIT\_COMPLETE = OFF), an M50 to Earth Fixed transformation matrix based on the GMT from FCOS (CLOCKTIME) shall be computed:

$$M\_TEMP\_TXPOS = EARTH\_FIXED\_TO\_M50\_COORD (CLOCKTIME)^T$$

5. If the Nav Init event has occurred (ASC\_INIT\_COMPLETE = ON), an M50 to Earth Fixed transformation matrix based on the User Parameter Processing (UPP) state time tag (T\_STATE) shall be computed:

$$M\_TEMP\_TXPOS = EARTH\_FIXED\_TO\_M50\_COORD (T\_STATE)^T$$

6. If major mode is 102, 103, 104 or 601 (MM\_CODE = 102 or 103 or 104 or 601), magnitude of the user parameter processing (UPP) state position vector R\_AVGG shall be computed for later use:

$$R\_S\_MAG = ABVAL(\bar{R}\_AVGG)$$

7. If the Major Mode is 103 (MM\_CODE = 103), the inertial unit vector normal to the target insertion plane shall be set to the targeting parameter, for use in the target insertion ground track computations:

$$\bar{U}\_IY\_TGT = \bar{I}Y$$

8. If the Major Mode is 102 (MM\_CODE = 102), the inertial unit vector normal to the target insertion plane shall be set to the Ascent UPP adjusted parameter:

$$\bar{U}\_IY\_TGT = \bar{I}\_YD\_M50$$

9. If the Major Mode is 101 (MM\_CODE = 101), the following steps shall be executed to set the unit vector normal to the target insertion plane:

- a. If EF\_PLANE\_SW = ON, the earth fixed unit normal vector to the target insertion plane shall be set to the I-Loaded / uplinked parameter:

$$\bar{U}\_IY\_TGT\_EF = \bar{I}YD$$

- b. Otherwise (EF\_PLANE\_SW = OFF), the inertial unit vector normal to the target

insertion plane shall be set to the I-Loaded / uplinked parameter:

$$\bar{U}_{IY\_TGT} = \bar{I}YD$$

Note: In Major Modes 104 and 601, a new unit vector normal to the target insertion plane does not need to be set. In MM 104, the last unit vector set in MM 103 is used, in order to "freeze" the target insertion plane in MM 104 with the last one used by guidance in MM 103. (Since the last computed target insertion plane in MM 103 is inertial, its ground track line on the Ascent Bearing Display will continue to move across the display.) In MM 601, no target insertion ground track line is displayed or computed.

### B.5.26.5 Alternate Runway Site Lookup (ALT\_RUNWAY\_SITE\_LOOKUP\_ASC)

This section specifies requirements to process updates to the alternate sites based on: (1) alternate site item entries, (2) selection of a new landing site, and (3) runway uplinks.

1. Alternate runway site lookup requirements shall be executed in MM 101 through MM 104 and MM 601.
2. Alternate runway site lookup requirements shall be executed at 0.52 Hz.
3. For each alternate site,  $I = 1$  or  $2$ , if one of the following conditions is true:
  - $ALT\_SITE\_INDEX(I)$  has changed from the previous pass ( $ALT\_SITE\_INDEX(I) \neq ALT\_SITE\_IDX\_P(I)$ ) OR
  - the selected area ( $AREA\_SEL$ ) has changed from the previous pass ( $AREA\_SEL \neq AREA\_SEL\_PREV$ )

then the runway update indicator shall be set if a runway uplink has occurred, and alternate site data updated as follows:

```
IF RW_UPLINK_ALT = ON THEN
  RW_UPDATE_ALT = ON
ENDIF
IF ALT_SITE_INDEX(I)  $\neq$  0, THEN
  L = 2 * ALT_SITE_INDEX(I) - 1
  ALT_RW_NAME(I) = RUNWAY_NAME(L)
   $\bar{R}_{EF\_ALT}(I)$  = GEODETIC_TO_EF(RW_LAT(L), RW_LON(L), RUNWAY_ALT(L))
ENDIF
```

4. If both the runway data uplink indicator ( $RW\_UPLINK\_ALT$ ) and the runway update indicator ( $RW\_UPDATE\_ALT$ ) are ON, the following steps shall be executed:
  - a. Landing sites initialization requirements of Section B.5.26.2 shall be executed.

- b. RW\_UPLINK\_ALT shall be set OFF acknowledging the request from the Uplink Processor.
  - c. RW\_UPDATE\_ALT shall be set OFF acknowledging an item entry affecting alternate site data has been executed.
5. Previous values of AREA\_SEL and the alternate site indexes shall be updated with current values for the next pass:

```
AREA_SEL_PREV = AREA_SEL  
ALT_SITE_IDX_P(1) = ALT_SITE_INDEX(1)  
ALT_SITE_IDX_P(2) = ALT_SITE_INDEX(2)
```

A potential implementation is shown in the ALT\_RUNWAY\_SITE\_LOOKUP\_ASC flowchart of Figure B.5.26-3.

#### **B.5.26.6 Shuttle Symbol Processing (SHUTTLE\_SYMBOL\_PROC)**

This section specifies requirements to determine the location of the current Shuttle symbol in the main map plot area(s) of the Ascent Bearing display.

1. Shuttle symbol processing requirements shall be executed in MM 101 through MM 104 and MM 601.
2. Shuttle symbol processing requirements shall be executed at 0.52 Hz.
3. If MM\_CODE = 101, Shuttle latitude and longitude shall be initialized as follows:  
LAT\_S = NAVBASE\_LAT\_ZERO  
LON\_S = NAVBASE\_LONG\_ZERO
4. If MM\_CODE  $\neq$  101, the UPP position vector  $\bar{R}_{AVGG}$  shall be transformed to Earth Fixed coordinates:

$$\bar{R}_{AVGG\_EF} = M\_TEMP\_TXPOS \bar{R}_{AVGG}$$

5. If MM\_CODE  $\neq$  101, shuttle symbol processing shall call the EF\_TO\_GEODETTIC routine to return latitude and longitude for the current Shuttle position:

$$(LAT\_S, LON\_S, DUMMY\_ALT) = EF\_TO\_GEODETTIC(\bar{R}_{AVGG\_EF})$$

6. Shuttle latitude and longitude shall be converted to display coordinates (AUs) by calling the Main Display Park and Convert to Display Coordinates Utility as follows:

$$(AB\_STATE\_X, AB\_STATE\_Y) = PARK\_CONV\_MAIN\_DISP(LAT\_S, LON\_S)$$

A potential implementation is shown in the SHUTTLE\_SYMBOL\_PROC flowchart of Figure B.5.26-4.

### B.5.26.7 Shuttle Predictors Processing (SHUTTLE\_PREDICTORS\_PROC)

This section specifies requirements to determine the locations of the Shuttle 30 and 60 second predictor symbols in the main map plot area(s) of the Ascent Bearing display.

1. Shuttle predictors processing requirements shall be executed in MM 102 through MM 104 and MM 601.
2. Shuttle predictors processing requirements shall be executed at 0.52 Hz.
3. Changes in longitude and latitude shall be computed from previous values of Shuttle longitude and latitude as follows:

$$\begin{aligned} \text{DELTA\_LON} &= \text{MID}(\text{LON\_S} - \text{LON\_P}(3), \text{LON\_P}(3) - \text{LON\_P}(2), \text{LON\_P}(2) - \text{LON\_P}(1)) \\ \text{DELTA\_LAT} &= \text{MID}(\text{LAT\_S} - \text{LAT\_P}(3), \text{LAT\_P}(3) - \text{LAT\_P}(2), \text{LAT\_P}(2) - \text{LAT\_P}(1)) \end{aligned}$$

4. Latitude and longitude for the 30 second predictor shall be computed:

$$\begin{aligned} \text{LON\_PRED} &= \text{LON\_S} + (\text{DELTA\_LON} / \text{AB\_PRED\_T\_CYCLE}) * 30 \\ \text{LAT\_PRED} &= \text{LAT\_S} + (\text{DELTA\_LAT} / \text{AB\_PRED\_T\_CYCLE}) * 30 \end{aligned}$$

5. Latitude and longitude for the 30 second predictor shall be converted to display coordinates (AUs) by calling the Main Display Park and Convert to Display Coordinates Utility as follows:

$$\begin{aligned} (\text{AB\_PRED\_30\_X}, \text{AB\_PRED\_30\_Y}) &= \\ &\text{PARK\_CONV\_MAIN\_DISP}(\text{LAT\_PRED}, \text{LON\_PRED}) \end{aligned}$$

6. Latitude and longitude for the 60 second predictor shall be computed:

$$\begin{aligned} \text{LON\_PRED} &= \text{LON\_S} + (\text{DELTA\_LON} / \text{AB\_PRED\_T\_CYCLE}) * 60 \\ \text{LAT\_PRED} &= \text{LAT\_S} + (\text{DELTA\_LAT} / \text{AB\_PRED\_T\_CYCLE}) * 60 \end{aligned}$$

7. Latitude and longitude for the 60 second predictor shall be converted to display coordinates (AUs) by calling the Main Display Park and Convert to Display Coordinates Utility as follows:

$$\begin{aligned} (\text{AB\_PRED\_60\_X}, \text{AB\_PRED\_60\_Y}) &= \\ &\text{PARK\_CONV\_MAIN\_DISP}(\text{LAT\_PRED}, \text{LON\_PRED}) \end{aligned}$$

8. Previous values of Shuttle longitude and latitude shall be updated with the current Shuttle values as follows:

```
DO FOR I = 1 TO 2
    LON_P(I) = LON_P(I+1)
    LAT_P(I) = LAT_P(I+1)
ENDDO
```

LON\_P(3) = LON\_S  
LAT\_P(3) = LAT\_S

A potential implementation is shown in the SHUTTLE\_PREDICTORS\_PROC flowchart of Figure B.5.26-5.

#### **B.5.26.8 Instantaneous Impact Point (IIP) Processing (IIP\_SYMBOL\_PROC\_ASC)**

This section specifies requirements to determine the location of the Instantaneous Impact Point (IIP) symbol on the Ascent Bearing display.

1. IIP processing requirements shall be executed in MM 103 through MM 104 and MM 601 when  $IIP\_AERO\_R\_FACT * IIP\_AERO\_T\_FACT \neq 0.0$  and the Ascent Bearing Display is present on an MDU.
2. IIP processing requirements shall be executed at 0.52 Hz.
3. IIP processing shall execute the IIP Prediction requirements of Section B.5.26.8.1.
4. The IIP\_INVALID flag returned by IIP Prediction shall be stored in the IIP blanking flag:

BLANK\_IIP = IIP\_INVALID

5. If BLANK\_IIP = OFF, the following steps shall be executed:
  - a. The M50 to Earth Fixed transformation matrix based on the time of impact  $T\_IIP$  shall be computed:

$M\_TEMP = EARTH\_FIXED\_TO\_M50\_COORD(T\_IIP)^T$

- b. The IIP M50 position vector  $\bar{R}\_IIP$  shall be transformed to earth fixed coordinates:

$\bar{R}\_IIP\_EF = M\_TEMP \bar{R}\_IIP$

- c. IIP processing shall call the Earth Fixed to Geodetic function to convert the IIP earth fixed position returned by the IIP Prediction to geodetic coordinates:

CALL: EF\_TO\_GEODETTIC  
INLIST:  $\bar{R}\_IIP\_EF$   
OUTLIST: IIP\_LAT, IIP\_LON, DUMMY\_ALT

- d. IIP processing shall set the IIP plot index to indicate the main plot and call the Main Display Check and Convert to Display Coordinates Utility to check if the IIP latitude and longitude are on the main plot, and if so to convert them to display (AU) coordinates:

AB\_IIP\_PLOT\_IND = 1 (MAIN)  
CALL: CHECK\_CONV\_MAIN\_DISP

INLIST: IIP\_LAT, IIP\_LON  
 OUTLIST: AB\_IIP\_X, AB\_IIP\_Y, BLANK\_IIP

- e. If BLANK\_IIP = ON, indicating the IIP latitude and longitude are not on the main display, IIP processing shall set the IIP plot index to indicate the inset window and call the Inset Window Check and Convert to Display Coordinates Utility to check if the IIP latitude and longitude are in the inset window, and if so to convert them to display (AU) coordinates:

AB\_IIP\_PLOT\_IND = 2 (INSET)

CALL: CHECK\_CONV\_INSET\_DISP  
 INLIST: IIP\_LAT, IIP\_LON  
 OUTLIST: AB\_IIP\_X, AB\_IIP\_Y, BLANK\_IIP

A potential implementation is shown in the IIP\_SYMBOL\_PROC\_ASC flowchart of Figure B.5.26-6.

### B.5.26.8.1 Instantaneous Impact Point (IIP) Prediction (IIP\_PREDICT)

This section specifies requirements to calculate the IIP M50 position vector  $\bar{R}_{IIP}$  and time of impact  $T_{IIP}$  from the user parameter processing (UPP) state vector  $\bar{R}_{AVGG}$ ,  $\bar{V}_{AVGG}$ , and  $T_{STATE}$ .

1. IIP prediction requirements shall execute on demand.
2. Several terms shall be calculated from the UPP state vector:

$R\_MAG = ABVAL(\bar{R}_{AVGG})$   
 $SIGMA = R\_AVGG_1 * V\_AVGG_1 + R\_AVGG_2 * V\_AVGG_2 + R\_AVGG_3 * V\_AVGG_3$   
 $V\_MAG = ABVAL(\bar{V}_{AVGG})$   
 $D = 2.0 - R\_MAG * V\_MAG^2 / EARTH\_MU$

3. The IIP invalid flag shall be initialized for this execution:

IIP\_INVALID = ON

4. Shuttle altitude ALT\_S shall be calculated using the H\_ELLIPSOID function:

ALT\_S = H\_ELLIPSOID( $\bar{R}_{AVGG}$ )

5. If  $D > 0.0$  and  $ALT\_S > 0.0$ , the following steps shall be executed:

- 5.1. Sine and cosine of the eccentric anomaly of the UPP state vector shall be calculated:

$A = R\_MAG / D$   
 $SINE0 = SIGMA / SQRT(EARTH\_MU * A)$   
 $COSE0 = 1.0 - R\_MAG / A$

- 5.2. The value of the earth's radius at the IIP shall be initialized to the earth's equatorial radius for the first execution of Kepler prediction requirements:

EARTH\_RADIUS = EARTH\_RADIUS\_EQUATOR



5.3. IIP prediction shall execute the Kepler prediction requirements of Section B.5.26.8.2. to calculate the first iteration of the IIP M50 position vector  $\bar{R}_{IIP}$  and associated validity flag (IIP\_INVALID)

5.4. If IIP\_INVALID = OFF, the following steps shall be executed:

5.4.1. Altitude at the position vector  $\bar{R}_{IIP}$  shall be calculated using the H\_ELLIPSOID function:

$$ALT\_S = H\_ELLIPSOID(\bar{R}_{IIP})$$

5.4.2. The earth's radius at the IIP position vector from the first iteration shall be computed as follows:

$$EARTH\_RADIUS = ABVAL(\bar{R}_{IIP}) - ALT\_S$$

5.4.3 The IIP invalid flag shall be set to ON for the next execution of the Kepler prediction requirements.

5.4.4 IIP prediction shall re-execute the Kepler prediction requirements of Section B.5.26.8.2 with the updated earth radius to calculate the IIP M50 position vector  $\bar{R}_{IIP}$ , GMT time of impact T\_IIP, and associated validity flag (IIP\_INVALID).

5.4.5 If IIP\_INVALID = OFF, the following steps shall be executed:

5.4.5.1 If both I-Loads IIP\_AERO\_R\_FACT > 1.0 and IIP\_AERO\_T\_FACT > 1.0, IIP prediction shall perform the following steps to determine scale factors to account for aerodynamic effects on the IIP and time of impact:

5.4.5.1.1 If vehicle inertial velocity is greater than an I-Loaded upper limit, V\_MAG > IIP\_VI\_MAG\_HIGH, indicating the aerodynamic regime for IIP behavior, the scale factors for range and time of impact shall be set to the I-Loaded aerodynamic scale factors:

$$R\_FACT = IIP\_AERO\_R\_FACT$$
$$T\_FACT = IIP\_AERO\_T\_FACT$$

5.4.5.1.2 Otherwise (V\_MAG ≤ IIP\_VI\_MAG\_HIGH), the following steps shall be executed:

5.4.5.1.2.1 If DELTA\_VI > 1.0E-8 and vehicle inertial velocity is greater than an I-Loaded lower limit, V\_MAG > IIP\_VI\_MAG\_LOW, indicating transition between aerodynamic and ballistic regimes for IIP behavior, the scale factors for range and time of impact shall be interpolated as follows:

$$VI\_FACT = (V\_MAG - IIP\_VI\_MAG\_LOW) / DELTA\_VI$$
$$R\_FACT = (IIP\_AERO\_R\_FACT - 1) * VI\_FACT + 1$$
$$T\_FACT = (IIP\_AERO\_T\_FACT - 1) * VI\_FACT + 1$$

5.4.5.1.2.2 Otherwise ( $V\_MAG \leq IIP\_VI\_MAG\_LOW$ ), indicating the ballistic regime for IIP behavior, the scale factors for range and time of impact shall be set to 1.0:

$$R\_FACT = 1.0$$
$$T\_FACT = 1.0$$

5.4.5.1.3 If both  $R\_FACT > 1.0$  and  $T\_FACT > 1.0$ , the following steps shall be executed to scale  $\bar{R}\_IIP$  and  $T\_IIP$  for aerodynamic effects:

5.4.5.1.3.1 The magnitude of the M50 IIP position vector  $\bar{R}\_IIP$  returned from Kepler prediction shall be calculated:

$$R\_MAG\_IIP = ABVAL(\bar{R}\_IIP)$$

5.4.5.1.3.2 The additional angle needed to extend the range between the vehicle state vector and  $\bar{R}\_IIP$  scaled for aerodynamic effects shall be computed:

$$THET\_IIP = ARCCOS(\bar{R}\_AVGG \bullet \bar{R}\_IIP / (R\_MAG * R\_MAG\_IIP)) * (R\_FACT - 1)$$

5.4.5.1.3.3 The quaternion to rotate  $\bar{R}\_IIP$  returned from Kepler prediction shall be computed:

$$\bar{N}ORM = UNIT(\bar{R}\_AVGG \times \bar{R}\_IIP)$$
$$Q\_S = COS(THET\_IIP / 2)$$
$$Q\_V = \bar{N}ORM * SIN(THET\_IIP / 2)$$

5.4.5.1.3.4  $\bar{R}\_IIP$  returned from Kepler prediction shall be rotated for aerodynamic effects as follows:

$$\bar{R}\_IIP = QUAT\_XFORM(Q\_S, Q\_V, \bar{R}\_IIP)$$

5.4.5.1.3.5 Time of impact  $T\_IIP$  returned from Kepler prediction shall be scaled for aerodynamic effects as follows:

$$T\_IIP = (T\_IIP - T\_STATE) * T\_FACT + T\_STATE$$

A potential implementation is shown in the IIP\_PREDICT flowchart of Figure B.5.26-7.

### B.5.26.8.2 Kepler Prediction (KEPLER\_PREDICT)

This section specifies requirements to calculate the ballistic (only gravitational forces modeled) IIP M50 position vector  $\bar{R}\_IIP$ , and time of impact  $T\_IIP$  from the (UPP) state vector  $\bar{R}\_AVGG$ ,  $\bar{V}\_AVGG$ , and  $T\_STATE$  and an estimate of the earth's radius at the IIP.

1. Kepler prediction requirements shall execute on demand.

2. Cosine of the eccentric anomaly at the IIP shall be computed:

$$\text{COSE} = 1.0 - \text{EARTH\_RADIUS} / A$$

3. Square of the sine of the eccentric anomaly at the IIP shall be computed:

$$\text{SINE2} = \text{SINE0}^2 + \text{COSE0}^2 - \text{COSE}^2$$

4. If  $\text{SINE2} \geq 0.0$ , the following steps shall be executed:

- a. The sine of the eccentric anomaly at the IIP shall be calculated:

$$\text{SINE} = -\text{SQRT}(\text{SINE2})$$

- b. Numerator and denominator terms for computing the delta eccentric anomaly ( $E - E0$ ) sine and cosine shall be calculated:

$$N = \text{SINE} * \text{COSE0} - \text{COSE} * \text{SINE0}$$

$$D = \text{COSE} * \text{COSE0} + \text{SINE} * \text{SINE0}$$

- c. If the absolute value of the denominator term  $D \geq 1.0\text{E-}8$ , sine and cosine of the delta eccentric anomaly shall be computed as follows:

$$\text{TANDLE} = N / D$$

$$\text{COSDLE} = \text{SIGN}(D) * (1.0 / \text{SQRT}(1 + \text{TANDLE}^2))$$

$$\text{SINDLE} = \text{TANDLE} * \text{COSDLE}$$

- d. If the absolute value of the denominator term  $D < 1.0\text{E-}8$ , sine and cosine of the delta eccentric anomaly shall be computed as follows:

$$\text{COSDLE} = 0.0$$

$$\text{SINDLE} = \text{SIGN}(N)$$

- e. Parameters used in computing the f and g terms shall be calculated:

$$P = \text{SQRT}(A / \text{EARTH\_MU})$$

$$S1 = \text{SINDLE} * P$$

$$S2 = (1.0 - \text{COSDLE}) * (A / \text{EARTH\_MU})$$

- f. F and g terms shall be calculated:

$$F = 1.0 - \text{EARTH\_MU} * S2 / R\_MAG$$

$$G = R\_MAG * S1 + \text{SIGMA} * S2$$

- g. The IIP M50 position vector shall be computed:

$$\bar{R}\_IIP = F * \bar{R}\_AVGG + G * \bar{V}\_AVGG$$

- h. The delta eccentric anomaly ( $E - E0$ ) shall be computed as follows:

$$\text{DLE} = \text{ARCTAN2}(\text{SINDLE}, \text{COSDLE})$$

IF DLE < 0.0, THEN  
DLE = DLE + 2 PI

- i. Time of impact T\_IIP shall be computed:

$$T_{IIP} = T_{STATE} + G + (DLE - SINDLE) * A * P$$

- j. The IIP invalid flag (IIP\_INVALID) shall be set to OFF to indicate a valid computation of the IIP M50 position vector and time of impact.

A potential implementation is shown in the KEPLER\_PREDICT flowchart of Figure B.5.26-8.

### B.5.26.9 Ground Track Computations

This section specifies requirements to compute the ground track lines for the target insertion line and launch window open and close lines. The target insertion line is computed cyclically for both the main plot and inset window. Launch window lines are computed on demand for the main plot. Ground track lines are computed for the appropriate map set being displayed.

#### B.5.26.9.1 Target Insertion Ground Track Computations (TGT\_INS\_GNDTRK\_COMPS)

This section specifies requirements to compute the ground track lines for the target insertion line on both the main plot and inset window.

1. Target insertion ground track computation requirements shall be executed in MM 101 through MM 104 and MM 601 when the Ascent Bearing Display is present on an MDU.
2. Target insertion ground track computation requirements shall be executed at 0.52 Hz.
3. If MM\_CODE = 601, the target insertion line blanking flags for both the main plot and inset window are set ON:

BLANK\_TGT\_INS\_LN\_MN = ON  
BLANK\_TGT\_INS\_LN\_IS = ON

4. Otherwise (MM\_CODE is not equal to 601), the following steps shall be executed:
  - a. If the discrete indicating the unit vector normal to the target insertion plane is in earth fixed coordinates is off, EF\_PLANE\_SW = OFF, or the Major Mode is not 101 (MM\_CODE ≠ 101), the inertial unit normal vector to the target insertion plane shall be transformed to earth fixed coordinates:

$$\bar{U}_{IY\_TGT\_EF} = M\_TEMP\_TXPOS \bar{U}_{IY\_TGT}$$

- b. If  $U_{IY\_TGT\_EF_3} < 0.0$ , indicating a usable IY vector, the following steps shall be executed:

(1) Inclination angle of the target insertion plane and its sine and cosine shall be computed, with the sine and cosine stored for later use by other computations:

```
INCL = ARCCOS( - U_IY_TGT_EF3)  
SIN_INCL = SIN(INCL)  
COS_INCL = COS(INCL)  
SIN_INCL_TGT = SIN_INCL  
COS_INCL_TGT = COS_INCL
```

(2) Longitude of ascending node for the target insertion plane shall be computed and stored for later use by other computations:

```
LON_ASC_NODE = ARCTAN2(- U_IY_TGT_EF1, U_IY_TGT_EF2)  
LON_ASC_NODE_TGT = LON_ASC_NODE
```

(3) The main plot / inset window index PLOT\_IND shall be set to 1 to indicate main display.

(4) The target insertion line computation requirements of Section B.5.26.9.2 shall be executed to compute the target insertion line in display (AU) coordinates for the main display:

```
EXECUTE TGT_INS_LINE_COMP
```

(5) The target insertion line blanking flag for the main plot shall be set to the blanking flag computed by target insertion line computation:

```
BLANK_TGT_INS_LN_MN = BLANK_FLAG
```

(6) The main plot / inset window index PLOT\_IND shall be set to 2 to indicate inset window.

(7) The target insertion line computation requirements of Section B.5.26.9.2 shall be executed to compute the target insertion line in display (AU) coordinates for the inset window:

```
EXECUTE TGT_INS_LINE_COMP
```

(8) The target insertion line blanking flag for the inset window shall be set to the blanking flag computed by target insertion line computation:

```
BLANK_TGT_INS_LN_IS = BLANK_FLAG
```

c. Otherwise ( $U_{IY\_TGT\_EF_3} \geq 0.0$ ), the target insertion line blanking flags shall be set ON:

```
BLANK_TGT_INS_LN_MN = ON  
BLANK_TGT_INS_LN_IS = ON
```

A potential implementation is shown in the TGT\_INS\_GNDTRK\_COMPS flowchart of Figure B.5.26-9.

### **B.5.26.9.2 Target Insertion Line Computation (TGT\_INS\_LINE\_COMP)**

This section specifies requirements to compute the target insertion line in display (AU) coordinates for either the main plot or inset window as specified. Start point, break points, and end point are calculated for a five-

segment, continuous, piecewise linear curve. A blanking flag is set if the target insertion line is determined not to be within the specified plot region.

1. Target insertion line computation requirements shall be executed on demand when called.
2. The blanking flag shall be initialized to OFF:  
  
BLANK\_FLAG = OFF
3. The ARG\_LAT\_LWR\_LMT function shall be called with PLOT\_IND set by target insertion ground track computation as input argument to return the argument of latitude lower limit ARG\_LAT\_LL at the entry point of the target insertion line to the specified plot region:

CALL: ARG\_LAT\_LWR\_LMT  
INLIST: PLOT\_IND  
OUTLIST: ARG\_LAT\_LL

4. If BLANK\_FLAG set by the ARG\_LAT\_LWR\_LMT function is OFF, the following steps shall be executed:

- 4.1 The ARG\_LAT\_UPR\_LMT function shall be called with PLOT\_IND as input argument to return the argument of latitude upper limit ARG\_LAT\_UL at the exit point of the target insertion line from the specified plot region:

CALL: ARG\_LAT\_UPR\_LMT  
INLIST: PLOT\_IND  
OUTLIST: ARG\_LAT\_UL

- 4.2 IF ARG\_LAT\_LL < ARG\_LAT\_UL, the following steps shall be executed:

- 4.2.1 The argument of latitude increment for each line segment shall be computed:

$$\text{ARG\_LAT\_INCR} = (\text{ARG\_LAT\_UL} - \text{ARG\_LAT\_LL}) / 5$$

- 4.2.2 If PLOT\_IND = 1 indicating the main plot, the LINE\_COMP function shall be called to compute target insertion line points in AU coordinates for the main plot:

CALL: LINE\_COMP  
INLIST: ARG\_LAT\_LL, ARG\_LAT\_INCR  
OUTLIST: TGT\_INS\_LINE\_MN\_X, TGT\_INS\_LINE\_MN\_Y

- 4.2.3 If PLOT\_IND = 2 indicating the inset window, the LINE\_COMP function shall be called to compute target insertion line points in AU coordinates for the inset window:

CALL: LINE\_COMP  
INLIST: ARG\_LAT\_LL, ARG\_LAT\_INCR  
OUTLIST: TGT\_INS\_LINE\_IS\_X, TGT\_INS\_LINE\_IS\_Y

- 4.3 Otherwise ( $\text{ARG\_LAT\_LL} \geq \text{ARG\_LAT\_UL}$ ), BLANK\_FLAG shall be set ON to indicate no target insertion line can be computed for the specified plot region.

A potential implementation is shown in the TGT\_INS\_LINE\_COMP flowchart of Figure B.5.26-10.

### **B.5.26.9.3 Launch Window Ground Track Computations (LAUNCH\_WINDOW\_GNDTRK\_COMPS)**

This section specifies requirements to compute the ground tracks for the launch window open and close lines in the main plot.

1. Launch window ground track computation requirements shall be executed on demand when called.
2. Launch window ground track computation shall call the launch window line computation function LAUNCH\_WINDOW\_LINE\_COMPS of Section B.5.26.9.4 with launch azimuth at window open (AZ\_OPEN) as input argument to compute the launch window open line in display (AU) coordinates:

```
CALL: LAUNCH_WINDOW_LINE_COMPS  
INLIST: AZ_OPEN  
OUTLIST: LCH_WINDOW_OPEN_X, LCH_WINDOW_OPEN_Y
```

3. The blanking flag for the launch window open line shall be set to the value of BLANK\_FLAG determined by the launch window line computation function:

```
BLANK_LCH_WINDOW_OPEN = BLANK_FLAG
```

4. Launch window ground track computation shall call the launch window line computation function LAUNCH\_WINDOW\_LINE\_COMPS of Section B.5.26.9.4 with launch azimuth at window close (AZ\_CLOSE) as input argument to compute the launch window close line in display (AU) coordinates:

```
CALL: LAUNCH_WINDOW_LINE_COMPS  
INLIST: AZ_CLOSE  
OUTLIST: LCH_WINDOW_CLOSE_X, LCH_WINDOW_CLOSE_Y
```

5. The blanking flag for the launch window close line shall be set to the value of BLANK\_FLAG determined by the launch window line computation function:

```
BLANK_LCH_WINDOW_CLOSE = BLANK_FLAG
```

A potential implementation is shown in the LAUNCH\_WINDOW\_GNDTRK\_COMPS flowchart of Figure B.5.26-11.

### **B.5.26.9.4 Launch Window Line Computation (LAUNCH\_WINDOW\_LINE\_COMPS)**

This section specifies requirements to compute a launch window line in display (AU) coordinates for the main plot. Launch window line computation takes as input an azimuth angle (AZ). X and Y coordinates (LINE\_X and LINE\_Y, respectively) are returned for the start point, break points, and end point of a five-

segment, continuous, piecewise linear curve. A global blanking flag is set if the launch window line is determined not to be within the specified plot region.

1. Launch window line computation requirements shall be executed on demand when called.

2. The main plot / inset window index shall be set to indicate the main plot:

PLOT\_IND = 1 (MAIN)

3. The blanking flag shall be initialized to OFF:

BLANK\_FLAG = OFF

4. Sine and cosine of the input launch azimuth angle shall be calculated:

SIN\_AZ = SIN(AZ)

COS\_AZ = COS(AZ)

5. Parameters for the launch window plane shall be computed as follows:

COS\_INCL = SIN\_AZ \* COS\_LAT\_ZERO\_C

SIN\_INCL = SQRT(1 - COS\_INCL<sup>2</sup>)

SIN\_DEL\_LON = SIN\_AZ \* SIN\_LAT\_ZERO\_C / SIN\_INCL

COS\_DEL\_LON = COS\_AZ / SIN\_INCL

LON\_ASC\_NODE = NAVBASE\_LONG\_ZERO -  
ARCTAN2(SIN\_DEL\_LON, COS\_DEL\_LON)

6. If the map set index AB\_DISP\_IND = 1, indicating the first map set, the argument of latitude lower limit ARG\_LAT\_LL shall be set to the argument of latitude for the launch window plane at the launch site:

ARG\_LAT\_LL = ARCTAN2(SIN\_DEL\_LON / COS\_INCL, COS\_DEL\_LON)

7. Otherwise (the map set index AB\_DISP\_IND is not equal to 1, indicating the second map set), the ARG\_LAT\_LWR\_LMT function shall be called with PLOT\_IND as input argument to return the argument of latitude lower limit (ARG\_LAT\_LL) at the entry point of the launch window line to the main plot region:

CALL: ARG\_LAT\_LWR\_LMT

INLIST: PLOT\_IND

OUTLIST: ARG\_LAT\_LL

8. If BLANK\_FLAG, either initialized or set by the ARG\_LAT\_LWR\_LMT function, is OFF, the following steps shall be executed:



- a. The ARG\_LAT\_UPR\_LMT function shall be called with PLOT\_IND as input argument to return the argument of latitude upper limit (ARG\_LAT\_UL) at the exit point of the launch window line from the specified plot region:

CALL: ARG\_LAT\_UPR\_LMT  
INLIST: PLOT\_IND  
OUTLIST: ARG\_LAT\_UL

- b. If ARG\_LAT\_LL < ARG\_LAT\_UL, the following steps shall be executed:

- (1) The argument of latitude increment for each line segment shall be computed:

$$\text{ARG\_LAT\_INCR} = (\text{ARG\_LAT\_UL} - \text{ARG\_LAT\_LL}) / 5$$

- (2) The LINE\_COMP function shall be called to compute launch window line points in AU coordinates for the main plot:

CALL: LINE\_COMP  
INLIST: ARG\_LAT\_LL, ARG\_LAT\_INCR  
OUTLIST: LINE\_X, LINE\_Y

- c. Otherwise (ARG\_LAT\_LL ≥ ARG\_LAT\_UL), BLANK\_FLAG shall be set ON to indicate no launch window line can be computed for the specified plot region.

A potential implementation is shown in the LAUNCH\_WINDOW\_LINE\_COMPS flowchart of Figure B.5.26-12.

#### **B.5.26.9.5 Line Computation (LINE\_COMP)**

This section specifies requirements to compute a ground track line in display (AU) coordinates for the specified plot region. Line computation takes as input arguments a lower limit of argument of latitude (ARG\_LAT\_LL) and argument of latitude increment (ARG\_LAT\_INCR). X and Y coordinates (LINE\_X and LINE\_Y, respectively) are returned for the start point, break points, and end point of a five-segment, continuous, piecewise linear curve. Line computation also uses the global parameters inclination type indicator AB\_INCL\_IND (1 = high and 2 = low), map set indicator AB\_DISP\_IND (1 = first map set and 2 = second map set), and PLOT\_IND (1 = main plot and 2 = inset window).

1. Line computation requirements shall be executed on demand when called.
2. The argument of latitude variable ARG\_LAT shall be initialized:

ARG\_LAT = ARG\_LAT\_LL

3. For each of six points indexed by I (DO FOR I = 1 TO 6), the following steps shall be executed:

- a. The LON\_LINE\_INCR function shall be called with ARG\_LAT as input argument to return the longitude LON corresponding to ARG\_LAT:

$$\text{LON} = \text{LON\_LINE\_INCR}(\text{ARG\_LAT})$$

- b. The LAT\_LINE function shall be called with ARG\_LAT as input argument to return the geodetic latitude LAT corresponding to ARG\_LAT:

$$\text{LAT} = \text{LAT\_LINE}(\text{ARG\_LAT})$$

- c. X coordinate of the Ith point of the line shall be computed as:

$$\text{LINE\_X}(I) = \text{AB\_X\_SC\_FACT}(\text{AB\_INCL\_IND}, \text{AB\_DISP\_IND}, \text{PLOT\_IND}) * \text{LON} \\ + \text{AB\_X\_BIAS}(\text{AB\_INCL\_IND}, \text{AB\_DISP\_IND}, \text{PLOT\_IND})$$

- d. Y coordinate of the Ith point of the line shall be computed as:

$$\text{LINE\_Y}(I) = \text{AB\_Y\_SC\_FACT}(\text{AB\_INCL\_IND}, \text{AB\_DISP\_IND}, \text{PLOT\_IND}) * \text{LAT} \\ + \text{AB\_Y\_BIAS}(\text{AB\_INCL\_IND}, \text{AB\_DISP\_IND}, \text{PLOT\_IND})$$

- e. ARG\_LAT shall be incremented for the next pass:

$$\text{ARG\_LAT} = \text{ARG\_LAT} + \text{ARG\_LAT\_INCR}$$

A potential implementation is shown in the LINE\_COMP flowchart of Figure B.5.26-13.

#### **B.5.26.9.6 Argument of Latitude Lower Limit (ARG\_LAT\_LWR\_LMT)**

This section specifies requirements for the argument of latitude lower limit (ARG\_LAT\_LWR\_LMT) function. This function takes as input argument a main plot / inset window indicator (PLOT). It returns argument of latitude lower limit (ARG\_LAT\_LL) at the entry point of the ground track line to the specified plot region. ARG\_LAT\_LWR\_LMT also uses the global parameters inclination type index AB\_INCL\_IND (1 = high and 2 = low) and map set index AB\_DISP\_IND (1 = first map set and 2 = second map set).

The argument of latitude lower limit function assumes the entry point for a ground track line to a plot region is along the bottom edge, left edge, or top edge of the region. Edges of the corner of the inset window are also included.

1. The argument of latitude lower limit (ARG\_LAT\_LWR\_LMT) function requirements shall be executed on demand when called.
2. The geodetic latitude variable LAT shall be initialized to the lower limit of latitude at the bottom edge of the specified plot region:

LAT = AB\_MAP\_LAT\_LL(AB\_INCL\_IND, AB\_DISP\_IND, PLOT)

3. The argument of latitude second quadrant flag shall be set OFF and the LON\_LINE utility function called to return the longitude of the ground track line at the value of LAT:

ARG\_LAT\_2\_QUADRANT = OFF  
LON = LON\_LINE(LAT)

4. If NO\_POINT = OFF and  $LON \leq AB\_MAP\_LON\_UL(AB\_INCL\_IND, AB\_DISP\_IND, PLOT)$  and  $LON \geq AB\_MAP\_LON\_LL(AB\_INCL\_IND, AB\_DISP\_IND, PLOT)$  (i.e., the ground track line enters at the bottom edge of the plot region), the ARG\_LAT\_LINE utility function shall be called to return the argument of latitude lower limit with LON as input argument:

ARG\_LAT\_LL = ARG\_LAT\_LINE(LON)

5. Otherwise (i.e., the ground track line does not intersect the bottom edge of the plot region), the following steps shall be executed:

- 5.1 LON shall be set to the longitude lower limit at the left edge of the plot region:

LON = AB\_MAP\_LON\_LL(AB\_INCL\_IND, AB\_DISP\_IND, PLOT)

- 5.2 The ARG\_LAT\_LINE utility function shall be called to return the argument of latitude of the ground track line for LON:

ARG\_LAT = ARG\_LAT\_LINE(LON)

- 5.3 The LAT\_LINE utility function shall be called to return the geodetic latitude LAT of the ground track line for ARG\_LAT:

LAT = LAT\_LINE(ARG\_LAT)

- 5.4 If  $LAT \leq AB\_MAP\_LAT\_LL(AB\_INCL\_IND, AB\_DISP\_IND, PLOT)$ , so that the ground track line does not intersect the left edge of the plot region, BLANK\_FLAG shall be set ON to blank the line.

- 5.5 Otherwise ( $LAT \geq AB\_MAP\_LAT\_LL(AB\_INCL\_IND, AB\_DISP\_IND, PLOT)$ ), the following steps shall be executed:

- 5.5.1 If PLOT = 1 (main plot) and  $LAT \leq AB\_MAP\_LAT\_UL(AB\_INCL\_IND, AB\_DISP\_IND, PLOT)$ , or PLOT = 2 (inset) and  $LAT \leq AB\_INSET\_CORNER\_LAT\_UL(AB\_INCL\_IND, AB\_DISP\_IND)$  (i.e., the ground track line enters the left edge of the plot region), ARG\_LAT\_LL shall be set to ARG\_LAT computed in 5.2.

5.5.2 Otherwise, the following steps shall be executed:

5.5.2.1 If PLOT = 2 (inset), the following steps shall be executed:

5.5.2.1.1 LON shall be set to the longitude lower limit at the left edge of the inset corner:

$$\text{LON} = \text{AB\_INSET\_CORNER\_LON\_LL}(\text{AB\_INCL\_IND}, \text{AB\_DISP\_IND})$$

5.5.2.1.2 The ARG\_LAT\_LINE utility function shall be called to return the argument of latitude of the ground track line for LON:

$$\text{ARG\_LAT} = \text{ARG\_LAT\_LINE}(\text{LON})$$

5.5.2.1.3 The LAT\_LINE utility function shall be called to return the geodetic latitude LAT of the ground track line for ARG\_LAT:

$$\text{LAT} = \text{LAT\_LINE}(\text{ARG\_LAT})$$

5.5.2.1.4 If  $\text{LAT} \leq \text{AB\_MAP\_LAT\_UL}(\text{AB\_INCL\_IND}, \text{AB\_DISP\_IND}, \text{PLOT})$  and  $\text{LAT} \geq \text{AB\_INSET\_CORNER\_LAT\_UL}(\text{AB\_INCL\_IND}, \text{AB\_DISP\_IND})$ , so that the ground track line intersects the left edge of the inset corner, ARG\_LAT\_LL shall be set to ARG\_LAT computed in 5.5.2.1.2.

5.5.2.1.5 Otherwise ( $\text{LAT} > \text{AB\_MAP\_LAT\_UL}(\text{AB\_INCL\_IND}, \text{AB\_DISP\_IND}, \text{PLOT})$  or  $\text{LAT} < \text{AB\_INSET\_CORNER\_LAT\_UL}(\text{AB\_INCL\_IND}, \text{AB\_DISP\_IND})$ ), the CHECK\_TOP\_EDGE function requirements of Section B.5.26.9.6.1 shall be executed.

5.5.2.2 Otherwise (PLOT = 1 (main plot)), the CHECK\_TOP\_EDGE function requirements of Section B.5.26.9.6.1 shall be executed.

#### **B.5.26.9.6.1 CHECK\_TOP\_EDGE Function**

The CHECK\_TOP\_EDGE function determines whether the ground track line enters the plot region along the top edge (exclusive of the top of the inset corner), and if so computes the argument of latitude lower limit.

1. The CHECK\_TOP\_EDGE function requirements shall be executed on demand when called.
2. LAT shall be set to the latitude upper limit of the plot region:

$$\text{LAT} = \text{AB\_MAP\_LAT\_UL}(\text{AB\_INCL\_IND}, \text{AB\_DISP\_IND}, \text{PLOT})$$

3. The argument of latitude second quadrant flag shall be set ON and the LON\_LINE utility function called to return the longitude of the ground track line at the value of LAT:

ARG\_LAT\_2\_QUADRANT = ON  
LON = LON\_LINE(LAT)

4. If the NO\_POINT flag returned by LON\_LINE is ON (indicating the ground track line does not intersect the top edge of the plot region), the value of PLOT is checked.
  - 4.1 If PLOT = 2 (inset) the CHECK\_TOP\_INSET\_CORNER function requirements of Section B.5.26.9.6.2 shall be executed.
  - 4.2 Otherwise (PLOT = 1 (main plot)), BLANK\_FLAG shall be set ON to blank the line.
5. Otherwise (NO\_POINT = OFF), the following steps shall be executed:
  - 5.1 If  $LON > AB\_MAP\_LON\_UL(AB\_INCL\_IND, AB\_DISP\_IND, PLOT)$  (i.e., LON exceeds the longitude upper limit at the right edge of the plot region, so that the line does not intersect the plot region), BLANK\_FLAG shall be set ON to blank the line.
  - 5.2 Otherwise ( $LON \leq AB\_MAP\_LON\_UL(AB\_INCL\_IND, AB\_DISP\_IND, PLOT)$ ), the following steps shall be executed:
    - 5.2.1 If PLOT = 1 (main plot) and  $LON \geq (AB\_MAP\_LON\_LL(AB\_INCL\_IND, AB\_DISP\_IND, PLOT),$  or PLOT = 2 (inset) and  $LON \geq AB\_INSET\_CORNER\_LON\_LL(AB\_INCL\_IND, AB\_DISP\_IND)$ , i.e., the ground track line enters the top edge of the plot region, the ARG\_LAT\_LINE utility function shall be called to return the argument of latitude lower limit of the ground track line for LON:  
  
$$ARG\_LAT\_LL = ARG\_LAT\_LINE(LON)$$
    - 5.2.2 Otherwise, the following steps shall be executed:
      - 5.2.2.1 If PLOT = 1 (main plot), LON is less than the longitude lower limit at the left edge of the plot region, so that the line does not intersect the plot region, then BLANK\_FLAG shall be set ON to blank the line.
      - 5.2.2.2 Otherwise (PLOT = 2 (inset)), the CHECK\_TOP\_INSET\_CORNER function requirements of Section B.5.26.9.6.2 shall be executed.

Note: The otherwise condition of requirement 5.2.2 is equivalent to either: (1) PLOT = 1 (main plot) and LON of the ground track line is less than the longitude lower limit at the left edge of the plot region, or (2) PLOT = 2 (inset) and LON is less than the longitude lower limit at the inset corner. In the former case, the bottom, left, and top edges of the plot region have been checked at this point with no point of intersection found. Therefore, the blanking flag is set on. In the latter case, the ground track line could enter the top of the inset corner, so the CHECK\_TOP\_INSET\_CORNER function is executed.

**B.5.26.9.6.2 CHECK\_TOP\_INSET\_CORNER Function**

The CHECK\_TOP\_INSET\_CORNER function determines whether the ground track line enters the plot region along the top edge of the inset corner, and if so computes the argument of latitude lower limit.

1. The CHECK\_TOP\_INSET\_CORNER function requirements shall be executed on demand when called.
2. LAT shall be set to the latitude upper limit at the top edge of the inset corner:

$$\text{LAT} = \text{AB\_INSET\_CORNER\_LAT\_UL}(\text{AB\_INCL\_IND}, \text{AB\_DISP\_IND})$$

3. The LON\_LINE utility function called to return the longitude of the ground track line at the value of LAT (ARG\_LAT\_2\_QUADRANT has already been set ON):

$$\text{LON} = \text{LON\_LINE}(\text{LAT})$$

4. If NO\_POINT = OFF and  $\text{LON} \geq \text{AB\_MAP\_LON\_LL}(\text{AB\_INCL\_IND}, \text{AB\_DISP\_IND}, \text{PLOT})$  and  $\text{LON} \leq \text{AB\_INSET\_CORNER\_LON\_LL}(\text{AB\_INCL\_IND}, \text{AB\_DISP\_IND})$  (i.e., the ground track line enters the top edge of the inset corner), the ARG\_LAT\_LINE utility function shall be called to return the argument of latitude lower limit of the ground track line for LON:

$$\text{ARG\_LAT\_LL} = \text{ARG\_LAT\_LINE}(\text{LON})$$

5. Otherwise, BLANK\_FLAG shall be set ON to blank the line.

A potential implementation is shown in the ARG\_LAT\_LWR\_LMT flowchart of Figure B.5.26-14.

**B.5.26.9.7 Argument of Latitude Upper Limit (ARG\_LAT\_UPR\_LMT)**

This section specifies requirements for the argument of latitude upper limit (ARG\_LAT\_UPR\_LMT) function. This function takes as input argument a main plot / inset window indicator (PLOT). It returns argument of latitude upper limit (ARG\_LAT\_UL) at the exit point of the ground track line from the specified plot region. ARG\_LAT\_UPR\_LMT also uses the global parameters inclination type indicator AB\_INCL\_IND (1 = high and 2 = low) and map set indicator AB\_DISP\_IND (1 = first map set and 2 = second map set).

The argument of latitude upper limit function assumes entry point for the ground track line has already been established in earlier computations. It also assumes the exit point for a ground track line from a plot region is along the top edge, right edge, or bottom edge of the region.

1. The argument of latitude upper limit (ARG\_LAT\_UPR\_LMT) function requirements shall be executed on demand when called.

2. The geodetic latitude variable LAT shall be initialized to the upper limit of latitude at the top edge of the specified plot region:

LAT = AB\_MAP\_LAT\_UL(AB\_INCL\_IND, AB\_DISP\_IND, PLOT)

3. The argument of latitude second quadrant flag shall be set OFF and the LON\_LINE utility function shall be called to return the longitude of the ground track line at the value of LAT:

ARG\_LAT\_2\_QUADRANT = OFF  
LON = LON\_LINE(LAT)

4. If  $LON \leq AB\_MAP\_LON\_UL(AB\_INCL\_IND, AB\_DISP\_IND, PLOT)$ , and if  $PLOT = 1$  (main plot) and  $LON \geq AB\_MAP\_LON\_LL(AB\_INCL\_IND, AB\_DISP\_IND, PLOT)$ , or  $PLOT = 2$  (inset) and  $LON \geq AB\_INSET\_CORNER\_LON\_LL(AB\_INCL\_IND, AB\_DISP\_IND)$ , and if  $NO\_POINT = OFF$ , i.e., the ground track line exits the top of the plot region, the ARG\_LAT\_LINE utility function shall be called to return the argument of latitude upper limit of the ground track line for LON:

ARG\_LAT\_UL = ARG\_LAT\_LINE(LON)

5. Otherwise (the ground track line does not exit the top of the plot region, and hence must exit the right edge or bottom), the following steps shall be executed:

- 5.1 LON shall be set to the longitude upper limit at the right edge of the plot region:

LON = AB\_MAP\_LON\_UL(AB\_INCL\_IND, AB\_DISP\_IND, PLOT)

- 5.2 The ARG\_LAT\_LINE utility function shall be called to return the argument of latitude of the ground track line for LON:

ARG\_LAT = ARG\_LAT\_LINE(LON)

- 5.3 The LAT\_LINE utility function shall be called to return the geodetic latitude LAT of the ground track line for ARG\_LAT:

LAT = LAT\_LINE(ARG\_LAT)

- 5.4 If  $LAT \geq AB\_MAP\_LAT\_LL(AB\_INCL\_IND, AB\_DISP\_IND, PLOT)$ , so that the ground track line intersects the right edge of the plot region, ARG\_LAT\_UL shall be set to ARG\_LAT computed in 5.2.

- 5.5 Otherwise ( $LAT < AB\_MAP\_LAT\_LL(AB\_INCL\_IND, AB\_DISP\_IND, PLOT)$ ), i.e., the ground track line does not exit the right edge of the plot region, and hence must exit the bottom), the following steps shall be executed:

- 5.5.1 The geodetic latitude variable LAT shall be set to the lower limit of latitude at the bottom edge of the specified plot region:

$$\text{LAT} = \text{AB\_MAP\_LAT\_LL}(\text{AB\_INCL\_IND}, \text{AB\_DISP\_IND}, \text{PLOT})$$

- 5.5.2 The argument of latitude second quadrant flag shall be set ON and the LON\_LINE utility function shall be called to return the longitude of the ground track line at the value of LAT:

$$\begin{aligned} \text{ARG\_LAT\_2\_QUADRANT} &= \text{ON} \\ \text{LON} &= \text{LON\_LINE}(\text{LAT}) \end{aligned}$$

- 5.5.3 The ARG\_LAT\_LINE utility function shall be called to return the argument of latitude upper limit of the ground track line for LON:

$$\text{ARG\_LAT\_UL} = \text{ARG\_LAT\_LINE}(\text{LON})$$

A potential implementation is shown in the ARG\_LAT\_UPR\_LMT flowchart of Figure B.5.26-15.

### **B.5.26.9.8 Ground Track Utility Functions**

This section specifies requirements for ground tracks utility functions callable by other ground track computations.

#### **B.5.26.9.8.1 LON\_LINE**

The LON\_LINE function takes as input argument geodetic latitude (LAT) and returns the corresponding longitude (LON) for the ground track line. It also sets a global no point flag (NO\_POINT). LON\_LINE uses the global parameters COS\_INCL, LON\_ASC\_NODE, and ARG\_LAT\_2\_QUADRANT.

For Ascent Bearing Display plot regions where the ground track line crosses the lower or upper limit latitude limits, the line is ascending to its maximum value equal to the inclination angle of the plane from which it is computed. In this case the azimuth, defined as the angle between north and the tangent to the ground track line at the input longitude, is between zero and 90 degrees.

1. LON\_LINE function requirements shall be executed on demand when called.
2. Geocentric latitude and its cosine shall be computed as follows:

$$\begin{aligned} \text{LAT\_C} &= \text{ARCTAN}(\text{ELLIPT\_FAC} * \text{TAN}(\text{LAT})) \\ \text{COS\_LAT\_C} &= \text{COS}(\text{LAT\_C}) \end{aligned}$$

3. If  $\text{COS\_INCL} \geq \text{COS\_LAT\_C}$  (i.e., the geocentric latitude is greater than or equal to the inclination angle of the plane whose ground track line is being computed, so the line does not cross that latitude), the no-point flag shall be set ON:



NO\_POINT = ON

4. Otherwise ( $\text{COS\_INCL} \leq \text{COS\_LAT\_C}$ ), the following steps shall be executed:

a. Sine of the azimuth shall be computed and the no-point flag set OFF:

```
SIN_AZIMUTH = COS_INCL / COS_LAT_C  
NO_POINT = OFF
```

b. Cosine of the azimuth shall be calculated:

```
COS_AZIMUTH = SQRT(1 - SIN_AZIMUTH2)
```

c. If the argument of latitude second quadrant flag ( $\text{ARG\_LAT\_2\_QUADRANT}$ ) is ON, the sign of  $\text{COS\_AZIMUTH}$  shall be reversed:

```
IF ARG_LAT_2_QUADRANT = ON THEN  
    COS_AZIMUTH = - COS_AZIMUTH  
ENDIF
```

d. Longitude of the ground track line corresponding to LAT shall be computed:

```
LON = LON_ASC_NODE + ARCTAN2(SIN(LAT_C) * SIN_AZIMUTH,  
                             COS_AZIMUTH)
```

e. LON shall be resolved to the range  $\pm \text{PI}$  as follows:

```
IF ABS(LON) > PI THEN  
    LON = LON - 2 * PI * SIGN(LON)  
ENDIF
```

A potential implementation is shown in the LON\_LINE flowchart of Figure B.5.26-16.

#### **B.5.26.9.8.2 ARG\_LAT\_LINE**

The ARG\_LAT\_LINE function takes as input argument longitude (LON) and returns the corresponding argument of latitude (ARG\_LAT) for the ground track line. ARG\_LAT\_LINE uses the global parameters COS\_INCL and LON\_ASC\_NODE.

1. ARG\_LAT\_LINE function requirements shall be executed on demand when called.
2. The difference between longitude and the longitude of ascending node for the plane whose ground track line is being computed shall be calculated:

$$\text{DEL\_LON} = \text{LON} - \text{LON\_ASC\_NODE}$$

3. Argument of latitude shall be computed:

$$\text{ARG\_LAT} = \text{ARCTAN2}(\text{SIN}(\text{DEL\_LON}) / \text{COS\_INCL}, \text{COS}(\text{DEL\_LON}))$$

A potential implementation is shown in the ARG\_LAT\_LINE flowchart of Figure B.5.26-17.

### B.5.26.9.8.3 LAT\_LINE

The LAT\_LINE function takes as input argument the argument of latitude (ARG\_LAT) and returns the corresponding geodetic latitude (LAT) for the ground track line. LAT\_LINE uses the global parameter SIN\_INCL.

1. LAT\_LINE function requirements shall be executed on demand when called.
2. Geocentric latitude shall be computed as follows:

$$\text{LAT\_C} = \text{ARCSIN}(\text{SIN\_INCL} * \text{SIN}(\text{ARG\_LAT}))$$

3. Geodetic latitude shall be computed:

$$\text{LAT} = \text{ARCTAN}(\text{TAN}(\text{LAT\_C}) / \text{ELLIPT\_FAC})$$

A potential implementation is shown in the LAT\_LINE flowchart of Figure B.5.26-18.

### B.5.26.9.8.4 LON\_LINE\_INCR

The LON\_LINE\_INCR function takes as input argument the argument of latitude (ARG\_LAT) and returns the corresponding longitude (LON) for the ground track line. LON\_LINE\_INCR uses the global parameters COS\_INCL and LON\_ASC\_NODE.

1. LON\_LINE\_INCR function requirements shall be executed on demand when called.
2. Longitude shall be computed:

$$\text{LON} = \text{LON\_ASC\_NODE} + \text{ARCTAN2}(\text{SIN}(\text{ARG\_LAT}) * \text{COS\_INCL}, \text{COS}(\text{ARG\_LAT}))$$

3. LON shall be resolved to the range  $\pm \text{PI}$  as follows:

```
IF ABS(LON) > PI THEN
    LON = LON - 2 * PI * SIGN(LON)
ENDIF
```

A potential implementation is shown in the LON\_LINE\_INCR flowchart of Figure B.5.26-19.

#### **B.5.26.10 Inertial Heading Arrow Computation (INERTIAL\_HEADING\_ARROW\_COMP)**

This section specifies requirements to compute the display angle in degrees for the inertial heading arrow. An inertial heading of zero (north) is represented by the arrow pointing up. A positive inertial heading rotates the arrow clockwise.

1. Inertial heading arrow computation requirements shall be executed in MM 102 through MM 104 and MM 601 when the Ascent Bearing Display is present on an MDU.
2. Inertial heading arrow computation requirements shall be executed at 0.52 Hz.
3. The earth-fixed vector normal to the plane containing the inertial position and velocity vectors shall be computed:

$$\bar{N}_{EG\_IY} = \bar{R}_{AVGG} \times \bar{V}_{AVGG}$$

$$\bar{V}_{NORM} = M\_TEMP\_TXPOS \bar{N}_{EG\_IY}$$

4. The inertial heading arrow angle shall be computed:

$$AB\_HDG\_ARROW\_ANG\_S = \text{ARCTAN2}(V\_NORM_3 * R\_S\_MAG, \\ (V\_NORM_1 * R\_AVGG\_EF_2 - V\_NORM_2 * R\_AVGG\_EF_1)) * \text{DEG\_PER\_RAD}$$

5. If the inertial heading angle is negative, the angle shall be converted to a positive angle by adding 360 degrees.

A potential implementation is shown in the INERTIAL\_HEADING\_ARROW\_COMP flowchart of Figure B.5.26-20.

#### **B.5.26.11 Shuttle Steering Angle Computation (SHUTTLE\_SYMBOL\_STEER\_ANGLE)**

This section specifies requirements to compute the display angle in degrees to rotate the Shuttle symbol to represent yaw steering. A zero display angle shows the Shuttle symbol pointing up. A positive display angle rotates the Shuttle symbol clockwise.

1. Shuttle steering angle computation requirements shall be executed in MM 102 through MM 104 and MM 601 when the Ascent Bearing Display is present on an MDU.
2. Shuttle steering angle computation requirements shall be executed at 0.52 Hz.
3. If the Major Mode is 601, then the display angle shall be set to the magnetic heading in degrees:

$$AB\_DISP\_ANG\_S = \text{PSI\_HSIMV} * \text{DEG\_PER\_RAD}$$

4. If the Major Mode is not 601 and the main plot target insertion line blanking flag (BLANK\_TGT\_INS\_LN\_MN) is ON, then the display angle shall be zeroed:

$$AB\_DISP\_ANG\_S = 0.0$$

5. If the Major Mode is not 601 and the main plot target insertion line blanking flag (BLANK\_TGT\_INS\_LN\_MN) is OFF, then the display angle shall be computed as follows:

- a. The argument of latitude shall be computed from the longitude of the Shuttle and the longitude of the target ascending node:

$$\begin{aligned} DEL\_LON &= LON\_S - LON\_ASC\_NODE\_TGT \\ COS\_DEL\_LON &= COS(DEL\_LON) \\ ARG\_LAT &= ARCTAN2(SIN(DEL\_LON) / COS\_INCL\_TGT, COS\_DEL\_LON) \end{aligned}$$

- b. The Shuttle geocentric latitude shall be computed:

$$\begin{aligned} SIN\_LAT\_C &= SIN\_INCL\_TGT * SIN(ARG\_LAT) \\ LAT\_C &= ARCSIN(SIN\_LAT\_C) \end{aligned}$$

- c. The inverse of the slope of the target insertion line at the Shuttle's longitude shall be computed:

$$\begin{aligned} GEOD\_FAC &= ELLIPT\_FAC + SIN\_LAT\_C^2 * GEOD\_ELLIPT\_FAC \\ INV\_SLOPE\_ANG &= ARCTAN2(COS\_INCL\_TGT * GEOD\_FAC, \\ &\quad (SIN\_INCL\_TGT * (COS(LAT\_C))^2 * COS\_DEL\_LON)) \end{aligned}$$

- d. The display angle shall be computed by combining the inverse target insertion line slope angle and the HSI yaw command:

$$AB\_DISP\_ANG\_S = (INV\_SLOPE\_ANG + YAW\_IY) * DEG\_PER\_RAD$$

A potential implementation is shown in the SHUTTLE\_SYMBOL\_STEER\_ANGLE flowchart of Figure B.5.26-21.

#### **B.5.26.12 Delta Azimuth Computations (DELAZ\_COMPS\_ASC)**

This section specifies requirements to compute heading error (delta azimuth) of the Shuttle with respect to the selected landing site and each of the alternate sites.

1. Delta azimuth computation requirements shall be executed in MM 102 through MM 104 and MM 601 when REL\_VEL\_MAG > 200 fps and the Ascent Bearing Display is present on an MDU.
2. Delta azimuth computation requirements shall be executed at 0.52 Hz.
3. The earth-fixed relative velocity shall be computed:

$$\bar{V}_{RHO\_S\_EF} = M\_TEMP\_TXPOS \bar{V}_{RHO}$$

- The vector normal to the plane containing the earth-fixed position and relative velocity vectors shall be computed:

$$\bar{V}_{NORM} = \bar{R}_{AVGG\_EF} \times \bar{V}_{RHO\_S\_EF}$$

- The earth-fixed heading of the Shuttle shall be computed:

$$PSI = ARCTAN2(V\_NORM_3 * R\_S\_MAG, \\ V\_NORM_1 * R\_AVGG\_EF_2 - V\_NORM_2 * R\_AVGG\_EF_1)$$

- The delta azimuth to the selected landing site shall be computed using the DELAZ\_COMP function (defined below):

CALL: DELAZ\_COMP  
INLIST:  $\bar{R}_{LS\_EF}$   
OUTLIST: DELAZ\_SEL

- For each of the two alternate sites (I), if a site has been selected ( $ALT\_SITE\_INDEX(I) \neq 0$ ) then the delta azimuth to that site shall be computed using DELAZ\_COMP:

CALL: DELAZ\_COMP  
INLIST:  $\bar{R}_{EF\_ALT}(I)$   
OUTLIST: DELAZ\_ALT(I)

A potential implementation is shown in the DELAZ\_COMPS\_ASC flowchart of Figure B.5.26-22.

### DELAZ\_COMP Function

The DELAZ\_COMP function takes as input argument an earth fixed landing site vector ( $\bar{R}_{LDG\_SITE\_EF}$ ) and returns the delta azimuth (DELAZ) of the Shuttle with respect to the site. Vehicle earth fixed position vector ( $\bar{R}_{AVGG\_EF}$ ), position vector magnitude (R\_S\_MAG), and earth relative heading (PSI) are global parameters used by DELAZ\_COMP.

- DELAZ\_COMP function requirements shall be executed on demand when called.
- The unit vector normal to the plane containing the earth-fixed Shuttle and site position vectors shall be computed:

$$\bar{V}_{NORM} = \bar{R}_{AVGG\_EF} \times \bar{R}_{LDG\_SITE\_EF}$$

- The bearing from the Shuttle position to the site shall be computed:

$$BEAR\_VEH = ARCTAN2(V\_NORM_3 * R\_S\_MAG, \\ V\_NORM_1 * R\_AVGG\_EF_2 - V\_NORM_2 * R\_AVGG\_EF_1)$$

4. The delta azimuth to the site shall be computed:

$$\text{DELAZ} = \text{PSI} - \text{BEAR\_VEH}$$

5. If  $\text{ABS}(\text{DELAZ}) > \text{PI}$ , then DELAZ shall be adjusted to be between  $-\text{PI}$  and  $+\text{PI}$ :

$$\text{DELAZ} = \text{DELAZ} - 2 * \text{PI} * \text{SIGN}(\text{DELAZ})$$

A potential implementation is shown in the DELAZ\_COMP flowchart of Figure B.5.26-23.

### **B.5.26.13 TAL Crossrange Circle Computation (TAL\_CRNG\_RADIUS\_COMP)**

This section specifies requirements to calculate the radius in AUs of the TAL crossrange circle displayed around the selected TAL site in the inset window of the second map set on the Ascent Bearing display. The circle is displayed when a TAL abort has been declared.

1. TAL crossrange circle requirements of steps 3 through 5 shall be executed when  $\text{TAL\_ABORT\_DECLARED} = \text{ON}$  and  $\text{TAL\_DECL\_FRST\_PASS} = \text{OFF}$  and  $\text{AB\_DISP\_IND} = 2$  (Map Set 2), and step 6 otherwise.
2. TAL crossrange circle requirements shall be executed at 0.52 Hz.
3. TAL crossrange circle shall execute the CHECK\_CONV\_INSET\_DISP utility with selected runway latitude and longitude as inputs to return the X and Y screen location for the center of the crossrange circle and the BLANK\_TAL\_CRNG\_CIRCLE discrete indicating whether the center of the circle resides in the inset window.

CALL: CHECK\_CONV\_INSET\_DISP

INLIST: LAT\_RW, LON\_RW

OUTLIST: TAL\_CRNG\_CTR\_X, TAL\_CRNG\_CTR\_Y, BLANK\_TAL\_CRNG\_CIRCLE

4. IF  $\text{BLANK\_TAL\_CRNG\_CIRCLE} = \text{ON}$  then the TAL crossrange circle radius shall be set as follows:

$$\text{TAL\_CRNG\_RADIUS} = 0$$

5. IF  $\text{BLANK\_TAL\_CRNG\_CIRCLE} = \text{OFF}$  then the following computations shall be performed:

- a. The lower bound on delta latitude  $\text{TAL\_CRNG\_DEL\_LAT}$  corresponding to the maximum crossrange CRMAX for the selected TAL site shall be computed:

$$\text{TAL\_CRNG\_DEL\_LAT} = (\text{CR\_MAX} / \text{EARTH\_RADIUS\_EQUATOR}) * \text{ELLIPT\_FAC}$$

- b. TAL\_CRNG\_DEL\_LAT shall be converted to AUs to determine TAL crossrange circle radius:

$$\text{TAL\_CRNG\_RADIUS} = \text{TAL\_CRNG\_DEL\_LAT} * \\ \text{AB\_Y\_SC\_FACT}(\text{AB\_INCL\_IND}, 2, 2)$$

6. IF TAL\_ABORT\_DECLARED = OFF or TAL\_DECL\_FRST\_PASS = ON or AB\_DISP\_IND is not equal to 2, then BLANK\_TAL\_CRNG\_CIRCLE shall be set ON.

A potential implementation is shown in the TAL\_CRNG\_RADIUS\_COMP flowchart of Figure B.5.26-24.

#### B.5.26.14 Utility Functions

This section specifies requirements for Ascent Bearing utility functions callable by other processing.

##### B.5.26.14.1 Main Display Check and Convert to Display Coordinates (CHECK\_CONV\_MAIN\_DISP)

The Main Display Check and Convert to Display Coordinates Utility takes as inputs longitude (LON) and latitude (LAT) in radians and converts them to POS\_X and POS\_Y in display coordinates (AUs) for the appropriate main plot (as opposed to an inset window). If the longitude and latitude represent a position out of the main plot region, off-screen coordinates are returned. An off-display (OFF\_DISPLAY) indicator is also returned.

1. The Main Display Check and Convert to Display Coordinates Utility shall execute on demand when called.
2. Display coordinate position variables shall be initialized off-display and the off-display indicator shall be initialized to ON.

POS\_X = -512 (Off Display)

POS\_Y = -400 (Off Display)

OFF\_DISPLAY = ON

3. Input latitude and longitude in radians shall be checked against plot limits and converted to display AU coordinates as follows:

```
IF (LON ≥ AB_MAP_LON_LL(AB_INCL_IND, AB_DISP_IND, 1)) AND  
(LON ≤ AB_MAP_LON_UL(AB_INCL_IND, AB_DISP_IND, 1)) AND  
(LAT ≥ AB_MAP_LAT_LL(AB_INCL_IND, AB_DISP_IND, 1)) AND  
(LAT ≤ AB_MAP_LAT_UL(AB_INCL_IND, AB_DISP_IND, 1)) THEN  
    POS_X = AB_X_SC_FACT(AB_INCL_IND, AB_DISP_IND, 1) * LON  
            + AB_X_BIAS(AB_INCL_IND, AB_DISP_IND, 1)  
    POS_Y = AB_Y_SC_FACT(AB_INCL_IND, AB_DISP_IND, 1) * LAT  
            + AB_Y_BIAS(AB_INCL_IND, AB_DISP_IND, 1)  
    OFF_DISPLAY = OFF  
ENDIF
```

A potential implementation is shown in the CHECK\_CONV\_MAIN\_DISP flowchart of Figure B.5.26-25.

#### **B.5.26.14.2 Inset Window Check and Convert to Display Coordinates (CHECK\_CONV\_INSET\_DISP)**

The Inset Window Check and Convert to Display Coordinates Utility takes as inputs longitude (LON) and latitude (LAT) in radians and converts them to POS\_X and POS\_Y in display coordinates (AUs) for the appropriate inset window (as opposed to the main plot). If the longitude and latitude represent a position out of the inset window, off-screen coordinates are returned. An off-display (OFF\_DISPLAY) indicator is also returned.

1. The Inset Window Check and Convert to Display Coordinates Utility shall execute on demand when called.
2. Display coordinate position variables shall be initialized off-display and the off-display indicator shall be initialized to ON.

```
POS_X = -512 (Off Display)
POS_Y = -400 (Off Display)
OFF_DISPLAY = ON
```

3. Input latitude and longitude in radians shall be checked against inset window limits and converted to display AU coordinates as follows:

```
IF (LON ≥ AB_MAP_LON_LL(AB_INCL_IND, AB_DISP_IND, 2)) AND
(LON ≤ AB_MAP_LON_UL(AB_INCL_IND, AB_DISP_IND, 2)) AND
(LAT ≥ AB_MAP_LAT_LL(AB_INCL_IND, AB_DISP_IND, 2)) AND
(LAT ≤ AB_MAP_LAT_UL(AB_INCL_IND, AB_DISP_IND, 2)) THEN
    IF (LAT ≤ AB_INSET_CORNER_LAT_UL(AB_INCL_IND, AB_DISP_IND)) OR
    (LON ≥ AB_INSET_CORNER_LON_LL(AB_INCL_IND, AB_DISP_IND)) THEN
        POS_X = AB_X_SC_FACT(AB_INCL_IND, AB_DISP_IND, 2) * LON
            + AB_X_BIAS(AB_INCL_IND, AB_DISP_IND, 2)
        POS_Y = AB_Y_SC_FACT(AB_INCL_IND, AB_DISP_IND, 2) * LAT
            + AB_Y_BIAS(AB_INCL_IND, AB_DISP_IND, 2)
        OFF_DISPLAY = OFF
    ENDIF
ENDIF
ENDIF
```

A potential implementation is shown in the CHECK\_CONV\_INSET\_DISP flowchart of Figure B.5.26-26.

#### **B.5.26.14.3 Main Display Park and Convert to Display Coordinates (PARK\_CONV\_MAIN\_DISP)**

The Main Display Park and Convert to Display Coordinates Utility takes as inputs longitude (LON) and latitude (LAT) in radians and converts them to POS\_X and POS\_Y in display coordinates (AUs) for the appropriate main plot. If the longitude and/or latitude is out of the main plot region, the longitude and/or



latitude is adjusted to bring the value to the nearest limit. Therefore, an adjusted value will convert to a display location at an edge or corner of the display region.

1. The Main Display Park and Convert to Display Coordinates Utility shall execute on demand when called.
2. Input longitude shall be checked against its plot limits and adjusted to a limit if necessary:

```
IF LON > AB_MAP_LON_UL(AB_INCL_IND, AB_DISP_IND, 1) THEN
    LON = AB_MAP_LON_UL(AB_INCL_IND, AB_DISP_IND, 1)
ELSE
    IF LON < AB_MAP_LON_LL(AB_INCL_IND, AB_DISP_IND, 1) THEN
        LON = AB_MAP_LON_LL(AB_INCL_IND, AB_DISP_IND, 1)
    ENDIF
ENDIF
```

3. Input latitude shall be checked against its plot limits and adjusted to a limit if necessary:

```
IF LAT > AB_MAP_LAT_UL(AB_INCL_IND, AB_DISP_IND, 1) THEN
    LAT = AB_MAP_LAT_UL(AB_INCL_IND, AB_DISP_IND, 1)
ELSE
    IF LAT < AB_MAP_LAT_LL(AB_INCL_IND, AB_DISP_IND, 1) THEN
        LAT = AB_MAP_LAT_LL(AB_INCL_IND, AB_DISP_IND, 1)
    ENDIF
ENDIF
```

4. Adjusted latitude and longitude in radians shall be converted to display AU coordinates as follows:

```
POS_X = AB_X_SC_FACT(AB_INCL_IND, AB_DISP_IND, 1) * LON
        + AB_X_BIAS(AB_INCL_IND, AB_DISP_IND, 1)
POS_Y = AB_Y_SC_FACT(AB_INCL_IND, AB_DISP_IND, 1) * LAT
        + AB_Y_BIAS(AB_INCL_IND, AB_DISP_IND, 1)
```

A potential implementation is shown in the PARK\_CONV\_MAIN\_DISP flowchart of Figure B.5.26-27.

### **B.5.26.15 Constraints and Assumptions**

1. The values of ALT\_SITE\_INDEX(I), I = 1 to 2, shall be preserved across the OPS1 to OPS3 transition.
2. Elapsed time of execution of the landing sites initialization requirements of Section B.5.26.2 shall not exceed four seconds.

Note: Because of the significant amount of processing for landing sites initialization, it is expected the function will be implemented as a low priority task. The elapsed time requirement is intended to allow that implementation without unduly sacrificing display response.

3. Requirements for the following coordinate transformation and reference ellipsoid functions used by the Ascent Bearing specialist function are specified in Section 4.4 of the Ascent/RTLS Navigation FSSR, STS 83-0005:

EARTH\_FIXED\_TO\_M50\_COORD  
GEODETTIC\_TO\_EF  
EF\_TO\_GEODETTIC  
H\_ELLIPSOID

4. To provide divide by zero protection for Ascent Bearing Specialist Function computations, the implied inclination angle from which SIN\_INCL, COS\_INCL, SIN\_INCL\_TGT, and COS\_INCL\_TGT are derived must be restricted to the open interval from zero to 90 degrees, exclusive of zero and 90. This constraint implies constraints on the values of the I-Load target insertion plane vector IYD. For practical purposes, the implied inclination angle should be restricted to a narrower range (e.g., 28.45 to 57 degrees).
5. Requirements for the following coordinate transformation function used by the Ascent Bearing specialist function are specified in Section 4.7.13 of the Ascent Flight Control FSSR Volume 1, STS 83-0008V1:

QUAT\_XFORM

6. The Instantaneous Impact Point (IIP) algorithm computes a ballistic (gravitational force only) impact point with a spherical earth model, based on Kepler's equation. To account for aerodynamic effects, the range-to-impact and time-of-impact of the Kepler algorithm's solution can be scaled by the I-Loads IIP\_AERO\_R\_FACT and IIP\_AERO\_T\_FACT, respectively. Scaling occurs when the values of both I-Loads >1.0.

Instantaneous Impact Point (IIP) I-Loads IIP\_AERO\_R\_FACT and IIP\_AERO\_T\_FACT are designed to jointly assume only the values 0.0 (no IIP) or 1.0 (ballistic IIP) or values > 1.0 (aerodynamic / ballistic IIP). In addition, IIP inertial velocity limit I-Loads IIP\_VI\_MAG\_HIGH and IIP\_VI\_MAG\_LOW are constrained such that  $IIP\_VI\_MAG\_HIGH \geq IIP\_VI\_MAG\_LOW$ . When  $IIP\_AERO\_R\_FACT = IIP\_AERO\_T\_FACT = 0.0$  or  $1.0$ , the inertial velocity limit I-Loads are not used. When  $IIP\_AERO\_R\_FACT$  and  $IIP\_AERO\_T\_FACT > 1.0$ , setting  $IIP\_VI\_MAG\_HIGH > IIP\_VI\_MAG\_LOW$  results in a transition phase between aerodynamic and ballistic behavior of the IIP. When  $IIP\_AERO\_R\_FACT$  and  $IIP\_AERO\_T\_FACT > 1.0$  and  $IIP\_VI\_MAG\_HIGH = IIP\_VI\_MAG\_LOW$ , IIP behavior steps from aerodynamic to ballistic.

Also, IIP behavior may be made completely aerodynamic or ballistic throughout the flight regime when  $IIP\_AERO\_R\_FACT$  and  $IIP\_AERO\_T\_FACT > 1.0$ . IIP behavior is completely aerodynamic when  $IIP\_VI\_MAG\_HIGH$  and  $IIP\_VI\_MAG\_LOW$  are set to smaller values than those achieved

throughout the flight regime, e.g., 1.0 and 0.0, respectively. IIP behavior is completely ballistic when IIP\_VI\_MAG\_HIGH and IIP\_VI\_MAG\_LOW are set to larger values than those achieved throughout the flight regime.

7. If the absolute values of both arguments of the ARCTAN2 function used to compute PSI in the DELAZ\_COMPS\_ASC function are less than 1.0E-8, the previous value of PSI shall be used on the current cycle. Similarly, if the absolute values of both arguments of the ARCTAN2 function used to compute BEAR\_VEH in the DELAZ\_COMP function are less than 1.0E-8, the previous value of BEAR\_VEH shall be used on the current cycle.
8. Longitudes are represented in the range of  $\pm\pi$  radians. Latitudes are represented in the range of 0 to  $\pi/2$  radians, exclusive, for the northern hemisphere only. See Notes 3 and 9 in this section.
9. Ground track computations are specified to generate target insertion lines and launch window lines in the northern hemisphere only. Argument of latitude is used to define a point on the ground track line, where zero is at the longitude of ascending node. Therefore, only the first and second quadrants of argument of latitude are considered.

#### B.5.26.16 Derivation of Ascent Bearing DIP Coefficients (Information Only)

Ascent Bearing Display scale factors and biases are derived using the relationships:

$$POS\_1 = BIAS + (SCALE\ FACTOR) (SCALE\_1)$$

$$POS\_2 = BIAS + (SCALE\ FACTOR) (SCALE\_2)$$

where POS\_1 and POS\_2 are two locations on the implied scale on the face of the CRT and SCALE\_1 and SCALE\_2 are the two corresponding values of the engineering parameter (latitude or longitude) represented by the scale. Table B.5.26-1 lists the values of POS\_1 and POS\_2 and MSIDs of SCALE\_1, SCALE\_2, SCALE FACTOR and BIAS used. The CRT locations are given in Addressable Unit (AU) coordinates with the origin at the center of the screen.

Table B.5.26-1. ASCENT BEARING DIP COEFFICIENTS					
POS_1	POS_2	SCALE_1	SCALE_2	SCALE FACTOR	BIAS
-296	324	V94U5425C	V94U5433C	V94U6383C	V94U6375C
-484	484	V94U5426C	V94U5434C	V94U6384C	V94U6376C
-296	18	V94U5427C	V94U5435C	V94U6385C	V94U6377C
10	484	V94U5428C	V94U5436C	V94U6386C	V94U6378C
-296	324	V94U5445C	V94U5453C	V94U6391C	V94U6399C
-484	484	V94U5446C	V94U5454C	V94U6392C	V94U6400C
-296	18	V94U5447C	V94U5455C	V94U6393C	V94U6401C

Table B.5.26-1. ASCENT BEARING DIP COEFFICIENTS					
POS_1	POS_2	SCALE_1	SCALE_2	SCALE FACTOR	BIAS
10	484	V94U5448C	V94U5456C	V94U6394C	V94U6402C
-296	324	V94U5429C	V94U5437C	V94U6403C	V94U6395C
-484	484	V94U5449C	V94U5457C	V94U6387C	V94U6379C
-296	18	V94U5430C	V94U5438C	V94U6404C	V94U6396C
10	484	V94U5450C	V94U5458C	V94U6388C	V94U6380C
-296	324	V94U5431C	V94U5439C	V94U6405C	V94U6397C
-484	484	V94U5451C	V94U5459C	V94U6389C	V94U6381C
-296	18	V94U5432C	V94U5548C	V94U6406C	V94U6398C
10	484	V94U5452C	V94U5549C	V94U6390C	V94U6382C

NOTE: Addressable Unit (AU) position and BIAS data is with respect to the center of the CRT.

### B.5.26.17 Flowcharts

Flowcharts represent a potential implementation and are included for reference only.

- Figure B.5.26-1 LANDING\_SITES\_INIT
- Figure B.5.26-2 LAUNCH\_WINDOW\_INIT
- Figure B.5.26-3 ALT\_RUNWAY\_SITE\_LOOKUP\_ASC
- Figure B.5.26-4 SHUTTLE\_SYMBOL\_PROC
- Figure B.5.26-5 SHUTTLE\_PREDICTORS\_PROC
- Figure B.5.26-6 IIP\_SYMBOL\_PROC\_ASC
- Figure B.5.26-7 IIP\_PREDICT
- Figure B.5.26-8 KEPLER\_PREDICT
- Figure B.5.26-9 TGT\_INS\_GNDTRK\_COMPS
- Figure B.5.26-10 TGT\_INS\_LINE\_COMP
- Figure B.5.26-11 LAUNCH\_WINDOW\_GNDTRK\_COMPS
- Figure B.5.26-12 LAUNCH\_WINDOW\_LINE\_COMPS
- Figure B.5.26-13 LINE\_COMP
- Figure B.5.26-14 ARG\_LAT\_LWR\_LMT
- Figure B.5.26-15 ARG\_LAT\_UPR\_LMT
- Figure B.5.26-16 LON\_LINE
- Figure B.5.26-17 ARG\_LAT\_LINE
- Figure B.5.26-18 LAT\_LINE
- Figure B.5.26-19 LON\_LINE\_INCR
- Figure B.5.26-20 INERTIAL\_HEADING\_ARROW\_COMP
- Figure B.5.26-21 SHUTTLE\_SYMBOL\_STEER\_ANGLE
- Figure B.5.26-22 DELAZ\_COMPS\_ASC
- Figure B.5.26-23 DELAZ\_COMP

Figure B.5.26-24 TAL\_CRNG\_RADIUS\_COMP  
Figure B.5.26-25 CHECK\_CONV\_MAIN\_DISP  
Figure B.5.26-26 CHECK\_CONV\_INSET\_DISP  
Figure B.5.26-27 PARK\_CONV\_MAIN\_DISP

### **B.5.26.18 Ascent Bearing Display Interface Support Functions**

Table B.5.26-1 Ascent Bearing DIP Coefficients

Table B.5.26-2 NA

Table B.5.26-3 NA

Table B.5.26-4 NA

Table B.5.26-5 Input Functional Parameters

Table B.5.26-6 Output Functional Parameters

Table B.5.26-7 I-Loads

Table B.5.26-8 K-Loads

Table B.5.26-9 Constants

LANDING\_SITES\_INIT

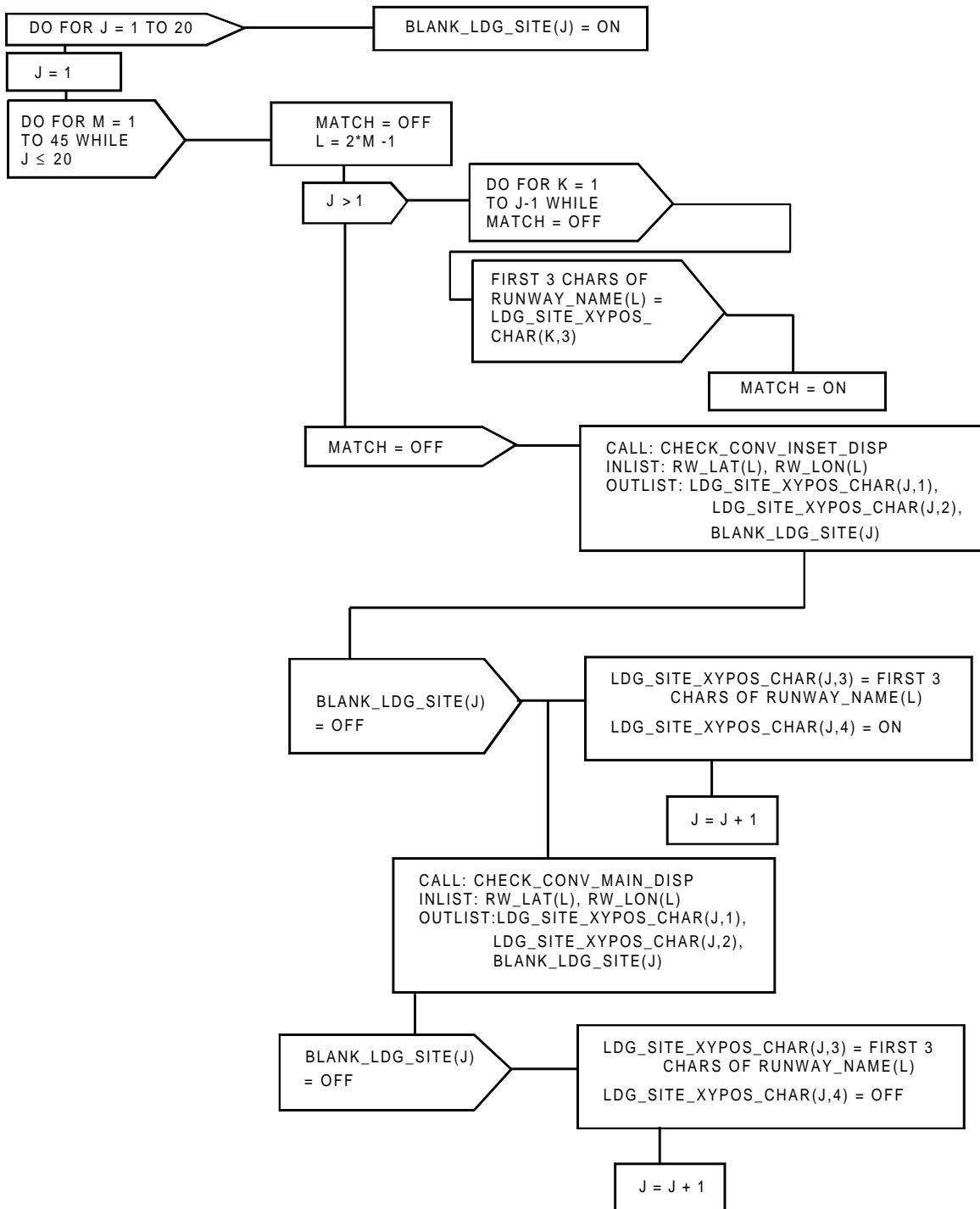


FIGURE B.5.26-1. LANDING\_SITES\_INIT

LAUNCH\_WINDOW\_INIT

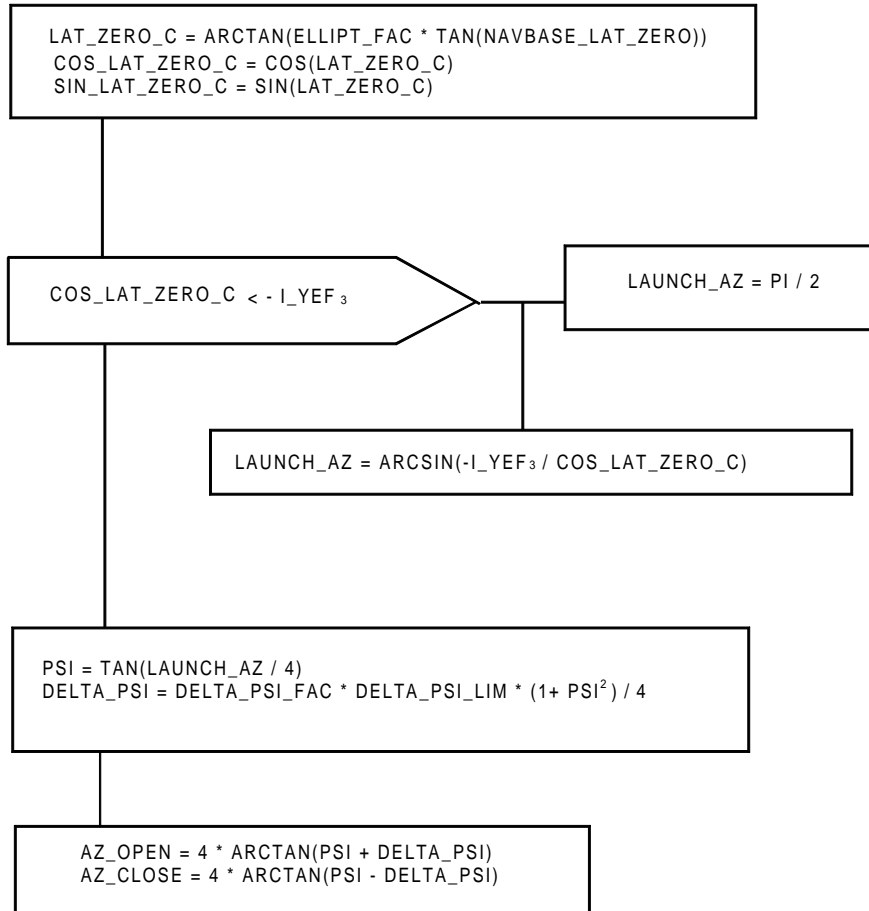


FIGURE B.5.26-2. LAUNCH\_WINDOW\_INIT

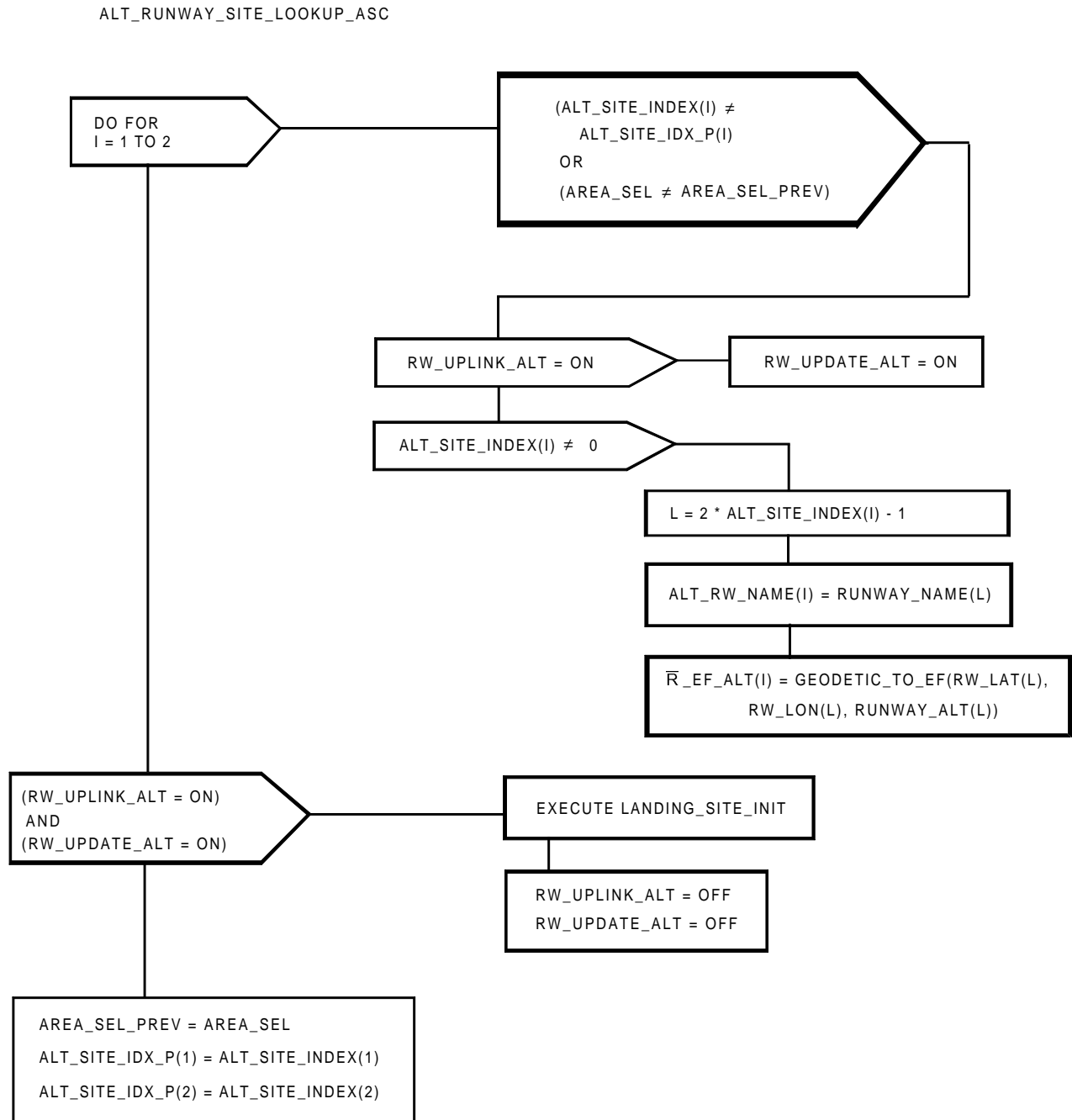


FIGURE B.5.26-3. ALT\_RUNWAY\_SITE\_LOOKUP\_ASC



SHUTTLE\_SYMBOL\_PROC

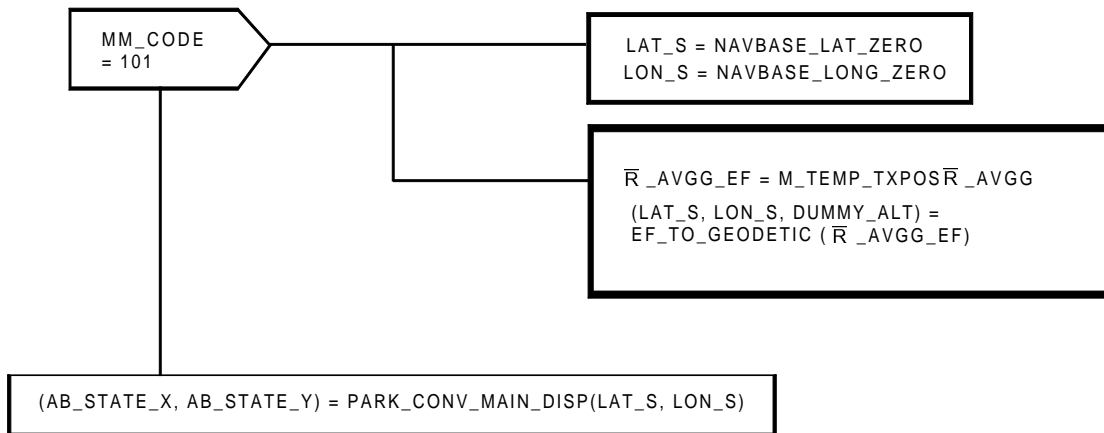


FIGURE B.5.26-4. SHUTTLE\_SYMBOL\_PROC

SHUTTLE\_PREDICTORS\_PROC

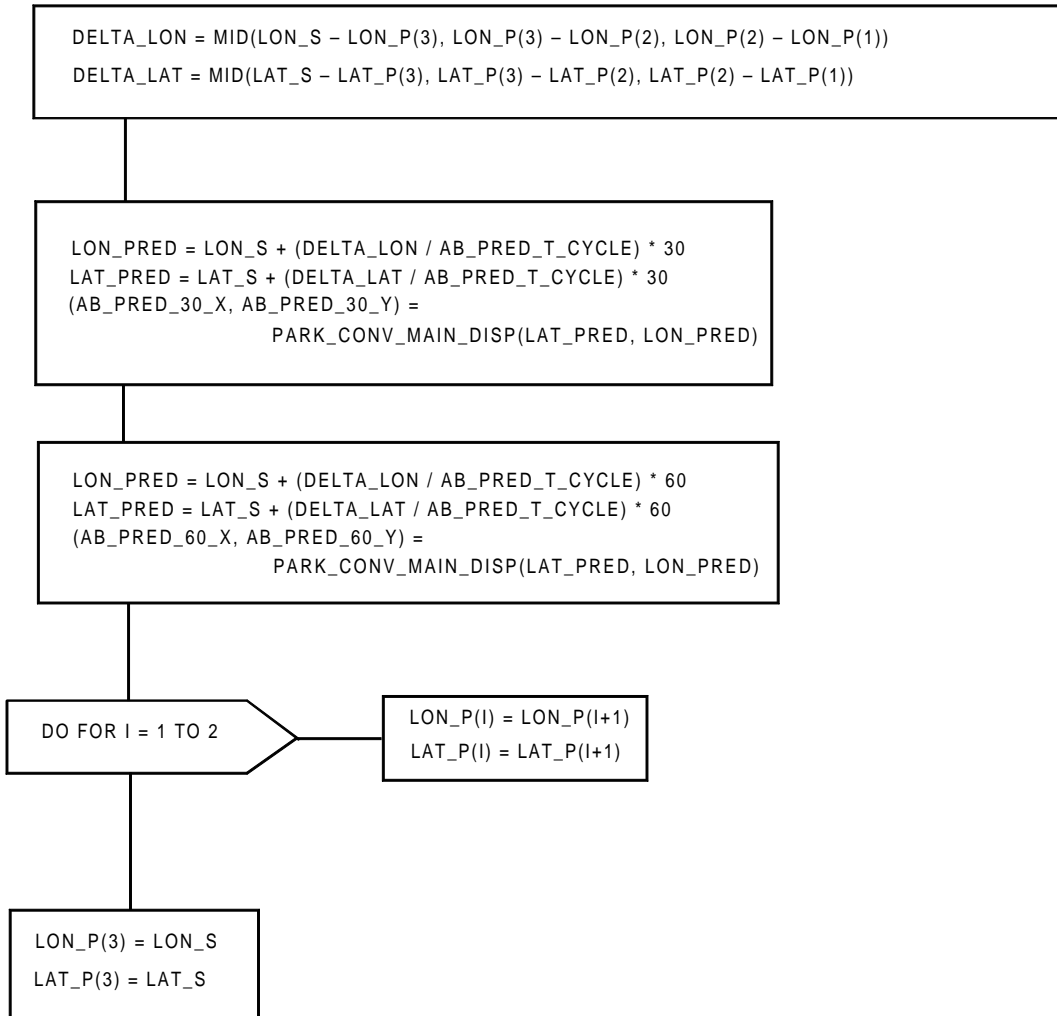


FIGURE B.5.26-5. SHUTTLE\_PREDICTORS\_PROC

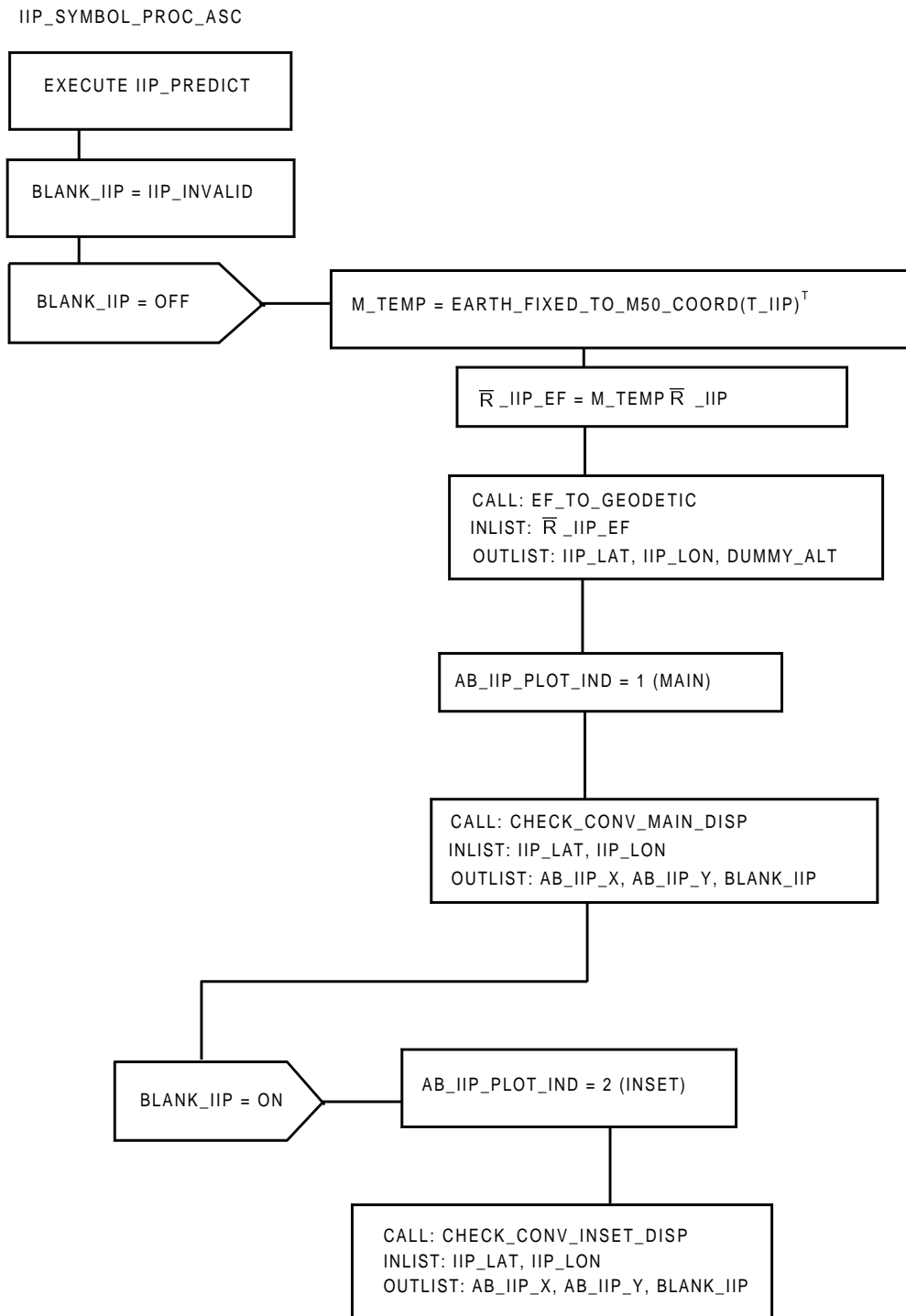


FIGURE B.5.26-6. IIP\_SYMBOL\_PROC\_ASC

IIP\_PREDICT

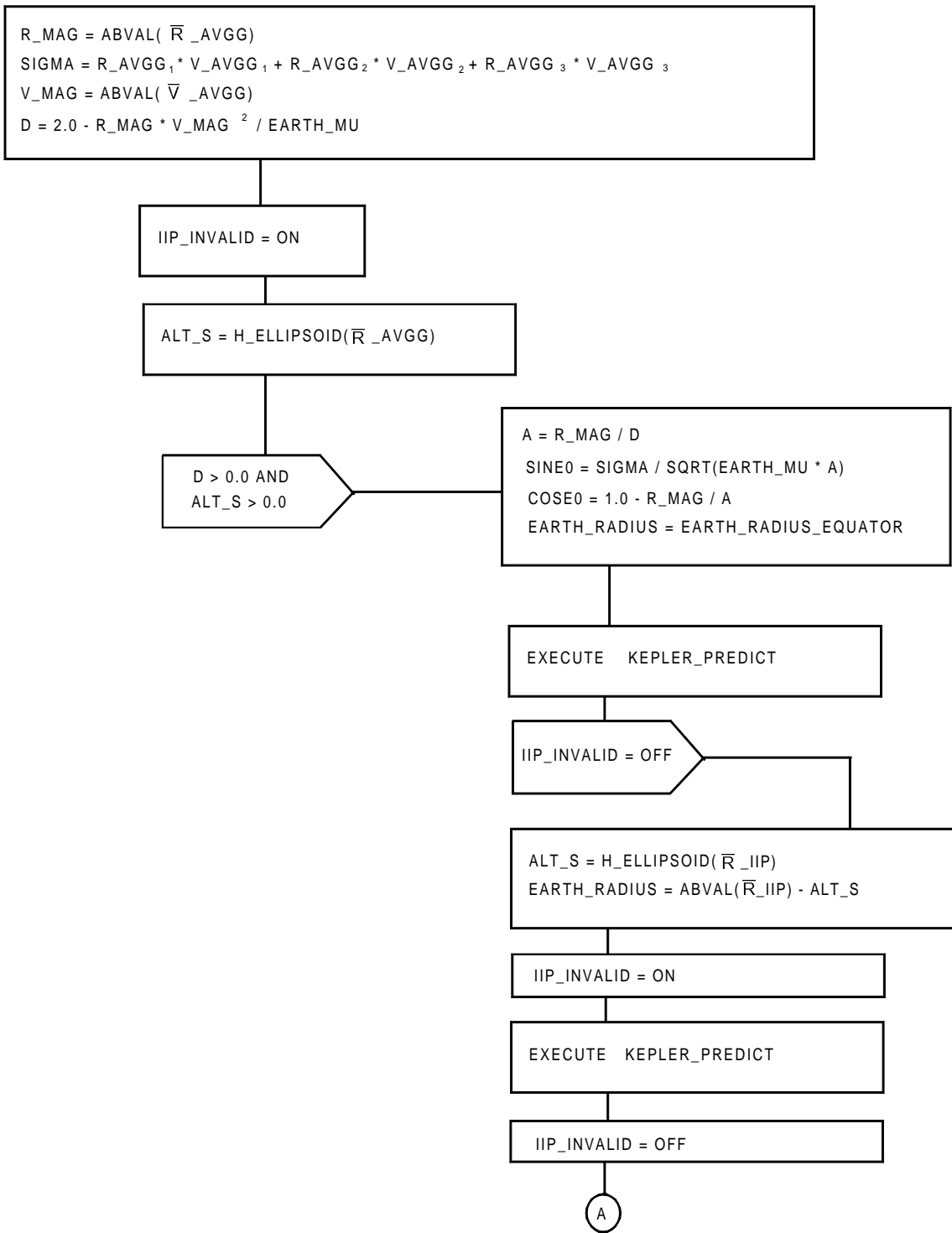


FIGURE B.5.26-7.(1) IIP\_PREDICT (Sheet 1 of 2)

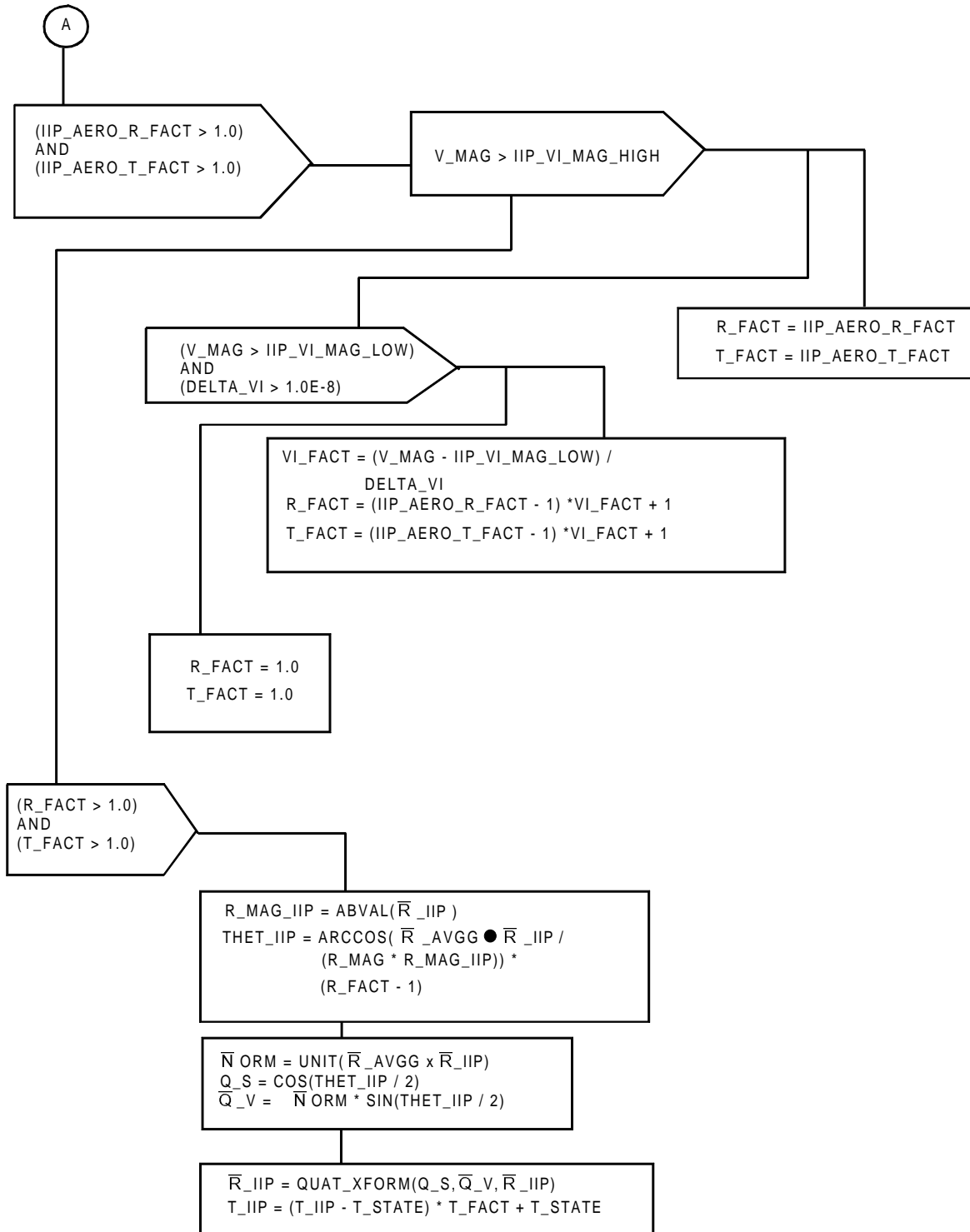


FIGURE B.5.26-7.(2) IIP\_PREDICT (Sheet 2 of 2)

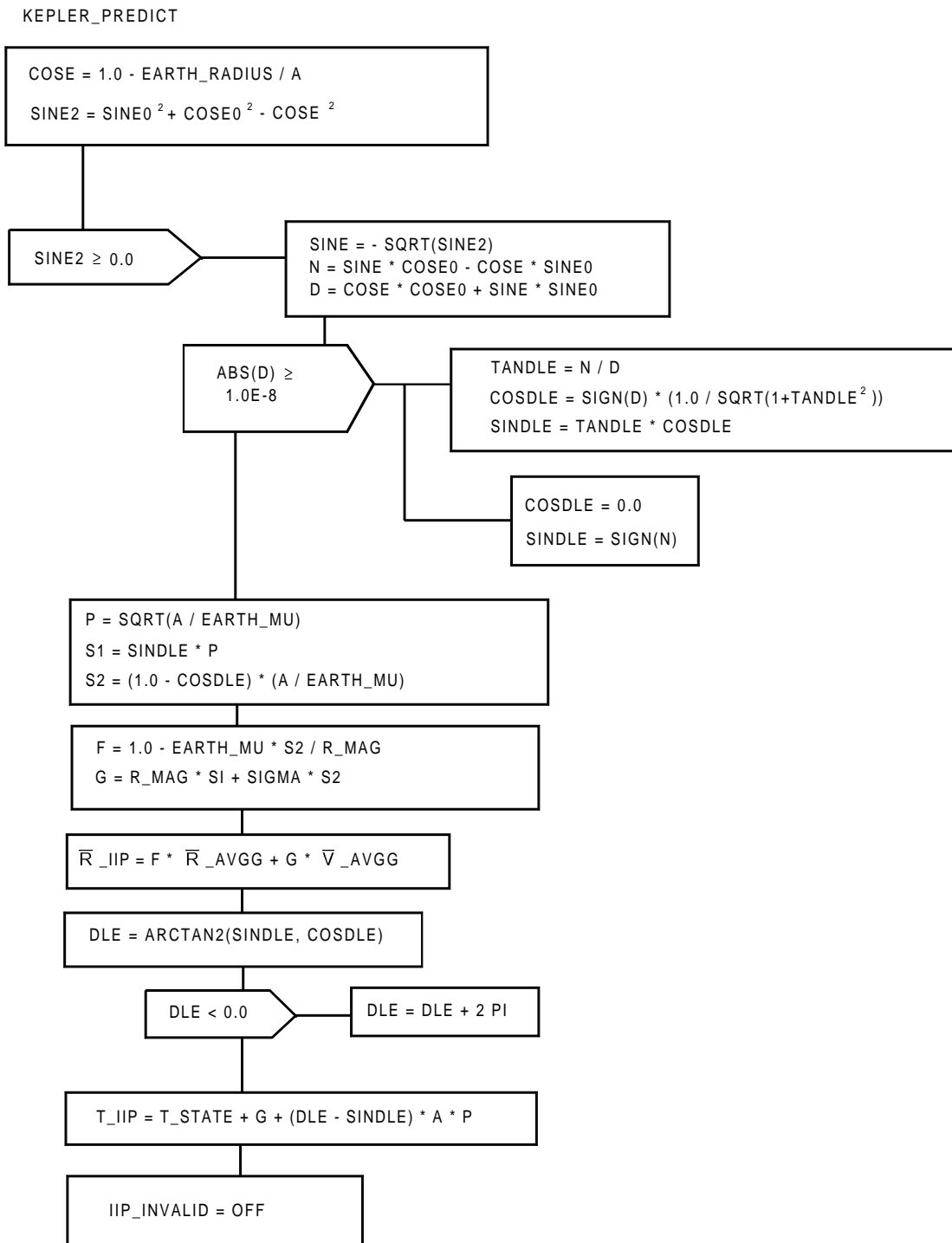


FIGURE B.5.26-8. KEPLER\_PREDICT

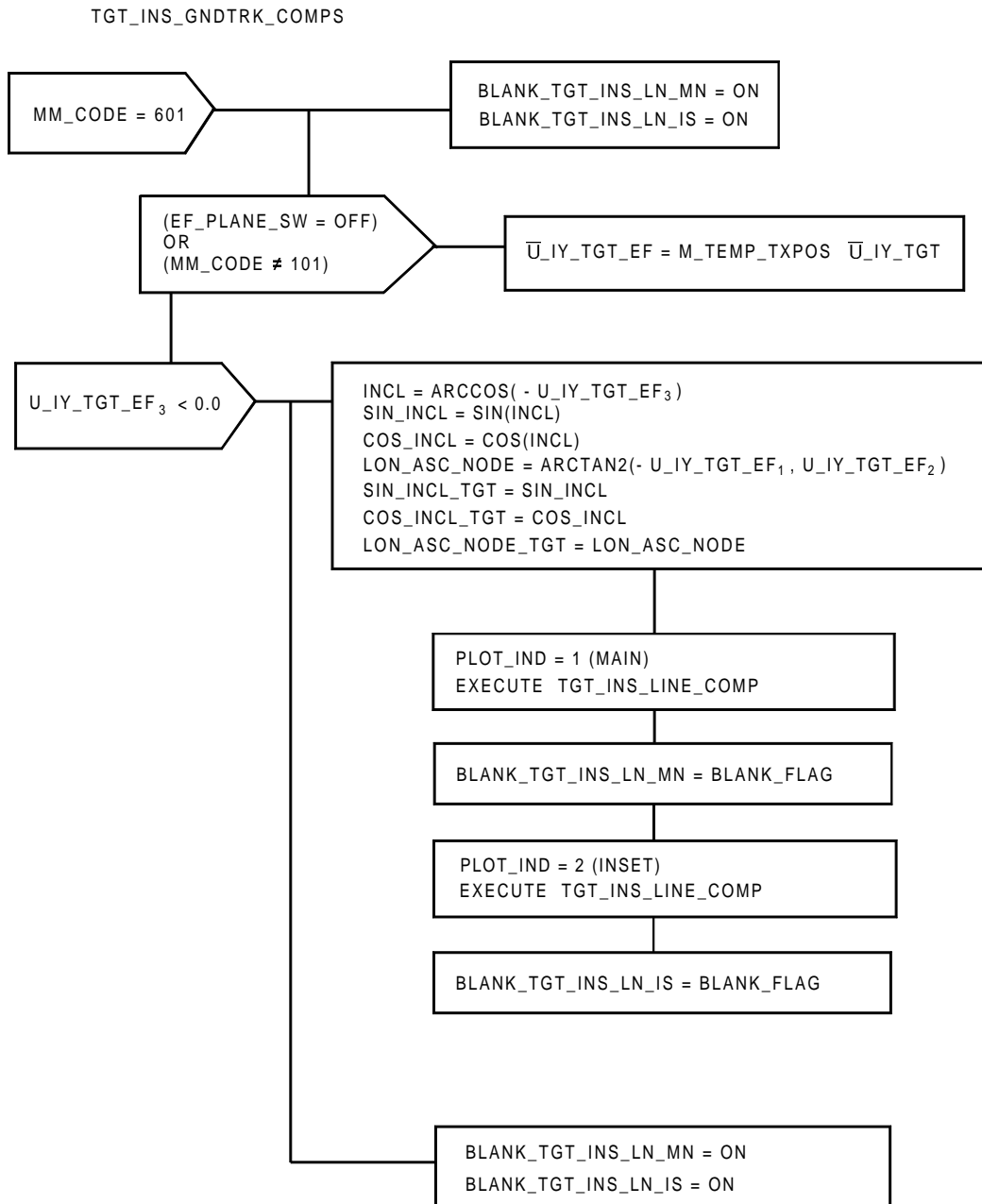


FIGURE B.5.26-9. TGT\_INS\_GNDTRK\_COMPS

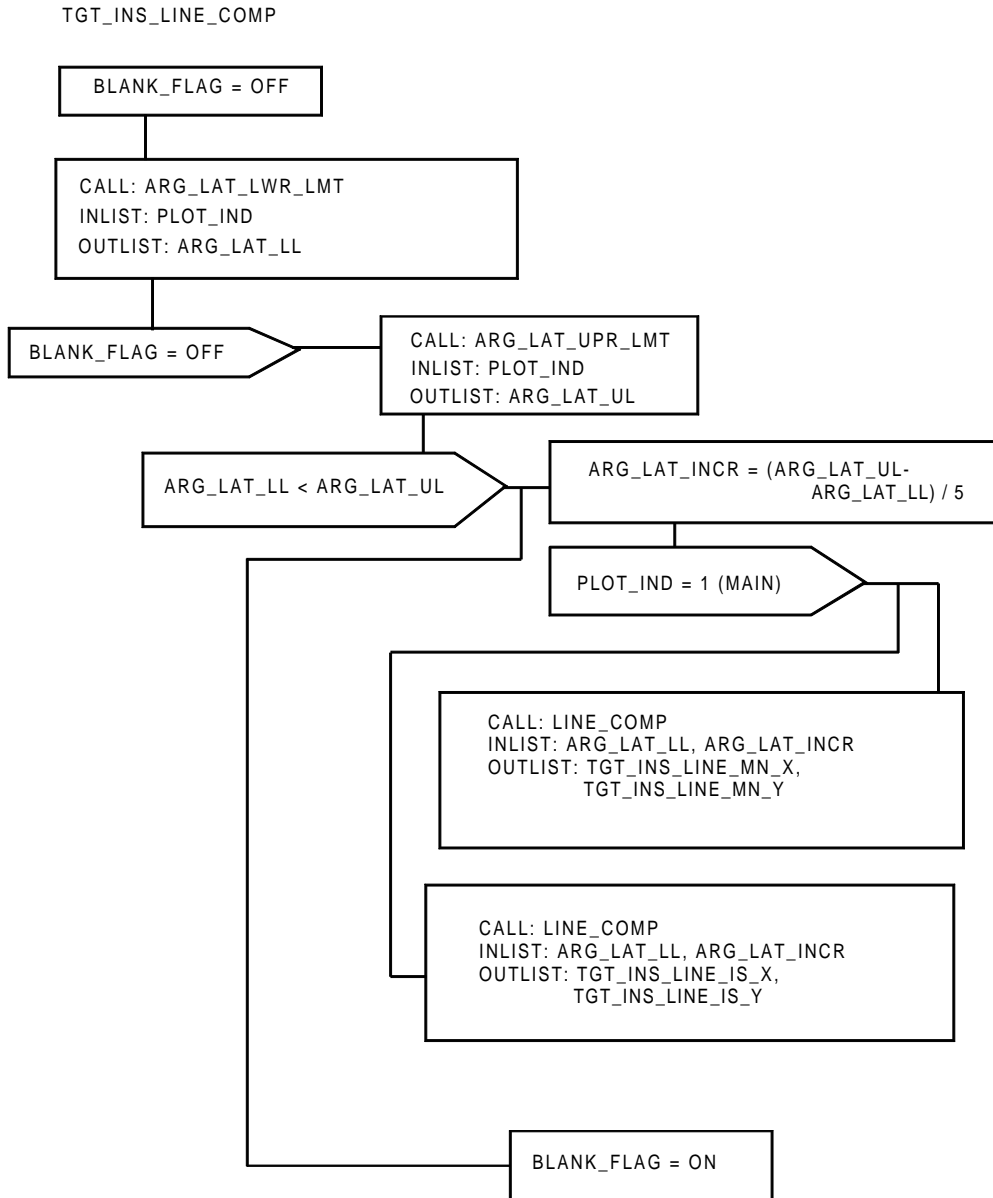


FIGURE B.5.26-10. TGT\_INS\_LINE\_COMP



LAUNCH\_WINDOW\_GNDTRK\_COMPS

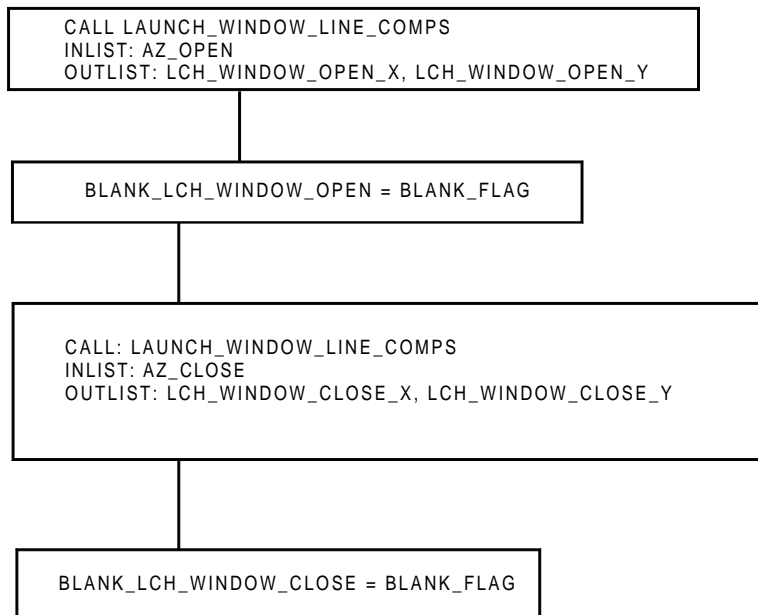


FIGURE B.5.26-11. LAUNCH\_WINDOW\_GNDTRK\_COMPS

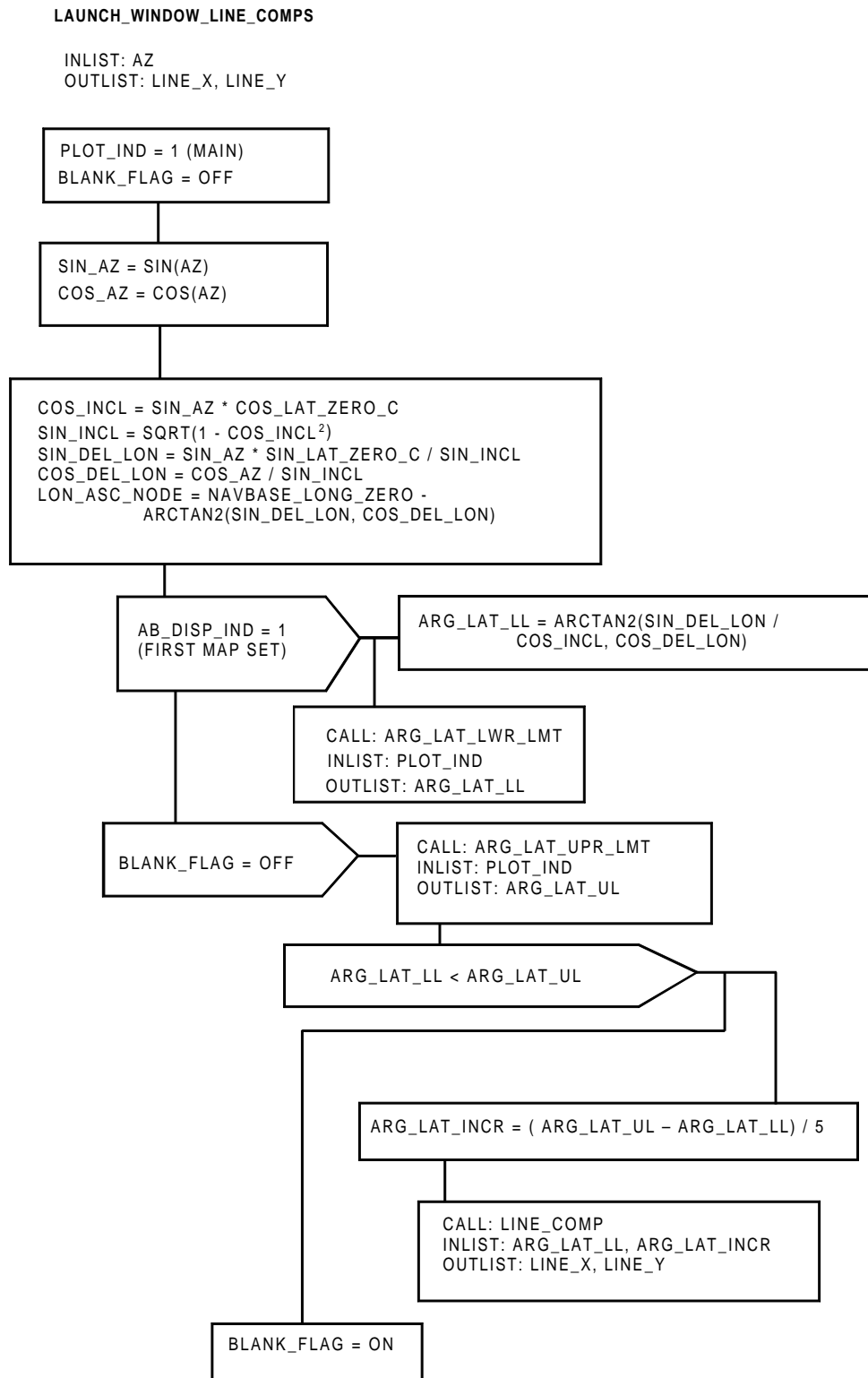


FIGURE B.5.26-12. LAUNCH\_WINDOW\_LINE\_COMPS

**LINE\_COMP**

INLIST: ARG\_LAT\_LL, ARG\_LAT\_INCR  
OUTLIST: LINE\_X, LINE\_Y

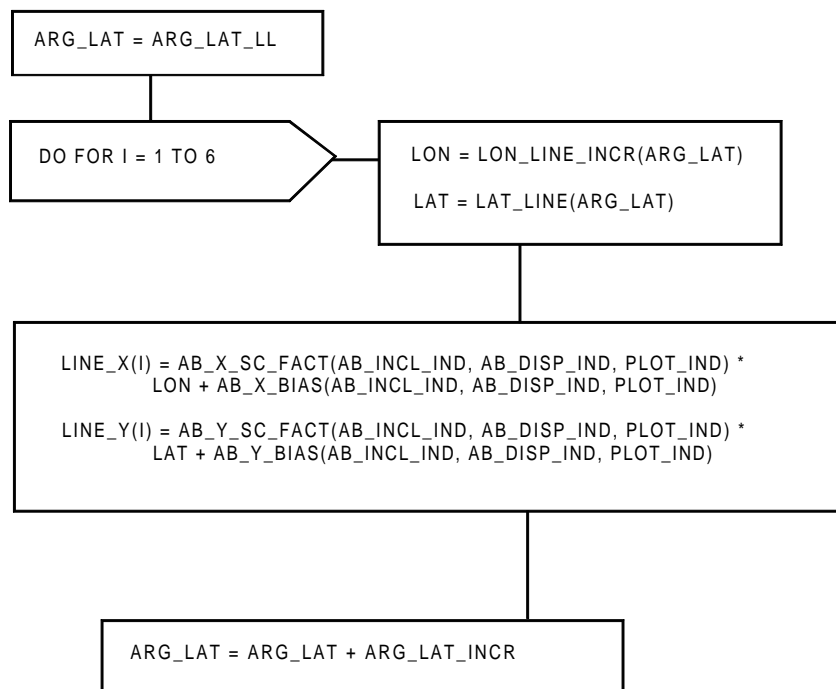


FIGURE B.5.26-13 LINE\_COMP

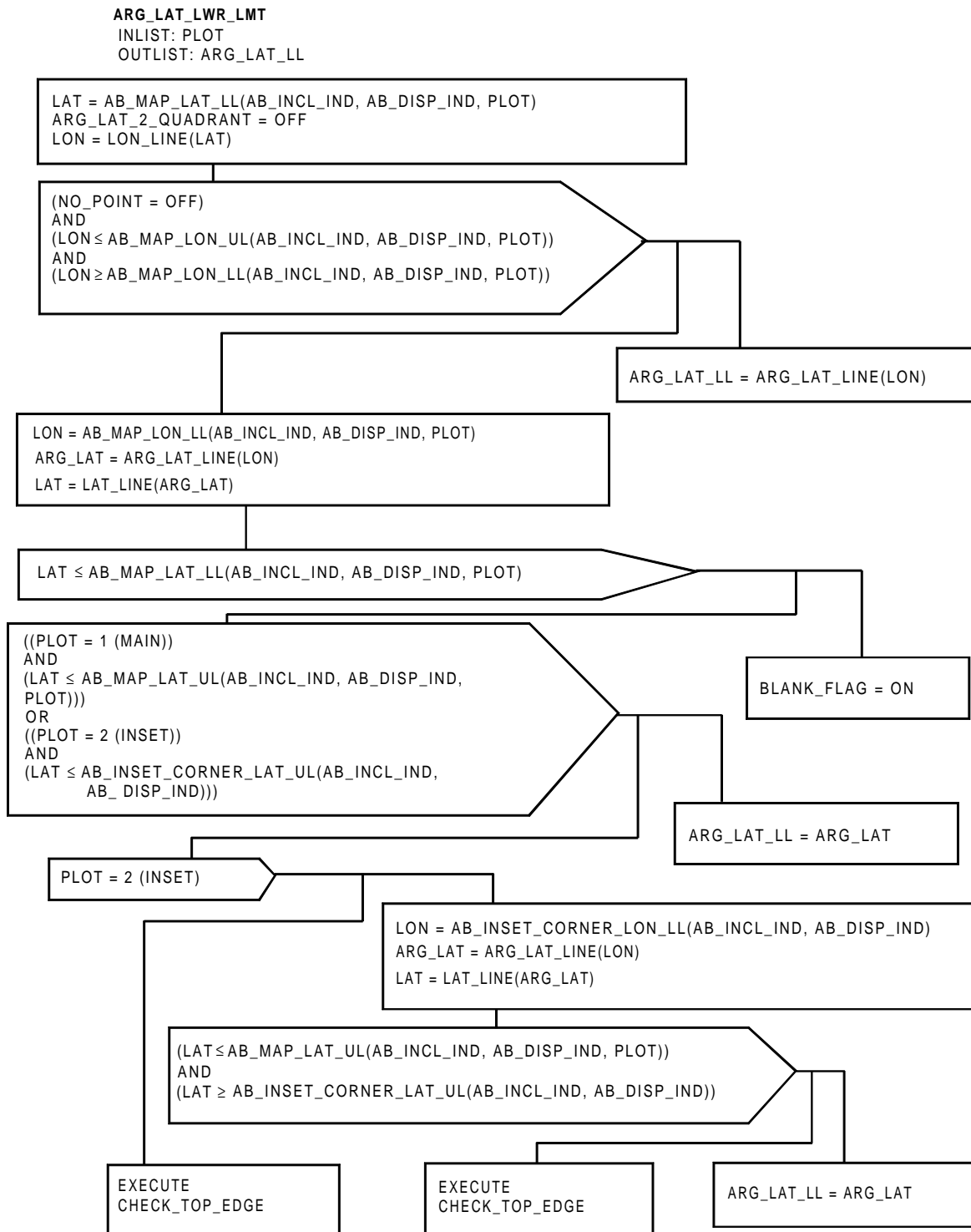


FIGURE B.5.26-14.(1) ARG\_LAT\_LWR\_LMT (Sheet 1 of 3)

CHECK\_TOP\_EDGE

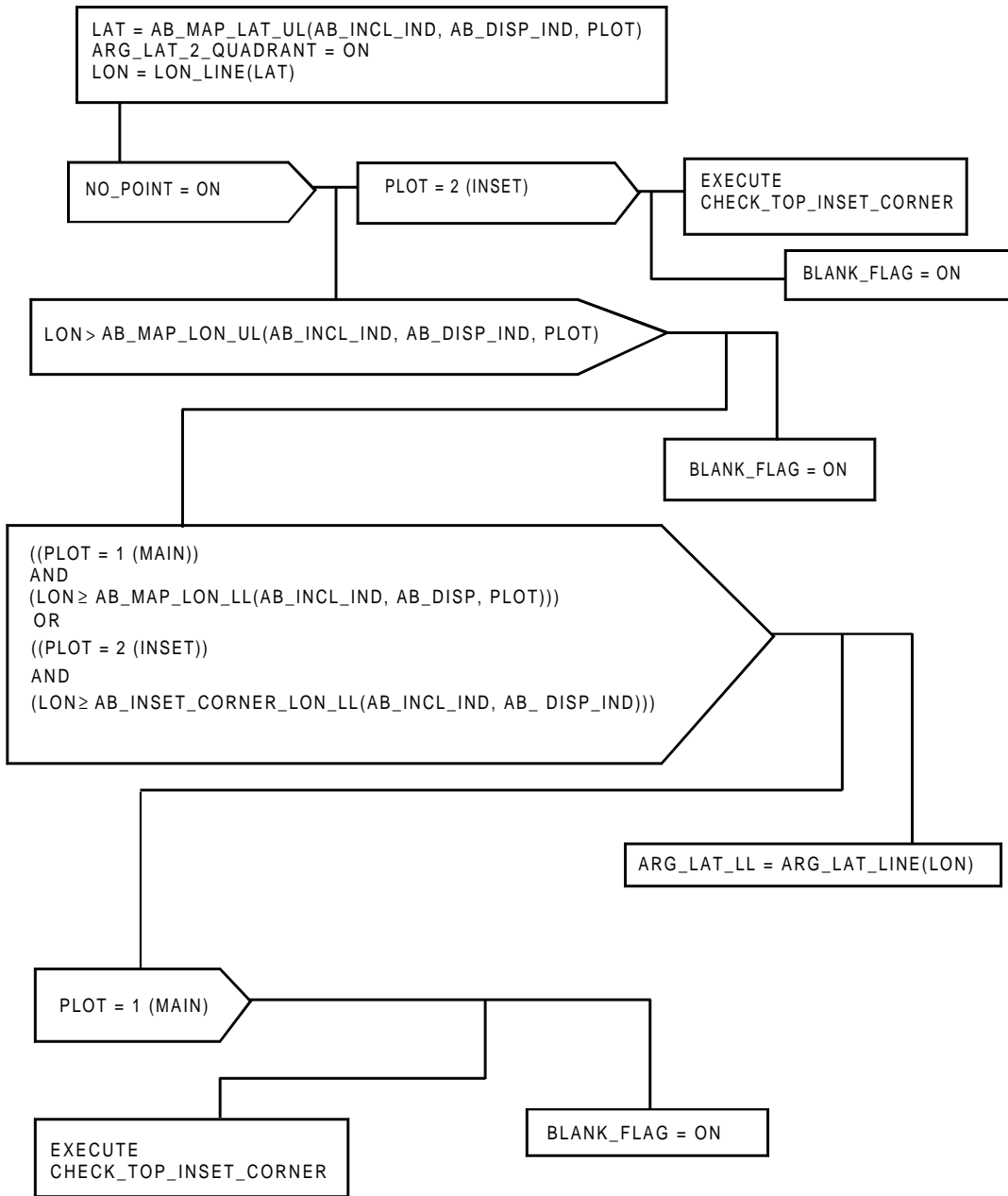


FIGURE B.5.26-14.(2) ARG\_LAT\_LWR\_LMT (Sheet 2 of 3)

CHECK\_TOP\_INSET\_CORNER

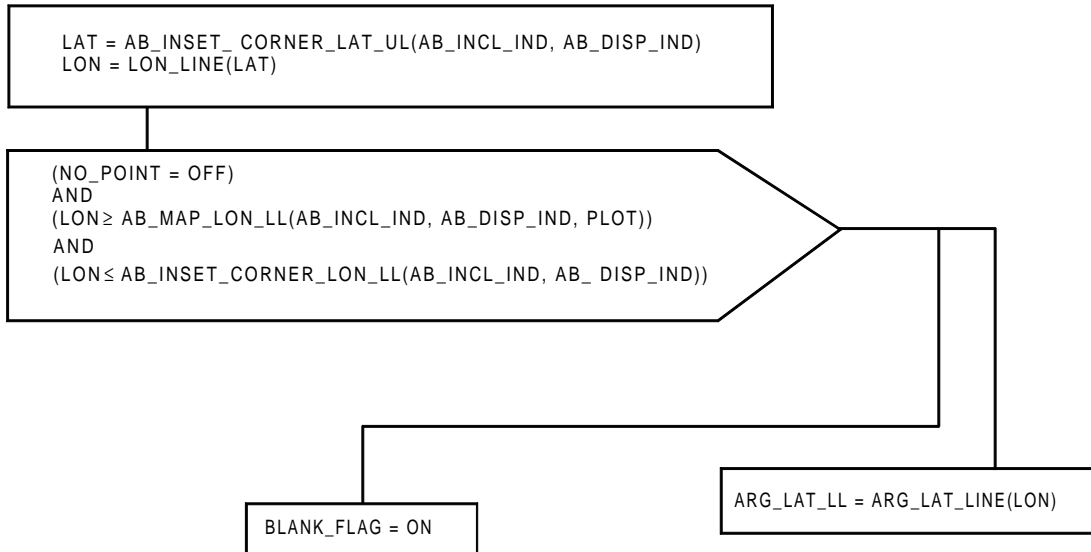


FIGURE B.5.26-14.(3) ARG\_LAT\_LWR\_LMT (Sheet 3 of 3)

ARG\_LAT\_UPR\_LMT  
INLIST: PLOT  
OUTLIST: ARG\_LAT\_UL

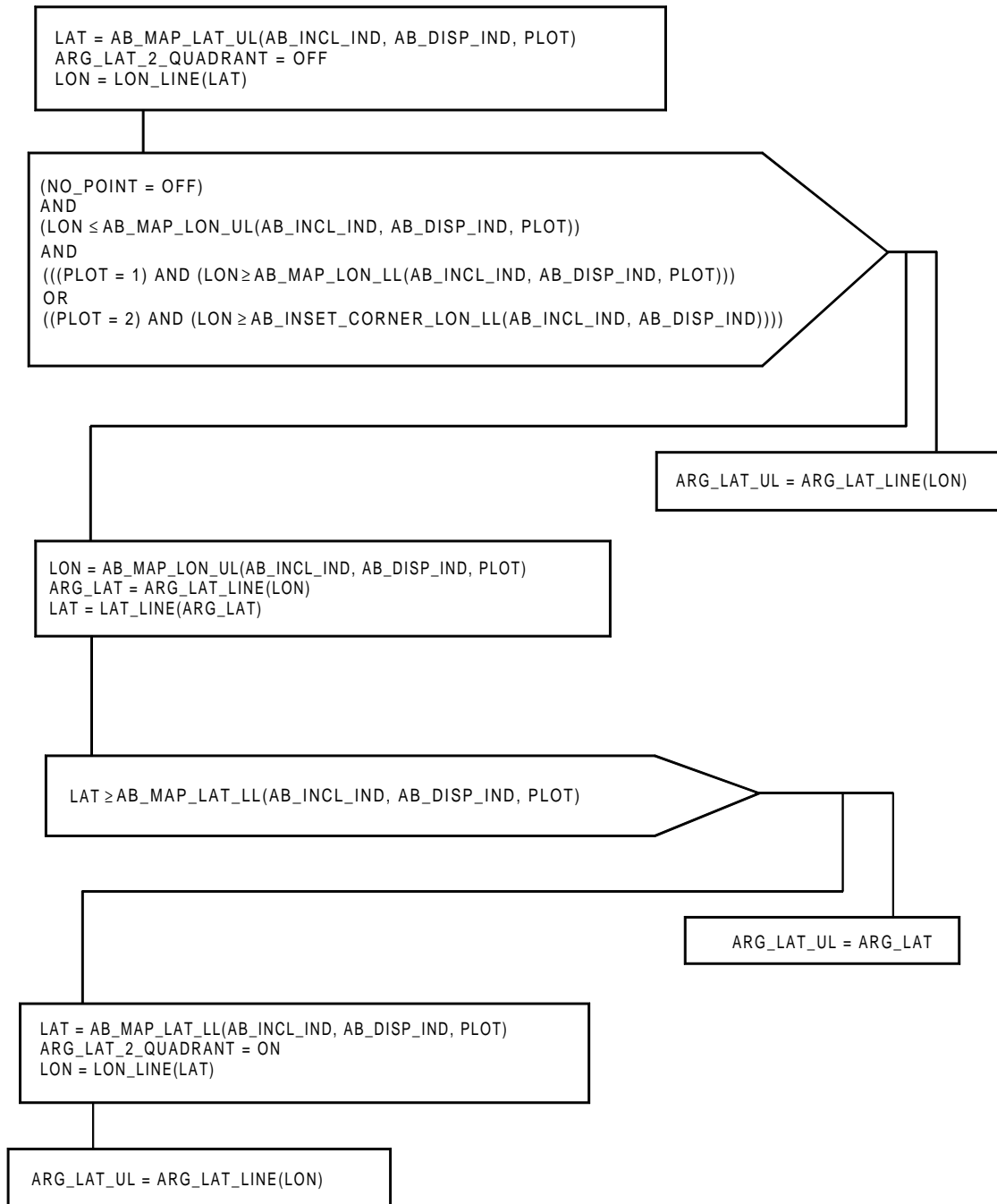


FIGURE B.5.26-15. ARG\_LAT\_UPR\_LMT

LON = LON\_LINE(LAT)

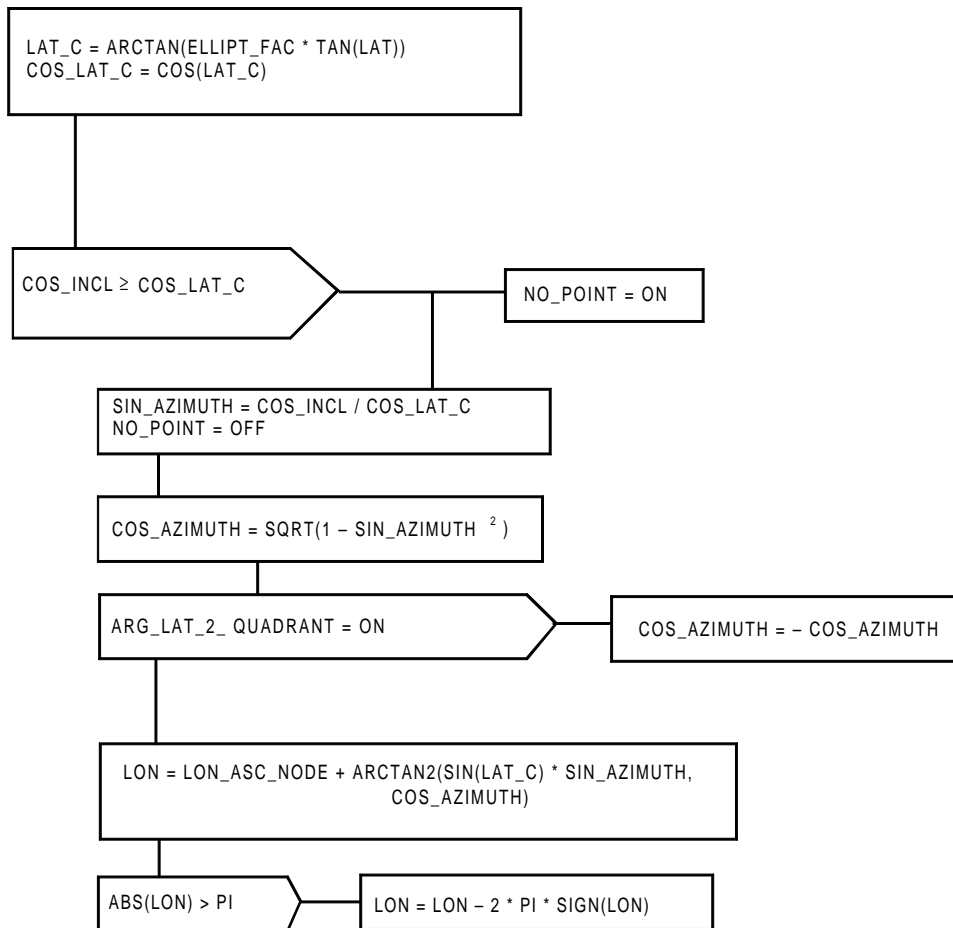


FIGURE B.5.26-16. LON\_LINE



$ARG\_LAT = ARG\_LAT\_LINE(LON)$

$DEL\_LON = LON - LON\_ASC\_NODE$   
 $ARG\_LAT = ARCTAN2(SIN(DEL\_LON) / COS\_INCL, COS(DEL\_LON))$

FIGURE B.5.26-17. ARG\_LAT\_LINE

$LAT = LAT\_LINE(ARG\_LAT)$

$LAT\_C = ARCSIN(SIN\_INCL * SIN(ARG\_LAT))$   
 $LAT = ARCTAN(TAN(LAT\_C) / ELLIPT\_FAC)$

FIGURE B.5.26-18. LAT\_LINE

LON = LON\_LINE\_INCR(ARG\_LAT)

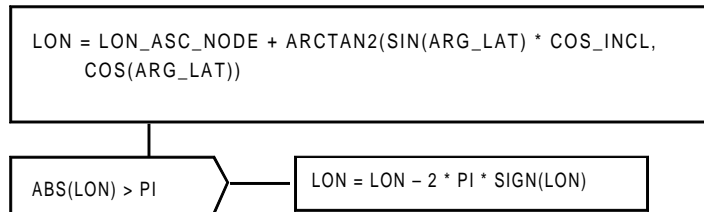


FIGURE B.5.26-19 LON\_LINE\_INCR

INERTIAL\_HEADING\_ARROW\_COMP

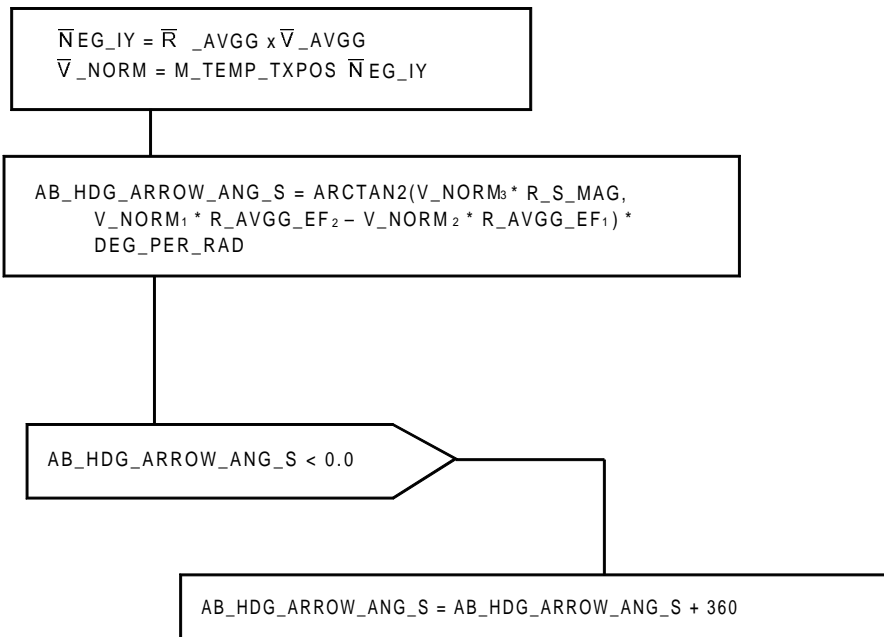


FIGURE B.5.26-20. INERTIAL\_HEADING\_ARROW\_COMP

SHUTTLE\_SYMBOL\_STEER\_ANGLE

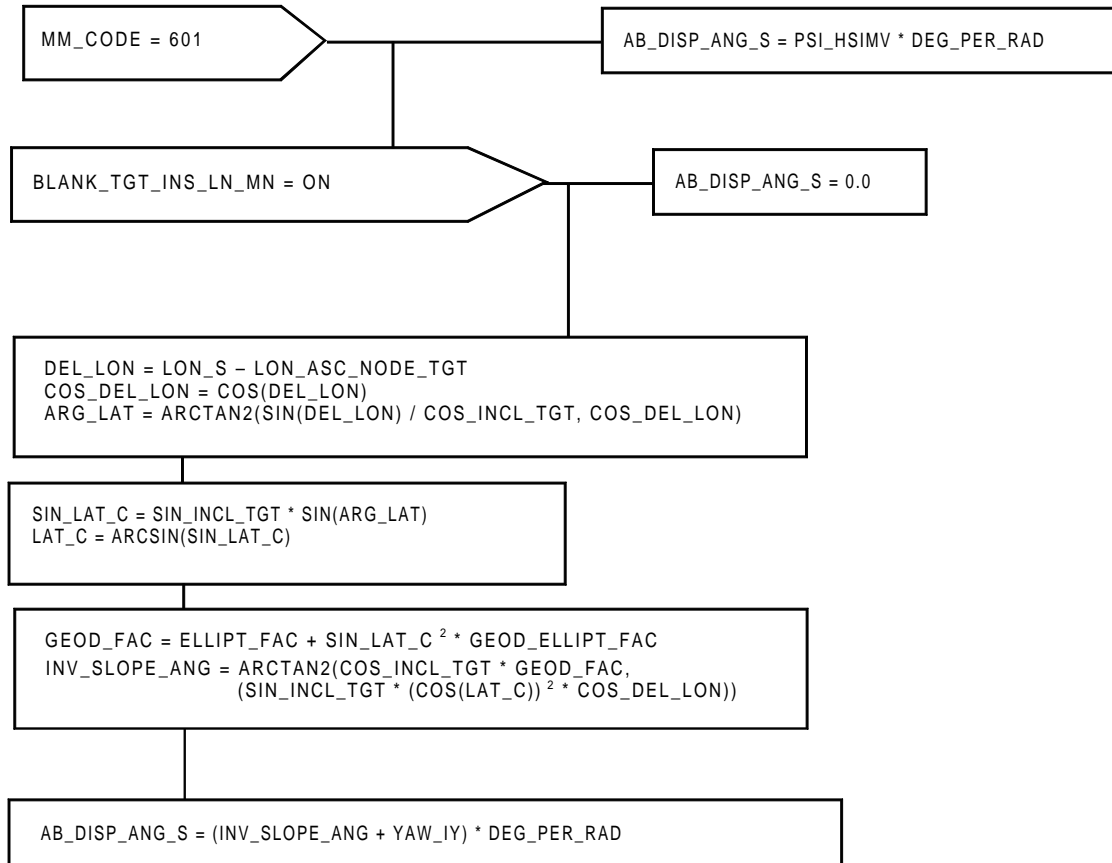


FIGURE B.5.26-21. SHUTTLE\_SYMBOL\_STEER\_ANGLE

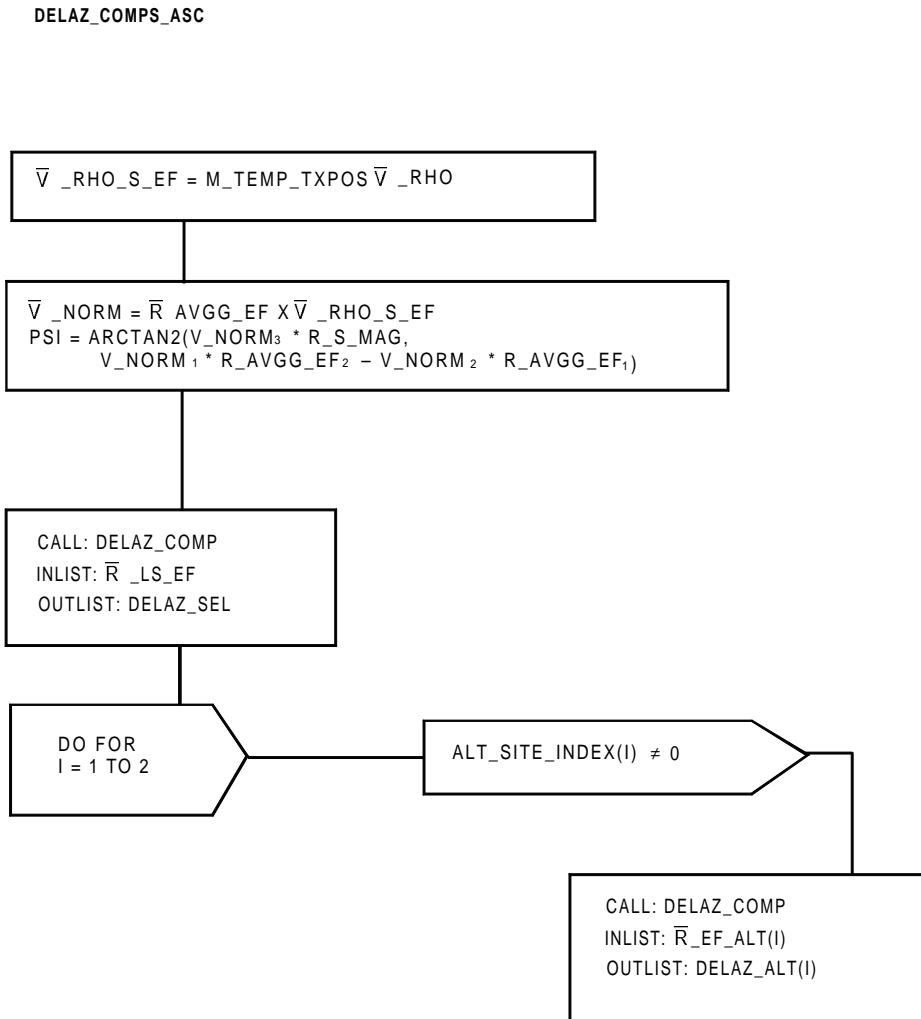


FIGURE B.5.26-22. DELAZ\_COMPS\_ASC

DELAZ\_COMP

INPUTS:  $\bar{R}_{LDG\_SITE\_EF}$

OUTPUTS: DELAZ

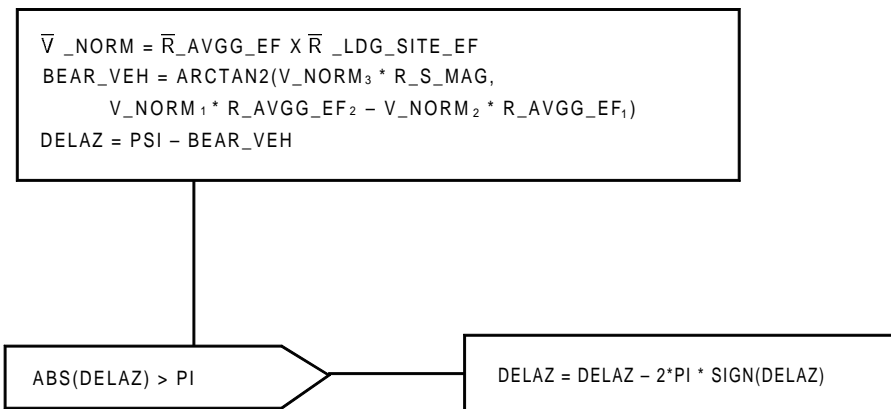


FIGURE B.5.26-23. DELAZ\_COMP

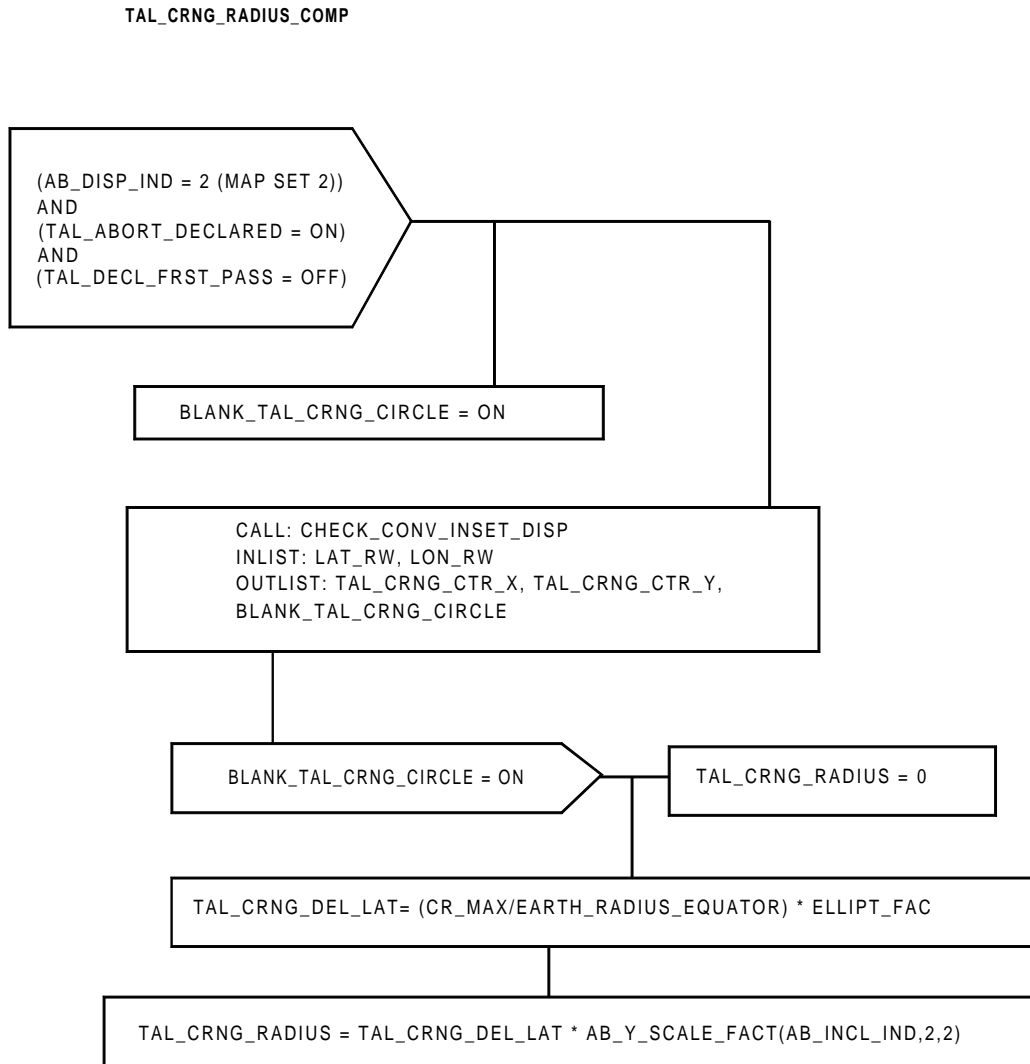


FIGURE B.5.26-24. TAL\_CRNG\_RADIUS\_COMP



CHECK\_CONV\_MAIN\_DISP  
INLIST: LAT, LON  
OUTLIST: POS\_X, POS\_Y, OFF\_DISPLAY

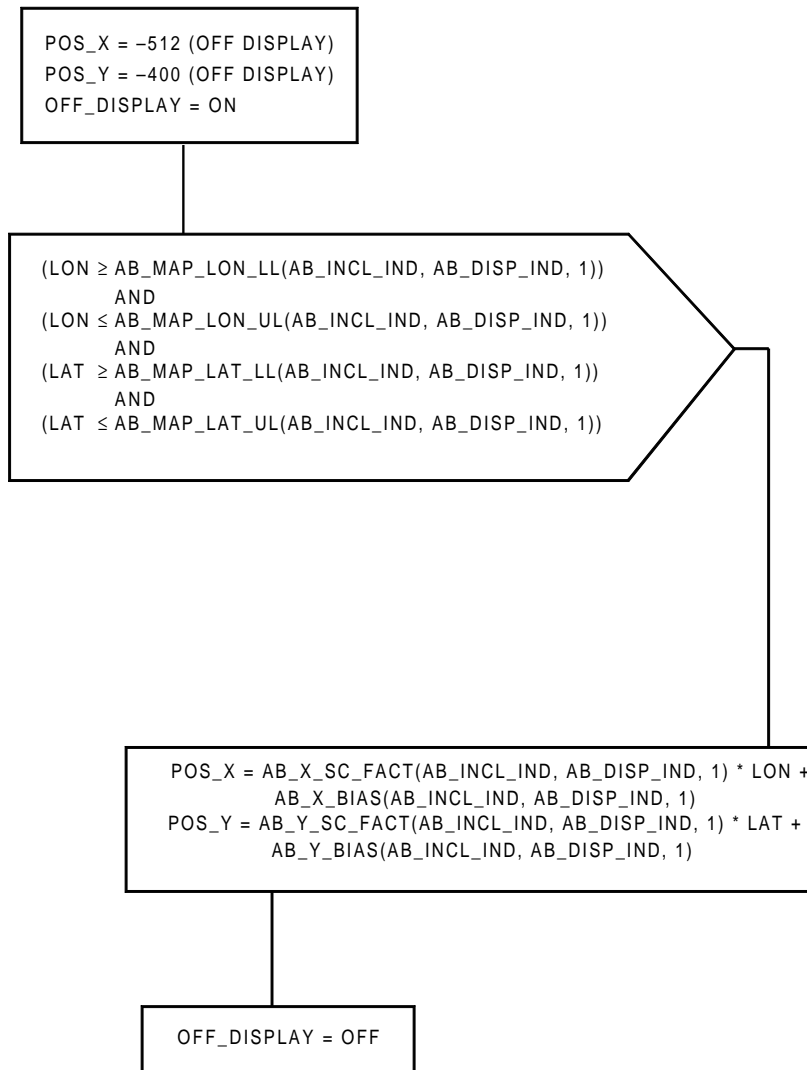


FIGURE B.5.26-25. CHECK\_CONV\_MAIN\_DISP

CHECK\_CONV\_INSET\_DISP  
INLIST: LAT, LON  
OUTLIST: POS\_X, POS\_Y, OFF\_DISPLAY

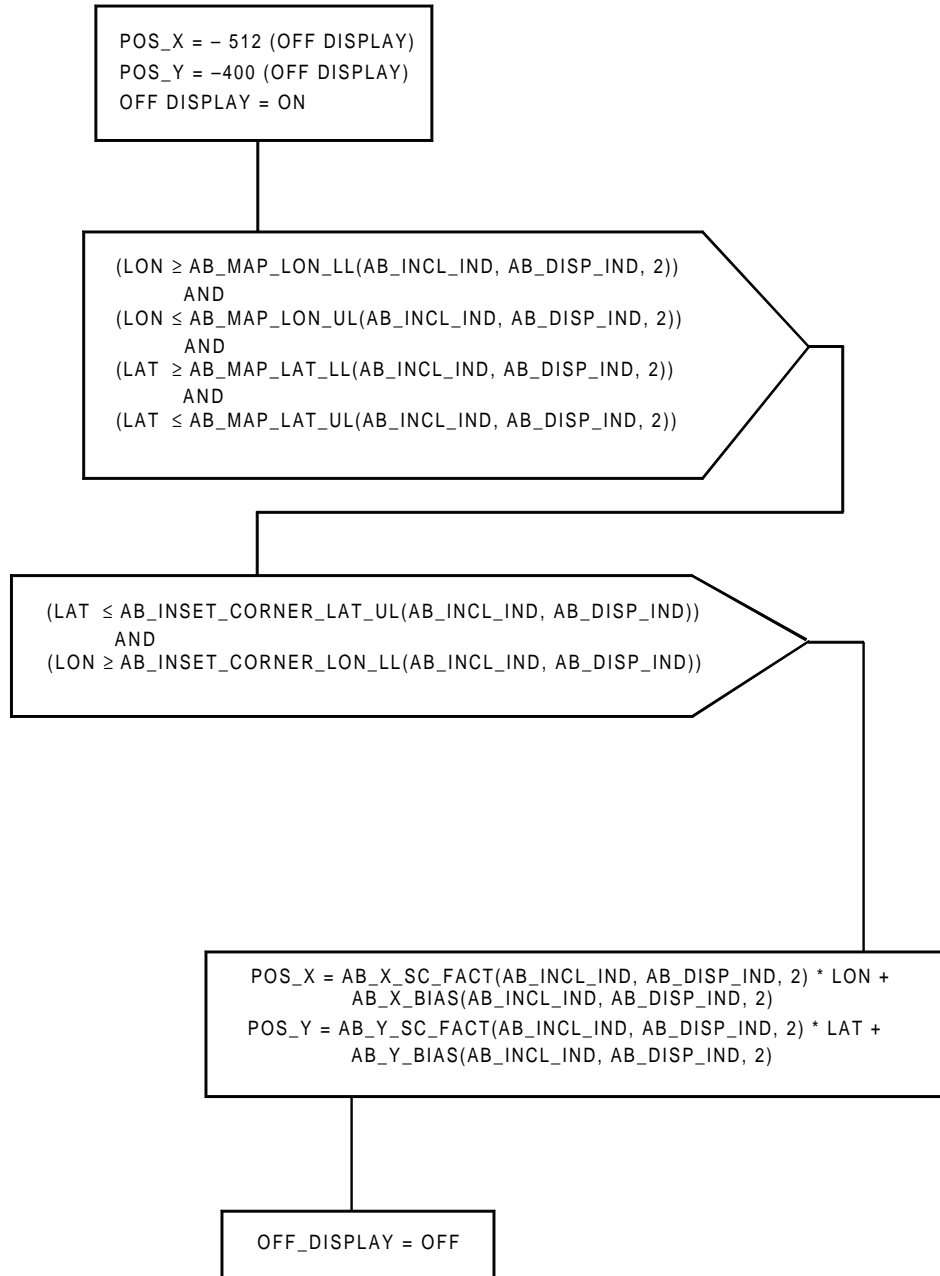


FIGURE B.5.26-26 CHECK\_CONV\_INSET\_DISP

PARK\_CONV\_MAIN\_DISP

INLIST: LAT, LON

OUTLIST: POS\_X, POS\_Y

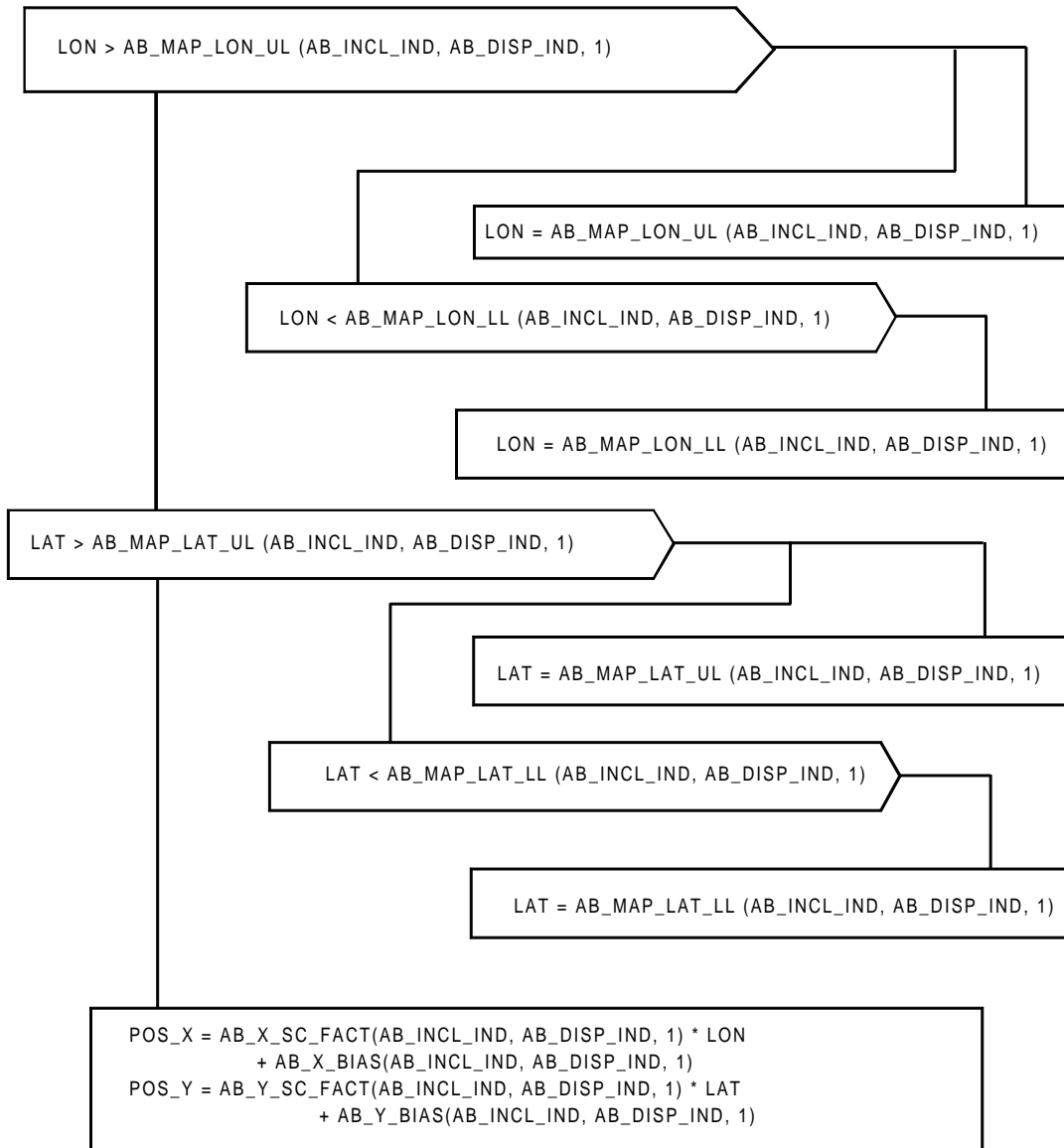


FIGURE B.5.26-27. PARK\_CONV\_MAIN\_DISP

TABLE B.5.26-5. INPUT FUNCTIONAL PARAMETERS FOR ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
ALT_SITE_INDEX(1)	V94U5524C	ALTERNATE SITE 1 INDEX	ASC BRG DISP	ND	HXS		93167A	*
ALT_SITE_INDEX(1)	V94U5524CB	ALTERNATE SITE 1 INDEX	ASC SITE LOOKUP	ND	HXS		93167A	*
ALT_SITE_INDEX(2)	V94U5525C	ALTERNATE SITE 2 INDEX	ASC BRG DISP	ND	HXS		93167A	*
ALT_SITE_INDEX(2)	V94U5525CB	ALTERNATE SITE 2 INDEX	ASC SITE LOOKUP	ND	HXS		93167A	*
AREA_SEL	V93J4392C	SELECTED AREA	HORIZ SIT DISP				93090E	
AREA_SEL	V93J4392CB	SELECTED AREA	ASC SITE LOOKUP				93017G	*
AREA_SEL	V93J4392CC	SELECTED AREA	ASC BRG DISP				93090E	
ASC_INIT_COMPLETE	V90X8924X	ASCENT INIT COMPLETE FLAG	ASC NAV SEQ				93090E	
CLOCK/CLOCKTIME	V91W5000C	CLOCK-COMPUTER(GMT)	FCOS	S			93160B	*
CONT_2EO_START	V93X6681XA	CONTINGENCY 2-ENG OUT START FLAG	XXXXXX TRAJ 1 DISP		BD		93017G	*
CONT_2EO_START	V93X6681XB	CONTINGENCY 2-ENG OUT START FLAG	PW CONT GUID		BD		93090E	
CONT_2EO_START	V93X6681XC	CONTINGENCY 2-ENG OUT START FLAG	XXXXXX TRAJ 2 DISP		BD		93017G	*
CONT_2EO_START	V93X6681XD	CONTINGENCY 2-ENG OUT START FLAG	RTLS TRAJ 2 DISP		BD		93017G	*
CR_MAX	V90H3892C	MAXIMUM TAL MECO CROSSRANGE	ASC 2STG GUID	FT			93090E	
EARTH_POLE(1)	V90U0190C	X-COMP UNIT VCTR ALONG EARTH AXIS	RNP MAT COMP	ND	DPL		93090E	
EARTH_POLE(2)	V90U0191C	Y-COMP UNIT VCTR ALONG EARTH AXIS	RNP MAT COMP	ND	DPL		93090E	
EARTH_POLE(3)	V90U0192C	Z-COMP UNIT VCTR ALONG EARTH AXIS	RNP MAT COMP	ND	DPL		93090E	
IY(X)	V90U1976CA	X-M50 UNIT VEC NORMAL TO ORB PLANE	ASC 2STG GUID				93017G	*
IY(X)	V90U1976CD	X-M50 UNIT VEC NORMAL TO ORB PLANE	AOA/ATO TGT				93090E	
IY(Y)	V90U1977CA	Y-M50 UNIT VEC NORMAL TO ORB PLANE	ASC 2STG GUID				93017G	*
IY(Y)	V90U1977CD	Y-M50 UNIT VEC NORMAL TO ORB PLANE	AOA/ATO TGT				93090E	
IY(Z)	V90U1978CA	Z-M50 UNIT VEC NORMAL TO ORB PLANE	ASC 2STG GUID				93017G	*
IY(Z)	V90U1978CD	Z-M50 UNIT VEC NORMAL TO ORB PLANE	AOA/ATO TGT				93090E	
IYD(X)	V97U4413CB	UNIT VEC NORM TRAJ PLANE X COMP	UL				93090E	
IYD(Y)	V97U4414CB	UNIT VEC NORM TRAJ PLANE Y COMP	UL				93090E	
IYD(Z)	V97U4415CB	UNIT VEC NORM TRAJ PLANE Z COMP	UL				93090E	
I_YD_M50(1)	V95U0494C	M50 INSERTION TARGET UNIT VECTOR-1	ASC UPP				93090E	
I_YD_M50(2)	V95U0495C	M50 INSERTION TARGET UNIT VECTOR-2	ASC UPP				93090E	
I_YD_M50(3)	V95U0496C	M50 INSERTION TARGET UNIT VECTOR-3	ASC UPP				93090E	
LAT_RW	V94H5526C	GEODETTIC LATITUDE OF RUNWAY	ASC SITE LOOKUP	RAD	SPL		93090E	
LON_RW	V94H5527C	LONGITUDE OF RUNWAY	ASC SITE LOOKUP	RAD	SPL		93090E	
MM_CODE	V90Q8001C	MAJOR MODE CODE	UI		HXS		93017G	*
M_M50TOEF_AT_EPOCH(1,1)	V97U5738C	M50 TO EF TRANS MATRIX ELEM 1,1	RNP MAT COMP	ND	DPL		93090E	
M_M50TOEF_AT_EPOCH(1,2)	V97U5739C	M50 TO EF TRANS MATRIX ELEM 1,2	RNP MAT COMP	ND	DPL		93090E	
M_M50TOEF_AT_EPOCH(1,3)	V97U5740C	M50 TO EF TRANS MATRIX ELEM 1,3	RNP MAT COMP	ND	DPL		93090E	
M_M50TOEF_AT_EPOCH(2,1)	V97U5741C	M50 TO EF TRANS MATRIX ELEM 2,1	RNP MAT COMP	ND	DPL		93090E	
M_M50TOEF_AT_EPOCH(2,2)	V97U5742C	M50 TO EF TRANS MATRIX ELEM 2,2	RNP MAT COMP	ND	DPL		93090E	
M_M50TOEF_AT_EPOCH(2,3)	V97U5743C	M50 TO EF TRANS MATRIX ELEM 2,3	RNP MAT COMP	ND	DPL		93090E	
M_M50TOEF_AT_EPOCH(3,1)	V97U5744C	M50 TO EF TRANS MATRIX ELEM 3,1	RNP MAT COMP	ND	DPL		93090E	
M_M50TOEF_AT_EPOCH(3,2)	V97U5745C	M50 TO EF TRANS MATRIX ELEM 3,2	RNP MAT COMP	ND	DPL		93090E	
M_M50TOEF_AT_EPOCH(3,3)	V97U5746C	M50 TO EF TRANS MATRIX ELEM 3,3	RNP MAT COMP	ND	DPL		93090E	
NAVBASE_LAT_ZERO	V90H3528C	LATITUDE OF VEHICLE NB AT SEL SITE	GROUND IMU DISP	RAD	DPL		93090E	
NAVBASE_LONG_ZERO	V90H3529C	LONGITUDE OF VEHICLE NB AT SEL SITE	GROUND IMU DISP	RAD	DPL		93090E	
PSI_HSIMV	V90H2212C	HEADING RELATIVE TO MAG NORTH	A/E ATT PROC	RAD			93090E	
REL_VEL_MAG	V95L0151CA	GND REL VEL MAGNITUDE IN M50 SYS	RTLS UPP	FT/S	SPL		93017G	*
REL_VEL_MAG	V95L0151CE	GND REL VEL MAGNITUDE IN M50 SYS	ASC UPP	FT/S			93017G	*

TABLE B.5.26-5. INPUT FUNCTIONAL PARAMETERS FOR ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
RTLS_ABORT_DECLARED	V90X8637XA	RTLS ABORT DECLARED	MSC		BD		93167A	*
RTLS_ABORT_DECLARED	V90X8637XB	RTLS ABORT DECLARED	ET SEP SEQ		BD		93167A	*
RTLS_ABORT_DECLARED	V90X8637XC	RTLS ABORT DECLARED	CONT 3E/O GUID		BD		93167A	*
RW_UPLINK_ALT	V94H5529C	RW UPLINK IND FOR ALT SITES	UL	ND	BD		93090E	
R_AVGG(1)	V95H0185CA	X-COMP OF CUR SHUTTLE POS VCTR M50	RTLS UPP	FT	DPL		93017G	*
R_AVGG(1)	V95H0185CB	X-COMP OF CUR SHUTTLE POS VCTR M50	ASC UPP	FT	DPL		93017G	*
R_AVGG(2)	V95H0186CA	Y-COMP OF CUR SHUTTLE POS VCTR M50	RTLS UPP	FT	DPL		93017G	*
R_AVGG(2)	V95H0186CB	Y-COMP OF CUR SHUTTLE POS VCTR M50	ASC UPP	FT	DPL		93017G	*
R_AVGG(3)	V95H0187CA	Z-COMP OF CUR SHUTTLE POS VCTR M50	RTLS UPP	FT	DPL		93017G	*
R_AVGG(3)	V95H0187CB	Z-COMP OF CUR SHUTTLE POS VCTR M50	ASC UPP	FT	DPL		93017G	*
R_LS_EF(1)	V90H1900CB	X-COMP LDG SITE POS VCT-EF COORD	ASC SITE LOOKUP	FT			93090E	
R_LS_EF(2)	V90H1901CB	Y-COMP LDG SITE POS VCT-EF COORD	ASC SITE LOOKUP	FT			93090E	
R_LS_EF(3)	V90H1902CB	Z-COMP LDG SITE POS VCT-EF COORD	ASC SITE LOOKUP	FT			93090E	
TAL_ABORT_DECLARED	V90X8658X	TAL ABORT DECLARED	MSC				93090E	
TAL_DECL_FRST_PASS	V90X8657XA	TAL ABORT DECLARED FIRST PASS FLAG	ASC SITE LOOKUP				93090E	
T_EPOCH	V97W5528C	TIME TAG FOR M_M50TOEF_AT_EPOCH	RNP MAT COMP	S	DPL		93090E	
T_STATE	V95W0200CC	TIME TAG ASSOC WITH CURRENT STATE	RTLS UPP	S			93017G	*
T_STATE	V95W0200CD	TIME TAG ASSOC WITH CURRENT STATE	ASC UPP	S			93017G	*
V_AVGG(1)	V95L0190CA	X-COMP OF CUR SHUTTLE VEL VCTR M50	RTLS UPP	FT/S	SPL		93017G	*
V_AVGG(1)	V95L0190CB	X-COMP OF CUR SHUTTLE VEL VCTR M50	ASC UPP	FT/S	SPL		93017G	*
V_AVGG(2)	V95L0191CA	Y-COMP OF CUR SHUTTLE VEL VCTR M50	RTLS UPP	FT/S	SPL		93017G	*
V_AVGG(2)	V95L0191CB	Y-COMP OF CUR SHUTTLE VEL VCTR M50	ASC UPP	FT/S	SPL		93017G	*
V_AVGG(3)	V95L0192CA	Z-COMP OF CUR SHUTTLE VEL VCTR M50	RTLS UPP	FT/S	SPL		93017G	*
V_AVGG(3)	V95L0192CB	Z-COMP OF CUR SHUTTLE VEL VCTR M50	ASC UPP	FT/S	SPL		93017G	*
V_RHO(1)	V95L0215CA	X-COMP OF RELATIVE VEL IN M50	RTLS UPP	FT/S			93090E	
V_RHO(1)	V95L0215CE	X-COMP OF RELATIVE VEL IN M50	ASC UPP	FT/S			93090E	
V_RHO(2)	V95L0216CA	Y-COMP OF RELATIVE VEL IN M50	RTLS UPP	FT/S			93090E	
V_RHO(2)	V95L0216CE	Y-COMP OF RELATIVE VEL IN M50	ASC UPP	FT/S			93090E	
V_RHO(3)	V95L0217CA	Z-COMP OF RELATIVE VEL IN M50	RTLS UPP	FT/S			93090E	
V_RHO(3)	V95L0217CE	Z-COMP OF RELATIVE VEL IN M50	ASC UPP	FT/S			93090E	
YAW_IY	V90U2689C	HSI YAW COMMAND	A/E ATT PROC	RAD			93090E	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE B.5.26-6. OUTPUT FUNCTIONAL PARAMETERS FROM ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
AB_DISP_ANG_S	V94U5624C	ASC BRG VEH SYMBOL ROTATION ANGLE	ASC BRG DISP	DEG	SPL		93090E	
AB_DISP_IND	V94X5630X	ASC BRG MAP SET INDICATOR	ASC BRG DISP	ND	HXS		93090E	
AB_HDG_ARROW_ANG_S	V94U5625C	ASC BRG HEADING ARROW ROT ANGLE	ASC BRG DISP	DEG	SPL		93090E	
AB_IIP_PLOT_IND	V94X5572X	ASC BRG IIP PLOT INDEX	ASC BRG DISP	ND	HXS		93090E	
AB_IIP_X	V94H5573C	ASC BRG LAT/LON IIP X POS	ASC BRG DISP	AU	VAR		93090E	
AB_IIP_Y	V94H5574C	ASC BRG LAT/LON IIP Y POS	ASC BRG DISP	AU	VAR		93090E	
AB_INCL_IND	V94X6407X	ASC BRG INCLINATION INDICATOR	ASC BRG DISP	ND	HXS		93090E	
AB_PRED_30_X	V94H5575C	ASC BRG LAT/LON PRED X POS 30	ASC BRG DISP	AU	VAR		93090E	
AB_PRED_30_Y	V94H5576C	ASC BRG LAT/LON PRED Y POS 30	ASC BRG DISP	AU	VAR		93090E	
AB_PRED_60_X	V94H5577C	ASC BRG LAT/LON PRED X POS 60	ASC BRG DISP	AU	VAR		93090E	
AB_PRED_60_Y	V94H5578C	ASC BRG LAT/LON PRED Y POS 60	ASC BRG DISP	AU	VAR		93090E	
AB_STATE_X	V94H5579C	ASC BRG LAT/LON CURR X POS	ASC BRG DISP	AU	VAR		93090E	
AB_STATE_Y	V94H5580C	ASC BRG LAT/LON CURR Y POS	ASC BRG DISP	AU	VAR		93090E	
ALT_RW_NAME(1)	V94U5522C	ALTERNATE SITE 1 PRI RUNWAY NAME	ASC BRG DISP	ND	VAR		93090E	
ALT_RW_NAME(2)	V94U5523C	ALTERNATE SITE 2 PRI RUNWAY NAME	ASC BRG DISP	ND	VAR		93090E	
BLANK_IIP	V94X5534X	IIP SYMBOL BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LCH_WINDOW_CLOSE	V94X5536X	LAUNCH WINDOW CLOSE BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LCH_WINDOW_OPEN	V94X5535X	LAUNCH WINDOW OPEN BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(1)	V94X5693X	LANDING SITE 1 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(10)	V94X5702X	LANDING SITE 10 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(11)	V94X5703X	LANDING SITE 11 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(12)	V94X5704X	LANDING SITE 12 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(13)	V94X5705X	LANDING SITE 13 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(14)	V94X5706X	LANDING SITE 14 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(15)	V94X5707X	LANDING SITE 15 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(16)	V94X5708X	LANDING SITE 16 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(17)	V94X5709X	LANDING SITE 17 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(18)	V94X5710X	LANDING SITE 18 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(19)	V94X5711X	LANDING SITE 19 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(2)	V94X5694X	LANDING SITE 2 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(20)	V94X5712X	LANDING SITE 20 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(3)	V94X5695X	LANDING SITE 3 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(4)	V94X5696X	LANDING SITE 4 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(5)	V94X5697X	LANDING SITE 5 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(6)	V94X5698X	LANDING SITE 6 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(7)	V94X5699X	LANDING SITE 7 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(8)	V94X5700X	LANDING SITE 8 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_LDG_SITE(9)	V94X5701X	LANDING SITE 9 BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_TAL_CRNG_CIRCLE	V94X6682X	TAL CRNG CIRCLE BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_TGT_INS_LN_IS	V94X5538X	TGT INS LINE INSET BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
BLANK_TGT_INS_LN_MN	V94X5537X	TGT INS LINE MAIN BLANKING FLAG	ASC BRG DISP	ND	BD		93090E	
DELAZ_ALT(1)	V94H5517C	ALTER SITE 1 DELTA AZIMUTH	ASC BRG DISP	RAD	SPL		93090E	
DELAZ_ALT(2)	V94H5518C	ALTER SITE 2 DELTA AZIMUTH	ASC BRG DISP	RAD	SPL		93090E	
DELAZ_SEL	V94H5519C	SELECTED SITE DELTA AZIMUTH	ASC BRG DISP	RAD	SPL		93090E	
LCH_WINDOW_CLOSE_X(1)	V94H5477C	ASC BRG LAT/LON LCH CL X POS 1	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_CLOSE_X(2)	V94H5478C	ASC BRG LAT/LON LCH CL X POS 2	ASC BRG DISP	AU	VAR		93090E	

TABLE B.5.26-6. OUTPUT FUNCTIONAL PARAMETERS FROM ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
LCH_WINDOW_CLOSE_X(3)	V94H5479C	ASC BRG LAT/LON LCH CL X POS 3	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_CLOSE_X(4)	V94H5480C	ASC BRG LAT/LON LCH CL X POS 4	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_CLOSE_X(5)	V94H5481C	ASC BRG LAT/LON LCH CL X POS 5	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_CLOSE_X(6)	V94H5482C	ASC BRG LAT/LON LCH CL X POS 6	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_CLOSE_Y(1)	V94H5483C	ASC BRG LAT/LON LCH CL Y POS 1	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_CLOSE_Y(2)	V94H5484C	ASC BRG LAT/LON LCH CL Y POS 2	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_CLOSE_Y(3)	V94H5485C	ASC BRG LAT/LON LCH CL Y POS 3	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_CLOSE_Y(4)	V94H5486C	ASC BRG LAT/LON LCH CL Y POS 4	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_CLOSE_Y(5)	V94H5487C	ASC BRG LAT/LON LCH CL Y POS 5	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_CLOSE_Y(6)	V94H5488C	ASC BRG LAT/LON LCH CL Y POS 6	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_OPEN_X(1)	V94H5465C	ASC BRG LAT/LON LCH OP X POS 1	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_OPEN_X(2)	V94H5466C	ASC BRG LAT/LON LCH OP X POS 2	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_OPEN_X(3)	V94H5467C	ASC BRG LAT/LON LCH OP X POS 3	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_OPEN_X(4)	V94H5468C	ASC BRG LAT/LON LCH OP X POS 4	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_OPEN_X(5)	V94H5469C	ASC BRG LAT/LON LCH OP X POS 5	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_OPEN_X(6)	V94H5470C	ASC BRG LAT/LON LCH OP X POS 6	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_OPEN_Y(1)	V94H5471C	ASC BRG LAT/LON LCH OP Y POS 1	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_OPEN_Y(2)	V94H5472C	ASC BRG LAT/LON LCH OP Y POS 2	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_OPEN_Y(3)	V94H5473C	ASC BRG LAT/LON LCH OP Y POS 3	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_OPEN_Y(4)	V94H5474C	ASC BRG LAT/LON LCH OP Y POS 4	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_OPEN_Y(5)	V94H5475C	ASC BRG LAT/LON LCH OP Y POS 5	ASC BRG DISP	AU	VAR		93090E	
LCH_WINDOW_OPEN_Y(6)	V94H5476C	ASC BRG LAT/LON LCH OP Y POS 6	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(1,1)	V94H5489C	ASC BRG LAT/LON LDG SITE X POS 1	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(1,2)	V94H5490C	ASC BRG LAT/LON LDG SITE Y POS 1	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(1,3)	V94U5385C	ASC BRG LDG SITE CHAR STRING 1	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(1,4)	V94X5405X	ASC BRG LDG SITE PLOT IND 1	ASC BRG DISP	ND	BD		93090E	
LDG_SITE_XYPOS_CHAR(10,1)	V94H5507C	ASC BRG LAT/LON LDG SITE X POS 10	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(10,2)	V94H5508C	ASC BRG LAT/LON LDG SITE Y POS 10	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(10,3)	V94U5394C	ASC BRG LDG SITE CHAR STRING 10	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(10,4)	V94X5414X	ASC BRG LDG SITE PLOT IND 10	ASC BRG DISP	ND	BD		93090E	
LDG_SITE_XYPOS_CHAR(11,1)	V94H5509C	ASC BRG LAT/LON LDG SITE X POS 11	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(11,2)	V94H5584C	ASC BRG LAT/LON LDG SITE Y POS 11	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(11,3)	V94U5395C	ASC BRG LDG SITE CHAR STRING 11	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(11,4)	V94X5415X	ASC BRG LDG SITE PLOT IND 11	ASC BRG DISP	ND	BD		93090E	
LDG_SITE_XYPOS_CHAR(12,1)	V94H5585C	ASC BRG LAT/LON LDG SITE X POS 12	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(12,2)	V94H5586C	ASC BRG LAT/LON LDG SITE Y POS 12	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(12,3)	V94U5396C	ASC BRG LDG SITE CHAR STRING 12	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(12,4)	V94X5416X	ASC BRG LDG SITE PLOT IND 12	ASC BRG DISP	ND	BD		93090E	
LDG_SITE_XYPOS_CHAR(13,1)	V94H5587C	ASC BRG LAT/LON LDG SITE X POS 13	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(13,2)	V94H5588C	ASC BRG LAT/LON LDG SITE Y POS 13	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(13,3)	V94U5397C	ASC BRG LDG SITE CHAR STRING 13	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(13,4)	V94X5417X	ASC BRG LDG SITE PLOT IND 13	ASC BRG DISP	ND	BD		93090E	
LDG_SITE_XYPOS_CHAR(14,1)	V94H5589C	ASC BRG LAT/LON LDG SITE X POS 14	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(14,2)	V94H5590C	ASC BRG LAT/LON LDG SITE Y POS 14	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(14,3)	V94U5398C	ASC BRG LDG SITE CHAR STRING 14	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(14,4)	V94X5418X	ASC BRG LDG SITE PLOT IND 14	ASC BRG DISP	ND	BD		93090E	

TABLE B.5.26-6. OUTPUT FUNCTIONAL PARAMETERS FROM ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
LDG_SITE_XYPOS_CHAR(15,1)	V94H5591C	ASC BRG LAT/LON LDG SITE X POS 15	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(15,2)	V94H5592C	ASC BRG LAT/LON LDG SITE Y POS 15	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(15,3)	V94U5399C	ASC BRG LDG SITE CHAR STRING 15	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(15,4)	V94X5419X	ASC BRG LDG SITE PLOT IND 15	ASC BRG DISP	ND	BD		93090E	
LDG_SITE_XYPOS_CHAR(16,1)	V94H5593C	ASC BRG LAT/LON LDG SITE X POS 16	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(16,2)	V94H5594C	ASC BRG LAT/LON LDG SITE Y POS 16	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(16,3)	V94U5543C	ASC BRG LDG SITE CHAR STRING 16	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(16,4)	V94X5512X	ASC BRG LDG SITE PLOT IND 16	ASC BRG DISP	ND	BD		93090E	
LDG_SITE_XYPOS_CHAR(17,1)	V94H5595C	ASC BRG LAT/LON LDG SITE X POS 17	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(17,2)	V94H5596C	ASC BRG LAT/LON LDG SITE Y POS 17	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(17,3)	V94U5544C	ASC BRG LDG SITE CHAR STRING 17	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(17,4)	V94X5513X	ASC BRG LDG SITE PLOT IND 17	ASC BRG DISP	ND	BD		93090E	
LDG_SITE_XYPOS_CHAR(18,1)	V94H5597C	ASC BRG LAT/LON LDG SITE X POS 18	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(18,2)	V94H5598C	ASC BRG LAT/LON LDG SITE Y POS 18	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(18,3)	V94U5545C	ASC BRG LDG SITE CHAR STRING 18	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(18,4)	V94X5514X	ASC BRG LDG SITE PLOT IND 18	ASC BRG DISP	ND	BD		93090E	
LDG_SITE_XYPOS_CHAR(19,1)	V94H5599C	ASC BRG LAT/LON LDG SITE X POS 19	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(19,2)	V94H5600C	ASC BRG LAT/LON LDG SITE Y POS 19	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(19,3)	V94U5546C	ASC BRG LDG SITE CHAR STRING 19	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(19,4)	V94X5515X	ASC BRG LDG SITE PLOT IND 19	ASC BRG DISP	ND	BD		93090E	
LDG_SITE_XYPOS_CHAR(2,1)	V94H5491C	ASC BRG LAT/LON LDG SITE X POS 2	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(2,2)	V94H5492C	ASC BRG LAT/LON LDG SITE Y POS 2	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(2,3)	V94U5386C	ASC BRG LDG SITE CHAR STRING 2	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(2,4)	V94X5406X	ASC BRG LDG SITE PLOT IND 2	ASC BRG DISP	ND	BD		93090E	
LDG_SITE_XYPOS_CHAR(20,1)	V94H5604C	ASC BRG LAT/LON LDG SITE X POS 20	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(20,2)	V94H5605C	ASC BRG LAT/LON LDG SITE Y POS 20	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(20,3)	V94U5547C	ASC BRG LDG SITE CHAR STRING 20	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(20,4)	V94X5516X	ASC BRG LDG SITE PLOT IND 20	ASC BRG DISP	ND	BD		93090E	
LDG_SITE_XYPOS_CHAR(3,1)	V94H5493C	ASC BRG LAT/LON LDG SITE X POS 3	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(3,2)	V94H5494C	ASC BRG LAT/LON LDG SITE Y POS 3	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(3,3)	V94U5387C	ASC BRG LDG SITE CHAR STRING 3	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(3,4)	V94X5407X	ASC BRG LDG SITE PLOT IND 3	ASC BRG DISP	ND	BD		93090E	
LDG_SITE_XYPOS_CHAR(4,1)	V94H5495C	ASC BRG LAT/LON LDG SITE X POS 4	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(4,2)	V94H5496C	ASC BRG LAT/LON LDG SITE Y POS 4	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(4,3)	V94U5388C	ASC BRG LDG SITE CHAR STRING 4	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(4,4)	V94X5408X	ASC BRG LDG SITE PLOT IND 4	ASC BRG DISP	ND	BD		93090E	
LDG_SITE_XYPOS_CHAR(5,1)	V94H5497C	ASC BRG LAT/LON LDG SITE X POS 5	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(5,2)	V94H5498C	ASC BRG LAT/LON LDG SITE Y POS 5	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(5,3)	V94U5389C	ASC BRG LDG SITE CHAR STRING 5	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(5,4)	V94X5409X	ASC BRG LDG SITE PLOT IND 5	ASC BRG DISP	ND	BD		93090E	
LDG_SITE_XYPOS_CHAR(6,1)	V94H5499C	ASC BRG LAT/LON LDG SITE X POS 6	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(6,2)	V94H5500C	ASC BRG LAT/LON LDG SITE Y POS 6	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(6,3)	V94U5390C	ASC BRG LDG SITE CHAR STRING 6	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(6,4)	V94X5410X	ASC BRG LDG SITE PLOT IND 6	ASC BRG DISP	ND	BD		93090E	
LDG_SITE_XYPOS_CHAR(7,1)	V94H5501C	ASC BRG LAT/LON LDG SITE X POS 7	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(7,2)	V94H5502C	ASC BRG LAT/LON LDG SITE Y POS 7	ASC BRG DISP	AU	VAR		93090E	



TABLE B.5.26-6. OUTPUT FUNCTIONAL PARAMETERS FROM ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
LDG_SITE_XYPOS_CHAR(7,3)	V94U5391C	ASC BRG LDG SITE CHAR STRING 7	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(7,4)	V94X5411X	ASC BRG LDG SITE PLOT IND 7	ASC BRG DISP	ND	BD		93090E	
LDG_SITE_XYPOS_CHAR(8,1)	V94H5503C	ASC BRG LAT/LON LDG SITE X POS 8	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(8,2)	V94H5504C	ASC BRG LAT/LON LDG SITE Y POS 8	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(8,3)	V94U5392C	ASC BRG LDG SITE CHAR STRING 8	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(8,4)	V94X5412X	ASC BRG LDG SITE PLOT IND 8	ASC BRG DISP	ND	BD		93090E	
LDG_SITE_XYPOS_CHAR(9,1)	V94H5505C	ASC BRG LAT/LON LDG SITE X POS 9	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(9,2)	V94H5506C	ASC BRG LAT/LON LDG SITE Y POS 9	ASC BRG DISP	AU	VAR		93090E	
LDG_SITE_XYPOS_CHAR(9,3)	V94U5393C	ASC BRG LDG SITE CHAR STRING 9	ASC BRG DISP	ND	VAR		93090E	
LDG_SITE_XYPOS_CHAR(9,4)	V94X5413X	ASC BRG LDG SITE PLOT IND 9	ASC BRG DISP	ND	BD		93090E	
TAL_CRNG_CTR_X	V94H5553C	TAL CRNG CIRCLE X POS	ASC BRG DISP	AU	VAR		93090E	
TAL_CRNG_CTR_Y	V94H5554C	TAL CRNG CIRCLE Y POS	ASC BRG DISP	AU	VAR		93090E	
TAL_CRNG_RADIUS	V94H5555C	TAL CRNG CIRCLE RADIUS	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_IS_X(1)	V94H5373C	ASC BRG LAT/LON TGT INS IS X POS 1	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_IS_X(2)	V94H5374C	ASC BRG LAT/LON TGT INS IS X POS 2	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_IS_X(3)	V94H5375C	ASC BRG LAT/LON TGT INS IS X POS 3	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_IS_X(4)	V94H5376C	ASC BRG LAT/LON TGT INS IS X POS 4	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_IS_X(5)	V94H5377C	ASC BRG LAT/LON TGT INS IS X POS 5	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_IS_X(6)	V94H5378C	ASC BRG LAT/LON TGT INS IS X POS 6	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_IS_Y(1)	V94H5379C	ASC BRG LAT/LON TGT INS IS Y POS 1	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_IS_Y(2)	V94H5380C	ASC BRG LAT/LON TGT INS IS Y POS 2	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_IS_Y(3)	V94H5381C	ASC BRG LAT/LON TGT INS IS Y POS 3	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_IS_Y(4)	V94H5382C	ASC BRG LAT/LON TGT INS IS Y POS 4	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_IS_Y(5)	V94H5383C	ASC BRG LAT/LON TGT INS IS Y POS 5	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_IS_Y(6)	V94H5384C	ASC BRG LAT/LON TGT INS IS Y POS 6	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_MN_X(1)	V94H5361C	ASC BRG LAT/LON TGT INS MN X POS 1	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_MN_X(2)	V94H5362C	ASC BRG LAT/LON TGT INS MN X POS 2	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_MN_X(3)	V94H5363C	ASC BRG LAT/LON TGT INS MN X POS 3	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_MN_X(4)	V94H5364C	ASC BRG LAT/LON TGT INS MN X POS 4	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_MN_X(5)	V94H5365C	ASC BRG LAT/LON TGT INS MN X POS 5	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_MN_X(6)	V94H5366C	ASC BRG LAT/LON TGT INS MN X POS 6	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_MN_Y(1)	V94H5367C	ASC BRG LAT/LON TGT INS MN Y POS 1	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_MN_Y(2)	V94H5368C	ASC BRG LAT/LON TGT INS MN Y POS 2	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_MN_Y(3)	V94H5369C	ASC BRG LAT/LON TGT INS MN Y POS 3	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_MN_Y(4)	V94H5370C	ASC BRG LAT/LON TGT INS MN Y POS 4	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_MN_Y(5)	V94H5371C	ASC BRG LAT/LON TGT INS MN Y POS 5	ASC BRG DISP	AU	VAR		93090E	
TGT_INS_LINE_MN_Y(6)	V94H5372C	ASC BRG LAT/LON TGT INS MN Y POS 6	ASC BRG DISP	AU	VAR		93090E	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
 (HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec

TABLE B.5.26-7. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
DELTA_PSI_FAC	V97U0933C	ND	F	S	D	C	G4.19 G5.26	00	ARC	93090E	
DELTA_PSI_LIM	V97U0934C	RAD	F	S	D	C	G4.19 G5.26	00	ARC	93090E	
EF_PLANE_SW	V99U7441C	ND	D		M	C	G4.19 G4.2 G4.20 G4.210 G4.226 G4.3 G5.26	00	A2N	93090E	
IIP_AERO_R_FACT	V98U8582C	ND	F	S	D	P	G5.26 G5.27	01 03	IIP IIP	93168A	
IIP_AERO_T_FACT	V98U8583C	ND	F	S	D	P	G5.26 G5.27	00	IIP	93090E	
IIP_VI_MAG_HIGH	V98U8584C	FT/SEC	F	S	D	P	G5.26 G5.27	00	IIP	93090E	
IIP_VI_MAG_LOW	V98U8727C	FT/SEC	F	S	D	P	G5.26 G5.27	00	IIP	93090E	
IYD(1)	V97U4413C	ND	F	D	M	C	G4.19 G4.2 G4.210 G4.226 G4.3 G5.26	00	A2N	93090E	
IYD(2)	V97U4414C	ND	F	D	M	C	G4.19 G4.2 G4.210 G4.226 G4.3 G5.26	00	A2N	93090E	
IYD(3)	V97U4415C	ND	F	D	M	C	G4.19 G4.2 G4.210 G4.226 G4.3 G5.26	00	A2N	93090E	
RUNWAY_ALT(1)	V98U9795C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E01	93090E	
RUNWAY_ALT(11)	V97U6574C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E06	93090E	

TABLE B.5.26-7. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RUNWAY_ALT(13)	V97U6589C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E07	93090E	
RUNWAY_ALT(15)	V97U6603C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E08	93090E	
RUNWAY_ALT(17)	V97U6617C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E09	93090E	
RUNWAY_ALT(19)	V97U5684CC	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E10	93090E	
RUNWAY_ALT(21)	V97U5686CC	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E11	93090E	
RUNWAY_ALT(23)	V97U5685CB	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E12	93090E	
RUNWAY_ALT(25)	V99U7364C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E13	93090E	
RUNWAY_ALT(27)	V99U7378C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E14	93090E	
RUNWAY_ALT(29)	V99U7692C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E15	93090E	
RUNWAY_ALT(3)	V97U6563C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E02	93090E	
RUNWAY_ALT(31)	V98U8181C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E16	93090E	

TABLE B.5.26-7. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RUNWAY_ALT(33)	V98U8183C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E17	93090E	
RUNWAY_ALT(35)	V98U8185C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E18	93090E	
RUNWAY_ALT(37)	V98U8187C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E19	93090E	
RUNWAY_ALT(39)	V98U8189C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E20	93090E	
RUNWAY_ALT(41)	V98U8191C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E21	93090E	
RUNWAY_ALT(43)	V98U8193C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E22	93090E	
RUNWAY_ALT(45)	V98U8195C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E23	93090E	
RUNWAY_ALT(47)	V98U8197C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E24	93090E	
RUNWAY_ALT(49)	V98U8199C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E25	93090E	
RUNWAY_ALT(5)	V97U6565C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E03	93090E	
RUNWAY_ALT(51)	V97U6536C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E26	93090E	

TABLE B.5.26-7. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RUNWAY_ALT(53)	V97U6538C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E27	93090E	
RUNWAY_ALT(55)	V97U6540C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E28	93090E	
RUNWAY_ALT(57)	V97U6542C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E29	93090E	
RUNWAY_ALT(59)	V97U6544C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E30	93090E	
RUNWAY_ALT(61)	V97U7081C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E31	93090E	
RUNWAY_ALT(63)	V97U7083C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E32	93090E	
RUNWAY_ALT(65)	V97U7085C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E33	93090E	
RUNWAY_ALT(67)	V97U7087C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E34	93090E	
RUNWAY_ALT(69)	V97U7089C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E35	93090E	
RUNWAY_ALT(7)	V97U6567C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E04	93090E	
RUNWAY_ALT(71)	V97U7091C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E36	93090E	

TABLE B.5.26-7. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RUNWAY_ALT(73)	V97U7093C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E37	93090E	
RUNWAY_ALT(75)	V97U7095C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E38	93090E	
RUNWAY_ALT(77)	V97U7097C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E39	93090E	
RUNWAY_ALT(79)	V97U7099C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E40	93090E	
RUNWAY_ALT(81)	V97U7235C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E41	93090E	
RUNWAY_ALT(83)	V97U7237C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E42	93090E	
RUNWAY_ALT(85)	V97U7239C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E43	93090E	
RUNWAY_ALT(87)	V97U7241C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E44	93090E	
RUNWAY_ALT(89)	V97U7243C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E45	93090E	
RUNWAY_ALT(9)	V97U6569C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E05	93090E	
RUNWAY_NAME(01)	V98U8767C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E01	93090E	

TABLE B.5.26-7. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RUNWAY_NAME(03)	V98U8769C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E02	93090E	
RUNWAY_NAME(05)	V98U8771C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E03	93090E	
RUNWAY_NAME(07)	V98U8773C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E04	93090E	
RUNWAY_NAME(09)	V98U8775C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E05	93090E	
RUNWAY_NAME(11)	V97U6571C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E06	93090E	
RUNWAY_NAME(13)	V97U6586C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E07	93090E	
RUNWAY_NAME(15)	V97U6600C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E08	93090E	
RUNWAY_NAME(17)	V97U6614C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E09	93090E	
RUNWAY_NAME(19)	V97U5681CC	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E10	93090E	
RUNWAY_NAME(21)	V97U5683CC	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E11	93090E	
RUNWAY_NAME(23)	V97U5682CB	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E12	93090E	

TABLE B.5.26-7. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RUNWAY_NAME ( 25 )	V99U7363C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E13	93090E	
RUNWAY_NAME ( 27 )	V99U7377C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E14	93090E	
RUNWAY_NAME ( 29 )	V99U7691C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E15	93090E	
RUNWAY_NAME ( 31 )	V98U8201C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E16	93090E	
RUNWAY_NAME ( 33 )	V98U8203C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E17	93090E	
RUNWAY_NAME ( 35 )	V98U8205C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E18	93090E	
RUNWAY_NAME ( 37 )	V98U8207C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E19	93090E	
RUNWAY_NAME ( 39 )	V98U8209C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E20	93090E	
RUNWAY_NAME ( 41 )	V98U8211C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E21	93090E	
RUNWAY_NAME ( 43 )	V98U8213C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E22	93090E	
RUNWAY_NAME ( 45 )	V98U8215C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E23	93090E	



TABLE B.5.26-7. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RUNWAY_NAME (47)	V98U8217C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E24	93090E	
RUNWAY_NAME (49)	V98U8219C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E25	93090E	
RUNWAY_NAME (51)	V97U7245C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E26	93090E	
RUNWAY_NAME (53)	V97U7247C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E27	93090E	
RUNWAY_NAME (55)	V97U7249C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E28	93090E	
RUNWAY_NAME (57)	V97U7251C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E29	93090E	
RUNWAY_NAME (59)	V97U7253C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E30	93090E	
RUNWAY_NAME (61)	V97U7255C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E31	93090E	
RUNWAY_NAME (63)	V97U7257C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E32	93090E	
RUNWAY_NAME (65)	V97U7259C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E33	93090E	
RUNWAY_NAME (67)	V97U7261C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E34	93090E	

TABLE B.5.26-7. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RUNWAY_NAME (69)	V97U7263C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E35	93090E	
RUNWAY_NAME (71)	V97U7265C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E36	93090E	
RUNWAY_NAME (73)	V97U7267C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E37	93090E	
RUNWAY_NAME (75)	V97U7269C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E38	93090E	
RUNWAY_NAME (77)	V97U7271C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E39	93090E	
RUNWAY_NAME (79)	V97U7273C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E40	93090E	
RUNWAY_NAME (81)	V97U7275C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E41	93090E	
RUNWAY_NAME (83)	V97U7277C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E42	93090E	
RUNWAY_NAME (85)	V97U7279C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E43	93090E	
RUNWAY_NAME (87)	V97U7281C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E44	93090E	
RUNWAY_NAME (89)	V97U7283C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E45	93090E	

TABLE B.5.26-7. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_LAT(01)	V98U8820C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E01	93090E	
RW_LAT(03)	V98U8822C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E02	93090E	
RW_LAT(05)	V98U8824C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E03	93090E	
RW_LAT(07)	V98U8826C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E04	93090E	
RW_LAT(09)	V98U8828C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E05	93090E	
RW_LAT(11)	V97U6572C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E06	93090E	
RW_LAT(13)	V97U6587C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E07	93090E	
RW_LAT(15)	V97U6601C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E08	93090E	
RW_LAT(17)	V97U6615C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E09	93090E	
RW_LAT(19)	V97U5696CC	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E10	93090E	
RW_LAT(21)	V97U5698CC	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E11	93090E	

TABLE B.5.26-7. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_LAT(23)	V97U5697CB	RAD	F	S	D	C	G4.124 G4.238 G5.26	00	E12	93090E	
RW_LAT(25)	V99U7365C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E13	93090E	
RW_LAT(27)	V99U7379C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E14	93090E	
RW_LAT(29)	V99U7693C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E15	93090E	
RW_LAT(31)	V98U8301C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E16	93090E	
RW_LAT(33)	V98U8303C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E17	93090E	
RW_LAT(35)	V98U8305C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E18	93090E	
RW_LAT(37)	V98U8307C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E19	93090E	
RW_LAT(39)	V98U8309C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E20	93090E	
RW_LAT(41)	V98U8311C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E21	93090E	
RW_LAT(43)	V98U8313C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E22	93090E	

TABLE B.5.26-7. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_LAT(45)	V98U8315C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E23	93090E	
RW_LAT(47)	V98U8317C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E24	93090E	
RW_LAT(49)	V98U8319C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E25	93090E	
RW_LAT(51)	V97U7745C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E26	93090E	
RW_LAT(53)	V97U7747C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E27	93090E	
RW_LAT(55)	V97U7749C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E28	93090E	
RW_LAT(57)	V97U7751C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E29	93090E	
RW_LAT(59)	V97U7753C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E30	93090E	
RW_LAT(61)	V97U8062C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E31	93090E	
RW_LAT(63)	V97U8064C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E32	93090E	
RW_LAT(65)	V97U8066C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E33	93090E	

TABLE B.5.26-7. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_LAT(67)	V97U8068C	RAD	F	S	D	C	G4.124 G4.238 G5.26	00	E34	93090E	
RW_LAT(69)	V97U8070C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E35	93090E	
RW_LAT(71)	V97U8143C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E36	93090E	
RW_LAT(73)	V97U8145C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E37	93090E	
RW_LAT(75)	V97U8147C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E38	93090E	
RW_LAT(77)	V97U8149C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E39	93090E	
RW_LAT(79)	V97U8151C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E40	93090E	
RW_LAT(81)	V97U8153C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E41	93090E	
RW_LAT(83)	V97U8155C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E42	93090E	
RW_LAT(85)	V97U8157C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E43	93090E	
RW_LAT(87)	V97U8159C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E44	93090E	

TABLE B.5.26-7. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_LAT(89)	V97U8161C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E45	93090E	
RW_LON(01)	V98U8833C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E01	93090E	
RW_LON(03)	V98U8835C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E02	93090E	
RW_LON(05)	V98U8837C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E03	93090E	
RW_LON(07)	V98U8839C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E04	93090E	
RW_LON(09)	V98U8841C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E05	93090E	
RW_LON(11)	V97U6573C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E06	93090E	
RW_LON(13)	V97U6588C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E07	93090E	
RW_LON(15)	V97U6602C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E08	93090E	
RW_LON(17)	V97U6616C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E09	93090E	
RW_LON(19)	V98U9243CC	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E10	93090E	

TABLE B.5.26-7. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_LON(21)	V98U9245CC	RAD	F	S	D	C	G4.124 G4.238 G5.26	00	E11	93090E	
RW_LON(23)	V98U9244CB	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E12	93090E	
RW_LON(25)	V99U7366C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E13	93090E	
RW_LON(27)	V99U7380C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E14	93090E	
RW_LON(29)	V99U7694C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E15	93090E	
RW_LON(31)	V98U8341C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E16	93090E	
RW_LON(33)	V98U8343C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E17	93090E	
RW_LON(35)	V98U8345C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E18	93090E	
RW_LON(37)	V98U8347C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E19	93090E	
RW_LON(39)	V98U8349C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E20	93090E	
RW_LON(41)	V98U8351C	RAD	F	S	D	C	G5.27 G4.124 G4.238 G5.26	00	E21	93090E	



TABLE B.5.26-7. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_LON(43)	V98U8353C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E22	93090E	
RW_LON(45)	V98U8355C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E23	93090E	
RW_LON(47)	V98U8357C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E24	93090E	
RW_LON(49)	V98U8359C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E25	93090E	
RW_LON(51)	V97U8587C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E26	93090E	
RW_LON(53)	V97U8589C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E27	93090E	
RW_LON(55)	V97U8591C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E28	93090E	
RW_LON(57)	V97U8593C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E29	93090E	
RW_LON(59)	V97U8595C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E30	93090E	
RW_LON(61)	V97U8695C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E31	93090E	
RW_LON(63)	V97U8697C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E32	93090E	

TABLE B.5.26-7. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_LON(65)	V97U8699C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E33	93090E	
RW_LON(67)	V97U8701C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E34	93090E	
RW_LON(69)	V97U8703C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E35	93090E	
RW_LON(71)	V97U8814C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E36	93090E	
RW_LON(73)	V97U8816C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E37	93090E	
RW_LON(75)	V97U8818C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E38	93090E	
RW_LON(77)	V97U8820C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E39	93090E	
RW_LON(79)	V97U8822C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E40	93090E	
RW_LON(81)	V97U8824C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E41	93090E	
RW_LON(83)	V97U8826C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E42	93090E	
RW_LON(85)	V97U8828C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E43	93090E	

TABLE B.5.26-7. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_LON(87)	V97U8830C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E44	93090E	
RW_LON(89)	V97U8832C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E45	93090E	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

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TABLE B.5.26-8. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

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TABLE B.5.26-9. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
AB_INCL_THRESH AB HIGH/LOW INCL COS THRESHOLD	V94H5620C	00	0.76604444	ND	F	S	P	G5.26	93090E	
AB_INSET_CORNER_LAT_UL(1,1) AB LAT UL HI INC MAP 1 IS CORNER	V94H6707C	00	0.77856844	RAD	F	S	P	G5.26	93090E	
AB_INSET_CORNER_LAT_UL(1,2) AB LAT UL HI INC MAP 2 IS CORNER	V94H6708C	00	0.88920569	RAD	F	S	P	G5.26	93090E	
AB_INSET_CORNER_LAT_UL(2,1) AB LAT UL LO INC MAP 1 IS CORNER	V94H6709C	00	0.60325386	RAD	F	S	P	G5.26	93090E	
AB_INSET_CORNER_LAT_UL(2,2) AB LAT UL LO INC MAP 2 IS CORNER	V94H6710C	00	0.71536264	RAD	F	S	P	G5.26	93090E	
AB_INSET_CORNER_LON_LL(1,1) AB LON LL HI INC MAP 1 IS CORNER	V94H6711C	00	-1.2547958	RAD	F	S	P	G5.26	93090E	
AB_INSET_CORNER_LON_LL(1,2) AB LON LL HI INC MAP 2 IS CORNER	V94H6712C	00	-0.59245459	RAD	F	S	P	G5.26	93090E	
AB_INSET_CORNER_LON_LL(2,1) AB LON LL LO INC MAP 1 IS CORNER	V94H6713C	00	-1.1756294	RAD	F	S	P	G5.26	93090E	
AB_INSET_CORNER_LON_LL(2,2) AB LON LL LO INC MAP 2 IS CORNER	V94H6714C	00	-0.59245376	RAD	F	S	P	G5.26	93090E	
AB_MAP_LAT_LL(1,1,1) AB LAT LWR LMT HI INC MAP 1 MAIN	V94U5425C	00	0.49058691	RAD	F	S	P	G5.26	93090E	
AB_MAP_LAT_LL(1,1,2) AB LAT LWR LMT HI INC MAP 1 INSET	V94U5426C	00	0.59587794	RAD	F	S	P	G5.26	93090E	
AB_MAP_LAT_LL(1,2,1) AB LAT LWR LMT HI INC MAP 2 MAIN	V94U5427C	00	0.60000924	RAD	F	S	P	G5.26	93090E	
AB_MAP_LAT_LL(1,2,2) AB LAT LWR LMT HI INC MAP 2 INSET	V94U5428C	00	0.52359878	RAD	F	S	P	G5.26	93090E	
AB_MAP_LAT_LL(2,1,1) AB LAT LWR LMT LO INC MAP 1 MAIN	V94U5429C	00	0.38397244	RAD	F	S	P	G5.26	93090E	
AB_MAP_LAT_LL(2,1,2) AB LAT LWR LMT LO INC MAP 1 INSET	V94U5430C	00	0.41887902	RAD	F	S	P	G5.26	93090E	
AB_MAP_LAT_LL(2,2,1) AB LAT LWR LMT LO INC MAP 2 MAIN	V94U5431C	00	0.31415926	RAD	F	S	P	G5.26	93090E	
AB_MAP_LAT_LL(2,2,2) AB LAT LWR LMT LO INC MAP 2 INSET	V94U5432C	00	0.19198622	RAD	F	S	P	G5.26	93090E	
AB_MAP_LAT_UL(1,1,1) AB LAT UPR LMT HI INC MAP 1 MAIN	V94U5433C	00	0.61253597	RAD	F	S	P	G5.26	93090E	
AB_MAP_LAT_UL(1,1,2) AB LAT UPR LMT HI INC MAP 1 INSET	V94U5434C	00	0.86393798	RAD	F	S	P	G5.26	93090E	
AB_MAP_LAT_UL(1,2,1) AB LAT UPR LMT HI INC MAP 2 MAIN	V94U5435C	00	0.75591870	RAD	F	S	P	G5.26	93090E	
AB_MAP_LAT_UL(1,2,2) AB LAT UPR LMT HI INC MAP 2 INSET	V94U5436C	00	1.0943062	RAD	F	S	P	G5.26	93090E	
AB_MAP_LAT_UL(2,1,1) AB LAT UPR LMT LO INC MAP 1 MAIN	V94U5437C	00	0.55850536	RAD	F	S	P	G5.26	93090E	
AB_MAP_LAT_UL(2,1,2) AB LAT UPR LMT LO INC MAP 1 INSET	V94U5438C	00	0.68940505	RAD	F	S	P	G5.26	93090E	

TABLE B.5.26-9. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
AB_MAP_LAT_UL(2,2,1)	V94U5439C	00	0.62831853	RAD	F	S	P	G5.26	93090E	
AB LAT UPR LMT LO INC MAP 2 MAIN										
AB_MAP_LAT_UL(2,2,2)	V94U5548C	00	0.95993109	RAD	F	S	P	G5.26	93090E	
AB LAT UPR LMT LO INC MAP 2 INSET										
AB_MAP_LON_LL(1,1,1)	V94U5445C	00	-1.4206980	RAD	F	S	P	G5.26	93090E	
AB LON LWR LMT HI INC MAP 1 MAIN										
AB_MAP_LON_LL(1,1,2)	V94U5446C	00	-1.3439035	RAD	F	S	P	G5.26	93090E	
AB LON LWR LMT HI INC MAP 1 INSET										
AB_MAP_LON_LL(1,2,1)	V94U5447C	00	-1.3526302	RAD	F	S	P	G5.26	93090E	
AB LON LWR LMT HI INC MAP 2 MAIN										
AB_MAP_LON_LL(1,2,2)	V94U5448C	00	-1.0646508	RAD	F	S	P	G5.26	93090E	
AB LON LWR LMT HI INC MAP 2 INSET										
AB_MAP_LON_LL(2,1,1)	V94U5449C	00	-1.4206980	RAD	F	S	P	G5.26	93090E	
AB LON LWR LMT LO INC MAP 1 MAIN										
AB_MAP_LON_LL(2,1,2)	V94U5450C	00	-1.2566371	RAD	F	S	P	G5.26	93090E	
AB LON LWR LMT LO INC MAP 1 INSET										
AB_MAP_LON_LL(2,2,1)	V94U5451C	00	-1.2915436	RAD	F	S	P	G5.26	93090E	
AB LON LWR LMT LO INC MAP 2 MAIN										
AB_MAP_LON_LL(2,2,2)	V94U5452C	00	-1.0471976	RAD	F	S	P	G5.26	93090E	
AB LON LWR LMT LO INC MAP 2 INSET										
AB_MAP_LON_UL(1,1,1)	V94U5453C	00	-1.2566371	RAD	F	S	P	G5.26	93090E	
AB LON UPR LMT HI INC MAP 1 MAIN										
AB_MAP_LON_UL(1,1,2)	V94U5454C	00	-0.95993109	RAD	F	S	P	G5.26	93090E	
AB LON UPR LMT HI INC MAP 1 INSET										
AB_MAP_LON_UL(1,2,1)	V94U5455C	00	-1.0646508	RAD	F	S	P	G5.26	93090E	
AB LON UPR LMT HI INC MAP 2 MAIN										
AB_MAP_LON_UL(1,2,2)	V94U5456C	00	0.08726646	RAD	F	S	P	G5.26	93090E	
AB LON UPR LMT HI INC MAP 2 INSET										
AB_MAP_LON_UL(2,1,1)	V94U5457C	00	-1.2566371	RAD	F	S	P	G5.26	93090E	
AB LON UPR LMT LO INC MAP 1 MAIN										
AB_MAP_LON_UL(2,1,2)	V94U5458C	00	-0.90757121	RAD	F	S	P	G5.26	93090E	
AB LON UPR LMT LO INC MAP 1 INSET										
AB_MAP_LON_UL(2,2,1)	V94U5459C	00	-1.0471976	RAD	F	S	P	G5.26	93090E	
AB LON UPR LMT LO INC MAP 2 MAIN										
AB_MAP_LON_UL(2,2,2)	V94U5549C	00	0.08726646	RAD	F	S	P	G5.26	93090E	
AB LON UPR LMT LO INC MAP 2 INSET										
AB_MAP_TRANS_LAT(1)	V94H5614C	00	0.60000929	RAD	F	S	P	G5.26	93155B	
ASC BRG MAP HI INC TRANS LATITUDE										
AB_MAP_TRANS_LAT(2)	V94H5713C	00	0.55850536	RAD	F	S	P	G5.26	93155B	
ASC BRG MAP LO INC TRANS LATITUDE										
AB_MAP_TRANS_LON(1)	V94H5615C	00	-1.2767084	RAD	F	S	P	G5.26	93155B	
ASC BRG MAP HI INC TRANS LONGITUDE										
AB_MAP_TRANS_LON(2)	V94H5714C	00	-1.2880530	RAD	F	S	P	G5.26	93155B	
ASC BRG MAP LO INC TRANS LONGITUDE										
AB_PRED_T_CYCLE	V94W6715C	00	1.92	SEC	F	S	P	G5.26	93090E	
ASC BRG CYCLE INTVL PREDICTORS										

TABLE B.5.26-9. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
AB_X_BIAS(1,1,1) AB X BIAS HI INC MAP 1 MAIN	V94U6375C	00	7898.477	AU	F	S	P	G5.26	93090E	
AB_X_BIAS(1,1,2) AB X BIAS HI INC MAP 1 INSET	V94U6376C	00	1668.999	AU	F	S	P	G5.26	93090E	
AB_X_BIAS(1,2,1) AB X BIAS HI INC MAP 2 MAIN	V94U6377C	00	4062.667	AU	F	S	P	G5.26	93090E	
AB_X_BIAS(1,2,2) AB X BIAS HI INC MAP 2 INSET	V94U6378C	00	448.0909	AU	F	S	P	G5.26	93090E	
AB_X_BIAS(2,1,1) AB X BIAS LO INC MAP 1 MAIN	V94U6379C	00	7898.477	AU	F	S	P	G5.26	93090E	
AB_X_BIAS(2,1,2) AB X BIAS LO INC MAP 1 INSET	V94U6380C	00	1716.399	AU	F	S	P	G5.26	93090E	
AB_X_BIAS(2,2,1) AB X BIAS LO INC MAP 2 MAIN	V94U6381C	00	4632.572	AU	F	S	P	G5.26	93090E	
AB_X_BIAS(2,2,2) AB X BIAS LO INC MAP 2 INSET	V94U6382C	00	447.5385	AU	F	S	P	G5.26	93090E	
AB_X_SC_FACT(1,1,1) AB X SCALE FACT HI INC MAP 1 MAIN	V94U6383C	00	5900.258	AU/RAD	F	S	P	G5.26	93090E	
AB_X_SC_FACT(1,1,2) AB X SCALE FACT HI INC MAP 1 INSET	V94U6384C	00	1234.463	AU/RAD	F	S	P	G5.26	93090E	
AB_X_SC_FACT(1,2,1) AB X SCALE FACT HI INC MAP 2 MAIN	V94U6385C	00	3361.355	AU/RAD	F	S	P	G5.26	93090E	
AB_X_SC_FACT(1,2,2) AB X SCALE FACT HI INC MAP 2 INSET	V94U6386C	00	411.4879	AU/RAD	F	S	P	G5.26	93090E	
AB_X_SC_FACT(2,1,1) AB X SCALE FACT LO INC MAP 1 MAIN	V94U6387C	00	5900.258	AU/RAD	F	S	P	G5.26	93090E	
AB_X_SC_FACT(2,1,2) AB X SCALE FACT LO INC MAP 1 INSET	V94U6388C	00	1357.909	AU/RAD	F	S	P	G5.26	93090E	
AB_X_SC_FACT(2,2,1) AB X SCALE FACT LO INC MAP 2 MAIN	V94U6389C	00	3961.597	AU/RAD	F	S	P	G5.26	93090E	
AB_X_SC_FACT(2,2,2) AB X SCALE FACT LO INC MAP 2 INSET	V94U6390C	00	417.8185	AU/RAD	F	S	P	G5.26	93090E	
AB_Y_BIAS(1,1,1) AB Y BIAS HI INC MAP 1 MAIN	V94U6391C	00	-2790.188	AU	F	S	P	G5.26	93090E	
AB_Y_BIAS(1,1,2) AB Y BIAS HI INC MAP 1 INSET	V94U6392C	00	-993.9995	AU	F	S	P	G5.26	93090E	
AB_Y_BIAS(1,2,1) AB Y BIAS HI INC MAP 2 MAIN	V94U6393C	00	-2682.0370	AU	F	S	P	G5.26	93090E	
AB_Y_BIAS(1,2,2) AB Y BIAS HI INC MAP 2 INSET	V94U6394C	00	-584.0811	AU	F	S	P	G5.26	93090E	
AB_Y_BIAS(2,1,1) AB Y BIAS LO INC MAP 1 MAIN	V94U6395C	00	-1660.000	AU	F	S	P	G5.26	93090E	
AB_Y_BIAS(2,1,2) AB Y BIAS LO INC MAP 1 INSET	V94U6396C	00	-782.194	AU	F	S	P	G5.26	93090E	
AB_Y_BIAS(2,2,1) AB Y BIAS LO INC MAP 2 MAIN	V94U6397C	00	-916.0000	AU	F	S	P	G5.26	93090E	



TABLE B.5.26-9. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
AB_Y_BIAS(2,2,2)	V94U6398C	00	-374.5000	AU/RAD	F	S	P	G5.26	93090E	
AB Y BIAS LO INC MAP 2 INSET										
AB_Y_SC_FACT(1,1,1)	V94U6399C	00	5084.09	AU/RAD	F	S	P	G5.26	93090E	
AB Y SCALE FACT HI INC MAP 1 MAIN										
AB_Y_SC_FACT(1,1,2)	V94U6400C	00	1171.38	AU/RAD	F	S	P	G5.26	93090E	
AB Y SCALE FACT HI INC MAP 1 INSET										
AB_Y_SC_FACT(1,2,1)	V94U6401C	00	3976.667	AU/RAD	F	S	P	G5.26	93090E	
AB Y SCALE FACT HI INC MAP 2 MAIN										
AB_Y_SC_FACT(1,2,2)	V94U6402C	00	550.1944	AU/RAD	F	S	P	G5.26	93090E	
AB Y SCALE FACT HI INC MAP 2 INSET										
AB_Y_SC_FACT(2,1,1)	V94U6403C	00	3552.338	AU/RAD	F	S	P	G5.26	93090E	
AB Y SCALE FACT LO INC MAP 1 MAIN										
AB_Y_SC_FACT(2,1,2)	V94U6404C	00	1160.702	AU/RAD	F	S	P	G5.26	93090E	
AB Y SCALE FACT LO INC MAP 1 INC										
AB_Y_SC_FACT(2,2,1)	V94U6405C	00	1973.521	AU/RAD	F	S	P	G5.26	93090E	
AB Y SCALE FACT LO INC MAP 2 MAIN										
AB_Y_SC_FACT(2,2,2)	V94U6406C	00	408.8835	AU/RAD	F	S	P	G5.26	93090E	
AB Y SCALE FACT LO INC MAP 2 INSET										

TABLE B.5.26-9. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
DEG_PER_RAD RADIAN TO DEGREE CONVERSION FACTOR	V97U0112C	00	+5.72957795131E+01	DEG/RAD	F		S	C A6.9 G4.10 G4.126 G4.127 G4.128 G4.175 G4.20 G4.201 G4.204 G4.208 G4.21 G4.213 G4.220 G4.226 G4.227 G4.23 G4.234 G4.237 G4.24 G4.25 G4.35 G4.36 G4.5 G4.6 G4.66 G4.8 G4.9 G4.97 G5.26 G5.27 V4.10 V4.11 V4.11B V4.11C V4.9A	93090E	

TABLE B.5.26-9. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
EARTH_MU EARTH GRAVITATIONAL CONSTANT	V97U4378C	00	+1.40764487566E+16	FT**3/SEC**2	F		D	C A6.9 G4.126 G4.127 G4.13 G4.139 G4.144 G4.148 G4.15 G4.158 G4.2 G4.205 G4.209 G4.210 G4.211 G4.224 G4.236 G4.3 G4.4 G5.10 G5.24 G5.26 G5.27	93090E	
EARTH_RADIUS_EQUATOR EARTH EQUATORIAL RADIUS	V97U5324C	00	+2.09257414698E+07	FT	F		D	C A6.9 G4.126 G4.127 G4.13 G4.139 G4.144 G4.148 G4.15 G4.158 G4.19 G4.20 G4.205 G4.210 G4.211 G4.213 G4.23 G4.236 G4.238 G4.24 G4.25 G5.26 G5.27 V5.1.8	93090E	

TABLE B.5.26-9. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
EARTH_RATE EARTH'S ROTATIONAL RATE	V97U4379C	00	+7.29211514646E-05	RAD/SEC	F		D C	A6.9 G4.126 G4.127 G4.139 G4.144 G4.148 G4.15 G4.17 G4.19 G4.20 G4.205 G4.21 G4.213 G4.22 G4.236 G4.237 G4.4 G5.26	93090E	
ELLIPT EARTH'S ELLIPTICITY CONSTANT	V97U5332C	00	+3.352329869 E-03	ND	F		D C	A6.9 G4.126 G4.127 G4.139 G4.144 G4.148 G4.15 G4.19 G4.20 G4.205 G4.213 G4.23 G4.236 G4.237 G4.238 G4.24 G4.25 G5.26 G5.27 V5.1.8	93090E	

TABLE B.5.26-9. ASCENT BEARING SPEC FUNCTION (PFS) (REF DISP 6.55) (G5.26) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
PI RATIO OF CIRCUMFERENCE TO DIAMETER	V98U8725C	00	+3.14159265358E+00	ND	F	D	C	A6.9 G4.126 G4.127 G4.13 G4.144 G4.15 G4.158 G4.16 G4.19 G4.2 G4.20 G4.205 G4.209 G4.210 G4.213 G4.220 G4.236 G4.237 G4.3 G4.4 G4.5 G4.97 G5.10 G5.24 G5.26 G5.27	93090E	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

### **B.5.27 ENTRY BEARING SPECIALIST FUNCTION (PFS)**

The Entry Bearing specialist function performs display processing in support of the Entry Bearing display. Central plot area of the Entry Bearing display is a plot of range vs. delta azimuth (heading error to Way Point 1) with respect to the Shuttle orbiter of the selected landing site and the two alternate sites associated with the selected site. The plot is a "polar" plot with range as the distance variable and delta azimuth with respect to the orbiter as the angle variable. Current vehicle heading is "up". Therefore, the zero delta azimuth axis is "up", with positive delta azimuth in the clockwise direction. The plot is continuously rescaled based on range to the selected site. Fixed range rings enter and leave the plot as vehicle range decreases.

Energy over weight (E/W) scales are presented for the selected site and each of the alternate sites. E/W scale for the selected site is identical to that on the Vertical Situation 1/2 displays and is shown in MM 602 and MM 603. E/W scales for the alternate sites are shown in MM 602 and MM 603. Above each of the E/W scales its three-character site name is shown, as well as digital readouts of Shuttle heading error (delta azimuth) to WP1 with respect to the site.

The Entry Bearing display shows digital readouts of the selected site runway index and indexes of the two alternate sites. Selected site runway name and primary runway name of the two alternate sites are also displayed. An item entry to change the selected site like that on the Horizontal Situation display is also present on this display. Alternative sites are I-Loaded, but are changeable via item entries on the display.

Characteristics and formats of the Entry Bearing display are specified in Section 4.2.42 of the Level C D&C FSSR 20 Volume 1.

#### **B.5.27.1 Initialization**

This section specifies initialization requirements for the Entry Bearing specialist function.

1. Initialization requirements shall be executed at MM 304 or MM 602 as applicable.
2. The plot range constant EB\_PLOT\_RANGE shall be initialized from EB\_PLOT\_Y\_MAX and EB\_N\_Y as follows:

$$EB\_PLOT\_RANGE = EB\_PLOT\_Y\_MAX - EB\_N\_Y$$

3. Two processing control flags shall be initialized:

EB\_RNG\_DELAZ\_PROC = ON  
EB\_EOW\_PROC = OFF

4. Previous values for alternate runway site lookup processing shall be initialized:

AREA\_SEL\_PREV = 0  
ALT\_SITE\_IDX\_P(1) = 0  
ALT\_SITE\_IDX\_P(2) = 0

5. The IIP blanking flag shall be initialized:

```
EB_BLANK_IIP = ON
```

6. The delta inertial velocity between the two I-Loaded transition inertial velocities for the instantaneous impact point (IIP) shall be calculated:

```
DELTA_VI = IIP_VI_MAG_HIGH - IIP_VI_MAG_LOW
```

7. If MM 304 (MM\_CODE = 304), the roll reversal lines processing requirements of Section B.5.27.5 shall be executed.

8. Range ring parameters shall be initialized:

```
DO FOR I = 1 to 9  
  EB_RING_DISP(I) = OFF  
  RING_DISP_STOP(I) = OFF  
  EB_RING_DISP_RADIUS(I) = 0.0  
ENDDO  
RANGE_SEL_PREV = 0.0
```

#### **B.5.27.2 Common Processing**

This section specifies requirements for cyclic processing of the Entry Bearing specialist function which precedes other processing on each cycle.

1. Common processing requirements shall be executed in MM 304 through MM 305 and MM 602 through MM 603.
2. Common processing requirements shall be executed at 1.04 Hz.
3. A check shall be made to determine if processing for the range vs. delta azimuth plot should be terminated and the IIP blanking flag set ON:

```
IF (IPHASE = 2) AND (EB_RNG_DELAZ_PROC = ON) THEN  
  EB_RNG_DELAZ_PROC = OFF  
  EB_BLANK_IIP = ON  
ENDIF
```

4. A check shall be made to determine if processing for the E/W scales should be performed:

```
IF ((MM_CODE = 602) OR (MM_CODE = 603)) AND (ALT_WHEELS > HSWITCH2) AND  
(IPHASE ≤ 4) THEN  
  EB_EOW_PROC = ON  
ELSE  
  EB_EOW_PROC = OFF  
ENDIF
```

5. If EB\_RNG\_DELAZ\_PROC = ON, the range vs. delta azimuth plot scale factor is computed:

```

IF MM_CODE = 304 THEN
  RANGE_SEL = RNG_TO_RW_THRESH
ELSE
  RANGE_SEL = RPRED * NAUTMI_PER_FT
ENDIF
EB_SCALE_FACT = EB_PLOT_RANGE / (EB_RNG_FACTOR * RANGE_SEL)

```

6. If EB\_EOW\_PROC = OFF, for each of the alternate sites I = 1 TO 2, the Ith alternate site E/W scale symbols shall be blanked:

```

DO FOR I = 1 TO 2
  NOM_ENERGY_Y_ALT(I) = -400
  SHUTTLE_ENER_Y_ALT(I) = -400
  ENER_UL_Y_ALT(I) = -400
  ENER_LL_Y_ALT(I) = -400
  EMOH_ENER_Y_ALT(I) = -400
ENDDO

```

### B.5.27.3 Alternate Runway Site Lookup

This section specifies requirements to process updates to the alternate sites based on: (1) alternate site item entries, (2) selection of a new landing site, and (3) runway uplinks.

1. Alternate runway site lookup requirements shall be executed in MM 304 through MM 305 and MM 602 through MM 603.
2. Alternate runway site lookup requirements shall be executed at 1.04 Hz.
3. For each alternate site indexed by I, if a landing site has been selected (ALT\_SITE\_INDEX(I) ≠ 0, where I = 1 or 2) and one of the following conditions is also true
  - ALT\_SITE\_INDEX has changed from the previous pass (ALT\_SITE\_INDEX(I) ≠ ALT\_SITE\_IDX\_P(I)) OR
  - the selected area (AREA\_SEL) has changed from the previous pass (AREA\_SEL ≠ AREA\_SEL\_PREV)

then the alternate site data shall be updated as follows:

- a.  $L = 2 * ALT\_SITE\_INDEX(I) - 1$

ALT\_RW\_NAME(I) = RUNWAY\_NAME(L)

M\_EFTORW\_ALT(I) = EF\_TO\_RUNWAY(RW\_LAT(L), RW\_LON(L),  
RW\_AZIMUTH(L))



$\overline{R\_EF\_ALT(I)} = \text{GEODETTIC\_TO\_EF}(RW\_LAT(L), RW\_LON(L), RUNWAY\_ALT(L))$

- b. ALT\_RW\_UPDATE(I) shall be set ON requesting re-initialization of the overhead / straight-in indicator and HAC turn angle on the alternate site data update.
- c. If the Major Mode is 304, then the following site data shall be re-initialized:  
AZ\_RW\_ALT(I) = RW\_AZIMUTH(L)  
ALT\_R\_NEP(I) = RI
- d. If the Major Mode is not 304, then the following site data shall be re-initialized:  
ALT\_RF(I) = RFO  
ALT\_RTURNS(I) = RI  
ALT\_RW\_ALTITUDE(I) = RUNWAY\_ALT(L)

4. Previous values of AREA\_SEL and the alternate site indexes shall be updated with current values for the next pass:

AREA\_SEL\_PREV = AREA\_SEL  
ALT\_SITE\_IDX\_P(1) = ALT\_SITE\_INDEX(1)  
ALT\_SITE\_IDX\_P(2) = ALT\_SITE\_INDEX(2)

A potential implementation is shown in the ALT\_RUNWAY\_SITE\_LOOKUP\_ENT flowchart of Figure B.5.27-1.

#### **B.5.27.4 Range / Delta Azimuth / Energy Computations**

This section specifies requirements to compute range, delta azimuth, and energy parameters for the alternate sites. Range and delta azimuth are used on the range vs. delta azimuth plot, and energy parameters are used for the alternative site E/W scales. Also, ranges to the alternate sites are provided to the Entry DIP in MM 304 to compute positions of the alternate symbols on the Entry trajectory displays.

1. Range / delta azimuth / energy computations requirements shall be executed in MM 304 through MM 305 while EB\_RNG\_DELAZ\_PROC = ON and MM 602 through MM 603 while EB\_RNG\_DELAZ\_PROC = ON or EB\_EOW\_PROC = ON.
2. Range / delta azimuth / energy computations requirements shall be executed at 1.04 Hz.
3. For each of the alternate sites indexed by I = 1 to 2, the following steps shall be executed:
  - a. If the alternate site index ALT\_SITE\_INDEX(I) ≠ 0 indicating there is an alternate site identified, the major mode (MM\_CODE) shall be checked.
  - b. If MM\_CODE = 304, ALT\_GUIDECOMP processing requirements of Section B.5.27.4.1 shall be executed.
  - c. Otherwise (MM\_CODE = 305 or 602 or 603), the following steps shall be executed:

- (1) ALT\_GUIDECOMP\_TAEM\_RTLS processing requirements of Section B.5.27.4.2 shall be executed.
- (2) Alternate site ground track computation (ALT\_GTP) requirements of Section B.5.27.4.3 shall be executed.
- (3) If EB\_EOW\_PROC = ON, ALT\_TGCOMP processing requirements of Section B.5.27.4.4 shall be executed.
- (4) Predicted range RPRED\_ALT(I) for the Ith alternate site shall be converted from feet to nautical miles and stored in RNG\_TO\_RW\_THRESH\_ALT(I):

$$\text{RNG\_TO\_RW\_THRESH\_ALT}(I) = \text{RPRED\_ALT}(I) * \text{NAUTMI\_PER\_FT}$$

- (5) Heading error from the Shuttle to the Ith alternate site DPSAC\_ALT(I) shall be negated to represent heading error from the Ith alternate site to the Shuttle and stored in DELAZ\_ALT(I):

$$\text{DELAZ\_ALT}(I) = -\text{DPSAC\_ALT}(I)$$

4. Current value of the overhead / straight-in indicator OVHD shall be saved for use on the next pass:

$$\text{OVHD\_PREV} = \text{OVHD}$$

A potential implementation is shown in the ENT\_BRG\_RANGE\_DELAZ\_ENERGY\_COMPS flowchart of Figure B.5.27-2.

#### **B.5.27.4.1 ALT\_GUIDECOMP Computations**

This section specifies requirements to compute runway computations for the primary runway of the indexed alternate site in MM 304. These computation are similar to a subset of those performed for the selected runway by the GUIDECOMP function specified in Section 4.4.2 of the Entry Nav FSSR, STS 83-0004. Runway approach settings are assumed to be the same as those for the selected runway.

1. ALT\_GUIDECOMP computations requirements shall be executed on demand when called.
2. Position with respect to runway vector for the Ith alternate site and sign of the runway Y component shall be calculated:

$$\overline{\text{ALT\_POS\_WRT\_RW}} = \text{M\_EFTORW\_ALT}(I) (\overline{\text{R\_EF}} - \overline{\text{R\_EF\_ALT}}(I))$$

$$\text{SIGNY\_ALT} = \text{SIGN}(\text{ALT\_POS\_WRT\_RW}_2)$$

3. If the overhead / straight-in indicator (OVHD) is not equal to its previous value (OVHD\_PREV), signifying a HAC toggle item entry has been made, or ALT\_RW\_UPDATE(I) = ON, signifying either a new landing site or new Ith alternate site has been selected, the following steps shall be executed:

- a. HAC turn angle for the Ith alternate site shall be re-initialized:

ALT\_PSHA(I) = PSHARS

- b. The ALT\_RW\_UPDATE(I) flag shall be reset to OFF acknowledging the request to re-initialize the overhead / straight-in indicator and HAC turn angle:

ALT\_RW\_UPDATE(I) = OFF

- c. If the overhead / straight-in indicator OVHD = ON, sign of the commanded HAC side of the runway (YSGNP\_ALT(I)) shall be set opposite to the vehicle side of the runway:

YSGNP\_ALT(I) = - SIGNY\_ALT

- d. Otherwise (OVHD = OFF), sign of the commanded HAC side of the runway (YSGNP\_ALT(I)) shall be set equal to the vehicle side of the runway:

YSGNP\_ALT(I) = SIGNY\_ALT

4. If OVHD = OFF, sign of the commanded HAC side of the runway (YSGNP\_ALT(I)) shall be set equal to the vehicle side of the runway to account for a vehicle runway centerline crossing:

IF OVHD = OFF

    YSGNP\_ALT(I) = SIGNY\_ALT

ENDIF

5. If OVHD = ON and REL\_VEL\_MAG > RESELVE, sign of the commanded HAC side of the runway (YSGNP\_ALT(I)) shall be set opposite to the vehicle side of the runway, to perform an automatic overhead re-designation for a vehicle runway centerline crossing:

IF (OVHD = ON) AND (REL\_VEL\_MAG > RESELVE) THEN

    YSGNP\_ALT(I) = - SIGNY\_ALT

ENDIF

6. The ENT\_RNG\_BEAR function specified in Section 4.6.1.3 of the Entry Nav FSSR, STS 83-0004 shall be called with Ith alternate site runway parameters as inputs to return range to Ith alternate site primary runway threshold (RNG\_TO\_RW\_THRESH\_ALT(I)), heading error with respect to the alternate site primary runway WP1 (DELAZ\_ALT(I)), HAC radius (ALT\_R\_NEP(I)), and HAC turn angle (ALT\_PSHA(I)).

CALL: ENT\_RNG\_BEAR

INLIST: R\_EF\_ALT(I), M\_EFTORW\_ALT(I), AZ\_RW\_ALT(I), YSGNP\_ALT(I),  
ALT\_R\_NEP(I), ALT\_PSHA(I), SIGNY\_ALT

OUTLIST: RNG\_TO\_RW\_THRESH\_ALT(I), DELAZ\_ALT(I), ALT\_R\_NEP(I),  
ALT\_PSHA(I)

A potential implementation is shown in the ALT\_GUIDECOMP flowchart of Figure B.5.27-3.

#### B.5.27.4.2 ALT\_GUIDECOMP\_TAEM\_RTLS Computations

This section specifies requirements to compute runway computations for the primary runway of the indexed alternate site in MM 305, 602 and 603. These computations are similar to a subset of those performed for the selected runway by the GUIDECOMP function specified in Section 4.4.2 of the Entry Nav FSSR, STS 83-0004, and the GUIDECOMP\_RTLS function specified in Section 4.6.2.3 of the Ascent/RTLS Nav FSSR, STS 83-0005. Runway approach settings are assumed to be the same as those for the selected runway.

1. ALT\_GUIDECOMP\_TAEM\_RTLS computations requirements shall be executed on demand when called.
2. Position and velocity with respect to runway vectors for the Ith alternate site and sign of the runway Y component shall be calculated:

$$\begin{aligned}\overline{ALT\_POS\_WRT\_RW} &= M\_EFTORW\_ALT(I) (\overline{R\_EF} - \overline{R\_EF\_ALT}(I)) \\ \overline{ALT\_VEL\_WRT\_RW} &= M\_EFTORW\_ALT(I) \overline{V\_RHO\_EF} \\ SIGN\_ALT &= SIGN(ALT\_POS\_WRT\_RW_2)\end{aligned}$$

3. If the overhead / straight-in indicator (OVHD) is not equal to its previous value (OVHD\_PREV), signifying a HAC toggle item entry has been made, or ALT\_RW\_UPDATE(I) = ON, signifying either a new landing site or new Ith alternate site has been selected, the following steps shall be executed:

- a. HAC turn angle for the Ith alternate site shall be re-initialized:

$$ALT\_PSHA(I) = PSHARS$$

- b. The ALT\_RW\_UPDATE(I) flag shall be reset to OFF acknowledging the request to re-initialize the overhead / straight-in indicator and HAC turn angle:

$$ALT\_RW\_UPDATE(I) = OFF$$

- c. If the overhead / straight-in indicator OVHD = ON, sign of the commanded HAC side of the runway (YSGNP\_ALT(I)) shall be set opposite to the vehicle side of the runway:

$$YSGNP\_ALT(I) = - SIGN\_ALT$$

- d. Otherwise (OVHD = OFF), sign of the commanded HAC side of the runway (YSGNP\_ALT(I)) shall be set equal to the vehicle side of the runway:

$$YSGNP\_ALT(I) = SIGN\_ALT$$

4. If OVHD = OFF and IPHASE is not equal to 2 or 3, sign of the commanded HAC side of the runway (YSGNP\_ALT(I)) shall be set equal to the vehicle side of the runway to account for a vehicle runway centerline crossing:

```
IF (OVHD = OFF) AND (IPHASE ≠ 2) AND (IPHASE ≠ 3) THEN
    YSGNP_ALT(I) = SIGNY_ALT
ENDIF
```

5. Vehicle altitude rate (ALT\_H\_DOT) using the Z component of velocity with respect to runway for the Ith alternate site shall be calculated:

$$ALT\_H\_DOT = - ALT\_VEL\_WRT\_RW_3 - Q\_ORB * RAD\_PER\_DEG * (X\_NB\_CG * COSTH - Z\_NB\_CG * SINTH)$$

6. Vehicle groundspeed (ALT\_V\_GS) shall be calculated:

$$ALT\_V\_GS = (REL\_VEL\_MAG^2 - ALT\_H\_DOT^2)^{1/2}$$

7. Course with respect to the primary runway for the Ith alternate site (ALT\_COURSE\_WRT\_RW) shall be computed:

$$ALT\_COURSE\_WRT\_RW = ARCTAN2(ALT\_VEL\_WRT\_RW_2, ALT\_VEL\_WRT\_RW_1)$$

A potential implementation is shown in the ALT\_GUIDECOMP\_TAEM\_RTLS flowchart of Figure B.5.27-4.

### B.5.27.4.3 Alternate Site Ground Track Computation (ALT\_GTP)

This section specifies requirements to compute the predicted ground track range to the primary runway of the indexed alternate site. These computations are similar to those performed for the selected runway by the Ground Track Computation (GTP) function of TAEM Guidance specified in Section 4.6.2.5 of the Entry Through Landing Guidance FSSR, STS 83-0001, and the Ground Track Computation (GTP) function of GRTLS TAEM Guidance specified in Section 4.8.2.5 of the Entry Through Landing Guidance FSSR, STS 83-0001. Runway approach settings are assumed to be the same as those for the selected runway.

1. Alternate site ground track computation (ALT\_GTP) requirements shall be executed on demand when called.
2. Vehicle downrange position with respect to the HAC center for the primary runway of the Ith alternate site shall be calculated:

$$XCIRA = XHAC - ALT\_POS\_WRT\_RW_1$$

3. If (IPHASE = 3) and (XCIRA < DR4), predicted range for the Ith alternate site (RPRED\_ALT(I)) shall be computed as:

$$RPRED\_ALT(I) = SQRT(ALT\_POS\_WRT\_RW_1^2 + ALT\_POS\_WRT\_RW_2^2)$$

4. Otherwise (IPHASE is not equal to 3 or XCIRA ≥ DR4), predicted range for the Ith alternate site (RPRED\_ALT(I)) shall be computed by executing the following steps:

- 4.1 Crossrange position with respect to the HAC center, distance to the HAC center, and distance to the HAC tangency point shall be calculated:

```

YCIRA = YSGNP_ALT(I) * ALT_RF(I) - ALT_POS_WRT_RW2
RCIRA = SQRT(XCIRA2 + YCIRA2)
IF RCIRA > ALT_RTURN(I) THEN
    RTANA = SQRT(RCIRA2 - ALT_RTURN(I)2)
ELSE
    RTANA = 0
ENDIF

```

- 4.2 Heading error from the Shuttle to the HAC tangency point shall be computed:

```

PSCA = ARCTAN2(YCIRA, XCIRA)
PSTA = PSCA - YSGNP_ALT(I) * ARCTAN2(ALT_RTURN(I), RTANA)
IF ABS(PSTA) > PI THEN
    PSTA = PSTA - 2 * PI * SIGN(PSTA)
ENDIF
DPSAC_ALT(I) = PSTA - ALT_COURSE_WRT_RW
IF ABS(DPSAC_ALT(I)) > PI THEN
    DPSAC_ALT(I) = DPSAC_ALT(I) - 2 * PI * SIGN(DPSAC_ALT(I))
ENDIF

```

- 4.3 HAC turn angle and range from the HAC to the runway shall be computed:

```

PSHANA = - YSGNP_ALT(I) * PSTA * DEG_PER_RAD
IF ((ALT_PSHA(I) > PSHARS + 1) OR (PSHANA < -1) OR (YSGNP_ALT(I) ≠
SIGN_Y_ALT)) AND (ALT_PSHA(I) > 90) THEN
    PSHANA = PSHANA + 360
ENDIF
ALT_PSHA(I) = PSHANA
ALT_RTURN(I) = ALT_RF(I) + R1 * ALT_PSHA(I) + R2 * ALT_PSHA(I)2
RPRED2_ALT = (ALT_RF(I) * ALT_PSHA(I) + 0.5 * R1 * ALT_PSHA(I)2 +
0.333333 * R2 * ALT_PSHA(I)3) * RAD_PER_DEG - XHAC

```

- 4.4 If (IPHASE≠2) and (IPHASE≠3), the acquisition turn radius and arc length shall be computed:

```

PHAVGA = PHAVGC - PHAVGS * MACH
PHAVGA = MIDVAL(PHAVGLL, PHAVGA, PHAVGUL)
RTACA = ALT_V_GS * REL_VEL_MAG / (GO * TAN(PHAVGA *
RAD_PER_DEG)).
ARCACA = RTACA * ABS(DPSAC_ALT(I))

```

- 4.5 If (IPHASE≠2) and (IPHASE≠3) and MM\_CODE is not equal to 305, the arc length shall be adjusted:

```
HEADCRA = ABS(GPHI * DPSAC_ALT(I) * DEG_PER_RAD - PHI)
IF HEADCRA > HDCRLM THEN
    HEADCRA = HDCRLM
ENDIF
DELRNGA = REL_VEL_MAG * HEADCRA / ROLLRT
ARCACA = ARCACA + DELRNGA
```

- 4.6 If (IPHASE≠2) and (IPHASE≠3), range from the end of the acquisition turn to the HAC tangency point shall be computed:

```
AA = RTACA * (1 - COS(DPSAC_ALT(I)))
BA = RTANA - RTACA * ABS(SIN(DPSAC_ALT(I)))
RCA = SQRT(AA2 + BA2)
```

- 4.7 If (IPHASE≠2) and (IPHASE≠3) and MM\_CODE is not equal to 305, range from the end of the acquisition turn to the HAC tangency point shall be limited to the distance to the HAC tangency point:

```
IF RCA > RTANA THEN
    RCA = RTANA
ENDIF
```

- 4.8 If (IPHASE≠2) and (IPHASE≠3), total range to HAC intercept shall be computed:

```
RTANA = ARCACA + RCA
```

- 4.9 Total range to the primary runway of the Ith alternate site shall be computed:

```
RPRED_ALT(I) = RPRED2_ALT + RTANA
```

A potential implementation is shown in the ALT\_GTP flowchart of Figure B.5.27-5.

#### **B.5.27.4.4 TAEM Reference and Spiral Adjust Computation (ALT\_TGCOMP)**

This section specifies requirements to compute energy reference values with respect to the primary runway of the indexed alternate site. The final turn radius of the HAC spiral is adjusted in the HAC phase as a function of altitude error from an altitude profile. These computations are similar to a subset of those performed for the selected runway by the TAEM Reference, Dynamic Pressure, and Spiral Adjust (TGCOMP) function of TAEM Guidance specified in Section 4.6.2.6 of the Entry Through Landing Guidance FSSR, STS 83-0001, and the TAEM Reference, Dynamic Pressure, and Spiral Adjust (TGCOMP) function of GRTLS TAEM Guidance specified in Section 4.8.2.6 of the Entry Through Landing Guidance FSSR, STS 83-0001. Runway approach settings are assumed to be the same as those for the selected runway.

1. TAEM reference and spiral adjust computation (ALT\_TGCOMP) requirements shall be executed on demand when called.

2. Range to the nominal A/L interface shall be computed:

$$DRPREDA = RPRED\_ALT(I) + XALI$$

3. Reference coefficient index IELA shall be determined:

```
IF DRPREDA < EOW_NP31 THEN
    IELA = 4
ELSEIF DRPREDA < EOW_NP21
    IELA = 3
ELSEIF DRPREDA < EOW_NP11
    IELA = 2
ELSE
    IELA = 1
ENDIF
```

4. Reference coefficient index IESA shall be determined:

```
IF DRPREDA < EOW_SP21 THEN
    IESA = 3
ELSEIF DRPREDA < EOW_SP11
    IESA=2
ELSE
    IESA=1
ENDIF
```

5. Reference coefficient index IEMA shall be determined:

```
IF DRPREDA < EOW_MP21 THEN
    IEMA = 3
ELSEIF DRPREDA < EOW_MP11
    IEMA=2
ELSE
    IEMA=1
ENDIF
```

6. If (GLIDE\_RTLS\_INHIBIT = ON) and (ECAL = ON), i.e., an ECAL abort is occurring, and (RPRED\_ALT(I) > ECLRNG1), energy over weight reference, energy over weight for S-turn initiation, energy over weight for minimum entry point alert, and energy over weight for straight-in downmoding shall be computed as follows:

```
EN_ALT(I) = EN_ECLI + RPRED_ALT(I) * EN_ECLS
ES_ALT(I) = ES_ECLI + RPRED_ALT(I) * ES_ECLS
EMEP_ALT(I) = EMEP_ECLI + RPRED_ALT(I) * EMEP_ECLS
EMOH_ALT(I) = EMOH_ECLI + RPRED_ALT(I) * EMOH_ECLS
```



7. Otherwise ((GLIDE\_RTLS\_INHIBIT = OFF or (ECAL = OFF) or (RPRED\_ALT(I) ≤ ECLRNG1)), energy over weight reference, energy over weight for S-turn initiation, energy over weight for minimum entry point alert, and energy over weight for straight-in downmoding shall be computed as follows:

$$\begin{aligned} \text{EN\_ALT}(I) &= \text{EN\_C1}_{1,\text{IELA}} + \text{DRPREDA} * \text{EN\_C2}_{1,\text{IELA}} - \\ &\quad \text{MIDVAL}(0, \text{EN\_C2}_{1,3} * (\text{RPRED2\_ALT} - \text{R2MAX}), \text{ESHFMX}) \\ \text{ES\_ALT}(I) &= \text{ES1}_{1,\text{IESA}} + \text{DRPREDA} * \text{EDRS}_{1,\text{IESA}} \\ \text{EMEP\_ALT}(I) &= \text{EMEP\_C1}_{1,\text{IEMA}} + \text{DRPREDA} * \text{EMEP\_C2}_{1,\text{IEMA}} \\ \text{EMOH\_ALT}(I) &= \text{EMOHC1}_{1,\text{IEMA}} + \text{DRPREDA} * \text{EMOHC2}_{1,\text{IEMA}} \end{aligned}$$

8. Energy over weight references for normal acceleration command limiting shall be calculated:

$$\begin{aligned} \text{EMAX\_ALT}(I) &= \text{EN\_ALT}(I) + \text{EDELNZ}_1 * \\ &\quad \text{MIDVAL}(\text{EDEL C1}, \text{DRPREDA} / \text{DEL\_R\_EMAX}_1, \text{EDEL C2}) \\ \text{EMIN\_ALT}(I) &= \text{EN\_ALT}(I) - \text{EDELNZ}_1 \end{aligned}$$

9. If (IPHASE = 2) and (ALT\_PSHA(I) > PSRF), the altitude reference shall be computed:

```

IF DRPREDA < 0.0 THEN
    HREFA = CUBC11,1 + DRPREDA * CUBC21,1
ELSE
    IF DRPREDA < CUBRC1 THEN
        ICUBA = 1
        DRCUBA = DRPREDA
    ELSE
        ICUBA = 2
        DRCUBA = DRPREDA - CUBRC1
    ENDIF
    HREFA = CUBC11,ICUBA + DRCUBA * (CUBC21,ICUBA + DRCUBA *
        (CUBC31,ICUBA + DRCUBA * CUBC41,ICUBA))
ENDIF

```

10. If (IPHASE = 2) and (ALT\_PSHA(I) > PSRF), final turn radius of the HAC spiral shall be adjusted:

$$\begin{aligned} \text{ALTITUDE} &= \text{ALT\_WHEELS} + \text{ALT\_RW} - \text{ALT\_RW\_ALTITUDE}(I) \\ \text{HREFOHA} &= \text{HREFA} - \text{MIDVAL}(0, \text{DHOH1} * (\text{DRPREDA} - \text{DHOH2}), \text{DHOH3}) \\ \text{DRFA} &= \text{DRFK} * (\text{HREFOHA} - \text{ALTITUDE}) / (\text{ALT\_PSHA}(I) * \\ &\quad \text{RAD\_PER\_DEG}) \\ \text{ALT\_RF}(I) &= \text{MIDVAL}(\text{RFMN}, \text{ALT\_RF}(I) + \text{DRFA}, \text{RFMX}) \end{aligned}$$

A potential implementation is shown in the ALT\_TGCOMP flowchart of Figure B.5.27-6.

**B.5.27.5 Roll Reversal Lines Processing**

This section specifies requirements to locate two sets of roll reversal lines on the range vs. delta azimuth plot of the Entry Bearing display.

1. Roll reversal lines processing requirements shall be executed on demand when called.
2. The display length of the first set of roll reversal lines shall be computed as follows:

$$\text{RANGE\_DISP} = \text{RR\_LINE\_FACT} * \text{EB\_PLOT\_RANGE} / \text{EB\_RNG\_FACTOR}$$

3. The positive and negative of the sine and cosine angle of Y1 shall be computed as follows:

$$\begin{aligned} \text{SIN\_YL} &= \text{SIN}(Y1) \\ \text{COS\_YL} &= \text{COS}(Y1) \\ \text{SIN\_NEG\_YL} &= - \text{SIN\_YL} \\ \text{COS\_NEG\_YL} &= \text{COS\_YL} \end{aligned}$$

4. The left and right end points for the first set of roll reversal lines shall be calculated as follows:

$$\begin{aligned} \text{EB\_POS\_RR\_LINE1\_L\_X} &= \text{RANGE\_DISP} * \text{SIN\_NEG\_YL} + \text{EB\_N\_X} \\ \text{EB\_POS\_RR\_LINE1\_L\_Y} &= \text{RANGE\_DISP} * \text{COS\_NEG\_YL} + \text{EB\_N\_Y} \\ \text{EB\_POS\_RR\_LINE1\_R\_X} &= \text{RANGE\_DISP} * \text{SIN\_YL} + \text{EB\_N\_X} \\ \text{EB\_POS\_RR\_LINE1\_R\_Y} &= \text{RANGE\_DISP} * \text{COS\_YL} + \text{EB\_N\_Y} \end{aligned}$$

5. The left and right start points for the first set of roll reversal lines shall be calculated as follows:

$$\begin{aligned} \text{EB\_POS\_RR\_LINE1\_L\_STRT\_X} &= \text{RANGE\_OFFSET} * \text{SIN\_NEG\_YL} + \text{EB\_N\_X} \\ \text{EB\_POS\_RR\_LINE1\_L\_STRT\_Y} &= \text{RANGE\_OFFSET} * \text{COS\_NEG\_YL} + \text{EB\_N\_Y} \\ \text{EB\_POS\_RR\_LINE1\_R\_STRT\_X} &= \text{RANGE\_OFFSET} * \text{SIN\_YL} + \text{EB\_N\_X} \\ \text{EB\_POS\_RR\_LINE1\_R\_STRT\_Y} &= \text{RANGE\_OFFSET} * \text{COS\_YL} + \text{EB\_N\_Y} \end{aligned}$$

6. The display length of the second set of roll reversal lines shall be computed as follows:

$$\text{RANGE\_DISP} = 0.85 * \text{RR\_LINE\_FACT} * \text{EB\_PLOT\_RANGE} / \text{EB\_RNG\_FACTOR}$$

7. The positive and negative of the sine and cosine angle of Y3 shall be computed as follows:

$$\begin{aligned} \text{SIN\_YL} &= \text{SIN}(Y3) \\ \text{COS\_YL} &= \text{COS}(Y3) \\ \text{SIN\_NEG\_YL} &= - \text{SIN\_YL} \\ \text{COS\_NEG\_YL} &= \text{COS\_YL} \end{aligned}$$

8. The left and right end points for the second set of roll reversal lines shall be calculated as follows:

$$\begin{aligned} \text{EB\_POS\_RR\_LINE2\_L\_X} &= \text{RANGE\_DISP} * \text{SIN\_NEG\_YL} + \text{EB\_N\_X} \\ \text{EB\_POS\_RR\_LINE2\_L\_Y} &= \text{RANGE\_DISP} * \text{COS\_NEG\_YL} + \text{EB\_N\_Y} \\ \text{EB\_POS\_RR\_LINE2\_R\_X} &= \text{RANGE\_DISP} * \text{SIN\_YL} + \text{EB\_N\_X} \end{aligned}$$

$$EB\_POS\_RR\_LINE2\_R\_Y = RANGE\_DISP * COS\_YL + EB\_N\_Y$$

9. The left and right start points for the second set of roll reversal lines shall be calculated as follows:

$$\begin{aligned}EB\_POS\_RR\_LINE2\_L\_STRT\_X &= RANGE\_OFFSET * SIN\_NEG\_YL + EB\_N\_X \\EB\_POS\_RR\_LINE2\_L\_STRT\_Y &= RANGE\_OFFSET * COS\_NEG\_YL + EB\_N\_Y \\EB\_POS\_RR\_LINE2\_R\_STRT\_X &= RANGE\_OFFSET * SIN\_YL + EB\_N\_X \\EB\_POS\_RR\_LINE2\_R\_STRT\_Y &= RANGE\_OFFSET * COS\_YL + EB\_N\_Y\end{aligned}$$

A potential implementation is presented in the ROLL\_REVERSAL\_LINES\_COMP flowchart of Figure B.5.27-7.

### B.5.27.6 Sites Processing

This section specifies requirements to determine the locations of the selected site runway and alternate sites on the range vs. delta azimuth plot of the Entry Bearing display.

1. Sites processing requirements shall be executed in MM 304 through MM 305 and MM 602 through MM 603 while EB\_RNG\_DELAZ\_PROC = ON when the EntryBearing Display is present on an MDU.

2. Sites processing requirements shall be executed at 1.04 Hz.

3. The selected and alternate site symbols shall be blanked:

$$\begin{aligned}EB\_BLANK\_SEL\_SITE &= OFF \\EB\_BLANK\_ALT\_SITE(1) &= OFF \\EB\_BLANK\_ALT\_SITE(2) &= OFF\end{aligned}$$

4. The delta azimuth and heading to the selected site shall be set as follows:

```
IF MM_CODE = 304 THEN
    DELAZ_SEL = DELAZ
    D_AZ_RW_WRT_ORB = AZIMUTH_RW - HEADING_VR
ELSE
    DELAZ_SEL = -DPSAC * RAD_PER_DEG

    IF MM_CODE = 305 THEN
        D_AZ_RW_WRT_ORB = - COURSE_WRT_RW * RAD_PER_DEG
    ELSE
        D_AZ_RW_WRT_ORB = - COURSE_WRT_RUNWAY * RAD_PER_DEG
    ENDIF
ENDIF
```

5. The range between the shuttle location and the selected runway shall be calculated for display purposes as follows:

$$RANGE\_DISP = RANGE\_SEL * EB\_SCALE\_FACT$$

6. The selected runway symbol's display threshold point shall be calculated as follows:

```
(EB_POS_RW_X, EB_POS_RW_Y, SIN_NEG_DELAZ_SEL,
COS_NEG_DELAZ_SEL, EB_BLANK_SEL_SITE) =
ENT_BRG_DISP_RNG_DELAZ (RANGE_DISP, DELAZ_SEL)
```

Note: Selected runway symbol threshold given by EB\_POS\_RW\_X and EB\_POS\_RW\_Y may exceed their respective maximum / minimum screen locations. Nevertheless, these values are needed to determine positions of range ring arcs and labels when the selected site is off-screen.

7. The selected runway symbol's display end point shall be calculated as follows:

```
EB_POS_RW_ENDPT_X = LENGTH_RW_DISP * SIN(D_AZ_RW_WRT_ORB) *
EB_SCALE_FACT + EB_POS_RW_X
EB_POS_RW_ENDPT_Y = LENGTH_RW_DISP * COS(D_AZ_RW_WRT_ORB) *
EB_SCALE_FACT + EB_POS_RW_Y
```

8. The delta azimuth line starting point shall be calculated as follows:

```
EB_DELAZ_LINE_STRT_X=RANGE_OFFSET*SIN_NEG_DELAZ_SEL + EB_N_X
EB_DELAZ_LINE_STRT_Y=RANGE_OFFSET*COS_NEG_DELAZ_SEL + EB_N_Y
```

9. The delta azimuth line end point shall be calculated as follows:

```
DELTA_RANGE = RANGE_DISP - RANGE_OFFSET
EB_DELAZ_LINE_ENDPT_X = DELTA_RANGE * SIN_NEG_DELAZ_SEL + EB_N_X
EB_DELAZ_LINE_ENDPT_Y = DELTA_RANGE * COS_NEG_DELAZ_SEL + EB_N_Y
```

10. For each alternative site I = 1 to 2, the display applicability and display location shall be determined as follows:

```
IF ALT_SITE_INDEX(I) = 0 THEN
  EB_BLANK_ALT_SITE(I) = ON
ELSE
  RANGE_DISP = RNG_TO_RW_THRESH_ALT(I) * EB_SCALE_FACT
  (EB_POS_ALT_X(I), EB_POS_ALT_Y(I), DUMMY_SIN, DUMMY_COS, EB_
  BLANK_ALT_SITE(I)) = ENT_BRG_DISP_RNG_DELAZ(RANGE_DISP,
  DELAZ_ALT(I))
ENDIF
```

A potential implementation is presented in the ENT\_BRG\_SITE\_COMPS flowchart of Figure B.5.27-8.

### ENT\_BRG\_DISP\_RNG\_DELAZ Function

The ENT\_BRG\_DISP\_RNG\_DELAZ function takes as input arguments display range (RANGE\_DISP) of the site symbol from the Shuttle symbol and delta azimuth (DELAZ). The function returns the X and Y

display location of the site symbol (POS\_RW\_X and POS\_RW\_Y, respectively), the sine and cosine of negative delta azimuth (SIN\_NEG\_DELAZ and COS\_NEG\_DELAZ, respectively), and the symbol blanking flag (BLANK\_FLAG).

1. ENT\_BRG\_DISP\_RNG\_DELAZ function requirements shall be executed on demand when called.
2. The blanking flag BLANK\_FLAG shall be set OFF.
3. The sine and cosine of negative delta azimuth shall be calculated as follows:

$$\text{SIN\_NEG\_DELAZ} = \text{SIN}(-\text{DELAZ})$$

$$\text{COS\_NEG\_DELAZ} = \text{COS}(-\text{DELAZ})$$

4. The X and Y display coordinates of the site symbol shall be computed as follows:

$$\text{POS\_RW\_X} = \text{RANGE\_DISP} * \text{SIN\_NEG\_DELAZ} + \text{EB\_N\_X}$$

$$\text{POS\_RW\_Y} = \text{RANGE\_DISP} * \text{COS\_NEG\_DELAZ} + \text{EB\_N\_Y}$$

5. The site symbol blanking flag shall be set ON if the X coordinate is greater than the maximum value or less than the minimum value for the plot region as follows:

```
IF (POS_RW_X > EB_PLOT_X_MAX) OR (POS_RW_X < EB_PLOT_X_MIN) THEN  
    BLANK_FLAG = ON  
ENDIF
```

6. The site symbol blanking flag shall be set ON if the Y coordinate is greater than the maximum value or less than the minimum value for the plot region as follows:

```
IF (POS_RW_Y > EB_PLOT_Y_MAX) OR (POS_RW_Y < EB_PLOT_Y_MIN) THEN  
    BLANK_FLAG = ON  
ENDIF
```

A potential implementation is presented in the ENT\_BRG\_DISP\_RNG\_DELAZ flowchart of Figure B.5.27-9.

### **B.5.27.7 Instantaneous Impact Point (IIP) Processing**

This section specifies requirements to determine the location of the Instantaneous Impact Point (IIP) symbol on the Entry Bearing display.

1. IIP processing requirements shall be executed in MM 304 through MM 305 and MM 602 through MM 603 while EB\_RNG\_DELAZ\_PROC = ON when IIP\_AERO\_R\_FACT \* IIP\_AERO\_T\_FACT ≠ 0.0 and the Entry Bearing Display is present on an MDU.
2. IIP processing requirements shall be executed at 1.04 Hz.

3. IIP processing shall execute the IIP Prediction requirements of Section B.5.26.8.1 of the Ascent Bearing Specialist Function to compute the IIP M50 position vector  $\bar{R}_{IIP}$ , magnitude R\_MAG of the Shuttle M50 position vector  $\bar{R}_{AVGG}$ , and the IIP\_INVALID flag.

4. The IIP\_INVALID flag returned by IIP Prediction shall be stored in the IIP blanking flag:

EB\_BLANK\_IIP = IIP\_INVALID

5. If EB\_BLANK\_IIP = OFF, the following steps shall be executed:

- a. Magnitude of the IIP position vector shall be computed:

$R\_MAG\_IIP = ABVAL(\bar{R}_{IIP})$

- b. Cosine of the angle between the Shuttle and IIP position vectors shall be computed:

$COS\_THET\_VEH = \bar{R}_{AVGG} \bullet \bar{R}_{IIP} / (R\_MAG * R\_MAG\_IIP)$

- c. Range from the Shuttle to the IIP shall be computed:

$RANGE\_IIP = ARCCOS(COS\_THET\_VEH) * R\_MAG\_IIP * NAUTMI\_PER\_FT$

- d. Vertical display location of the IIP symbol shall be calculated:

$EB\_POS\_IIP\_Y = RANGE\_IIP * EB\_SCALE\_FACT + EB\_N\_Y$

- e. Vertical position of the IIP symbol shall be limited, if necessary, as follows:

```
IF EB_POS_IIP_Y > EB_PLOT_Y_MAX THEN
    EB_POS_IIP_Y = EB_PLOT_Y_MAX
ELSE
    IF EB_POS_IIP_Y < EB_PLOT_Y_MIN THEN
        EB_POS_IIP_Y = EB_PLOT_Y_MIN
    ENDIF
ENDIF
```

A potential implementation is presented in the IIP\_SYMBOL\_PROC\_ENT flowchart of Figure B.5.27-10.

### B.5.27.8 Range Rings Processing

This section specifies requirements to locate range rings and their associated labels on the range vs. delta azimuth plot of the Entry Bearing display.

1. Range rings processing requirements shall be executed in MM 304 through MM 305 and MM 602 through MM 603 while EB\_RNG\_DELAZ\_PROC = ON when the Entry Bearing Display is present on an MDU.
2. Range rings processing requirements shall be executed at 1.04 Hz.

3. If RANGE\_SEL > RANGE\_SEL\_PREV, for each range ring I = 1 TO 9, RING\_DISP\_STOP(I) and EB\_RING\_DISP(I) shall be set OFF:

```
DO FOR I = 1 TO 9
    RING_DISP_STOP(I) = OFF
    EB_RING_DISP(I) = OFF
ENDDO
```

4. For each range ring I = 1 TO 9, if RING\_DISP\_STOP(I) = OFF, the following requirements shall be executed to determine if the range ring is to be displayed:

```
IF I < 3 THEN
    IF ALT_WHEELS < 400,000 THEN
        EB_RING_DISP(I) = ON
    ENDIF
ELSE
    IF RANGE_SEL ≤ EB_RING_DISP_THRESH(I-2) THEN
        EB_RING_DISP(I) = ON
    ENDIF
ENDIF
```

5. For each range ring I = 1 TO 9, if RING\_DISP\_STOP(I) = OFF and EB\_RING\_DISP(I) = ON, the following requirements shall be executed to determine if a range ring is to be blanked:

- a. Radius of the Ith range ring shall be calculated as follows:

```
EB_RING_DISP_RADIUS(I) = EB_RANGE_RING_RADIUS(I)*EB_SCALE_FACT
```

- b. Each range ring shall be blanked if the ring radius exceeds the maximum value:

```
IF EB_RING_DISP_RADIUS(I) > EB_MAX_RING_RADIUS THEN
    EB_RING_DISP(I) = OFF
    RING_DISP_STOP(I) = ON
ENDIF
```

6. Current value of RANGE\_SEL shall be saved for use on the next pass:

```
RANGE_SEL_PREV = RANGE_SEL
```

A potential implementation is presented in the RANGE\_RINGS\_PROC flowchart of Figure B.5.27-11.

### **B.5.27.9 Alternate Energy Over Weight (E/W) Scales Computations**

This section specifies requirements to compute the locations of symbols on the alternate E/W scales of the Entry Bearing display, similar to symbols on the selected site E/W scale. Requirements of this section are similar to those performed by the Vertical Situation DIP for the selected site E/W scale.

1. Alternate E/W scales processing requirements shall be executed in MM 602 through MM 603 while EB\_EOW\_PROC = ON when the Entry Bearing Display is present on an MDU.
2. Alternate E/W scale processing requirements shall be executed at 1.04 Hz.
3. For each of the alternate sites I = 1 TO 2, if ALT\_SITE\_INDEX(I) ≠ 0, the following requirements shall be executed:

- a. Predicted range to the A/L shallow glideslope intercept location shall be calculated:

$$\text{PRED\_RA} = \text{RPRED\_ALT(I)} + \text{X\_AIM\_PT}$$

- b. The S-Turn energy level shall be computed as follows:

```
IF PRED_RA > RMINST THEN
    ENERGY_STURNA = ES_ALT(I)
ELSE
    ENERGY_STURNA = ES_C121 + EDRS21 * (PRED_RA - RMINST)
ENDIF
```

- c. The alternate E/W scale factor shall be computed as follows:

$$\text{ENERGY\_SCALEA} = \text{SCALE\_LEN} / (\text{ENERGY\_STURNA} - \text{EMEP\_ALT(I)})$$

- d. Y-coordinates of the alternate site nominal energy and current energy scale symbols shall be computed as follows:

$$\text{NOM\_ENERGY\_Y\_ALT(I)} = \text{YMEP} + \text{ENERGY\_SCALEA} * (\text{EN\_ALT(I)} - \text{EMEP\_ALT(I)})$$

$$\text{SHUTTLE\_ENER\_Y\_ALT(I)} = \text{YMEP} + \text{ENERGY\_SCALEA} * (\text{EOW} - \text{EMEP\_ALT(I)})$$

- e. Current energy scale symbol position shall be limited as follows:

```
IF SHUTTLE_ENER_Y_ALT(I) > YMAX THEN
    SHUTTLE_ENER_Y_ALT(I) = YMAX
ENDIF
```

```
IF SHUTTLE_ENER_Y_ALT(I) < YMIN THEN
    SHUTTLE_ENER_Y_ALT(I) = YMIN
ENDIF
```

- f. The upper and lower energy limit symbol positions shall be calculated as follows:

$$\text{ENER\_UL\_Y\_ALT(I)} = \text{YMEP} + \text{ENERGY\_SCALEA} * (\text{EMAX\_ALT(I)} - \text{EMEP\_ALT(I)}) + 11$$



$$\text{ENER\_LL\_Y\_ALT}(I) = \text{YMEP} + \text{ENERGY\_SCALEA} * \\ (\text{EMIN\_ALT}(I) - \text{EMEP\_ALT}(I)) + 11$$

- g. The alternate site OTT downmode energy symbol position shall be calculated as follows:

```
IF PRED_RA < RMOH THEN
    EMOH_ENER_Y_ALT(I) = -400 (off display)
ELSE
    EMOH_ENER_Y_ALT(I) = YMEP + ENERGY_SCALEA *
        (EMOH_ALT(I) - EMEP_ALT(I))
ENDIF
```

4. For each of the alternate sites I = 1 TO 2, if ALT\_SITE\_INDEX = 0, the Ith alternate site E/W scale symbols shall be blanked:

```
NOM_ENERGY_Y_ALT(I) = -400
SHUTTLE_ENER_Y_ALT(I) = -400
ENER_UL_Y_ALT(I) = -400
ENER_LL_Y_ALT(I) = -400
EMOH_ENER_Y_ALT(I) = -400
```

A potential implementation is presented in the ALT\_VERT\_SIT\_DIP flowchart of Figure B.5.27-12.

### **B.5.27.10 Constraints and Assumptions**

1. The instantaneous impact point (IIP) is in the direction of the Shuttle heading. For the Entry Bearing Display plot, the Shuttle heading is straight up from the fixed Shuttle symbol. Therefore, there is no need to compute the X location of the IIP, since it always coincides with that of the fixed Shuttle symbol.
2. Requirements for the following coordinate transformation and reference ellipsoid functions used by the Entry Bearing specialist function are specified in Section 4.4 of the Entry Through Landing Navigation FSSR STS 83-0004:

```
EF_TO_RUNWAY
GEODETTIC_TO_EF
H_ELLIPSOID
```

3. Requirements for the following coordinate transformation function used by the Entry Bearing specialist function are specified in Section 4.7.13 of the Ascent Flight Control FSSR Volume 1, STS 83-0008V1:

```
QUAT_XFORM
```

**B.5.27.11 Flowcharts**

Flowcharts represent a potential implementation and are included for reference only.

Figure B.5.27-1 ALT\_RUNWAY\_SITE\_LOOKUP\_ENT

Figure B.5.27-2 ENT\_BRG\_RANGE\_DELAZ\_ENERGY\_COMPS

Figure B.5.27-3 ALT\_GUIDECOMP

Figure B.5.27-4 ALT\_GUIDECOMP\_TAEM\_RTLS

Figure B.5.27-5 ALT\_GTP

Figure B.5.27-6 ALT\_TGCOMP

Figure B.5.27-7 ROLL\_REVERSAL\_LINES\_COMP

Figure B.5.27-8 ENT\_BRG\_SITE\_COMPS

Figure B.5.27-9 ENT\_BRG\_DISP\_RNG\_DELAZ

Figure B.5.27-10 IIP\_SYMBOL\_PROC\_ENT

Figure B.5.27-11 RANGE\_RINGS\_PROC

Figure B.5.27-12 ALT\_VERT\_SIT\_DIP

**B.5.27.12 Entry Bearing Display Interface Support Functions**

Table B.5.27-1 NA

Table B.5.27-2 NA

Table B.5.27-3 NA

Table B.5.27-4 NA

Table B.5.27-5 Input Functional Parameters

Table B.5.27-6 Output Functional Parameters

Table B.5.27-7 I-Loads

Table B.5.27-8 K-Loads

Table B.5.27-9 Constants

ALT\_RUNWAY\_SITE\_LOOKUP\_ENT

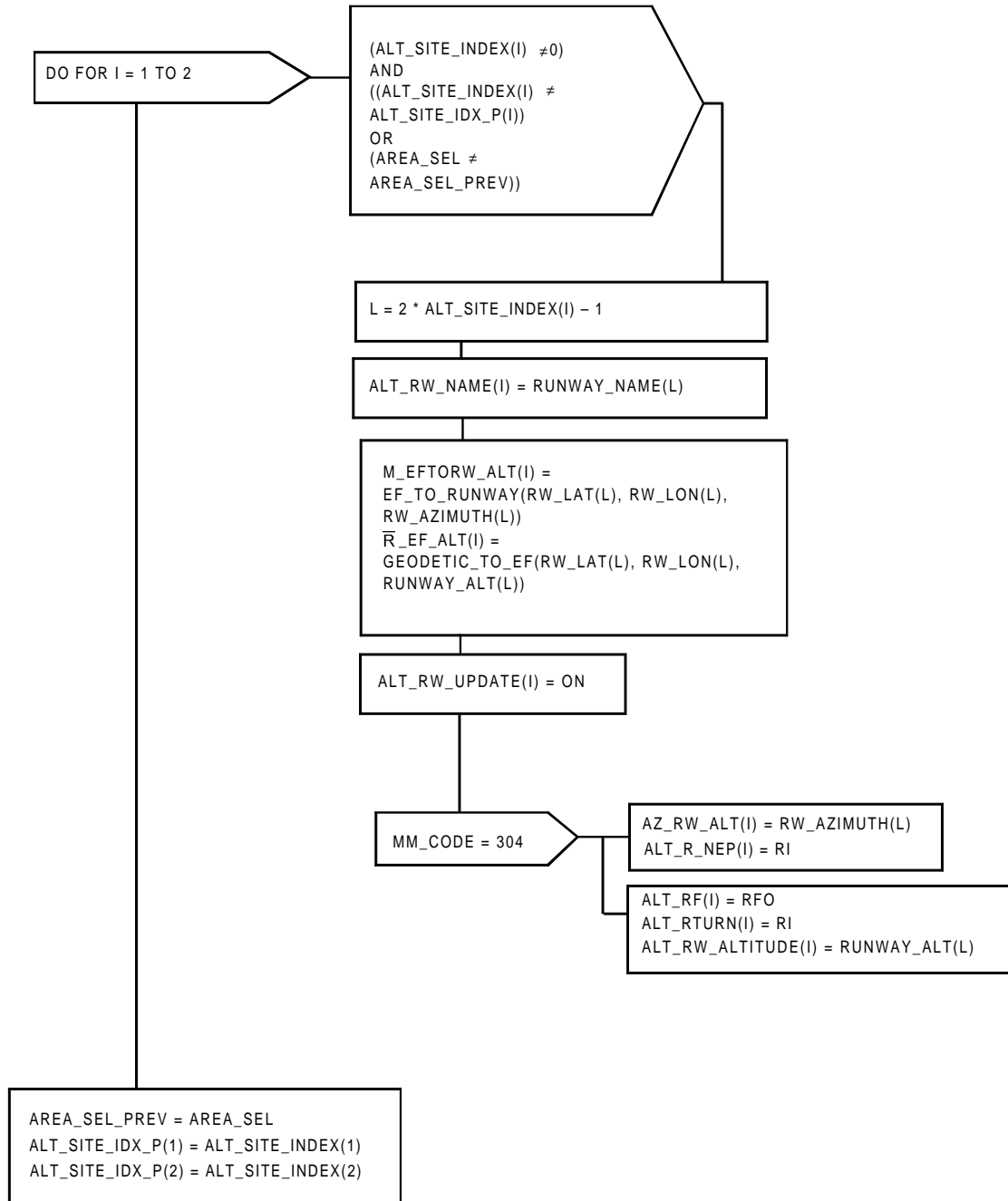


FIGURE B.5.27-1. ALT\_RUNWAY\_SITE\_LOOKUP\_ENT

ENT\_BRG\_RANGE\_DELAZ\_ENERGY\_COMPS

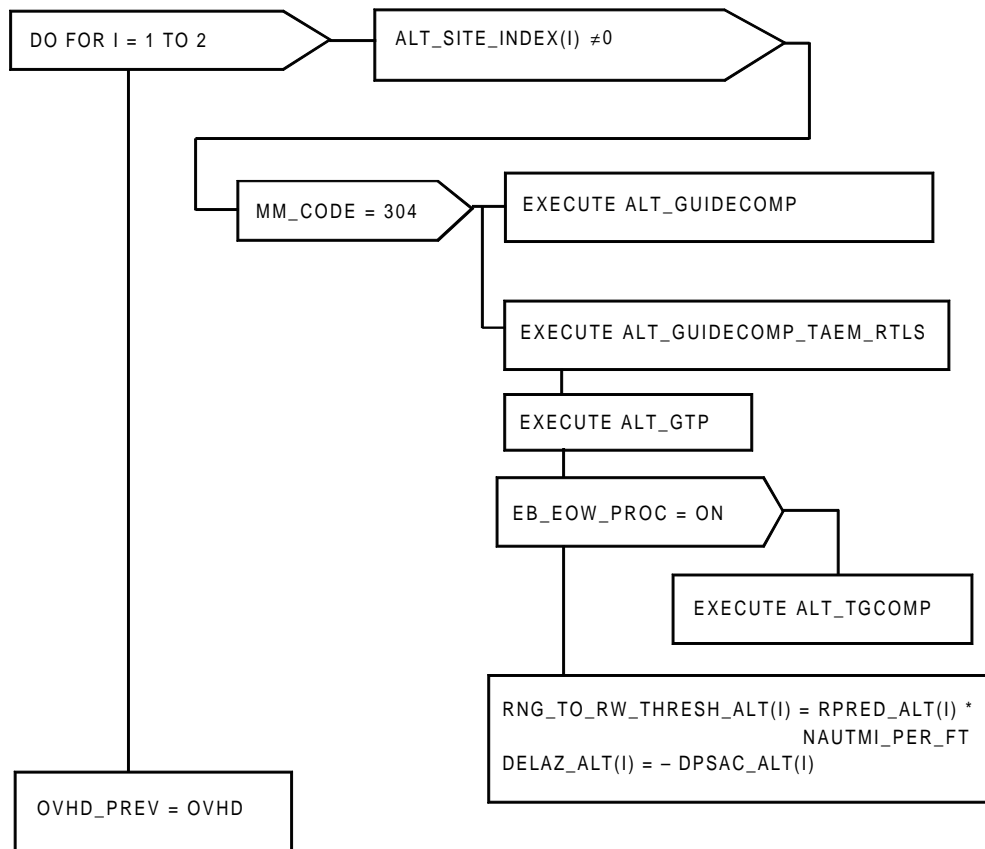


FIGURE B.5.27-2. ENT\_BRG\_RANGE\_DELAZ\_ENERGY\_COMPS

ALT\_GUIDECOMP

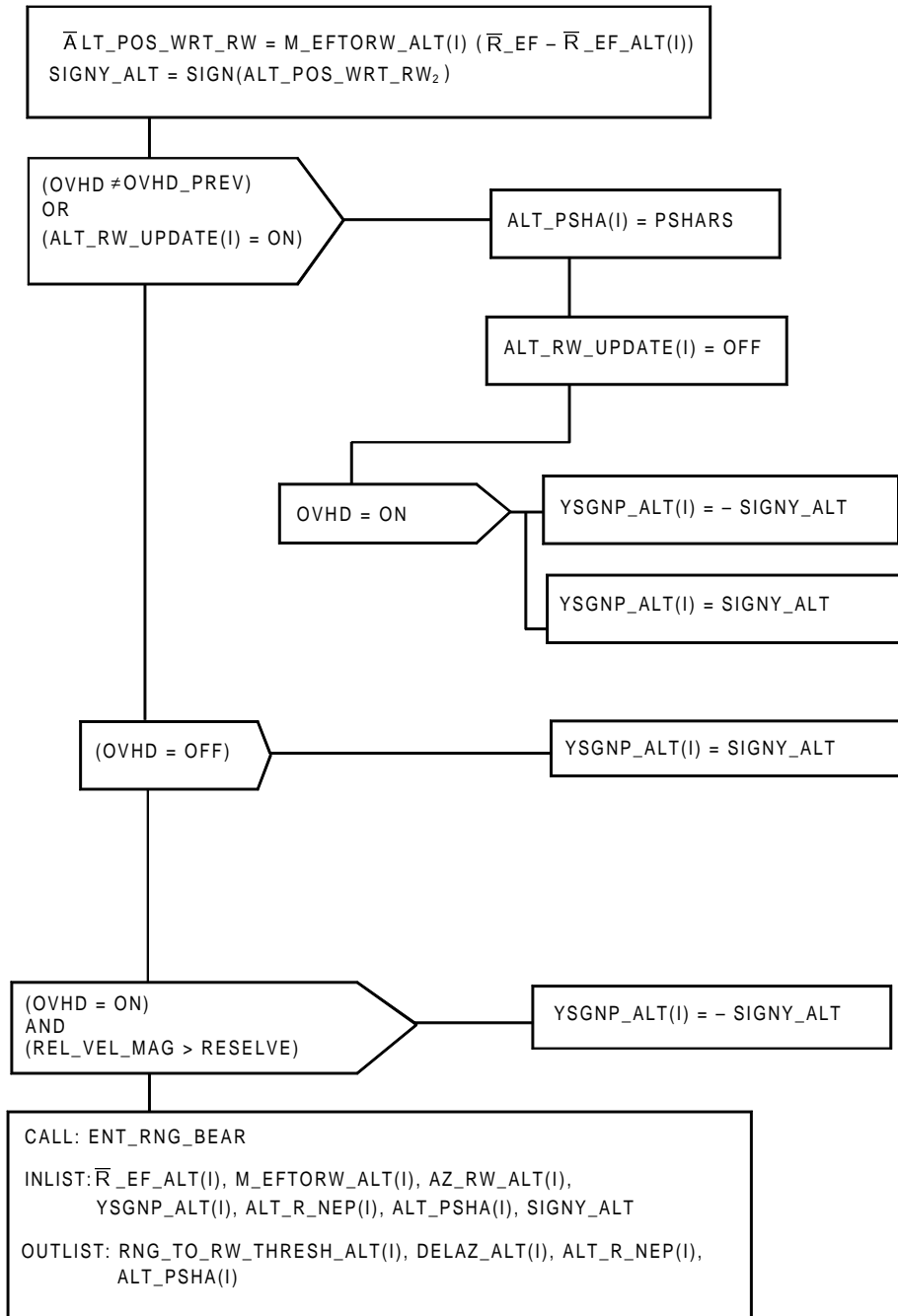


FIGURE B.5.27-3. ALT\_GUIDECOMP

ALT\_GUIDECOMP\_TAEM\_RTLS

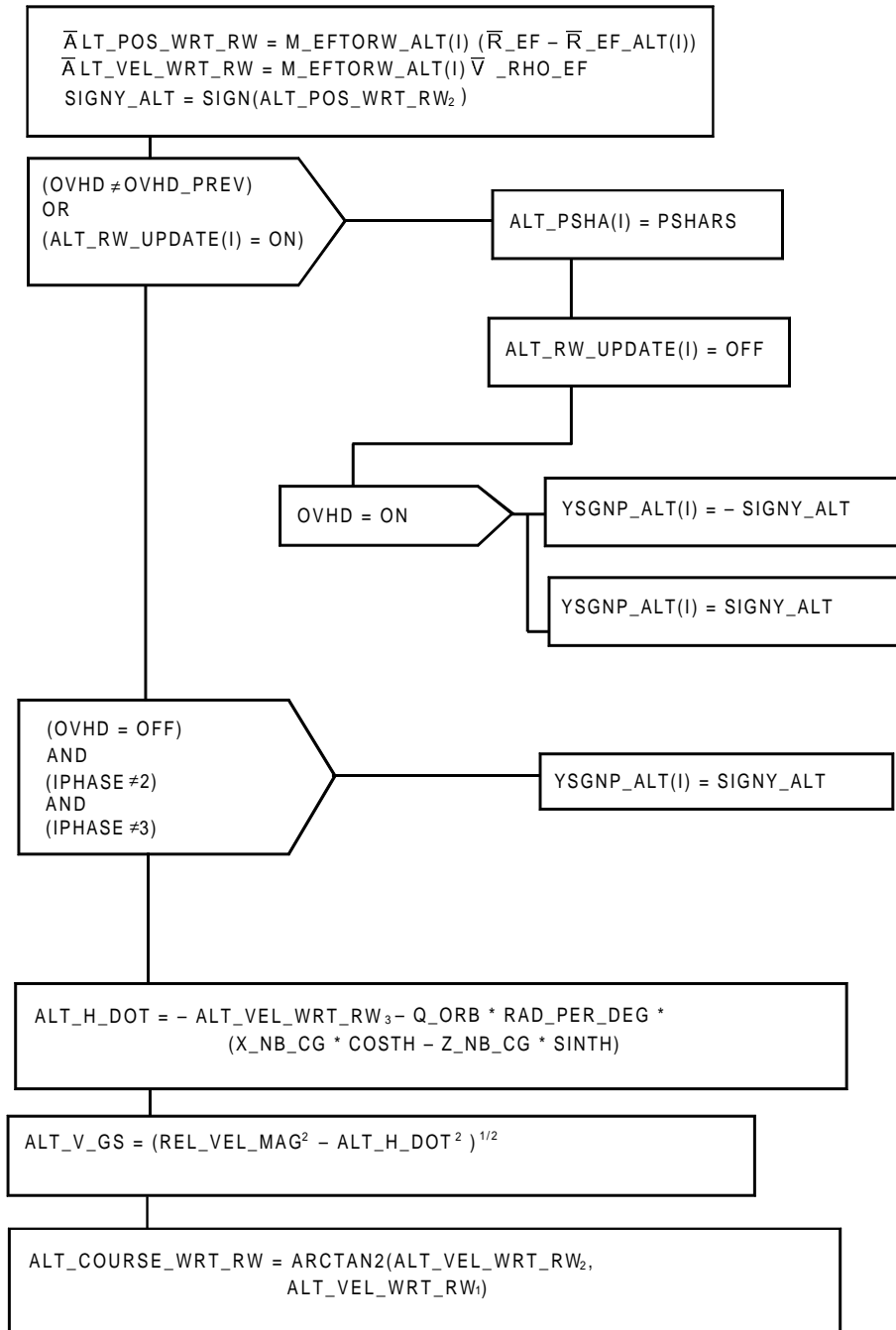


FIGURE B.5.27-4. ALT\_GUIDECOMP\_TAEM\_RTLS

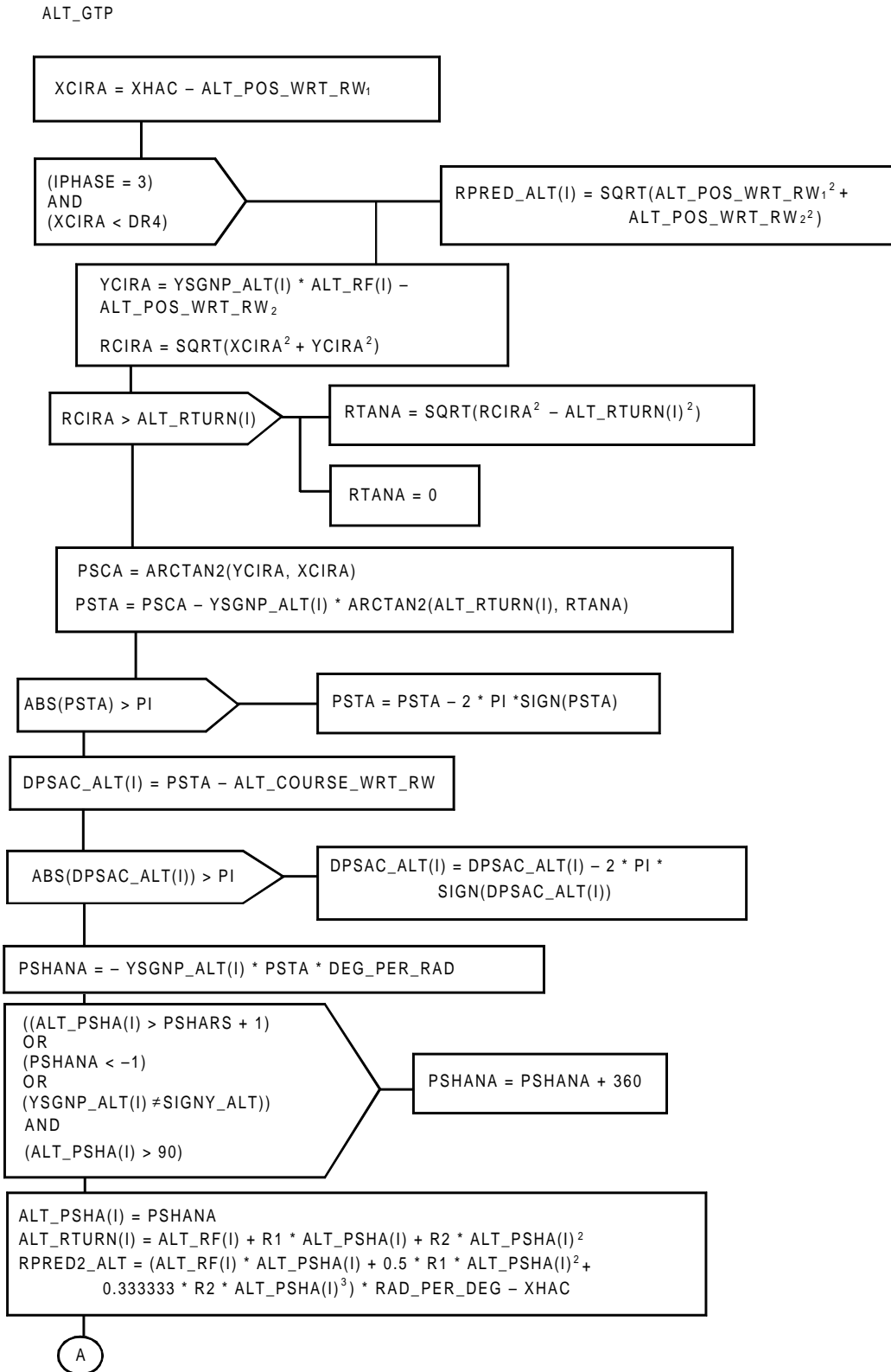


FIGURE B.5.27-5.(1) ALT\_GTP (Sheet 1 of 2)

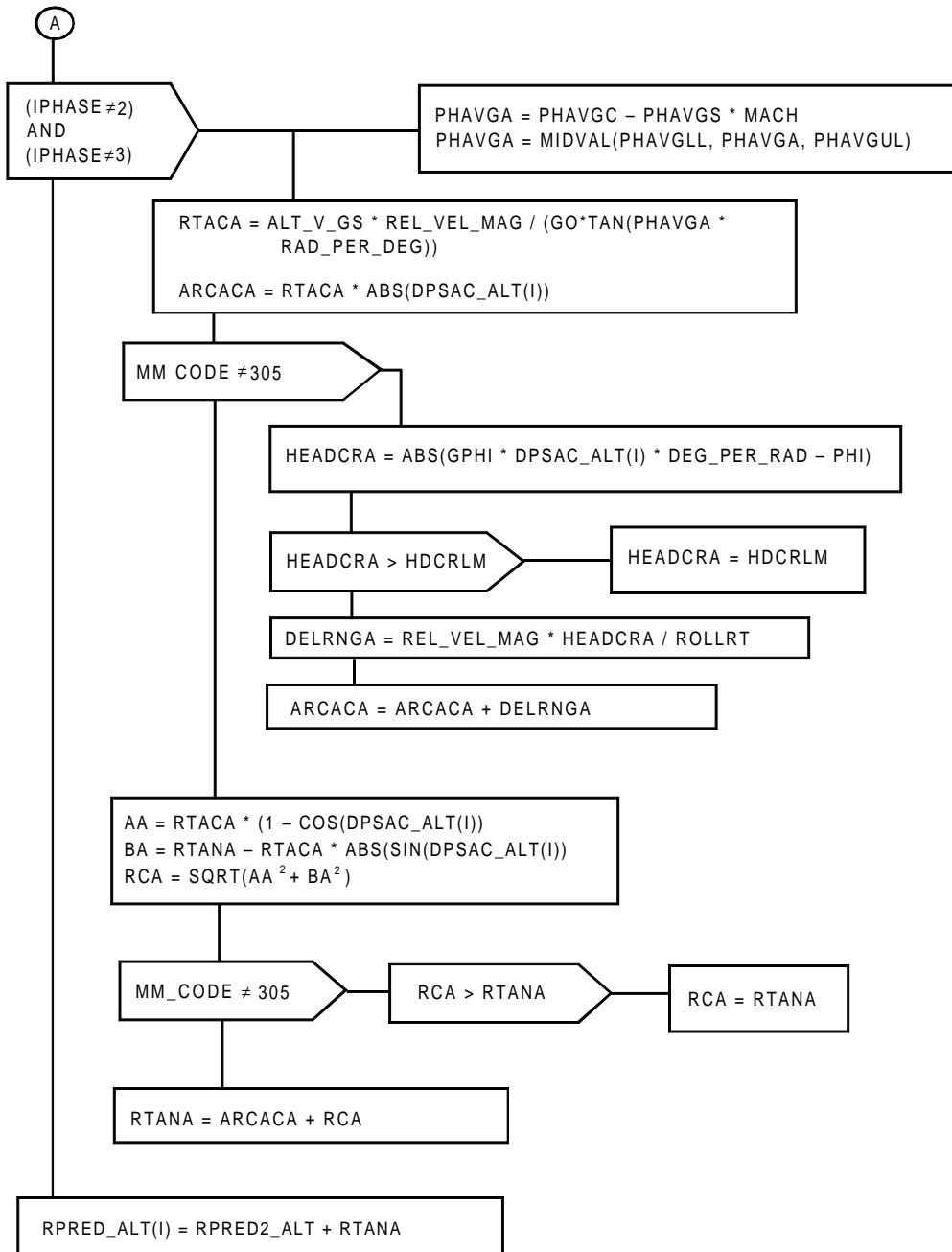


FIGURE B.5.27-5.(2) ALT\_GTP (Sheet 2 of 2)



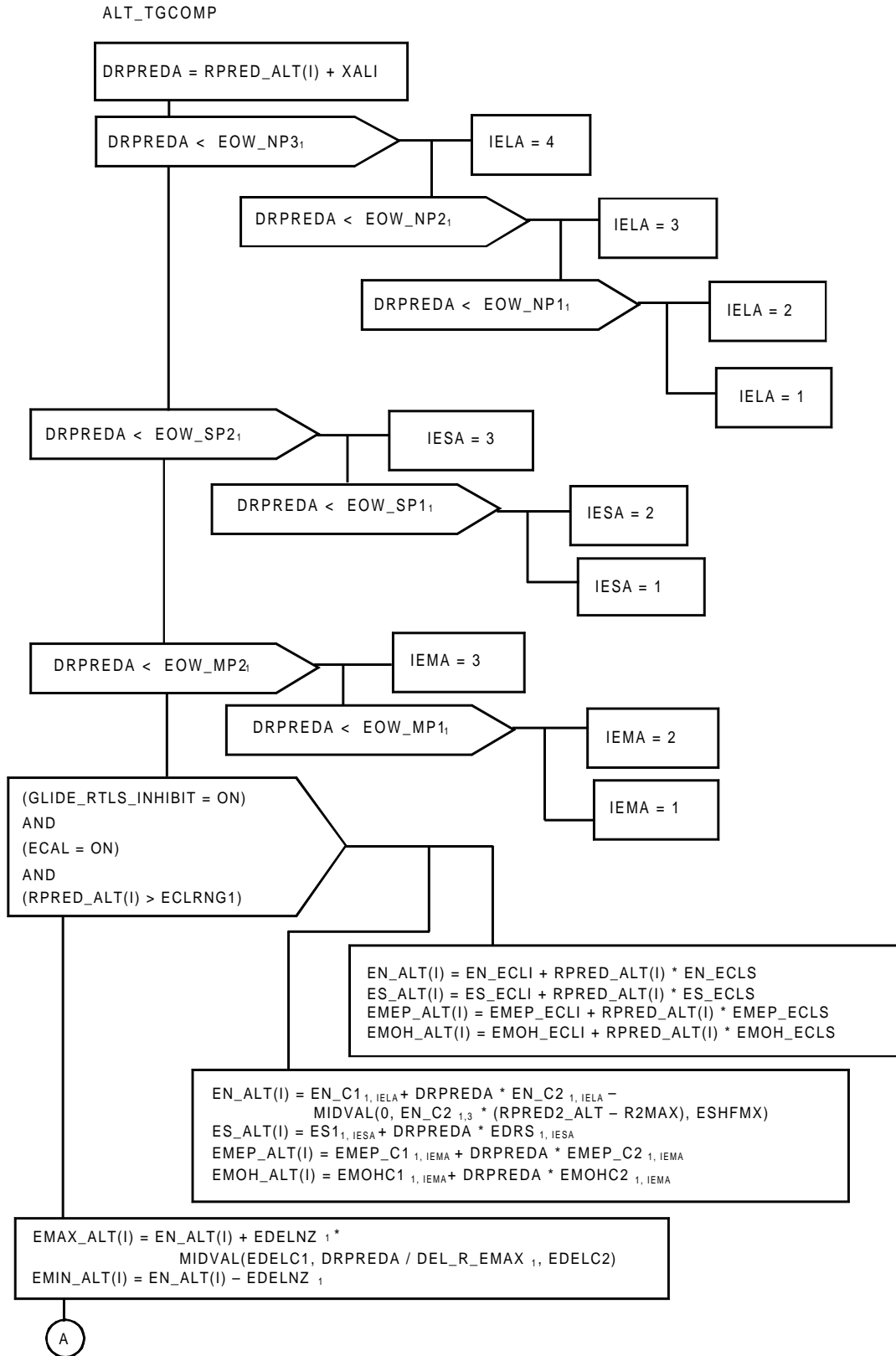


FIGURE B.5.27-6.(1) ALT\_TGCOMP (Sheet 1 of 2)

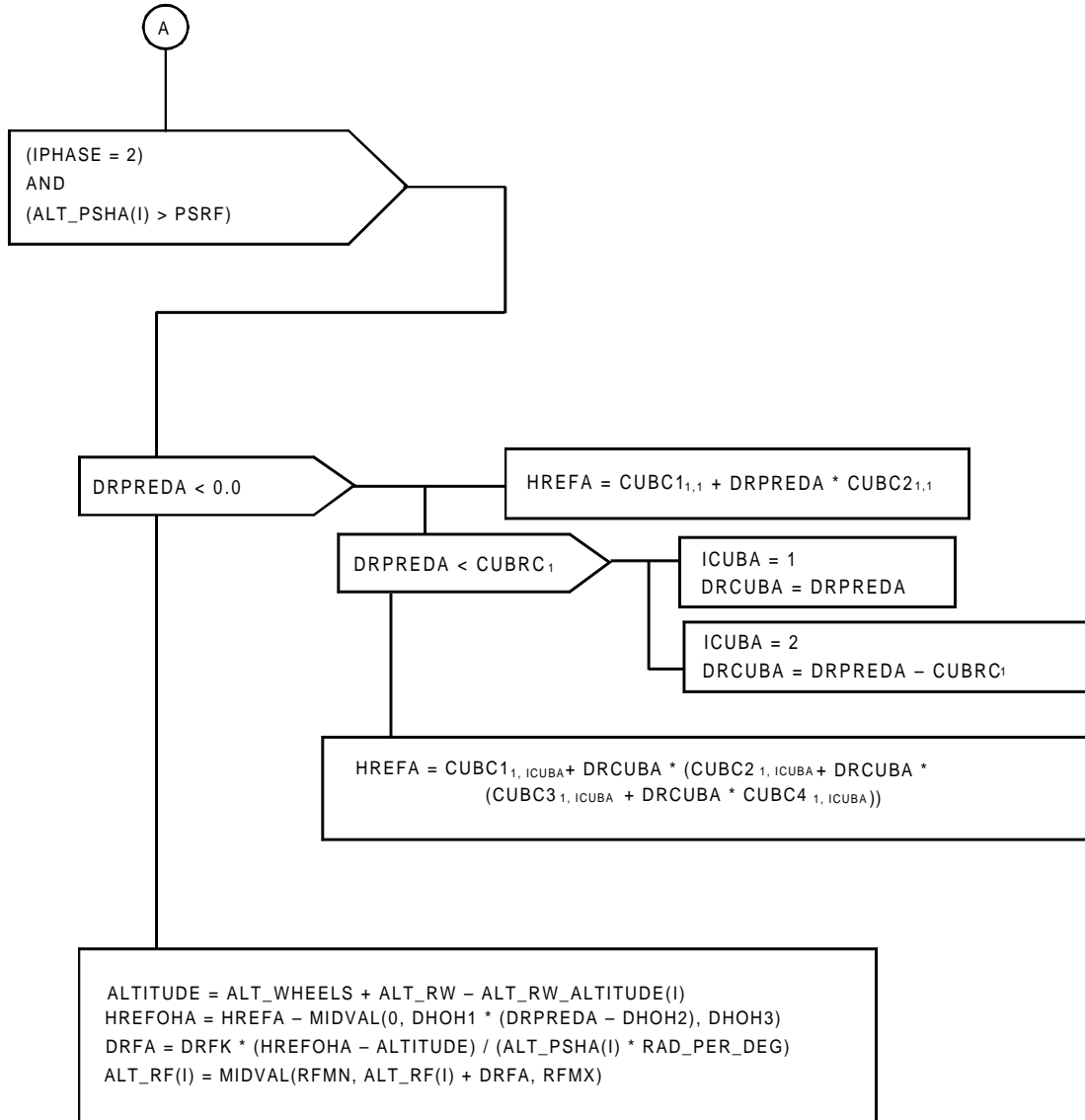


FIGURE B.5.27-6.(2) ALT\_TGCOMP (Sheet 2 of 2)

ROLL\_REVERSAL\_LINES\_COMP

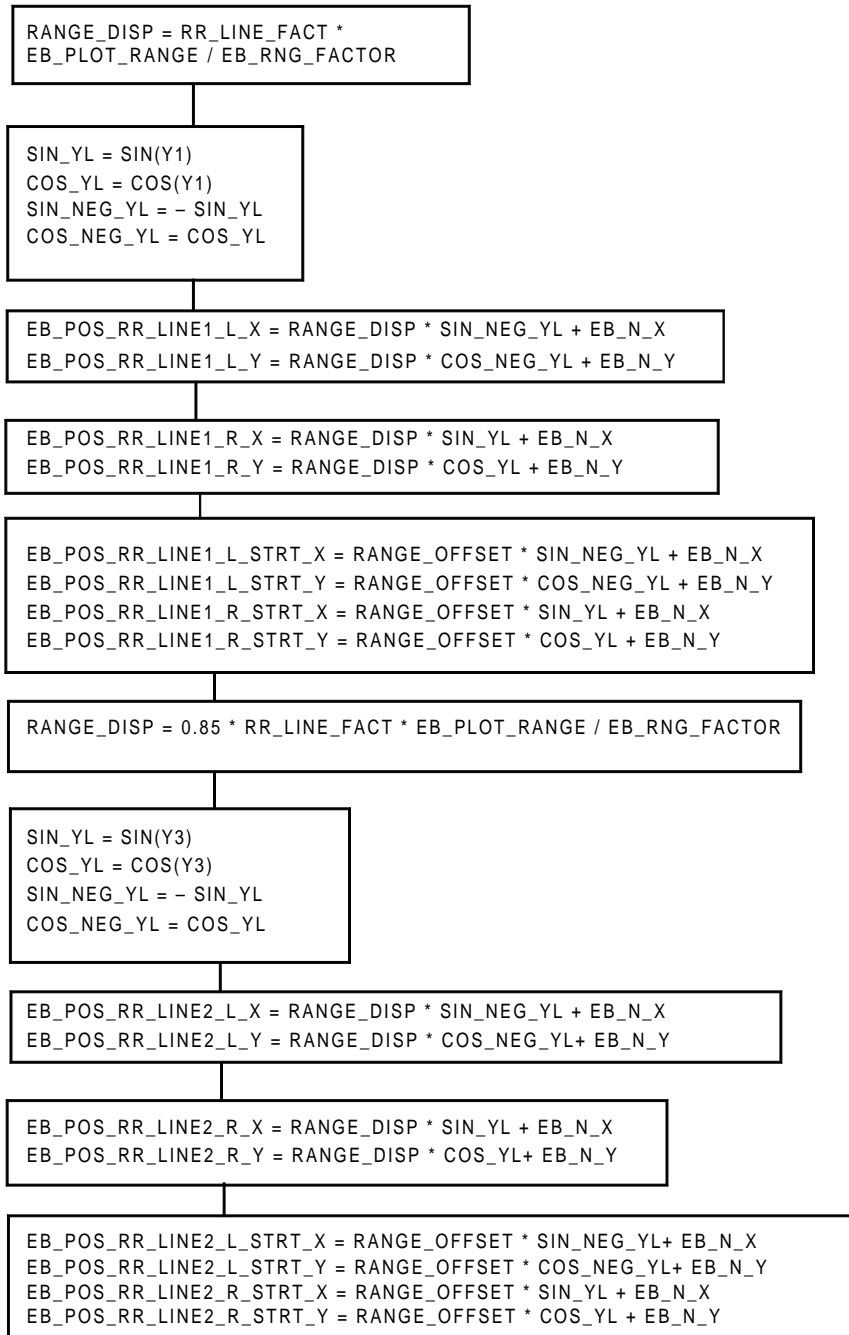


FIGURE B.5.27-7. ROLL\_REVERSAL\_LINES\_COMP

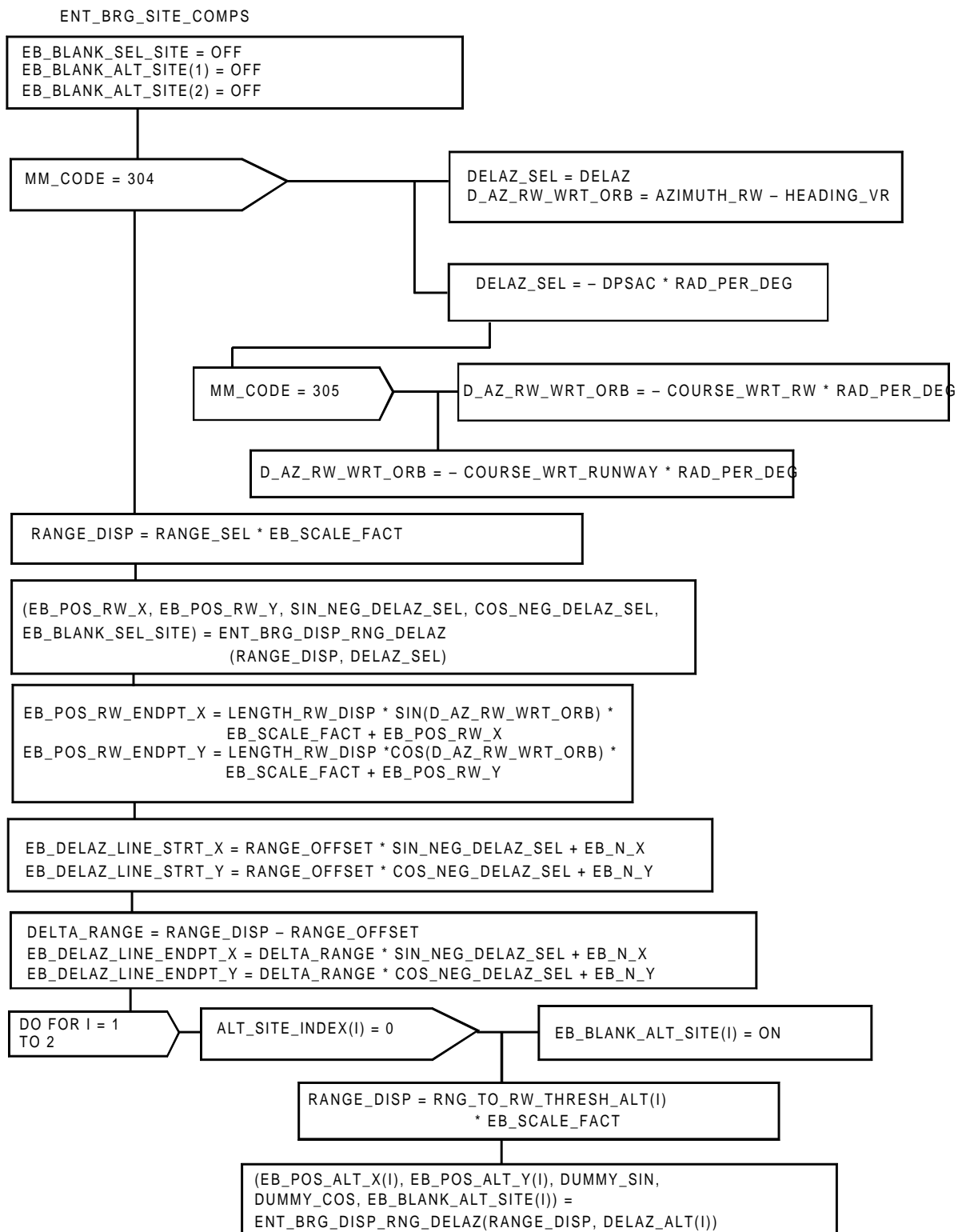


FIGURE B.5.27-8. ENT\_BRG\_SITE\_COMPS

ENT\_BRG\_DISP\_RNG\_DELAZ

INLIST: RANGE\_DISP, DELAZ  
OUTLIST: POS\_RW\_X, POS\_RW\_Y, SIN\_NEG\_DELAZ, COS\_NEG\_DELAZ  
BLANK\_FLAG

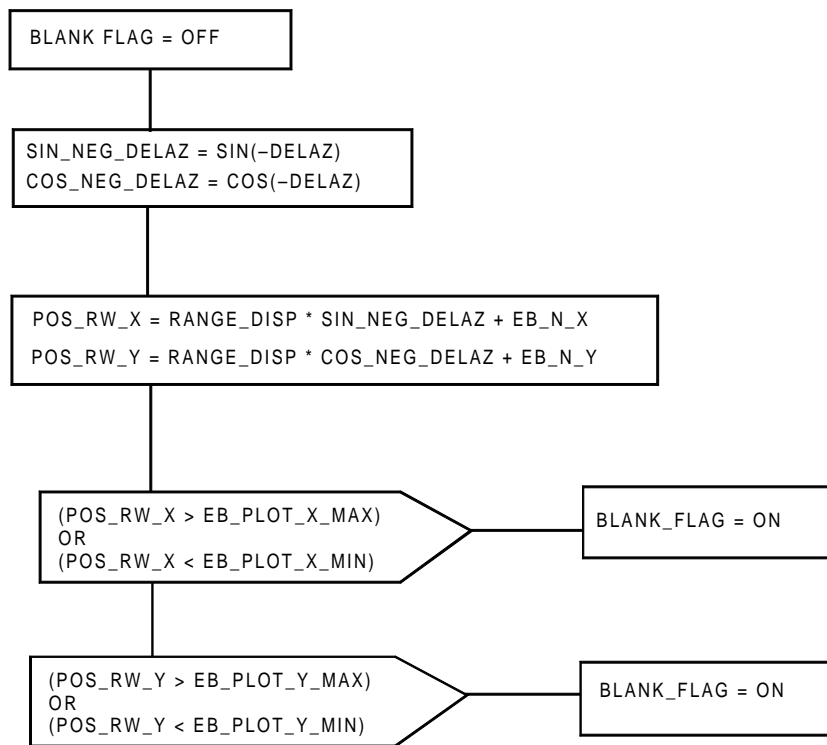


FIGURE B.5.27-9. ENT\_BRG\_DISP\_RNG\_DELAZ

IIP\_SYMBOL\_PROC\_ENT

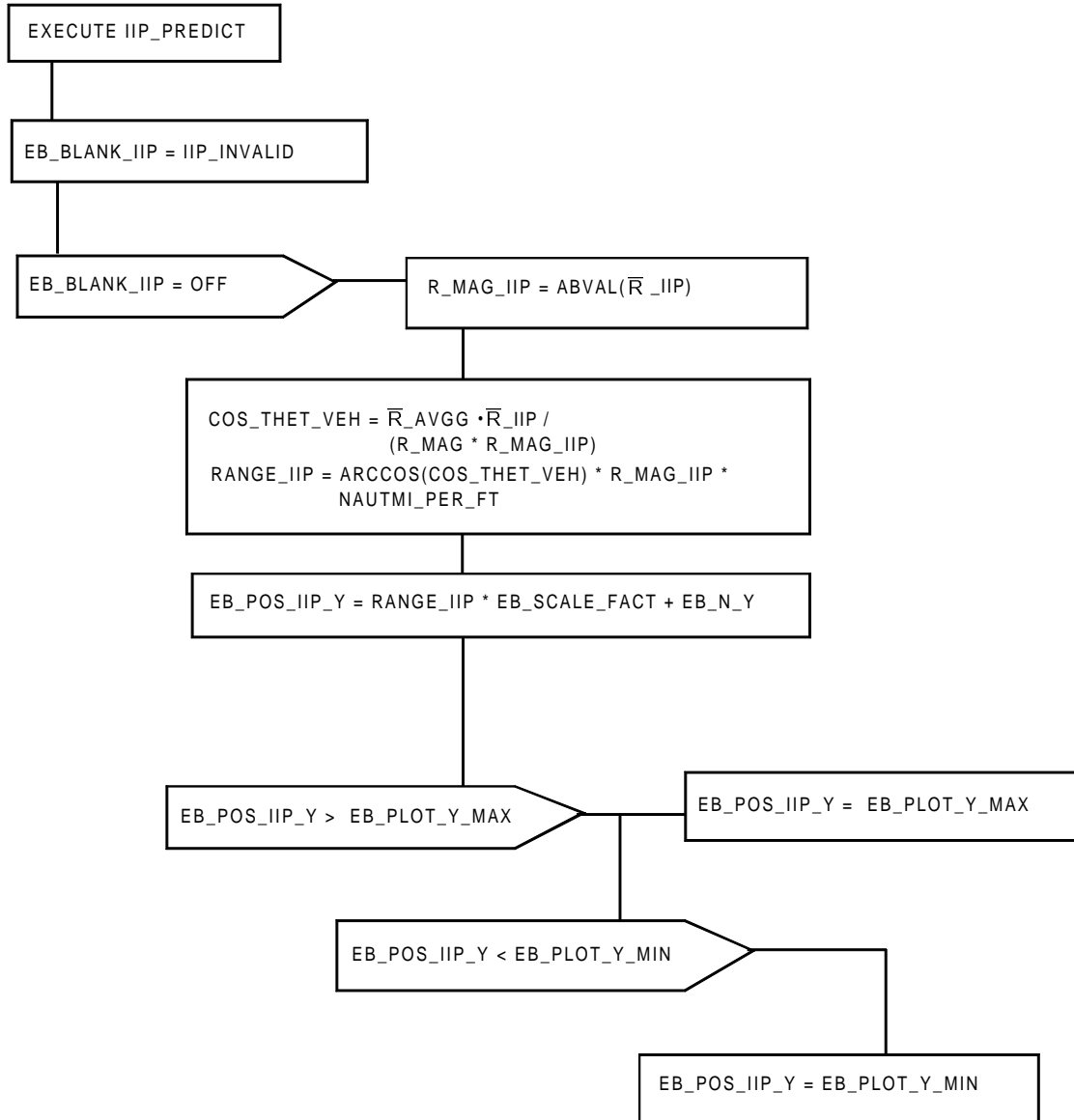


FIGURE B.5.27-10. IIP\_SYMBOL\_PROC\_ENT

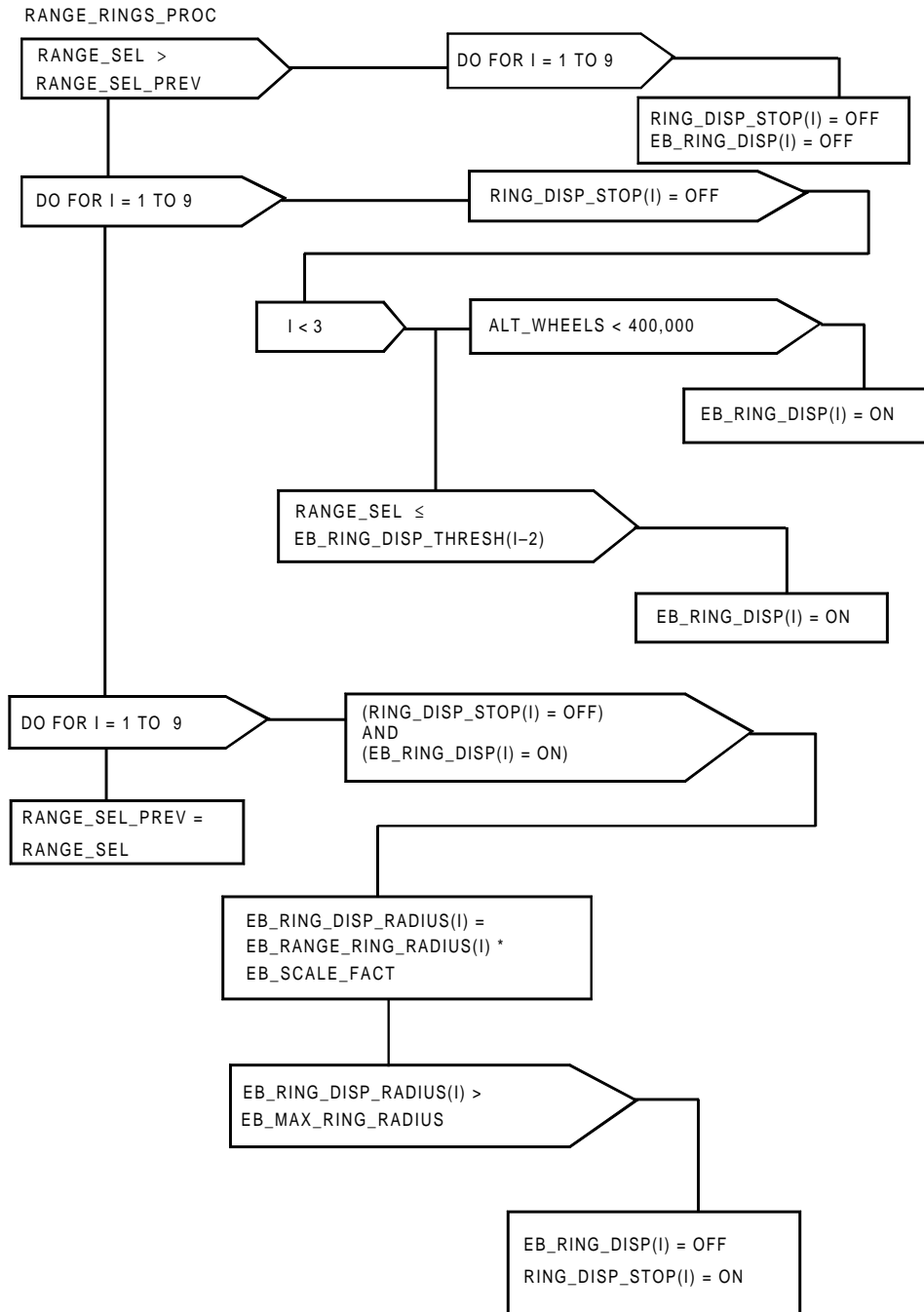


FIGURE B.5.27-11. RANGE\_RINGS\_PROC

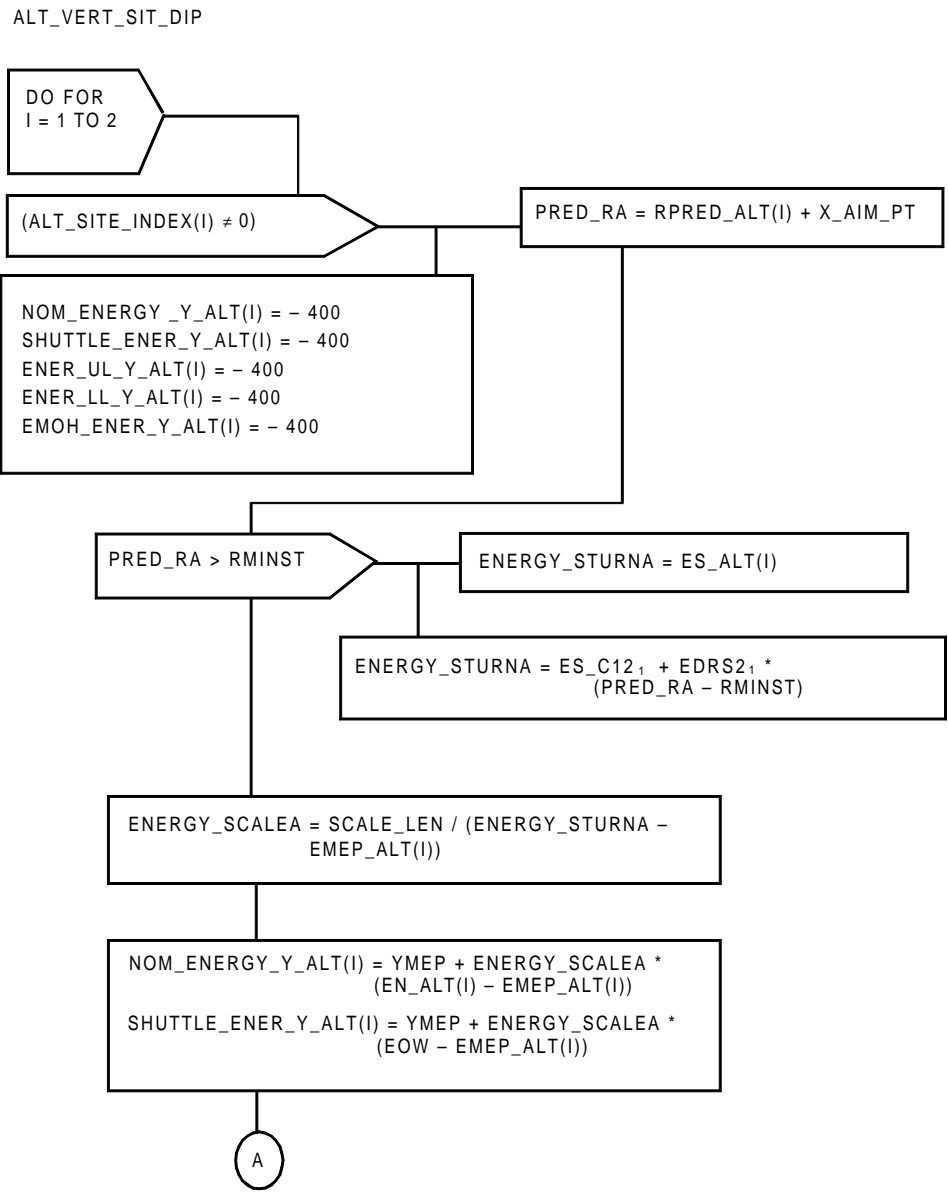


FIGURE B.5.27-12.(1) ALT\_VERT\_SIT\_DIP (Sheet 1 of 2)



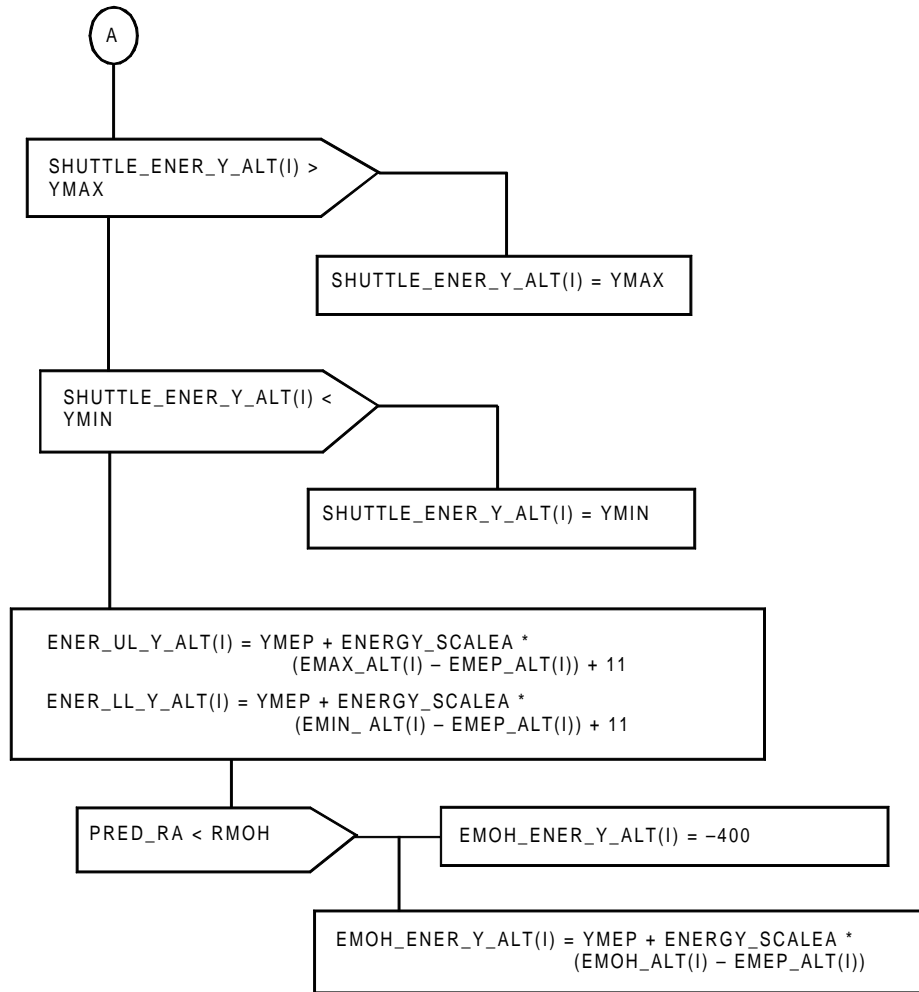


FIGURE B.5.27-12.(2) ALT\_VERT\_SIT\_DIP (Sheet 2 of 2)

TABLE B.5.27-5. INPUT FUNCTIONAL PARAMETERS FOR ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
ALT_PSHA(1)	V95H1883CA	ALT SITE 1 TURN ANG HAC	ENT UPP	DEG	SPL		93167A	*
ALT_PSHA(2)	V95H1884CA	ALT SITE 2 TURN ANG HAC	ENT UPP	DEG	SPL		93167A	*
ALT_RW	V90H1818CA	ALTITUDE OF RW WRT REF ELLIPSOID	ENT SITE LOOKUP	FT			93155B	
ALT_RW	V90H1818CB	ALTITUDE OF RW WRT REF ELLIPSOID	ASC SITE LOOKUP	FT			93155B	
ALT_R_NEP(1)	V95U1885CA	ALT SITE 1 HAC RADIUS	ENT UPP	FT	SPL		93167A	*
ALT_R_NEP(2)	V95U1886CA	ALT SITE 2 HAC RADIUS	ENT UPP	FT	SPL		93167A	*
ALT_SITE_INDEX(1)	V94U5524C	ALTERNATE SITE 1 INDEX	ASC BRG DISP	ND	HXS		93167A	*
ALT_SITE_INDEX(1)	V94U5524CA	ALTERNATE SITE 1 INDEX	ENT BRG DISP	ND	HXS		93090E	
ALT_SITE_INDEX(1)	V94U5524CB	ALTERNATE SITE 1 INDEX	ASC SITE LOOKUP	ND	HXS		93167A	*
ALT_SITE_INDEX(1)	V94U5524CC	ALTERNATE SITE 1 INDEX	ENT SITE LOOKUP	ND	HXS		93090E	
ALT_SITE_INDEX(2)	V94U5525C	ALTERNATE SITE 2 INDEX	ASC BRG DISP	ND	HXS		93167A	*
ALT_SITE_INDEX(2)	V94U5525CA	ALTERNATE SITE 2 INDEX	ENT BRG DISP	ND	HXS		93090E	
ALT_SITE_INDEX(2)	V94U5525CB	ALTERNATE SITE 2 INDEX	ASC SITE LOOKUP	ND	HXS		93167A	*
ALT_SITE_INDEX(2)	V94U5525CC	ALTERNATE SITE 2 INDEX	ENT SITE LOOKUP	ND	HXS		93090E	
ALT_WHEELS	V95H0165CA	ALT TO REAR WHEELS/NAV BASE(ENTRY)	RTLS UPP	FT			93017G	*
ALT_WHEELS	V95H0165CB	ALT TO REAR WHEELS/NAV BASE(ENTRY)	ENT UPP	FT	DPL		93017G	*
ALT_WHEELS	V95H0165CC	ALT TO REAR WHEELS/NAV BASE(ENTRY)	TAEM UPP	FT	DPL		93017G	*
AREA_SEL	V93J4392C	SELECTED AREA	HORIZ SIT DISP				93090E	
AREA_SEL	V93J4392CA	SELECTED AREA	ENT SITE LOOKUP				93090E	
AREA_SEL	V93J4392CD	SELECTED AREA	ENT BRG DISP				93090E	
AZIMUTH_RW	V90H1817CA	AZIMUTH OF RW FROM TRUE NORTH	ENT SITE LOOKUP	RAD			93090E	
COSTH	V90H2215C	EULER ANGLE PITCH COSINE	A/E ATT PROC				93090E	
COURSE_WRT_RW/PSD	V95H0225CB	COURSE WRT RW CENTERLINE	TAEM UPP	DEG			93017G	*
COURSE_WRT_RW/PSD	V95H0225CD	COURSE WRT RW CENTERLINE	RTLS UPP	DEG			93017G	*
DELAZ	V95H0172C	HEADING ERR WRT HAC TANGENT POINT	ENT UPP	RAD	SPL		93017G	*
DELAZ_ALT(1)	V94H5517CB	ALTER SITE 1 DELTA AZIMUTH	ENT UPP	RAD	SPL		93167A	*
DELAZ_ALT(2)	V94H5518CB	ALTER SITE 2 DELTA AZIMUTH	ENT UPP	RAD	SPL		93167A	*
DPSAC	V90H1111CA	HDG ERROR FROM TANGENCY WITH HAC	TAEM GUID	DEG			93017G	*
DPSAC	V90H1111CB	HDG ERROR FROM TANGENCY WITH HAC	GRTLS TAEM GUID	DEG			93017G	*
EARTH_POLE(1)	V90U0190C	X-COMP UNIT VCTR ALONG EARTH AXIS	RNP MAT COMP	ND	DPL		93090E	
EARTH_POLE(2)	V90U0191C	Y-COMP UNIT VCTR ALONG EARTH AXIS	RNP MAT COMP	ND	DPL		93090E	
EARTH_POLE(3)	V90U0192C	Z-COMP UNIT VCTR ALONG EARTH AXIS	RNP MAT COMP	ND	DPL		93090E	
ECAL	V93X0255XA	ECAL LOGIC ENA/INH DISCRETE	GRTLS TAEM GUID		BD		93017G	*
ECAL	V93X0255XB	ECAL LOGIC ENA/INH DISCRETE	VERT SIT1 DISP		BD		93090E	
EOW	V90U1231CB	ENERGY OVER WEIGHT	GRTLS TAEM GUID	FT			93090E	
GLIDE_RTLS_INHIBIT	V90X2090XA	RTLS CONTINGENCY FLAG	PW RTLS GUID		BD		93017G	*
GLIDE_RTLS_INHIBIT	V90X2090XB	RTLS CONTINGENCY FLAG	MSC		BD		93090E	
GLIDE_RTLS_INHIBIT	V90X2090XC	RTLS CONTINGENCY FLAG	PW CONT GUID		BD		93017G	*
GLIDE_RTLS_INHIBIT	V90X2090XD	RTLS CONTINGENCY FLAG	CONT 3E/O GUID		BD		93017G	*
GLIDE_RTLS_INHIBIT	V90X2090XE	RTLS CONTINGENCY FLAG	GRTLS TAEM GUID		BD		93017G	*
IPHASE	V90J1117CA	TAEM GUIDANCE PHASE INDICATOR	TAEM GUID	ND			93017G	*
IPHASE	V90J1117CB	TAEM GUIDANCE PHASE INDICATOR	GRTLS TAEM GUID	ND			93017G	*
M/CURR_ORB_MASS/MASS	V90U1961CC	CURRENT VEHICLE MASS	DEORB GUID	SLUGS			93090E	
M/MACH	V95L3029C	GN&C MACH NUMBER	ADTA SOP		SPL		93017G	*
MM_CODE	V90Q8001C	MAJOR MODE CODE	UI		HXS		93017G	*
OVHD	V95X0154XA	OVHD/STRT IND	ENT UPP	EVENT	BD		93017G	*

TABLE B.5.27-5. INPUT FUNCTIONAL PARAMETERS FOR ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
OVHD	V95X0154XB	OVHD/STRT IND	TAEM UPP	EVENT	BD		93017G	*
OVHD	V95X0154XC	OVHD/STRT IND	RTLS UPP	EVENT	BD		93017G	*
PHI/PHI_TOPO	V90H2202C	BODY ROLL ATTITUDE EULER ANGLE	A/E ATT PROC	DEG	SPL		93017G	*
PSI/HEADING_VR	V94U5610C	HEADING ANGLE OF REL VELOCITY	ENT UPP	RAD	SPL		93090E	
Q_ORB/Q	V90R5321CA	SELECTED RGA PITCH RATE	SF	DEG/S			93017G	*
REL_VEL_MAG	V95L0151CA	GND REL VEL MAGNITUDE IN M50 SYS	RTLS UPP	FT/S	SPL		93017G	*
REL_VEL_MAG/V	V95L0151CC	GND REL VEL MAGNITUDE IN M50 SYS	ENT UPP	FT/S	SPL		93017G	*
REL_VEL_MAG/V	V95L0151CD	GND REL VEL MAGNITUDE IN M50 SYS	TAEM UPP	FT/S	SPL		93017G	*
RNG_TO_RW_THRESH	V95H0176CA	RANGE TO RUNWAY THRESHOLD VIA WP1	ENT UPP	NM			93017G	*
RNG_TO_RW_THRESH_ALT(1)	V94U6528CA	RANGE TO ALT SITE 1 PRI RW THRESH	ENT UPP	NM	SPL		93167A	*
RNG_TO_RW_THRESH_ALT(2)	V94U6529CA	RANGE TO ALT SITE 2 PRI RW THRESH	ENT UPP	NM	SPL		93167A	*
RPRED	V90H1103CA	RANGE TO RUNWAY THRESHOLD VIA WP1	GRTLS TAEM GUID	FT			93017G	*
RPRED	V90H1103CB	RANGE TO RUNWAY THRESHOLD VIA WP1	TAEM GUID	FT			93017G	*
R_AVGG(1)	V95H0185CA	X-COMP OF CUR SHUTTLE POS VCTR M50	RTLS UPP	FT	DPL		93017G	*
R_AVGG(1)	V95H0185CC	X-COMP OF CUR SHUTTLE POS VCTR M50	ENT UPP	FT	DPL		93017G	*
R_AVGG(1)	V95H0185CD	X-COMP OF CUR SHUTTLE POS VCTR M50	TAEM UPP	FT	DPL		93017G	*
R_AVGG(2)	V95H0186CA	Y-COMP OF CUR SHUTTLE POS VCTR M50	RTLS UPP	FT	DPL		93017G	*
R_AVGG(2)	V95H0186CC	Y-COMP OF CUR SHUTTLE POS VCTR M50	ENT UPP	FT	DPL		93017G	*
R_AVGG(2)	V95H0186CD	Y-COMP OF CUR SHUTTLE POS VCTR M50	TAEM UPP	FT	DPL		93017G	*
R_AVGG(3)	V95H0187CA	Z-COMP OF CUR SHUTTLE POS VCTR M50	RTLS UPP	FT	DPL		93017G	*
R_AVGG(3)	V95H0187CC	Z-COMP OF CUR SHUTTLE POS VCTR M50	ENT UPP	FT	DPL		93017G	*
R_AVGG(3)	V95H0187CD	Z-COMP OF CUR SHUTTLE POS VCTR M50	TAEM UPP	FT	DPL		93017G	*
R_EF(1)	V95H0155CA	ORBITER X POSITION EF(TOD)	ENT UPP	FT	DPL		93090E	
R_EF(1)	V95H0155CB	ORBITER X POSITION EF(TOD)	RTLS UPP	FT	DPL		93090E	
R_EF(1)	V95H0155CC	ORBITER X POSITION EF(TOD)	TAEM UPP	FT	DPL		93090E	
R_EF(2)	V95H0156CA	ORBITER Y POSITION EF(TOD)	ENT UPP	FT	DPL		93090E	
R_EF(2)	V95H0156CB	ORBITER Y POSITION EF(TOD)	RTLS UPP	FT	DPL		93090E	
R_EF(2)	V95H0156CC	ORBITER Y POSITION EF(TOD)	TAEM UPP	FT	DPL		93090E	
R_EF(3)	V95H0157CA	ORBITER Z POSITION EF(TOD)	ENT UPP	FT	DPL		93090E	
R_EF(3)	V95H0157CB	ORBITER Z POSITION EF(TOD)	RTLS UPP	FT	DPL		93090E	
R_EF(3)	V95H0157CC	ORBITER Z POSITION EF(TOD)	TAEM UPP	FT	DPL		93090E	
SINTH	V90H2216C	EULER ANGLE PITCH SINE	A/E ATT PROC				93090E	
T_STATE	V95W0200CA	TIME TAG ASSOC WITH CURRENT STATE	TAEM UPP	S			93017G	*
T_STATE	V95W0200CC	TIME TAG ASSOC WITH CURRENT STATE	RTLS UPP	S			93017G	*
T_STATE	V95W0200CE	TIME TAG ASSOC WITH CURRENT STATE	ENT UPP	S			93017G	*
V_AVGG(1)	V95L0190CA	X-COMP OF CUR SHUTTLE VEL VCTR M50	RTLS UPP	FT/S	SPL		93017G	*
V_AVGG(1)	V95L0190CC	X-COMP OF CUR SHUTTLE VEL VCTR M50	ENT UPP	FT/S	SPL		93017G	*
V_AVGG(1)	V95L0190CD	X-COMP OF CUR SHUTTLE VEL VCTR M50	TAEM UPP	FT/S	SPL		93017G	*
V_AVGG(2)	V95L0191CA	Y-COMP OF CUR SHUTTLE VEL VCTR M50	RTLS UPP	FT/S	SPL		93017G	*
V_AVGG(2)	V95L0191CC	Y-COMP OF CUR SHUTTLE VEL VCTR M50	ENT UPP	FT/S	SPL		93017G	*
V_AVGG(2)	V95L0191CD	Y-COMP OF CUR SHUTTLE VEL VCTR M50	TAEM UPP	FT/S	SPL		93017G	*
V_AVGG(3)	V95L0192CA	Z-COMP OF CUR SHUTTLE VEL VCTR M50	RTLS UPP	FT/S	SPL		93017G	*
V_AVGG(3)	V95L0192CC	Z-COMP OF CUR SHUTTLE VEL VCTR M50	ENT UPP	FT/S	SPL		93017G	*
V_AVGG(3)	V95L0192CD	Z-COMP OF CUR SHUTTLE VEL VCTR M50	TAEM UPP	FT/S	SPL		93017G	*
V_RHO_EF(1)	V95L3884CB	X VELOCITY VECTOR EF(TOD)	RTLS UPP	FT/S			93090E	
V_RHO_EF(1)	V95L3884CC	X VELOCITY VECTOR EF(TOD)	TAEM UPP	FT/S			93090E	

TABLE B.5.27-5. INPUT FUNCTIONAL PARAMETERS FOR ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
V_RHO_EF(2)	V95L3885CB	Y VELOCITY VECTOR EF(TOD)	RTLS UPP	FT/S			93090E	
V_RHO_EF(2)	V95L3885CC	Y VELOCITY VECTOR EF(TOD)	TAEM UPP	FT/S			93090E	
V_RHO_EF(3)	V95L3886CB	Z VELOCITY VECTOR EF(TOD)	RTLS UPP	FT/S			93090E	
V_RHO_EF(3)	V95L3886CC	Z VELOCITY VECTOR EF(TOD)	TAEM UPP	FT/S			93090E	
XALI	V94U6518C	TRAJECTORY REFERENCE POINT	GRTLS TAEM GUID	FT	SPL		93090E	
XHAC	V90U1146CA	X-COORDINATE OF HAC CENTER	TAEM GUID	FT			93090E	
XHAC	V90U1146CB	X-COORDINATE OF HAC CENTER	GRTLS TAEM GUID	FT			93090E	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE B.5.27-6. OUTPUT FUNCTIONAL PARAMETERS FROM ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
ALT_PSHA(1)	V95H1883C	ALT SITE 1 TURN ANG HAC	ENT UPP	DEG	SPL		93167A	*
ALT_PSHA(2)	V95H1884C	ALT SITE 2 TURN ANG HAC	ENT UPP	DEG	SPL		93167A	*
ALT_RW_NAME(1)	V94U5522CA	ALTERNATE SITE 1 PRI RUNWAY NAME	ENT BRG DISP	ND	VAR		93090E	
ALT_RW_NAME(2)	V94U5523CA	ALTERNATE SITE 2 PRI RUNWAY NAME	ENT BRG DISP	ND	VAR		93090E	
ALT_R_NEP(1)	V95U1885C	ALT SITE 1 HAC RADIUS	ENT UPP	FT	SPL		93167A	*
ALT_R_NEP(2)	V95U1886C	ALT SITE 2 HAC RADIUS	ENT UPP	FT	SPL		93167A	*
AZ_RW_ALT(1)	V90H3976C	ALT SITE 1 PRI RW AZIMUTH	ENT UPP	RAD	SPL		93167A	*
AZ_RW_ALT(2)	V90H3977C	ALT SITE 2 PRI RW AZIMUTH	ENT UPP	RAD	SPL		93167A	*
DELAZ_ALT(1)	V94H5517CA	ALTER SITE 1 DELTA AZIMUTH	ENT BRG DISP	RAD	SPL		93090E	
DELAZ_ALT(2)	V94H5518CA	ALTER SITE 2 DELTA AZIMUTH	ENT BRG DISP	RAD	SPL		93090E	
DELAZ_SEL	V94H5519CA	SELECTED SITE DELTA AZIMUTH	ENT BRG DISP	RAD	SPL		93090E	
EB_BLANK_ALT_SITE(1)	V94U6523C	ENT BRG ALT SITE 1 BLANKING FLAG	ENT BRG DISP	ND	BD		93090E	
EB_BLANK_ALT_SITE(2)	V94U6524C	ENT BRG ALT SITE 2 BLANKING FLAG	ENT BRG DISP	ND	BD		93090E	
EB_BLANK_IIP	V94X6641X	ENT BRG IIP BLANKING FLAG	ENT BRG DISP	ND	BD		93090E	
EB_BLANK_SEL_SITE	V94U6519C	ENT BRG SEL SITE BLANKING FLAG	ENT BRG DISP	ND	BD		93090E	
EB_DELAZ_LINE_ENDPT_X	V94H6644C	ENT BRG DELAZ LINE ENDPT X POS	ENT BRG DISP	AU	VAR		93090E	
EB_DELAZ_LINE_ENDPT_Y	V94H6645C	ENT BRG DELAZ LINE ENDPT Y POS	ENT BRG DISP	AU	VAR		93090E	
EB_DELAZ_LINE_STRT_X	V94H6642C	ENT BRG DELAZ LINE START X POS	ENT BRG DISP	AU	VAR		93090E	
EB_DELAZ_LINE_STRT_Y	V94H6643C	ENT BRG DELAZ LINE STRT Y POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_ALT_X(1)	V94U5562C	ENT BRG ALT SITE 1 X POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_ALT_X(2)	V94U5563C	ENT BRG ALT SITE 2 X POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_ALT_Y(1)	V94U5564C	ENT BRG ALT SITE 1 Y POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_ALT_Y(2)	V94U5565C	ENT BRG ALT SITE 2 Y POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_IIP_Y	V94H6640C	ENT BRG IIP Y POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RR_LINE1_L_STRT_X	V94H6646C	ENT BRG RR LINE1 LEFT START X POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RR_LINE1_L_STRT_Y	V94H6647C	ENT BRG RR LINE1 LEFT START Y POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RR_LINE1_L_X	V94H6686C	ENT BRG RR LINE1 LEFT ENDPT X POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RR_LINE1_L_Y	V94H6687C	ENT BRG RR LINE1 LEFT ENDPT Y POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RR_LINE1_R_STRT_X	V94H6648C	ENT BRG RR LINE1 RIGHT START X POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RR_LINE1_R_STRT_Y	V94H6649C	ENT BRG RR LINE1 RIGHT START Y POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RR_LINE1_R_X	V94H6688C	ENT BRG RR LINE1 RIGHT ENDPT X POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RR_LINE1_R_Y	V94H6689C	ENT BRG RR LINE1 RIGHT ENDPT Y POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RR_LINE2_L_STRT_X	V94H6408C	ENT BRG RR LINE2 LEFT START X POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RR_LINE2_L_STRT_Y	V94H6409C	ENT BRG RR LINE2 LEFT START Y POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RR_LINE2_L_X	V94H6410C	ENT BRG RR LINE2 LEFT ENDPT X POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RR_LINE2_L_Y	V94H6411C	ENT BRG RR LINE2 LEFT ENDPT Y POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RR_LINE2_R_STRT_X	V94H6412C	ENT BRG RR LINE2 RIGHT START X POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RR_LINE2_R_STRT_Y	V94H6413C	ENT BRG RR LINE2 RIGHT START Y POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RR_LINE2_R_X	V94H6414C	ENT BRG RR LINE2 RIGHT ENDPT X POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RR_LINE2_R_Y	V94H6415C	ENT BRG RR LINE2 RIGHT ENDPT Y POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RW_ENDPT_X	V94U5566C	ENT BRG SEL RW ENDPT X POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RW_ENDPT_Y	V94U5567C	ENT BRG SEL RW ENDPT Y POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RW_X	V94U5568C	ENT BRG SEL RW THRESH X POS	ENT BRG DISP	AU	VAR		93090E	
EB_POS_RW_Y	V94U5569C	ENT BRG SEL RW THRESH Y POS	ENT BRG DISP	AU	VAR		93090E	
EB_RING_DISP(1)	V94U6690C	RANGE RING 1 DISPLAY INDICATOR	ENT BRG DISP	ND	BD		93090E	
EB_RING_DISP(2)	V94U6691C	RANGE RING 2 DISPLAY INDICATOR	ENT BRG DISP	ND	BD		93090E	

TABLE B.5.27-6. OUTPUT FUNCTIONAL PARAMETERS FROM ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
EB_RING_DISP(3)	V94U6692C	RANGE RING 3 DISPLAY INDICATOR	ENT BRG DISP	ND	BD		93090E	
EB_RING_DISP(4)	V94U6693C	RANGE RING 4 DISPLAY INDICATOR	ENT BRG DISP	ND	BD		93090E	
EB_RING_DISP(5)	V94U6694C	RANGE RING 5 DISPLAY INDICATOR	ENT BRG DISP	ND	BD		93090E	
EB_RING_DISP(6)	V94U6695C	RANGE RING 6 DISPLAY INDICATOR	ENT BRG DISP	ND	BD		93090E	
EB_RING_DISP(7)	V94U6696C	RANGE RING 7 DISPLAY INDICATOR	ENT BRG DISP	ND	BD		93090E	
EB_RING_DISP(8)	V94U6697C	RANGE RING 8 DISPLAY INDICATOR	ENT BRG DISP	ND	BD		93090E	
EB_RING_DISP(9)	V94U6698C	RANGE RING 9 DISPLAY INDICATOR	ENT BRG DISP	ND	BD		93090E	
EB_RING_DISP_RADIUS(1)	V94U6699C	RANGE RING 1 DISPLAY RADIUS	ENT BRG DISP	AU	VAR		93090E	
EB_RING_DISP_RADIUS(2)	V94U6670C	RANGE RING 2 DISPLAY RADIUS	ENT BRG DISP	AU	VAR		93090E	
EB_RING_DISP_RADIUS(3)	V94U6671C	RANGE RING 3 DISPLAY RADIUS	ENT BRG DISP	AU	VAR		93090E	
EB_RING_DISP_RADIUS(4)	V94U6672C	RANGE RING 4 DISPLAY RADIUS	ENT BRG DISP	AU	VAR		93090E	
EB_RING_DISP_RADIUS(5)	V94U6673C	RANGE RING 5 DISPLAY RADIUS	ENT BRG DISP	AU	VAR		93090E	
EB_RING_DISP_RADIUS(6)	V94U6674C	RANGE RING 6 DISPLAY RADIUS	ENT BRG DISP	AU	VAR		93090E	
EB_RING_DISP_RADIUS(7)	V94U6675C	RANGE RING 7 DISPLAY RADIUS	ENT BRG DISP	AU	VAR		93090E	
EB_RING_DISP_RADIUS(8)	V94U6676C	RANGE RING 8 DISPLAY RADIUS	ENT BRG DISP	AU	VAR		93090E	
EB_RING_DISP_RADIUS(9)	V94U6677C	RANGE RING 9 DISPLAY RADIUS	ENT BRG DISP	AU	VAR		93090E	
EB_RNG_DELAZ_PROC	V94X6683X	ENT BRG RNG DELAZ PROC FLAG	ENT BRG DISP	ND	BD		93090E	
EMOH_ENER_Y_ALT(1)	V94U6505C	Y COORD ALT SITE 1 OTT DNMD EN SYM	ENT BRG DISP	AU	VAR		93090E	
EMOH_ENER_Y_ALT(2)	V94U6506C	Y COORD ALT SITE 2 OTT DNMD EN SYM	ENT BRG DISP	AU	VAR		93090E	
ENER_LL_Y_ALT(1)	V94U6507C	Y COORD ALT SITE 1 LWR ENER LMT	ENT BRG DISP	AU	VAR		93090E	
ENER_LL_Y_ALT(2)	V94U6508C	Y COORD ALT SITE 2 LWR ENER LMT	ENT BRG DISP	AU	VAR		93090E	
ENER_UL_Y_ALT(1)	V94U6509C	Y COORD ALT SITE 1 UPR ENER LMT	ENT BRG DISP	AU	VAR		93090E	
ENER_UL_Y_ALT(2)	V94U6513C	Y COORD ALT SITE 2 UPR ENER LMT	ENT BRG DISP	AU	VAR		93090E	
M_EFTORW_ALT(1)(1,1)	V90U3978C	ALT SITE 1 EF TO PRI RW MTRX 1,1	ENT UPP	ND	SPL		93167A	*
M_EFTORW_ALT(1)(1,2)	V90U3979C	ALT SITE 1 EF TO PRI RW MTRX 1,2	ENT UPP	ND	SPL		93167A	*
M_EFTORW_ALT(1)(1,3)	V90U3980C	ALT SITE 1 EF TO PRI RW MTRX 1,3	ENT UPP	ND	SPL		93167A	*
M_EFTORW_ALT(1)(2,1)	V90U3981C	ALT SITE 1 EF TO PRI RW MTRX 2,1	ENT UPP	ND	SPL		93167A	*
M_EFTORW_ALT(1)(2,2)	V90U3982C	ALT SITE 1 EF TO PRI RW MTRX 2,2	ENT UPP	ND	SPL		93167A	*
M_EFTORW_ALT(1)(2,3)	V90U3983C	ALT SITE 1 EF TO PRI RW MTRX 2,3	ENT UPP	ND	SPL		93167A	*
M_EFTORW_ALT(1)(3,1)	V90U3984C	ALT SITE 1 EF TO PRI RW MTRX 3,1	ENT UPP	ND	SPL		93167A	*
M_EFTORW_ALT(1)(3,2)	V90U3985C	ALT SITE 1 EF TO PRI RW MTRX 3,2	ENT UPP	ND	SPL		93167A	*
M_EFTORW_ALT(1)(3,3)	V90U3986C	ALT SITE 1 EF TO PRI RW MTRX 3,3	ENT UPP	ND	SPL		93167A	*
M_EFTORW_ALT(2)(1,1)	V90U3987C	ALT SITE 2 EF TO PRI RW MTRX 1,1	ENT UPP	ND	SPL		93167A	*
M_EFTORW_ALT(2)(1,2)	V90U3988C	ALT SITE 2 EF TO PRI RW MTRX 1,2	ENT UPP	ND	SPL		93167A	*
M_EFTORW_ALT(2)(1,3)	V90U3989C	ALT SITE 2 EF TO PRI RW MTRX 1,3	ENT UPP	ND	SPL		93167A	*
M_EFTORW_ALT(2)(2,1)	V90U3990C	ALT SITE 2 EF TO PRI RW MTRX 2,1	ENT UPP	ND	SPL		93167A	*
M_EFTORW_ALT(2)(2,2)	V90U3991C	ALT SITE 2 EF TO PRI RW MTRX 2,2	ENT UPP	ND	SPL		93167A	*
M_EFTORW_ALT(2)(2,3)	V90U3992C	ALT SITE 2 EF TO PRI RW MTRX 2,3	ENT UPP	ND	SPL		93167A	*
M_EFTORW_ALT(2)(3,1)	V90U3993C	ALT SITE 2 EF TO PRI RW MTRX 3,1	ENT UPP	ND	SPL		93167A	*
M_EFTORW_ALT(2)(3,2)	V90U3994C	ALT SITE 2 EF TO PRI RW MTRX 3,2	ENT UPP	ND	SPL		93167A	*
M_EFTORW_ALT(2)(3,3)	V90U3995C	ALT SITE 2 EF TO PRI RW MTRX 3,3	ENT UPP	ND	SPL		93167A	*
NOM_ENERGY_Y_ALT(1)	V94U6514C	Y COORD ALT SITE 1 NOM ENER SYM	ENT BRG DISP	AU	VAR		93090E	
NOM_ENERGY_Y_ALT(2)	V94U6515C	Y COORD ALT SITE 2 NOM ENER SYM	ENT BRG DISP	AU	VAR		93090E	
RNG_TO_RW_THRESH_ALT(1)	V94U6528C	RANGE TO ALT SITE 1 PRI RW THRESH	ENT DIP	NM	SPL		93090E	
RNG_TO_RW_THRESH_ALT(2)	V94U6529C	RANGE TO ALT SITE 2 PRI RW THRESH	ENT DIP	NM	SPL		93090E	
R_EF_ALT(1)(1)	V90H3970C	X-COMP OF ALT SITE 1 POS VECTOR	ENT UPP	FT	DPL		93167A	*

TABLE B.5.27-6. OUTPUT FUNCTIONAL PARAMETERS FROM ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
R_EF_ALT(1)(2)	V90H3971C	Y-COMP OF ALT SITE 1 POS VECTOR	ENT UPP	FT	DPL		93167A	*
R_EF_ALT(1)(3)	V90H3972C	Z-COMP OF ALT SITE 1 POS VECTOR	ENT UPP	FT	DPL		93167A	*
R_EF_ALT(2)(1)	V90H3973C	X-COMP OF ALT SITE 2 POS VECTOR	ENT UPP	FT	DPL		93167A	*
R_EF_ALT(2)(2)	V90H3974C	Y-COMP OF ALT SITE 2 POS VECTOR	ENT UPP	FT	DPL		93167A	*
R_EF_ALT(2)(3)	V90H3975C	Z-COMP OF ALT SITE 2 POS VECTOR	ENT UPP	FT	DPL		93167A	*
SHUTTLE_ENER_Y_ALT(1)	V94U6516C	Y COORD ALT SITE 1 CURR ENER SYM	ENT BRG DISP	AU	VAR		93090E	
SHUTTLE_ENER_Y_ALT(2)	V94U6517C	Y COORD ALT SITE 2 CURR ENER SYM	ENT BRG DISP	AU	VAR		93090E	
SIGNY_ALT	V95J1880C	VEH SIDE ALT SITE PRI RW CTR LINE	ENT UPP	ND	HXS		93167A	*
YSGNP_ALT(1)	V95J1881C	ALT SITE 1 R/L CONE IND PRI RW	ENT UPP	ND	HXS		93167A	*
YSGNP_ALT(2)	V95J1882C	ALT SITE 2 R/L CONE IND PRI RW	ENT UPP	ND	HXS		93167A	*

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
 (HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
CUBC1(1,1)	V97U0087C	FT	F	S	M	C	G4.204 G4.237 G5.27	00	ZFU	93090E	
CUBC1(1,2)	V97U0088C	FT	F	S	M	C	G4.204 G4.237 G5.27	00	GT1	93090E	
CUBC2(1,1)	V97U0091C	ND	F	S	M	C	G4.204 G4.237 G5.27	00	XS3	93090E	
CUBC2(1,2)	V97U0092C	ND	F	S	M	C	G4.204 G4.237 G5.27	00	GT1	93090E	
CUBC3(1,1)	V97U0095C	FT**-1	F	S	M	C	G4.204 G4.237 G5.27	00	GT1	93090E	
CUBC3(1,2)	V97U0096C	FT**-1	F	S	M	C	G4.204 G4.237 G5.27	00	GT1	93090E	
CUBC4(1,1)	V97U0099C	FT**-2	F	S	M	C	G4.204 G4.237 G5.27	00	GT1	93090E	
CUBC4(1,2)	V97U0100C	FT**-2	F	S	M	C	G4.204 G4.237 G5.27	00	GT1	93090E	
CUBRC(1)	V97U0107C	FT	F	S	M	C	G4.204 G4.237 G5.27	00	GT1	93090E	
DEL_R_EMAX(1)	V97U0115C	FT	F	S	M	C	G4.204 G4.9 G5.27	01 03	ZFU ZFU	93090E	
DHOH1	V96U8639C	ND	F	S	D	C	G4.204 G4.9 G5.27	01 03	ZFU ZFU	93090E	
DHOH2	V96U8640C	FT	F	S	D	C	G4.204 G4.9 G5.27	01 03	ZFU ZFU	93090E	
DHOH3	V96U8641C	FT	F	S	D	C	G4.204 G4.9 G5.27	01 03	ZFU ZFU	93090E	
DR4	V96U8635C	FT	F	S	D	X	G4.204 G4.9 G5.27	00	ZSU	93090E	
DRFK	V96U8663C	ND	F	S	D	X	G4.204 G4.9 G5.27	00	ZSU	93090E	
ECLRNG1	V99U6540C	FT	F	S	M	P	G4.204 G5.27	00	GEC	93090E	



TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
EDELC1	V97U0142C	ND	F	S	M	X	G4.204 G4.9 G5.27	00	ZSU	93090E	
EDELC2	V97U0143C	ND	F	S	M	X	G4.204 G4.9 G5.27	00	ZSU	93090E	
EDELNZ(1)	V97U0144C	FT	F	S	M	C	G4.204 G4.9 G5.27	01 03	ZFU ZFU	93090E	
EDRS(1,1)	V97U0147C	ND	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EDRS(1,2)	V97U0148C	ND	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EDRS(1,3)	V97U0149C	ND	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EDRS2(1)	V97U6992C	FT/FT	F	S	M	C	G4.154 G5.27	01 03	VR1 VE1	93090E	
EMEP_C1(1,1)	V97U0161C	FT	F	S	M	C	G4.204 G4.9 G5.27	01 03	GT1 GT3	93090E	
EMEP_C1(1,2)	V97U0162C	FT	F	S	M	C	G4.204 G4.9 G5.27	01 03	GT1 GT3	93090E	
EMEP_C1(1,3)	V97U0163C	FT	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EMEP_C2(1,1)	V97U0167C	ND	F	S	M	C	G4.204 G4.9 G5.27	01 03	GT1 GT3	93090E	
EMEP_C2(1,2)	V97U0168C	ND	F	S	M	C	G4.204 G4.9 G5.27	01 03	GT1 GT3	93090E	
EMEP_C2(1,3)	V97U0169C	ND	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EMEP_ECLI	V99U6547C	FT	F	S	M	P	G4.204 G5.27	00	GEC	93090E	
EMEP_ECLS	V99U6548C	ND	F	S	M	P	G4.204 G5.27	00	GEC	93090E	
EMOHC1(1,1)	V96U8688C	FT	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EMOHC1(1,2)	V96U8689C	FT	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EMOHC1(1,3)	V96U8690C	FT	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EMOHC2(1,1)	V96U8694C	ND	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EMOHC2(1,2)	V96U8695C	ND	F	S	M	C	G4.204 G5.27	00	GT1	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
EMOHC2(1,3)	V96U8696C	ND	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EMOH_ECLI	V99U6549C	FT	F	S	M	P	G4.204 G5.27	00	GEC	93090E	
EMOH_ECLS	V99U6550C	ND	F	S	M	P	G4.204 G5.27	00	GEC	93090E	
EN_C1(1,1)	V97U0173C	FT	F	S	M	C	G4.204 G4.9 G5.27	01 03	GT1 GT3	93090E	
EN_C1(1,2)	V97U0174C	FT	F	S	M	C	G4.204 G4.9 G5.27	01 03	GT1 GT3	93090E	
EN_C1(1,3)	V97U0175C	FT	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EN_C1(1,4)	V97U0176C	FT	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EN_C2(1,1)	V97U0181C	ND	F	S	M	C	G4.204 G4.9 G5.27	01 03	GT1 GT3	93090E	
EN_C2(1,2)	V97U0182C	ND	F	S	M	C	G4.204 G4.9 G5.27	01 03	GT1 GT3	93090E	
EN_C2(1,3)	V97U0183C	ND	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EN_C2(1,4)	V97U0184C	ND	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EN_ECLI	V99U6541C	FT	F	S	M	P	G4.204 G5.27	00	GEC	93090E	
EN_ECLS	V99U6542C	ND	F	S	M	P	G4.204 G5.27	00	GEC	93090E	
EOW_MP1(1)	V97U0189C	FT	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EOW_MP2(1)	V97U0191C	FT	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EOW_NP1(1)	V97U0193C	FT	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EOW_NP2(1)	V97U0195C	FT	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EOW_NP3(1)	V97U0197C	FT	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EOW_SP1(1)	V97U0201C	FT	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
EOW_SP2(1)	V97U0203C	FT	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
ES1(1,1)	V97U0220C	FT	F	S	M	C	G4.204 G5.27	00	GT1	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
ES1(1,2)	V97U0221C	FT	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
ES1(1,3)	V97U0222C	FT	F	S	M	C	G4.204 G5.27	00	GT1	93090E	
ESHFMX	V96U8643C	FT	F	S	D	X	G4.204 G4.9 G5.27	00	ZSU	93090E	
ES_C12(1)	V97U7003C	FT	F	S	M	C	G4.154 G5.27	01 03	VR1 VE1	93090E	
ES_ECLI	V99U6543C	FT	F	S	M	P	G4.204 G5.27	00	GEC	93090E	
ES_ECLS	V99U6544C	ND	F	S	M	P	G4.204 G5.27	00	GEC	93090E	
GPFI	V97U0246C	ND	F	S	D	X	G4.204 G4.9 G5.27	00	ZSU	93090E	
HDCRLM	V97U0289C	DEG	F	S	D	C	G4.204 G5.27	00	ZSU	93090E	
HSWITCH2	V97U7023C	FT	F	S	M	C	G4.154 G5.27	00	VSC	93090E	
IIP_AERO_R_FACT	V98U8582C	ND	F	S	D	P	G5.26 G5.27	01 03	IIP IIP	93168A	
IIP_AERO_T_FACT	V98U8583C	ND	F	S	D	P	G5.26 G5.27	00	IIP	93090E	
IIP_VI_MAG_HIGH	V98U8584C	FT/SEC	F	S	D	P	G5.26 G5.27	00	IIP	93090E	
IIP_VI_MAG_LOW	V98U8727C	FT/SEC	F	S	D	P	G5.26 G5.27	00	IIP	93090E	
PHAVGC	V97U0335C	DEG	F	S	D	X	G4.204 G4.220 G4.237 G4.9 G5.27	00	ZSU	93090E	
PHAVGLL	V97U0336C	DEG	F	S	D	C	G4.204 G4.220 G4.237 G4.9 G5.27	01 03	ZFU ZFU	93090E	
PHAVGS	V97U0337C	DEG	F	S	D	C	G4.204 G4.220 G4.237 G4.9 G5.27	01 03	ZFU ZFU	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
PHAVGUL	V97U0338C	DEG	F	S	D	C	G4.204 G4.220 G4.237 G4.9 G5.27	01 03	ZFU ZFU	93090E	
PSHARS	V96U8647C	DEG	F	S	D	C	G4.19 G4.20 G4.204 G4.220 G4.23 G4.237 G4.24 G4.25 G4.9 G5.27	01 03	ZFU ZFU	93090E	
PSRF	V96U8648C	DEG	F	S	D	X	G4.204 G4.9 G5.27	00	ZSU	93090E	
R1	V96U8263C	FT/DEG	F	S	D	X	G4.204 G4.220 G4.23 G4.237 G4.24 G4.25 G4.9 G5.27 G5.7	00	ZSU	93090E	
R2	V96U8264C	FT/DEG**2	F	S	D	X	G4.204 G4.220 G4.23 G4.237 G4.24 G4.25 G4.9 G5.27 G5.7	00	ZSU	93090E	
R2MAX	V96U8673C	FT	F	S	D	C	G4.204 G4.9 G5.27	01 03	ZFU ZFU	93090E	
RESELVE	V99U7680C	FT/SEC	F	S	M	C	G4.220 G4.23 G4.24 G4.25 G5.27	00	VHS	93090E	
RFMN	V96U8661C	FT	F	S	D	X	G4.204 G4.9 G5.27	00	ZSU	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RFMX	V96U8662C	FT	F	S	D	X	G4.204 G4.9 G5.27	00	ZSU	93090E	
RFO	V96U8262C	FT	F	S	D	X	G4.204 G4.220 G4.23 G4.237 G4.24 G4.25 G4.9 G5.27 G5.7	00	ZSU	93090E	
RMINST	V97U7007C	FT	F	S	M	C	G4.154 G5.27	01 03	VR1 VE1	93090E	
RMOH	V96U8672C	FT	F	S	D	X	G4.204 G4.9 G5.27	00	ZSU	93090E	
ROLLRT	V97U0391C	DEG/SEC	F	S	D	C	G4.204 G5.27	00	ZSU	93090E	
RUNWAY_ALT(1)	V98U9795C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E01	93090E	
RUNWAY_ALT(11)	V97U6574C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E06	93090E	
RUNWAY_ALT(13)	V97U6589C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E07	93090E	
RUNWAY_ALT(15)	V97U6603C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E08	93090E	
RUNWAY_ALT(17)	V97U6617C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E09	93090E	
RUNWAY_ALT(19)	V97U5684CC	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E10	93090E	
RUNWAY_ALT(21)	V97U5686CC	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E11	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RUNWAY_ALT(23)	V97U5685CB	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E12	93090E	
RUNWAY_ALT(25)	V99U7364C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E13	93090E	
RUNWAY_ALT(27)	V99U7378C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E14	93090E	
RUNWAY_ALT(29)	V99U7692C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E15	93090E	
RUNWAY_ALT(3)	V97U6563C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E02	93090E	
RUNWAY_ALT(31)	V98U8181C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E16	93090E	
RUNWAY_ALT(33)	V98U8183C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E17	93090E	
RUNWAY_ALT(35)	V98U8185C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E18	93090E	
RUNWAY_ALT(37)	V98U8187C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E19	93090E	
RUNWAY_ALT(39)	V98U8189C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E20	93090E	
RUNWAY_ALT(41)	V98U8191C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E21	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RUNWAY_ALT(43)	V98U8193C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E22	93090E	
RUNWAY_ALT(45)	V98U8195C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E23	93090E	
RUNWAY_ALT(47)	V98U8197C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E24	93090E	
RUNWAY_ALT(49)	V98U8199C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E25	93090E	
RUNWAY_ALT(5)	V97U6565C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E03	93090E	
RUNWAY_ALT(51)	V97U6536C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E26	93090E	
RUNWAY_ALT(53)	V97U6538C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E27	93090E	
RUNWAY_ALT(55)	V97U6540C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E28	93090E	
RUNWAY_ALT(57)	V97U6542C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E29	93090E	
RUNWAY_ALT(59)	V97U6544C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E30	93090E	
RUNWAY_ALT(61)	V97U7081C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E31	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RUNWAY_ALT(63)	V97U7083C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E32	93090E	
RUNWAY_ALT(65)	V97U7085C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E33	93090E	
RUNWAY_ALT(67)	V97U7087C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E34	93090E	
RUNWAY_ALT(69)	V97U7089C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E35	93090E	
RUNWAY_ALT(7)	V97U6567C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E04	93090E	
RUNWAY_ALT(71)	V97U7091C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E36	93090E	
RUNWAY_ALT(73)	V97U7093C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E37	93090E	
RUNWAY_ALT(75)	V97U7095C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E38	93090E	
RUNWAY_ALT(77)	V97U7097C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E39	93090E	
RUNWAY_ALT(79)	V97U7099C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E40	93090E	
RUNWAY_ALT(81)	V97U7235C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E41	93090E	



TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RUNWAY_ALT(83)	V97U7237C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E42	93090E	
RUNWAY_ALT(85)	V97U7239C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E43	93090E	
RUNWAY_ALT(87)	V97U7241C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E44	93090E	
RUNWAY_ALT(89)	V97U7243C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E45	93090E	
RUNWAY_ALT(9)	V97U6569C	FT	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E05	93090E	
RUNWAY_NAME(01)	V98U8767C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E01	93090E	
RUNWAY_NAME(03)	V98U8769C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E02	93090E	
RUNWAY_NAME(05)	V98U8771C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E03	93090E	
RUNWAY_NAME(07)	V98U8773C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E04	93090E	
RUNWAY_NAME(09)	V98U8775C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E05	93090E	
RUNWAY_NAME(11)	V97U6571C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E06	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RUNWAY_NAME(13)	V97U6586C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E07	93090E	
RUNWAY_NAME(15)	V97U6600C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E08	93090E	
RUNWAY_NAME(17)	V97U6614C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E09	93090E	
RUNWAY_NAME(19)	V97U5681CC	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E10	93090E	
RUNWAY_NAME(21)	V97U5683CC	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E11	93090E	
RUNWAY_NAME(23)	V97U5682CB	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E12	93090E	
RUNWAY_NAME(25)	V99U7363C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E13	93090E	
RUNWAY_NAME(27)	V99U7377C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E14	93090E	
RUNWAY_NAME(29)	V99U7691C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E15	93090E	
RUNWAY_NAME(31)	V98U8201C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E16	93090E	
RUNWAY_NAME(33)	V98U8203C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E17	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RUNWAY_NAME ( 35 )	V98U8205C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E18	93090E	
RUNWAY_NAME ( 37 )	V98U8207C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E19	93090E	
RUNWAY_NAME ( 39 )	V98U8209C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E20	93090E	
RUNWAY_NAME ( 41 )	V98U8211C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E21	93090E	
RUNWAY_NAME ( 43 )	V98U8213C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E22	93090E	
RUNWAY_NAME ( 45 )	V98U8215C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E23	93090E	
RUNWAY_NAME ( 47 )	V98U8217C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E24	93090E	
RUNWAY_NAME ( 49 )	V98U8219C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E25	93090E	
RUNWAY_NAME ( 51 )	V97U7245C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E26	93090E	
RUNWAY_NAME ( 53 )	V97U7247C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E27	93090E	
RUNWAY_NAME ( 55 )	V97U7249C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E28	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RUNWAY_NAME (57)	V97U7251C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E29	93090E	
RUNWAY_NAME (59)	V97U7253C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E30	93090E	
RUNWAY_NAME (61)	V97U7255C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E31	93090E	
RUNWAY_NAME (63)	V97U7257C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E32	93090E	
RUNWAY_NAME (65)	V97U7259C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E33	93090E	
RUNWAY_NAME (67)	V97U7261C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E34	93090E	
RUNWAY_NAME (69)	V97U7263C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E35	93090E	
RUNWAY_NAME (71)	V97U7265C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E36	93090E	
RUNWAY_NAME (73)	V97U7267C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E37	93090E	
RUNWAY_NAME (75)	V97U7269C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E38	93090E	
RUNWAY_NAME (77)	V97U7271C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E39	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RUNWAY_NAME(79)	V97U7273C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E40	93090E	
RUNWAY_NAME(81)	V97U7275C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E41	93090E	
RUNWAY_NAME(83)	V97U7277C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E42	93090E	
RUNWAY_NAME(85)	V97U7279C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E43	93090E	
RUNWAY_NAME(87)	V97U7281C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E44	93090E	
RUNWAY_NAME(89)	V97U7283C	ND	CH		D	C	G4.124 G4.238 G5.26 G5.27	00	E45	93090E	
RW_AZIMUTH(01)	V98U8794C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E01	93090E	
RW_AZIMUTH(03)	V98U8796C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E02	93090E	
RW_AZIMUTH(05)	V98U8798C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E03	93090E	
RW_AZIMUTH(07)	V98U8800C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E04	93090E	
RW_AZIMUTH(09)	V98U8802C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E05	93090E	
RW_AZIMUTH(11)	V97U6575C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E06	93090E	
RW_AZIMUTH(13)	V97U6590C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E07	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_AZIMUTH(15)	V97U6604C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E08	93090E	
RW_AZIMUTH(17)	V97U6618C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E09	93090E	
RW_AZIMUTH(19)	V97U5687CC	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E10	93090E	
RW_AZIMUTH(21)	V97U5689CC	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E11	93090E	
RW_AZIMUTH(23)	V97U5688CB	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E12	93090E	
RW_AZIMUTH(25)	V99U7367C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E13	93090E	
RW_AZIMUTH(27)	V99U7381C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E14	93090E	
RW_AZIMUTH(29)	V99U7695C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E15	93090E	
RW_AZIMUTH(31)	V98U8221C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E16	93090E	
RW_AZIMUTH(33)	V98U8223C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E17	93090E	
RW_AZIMUTH(35)	V98U8225C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E18	93090E	
RW_AZIMUTH(37)	V98U8227C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E19	93090E	
RW_AZIMUTH(39)	V98U8229C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E20	93090E	
RW_AZIMUTH(41)	V98U8231C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E21	93090E	
RW_AZIMUTH(43)	V98U8233C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E22	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_AZIMUTH(45)	V98U8235C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E23	93090E	
RW_AZIMUTH(47)	V98U8237C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E24	93090E	
RW_AZIMUTH(49)	V98U8239C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E25	93090E	
RW_AZIMUTH(51)	V97U7285C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E26	93090E	
RW_AZIMUTH(53)	V97U7287C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E27	93090E	
RW_AZIMUTH(55)	V97U7289C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E28	93090E	
RW_AZIMUTH(57)	V97U7291C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E29	93090E	
RW_AZIMUTH(59)	V97U7293C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E30	93090E	
RW_AZIMUTH(61)	V97U7295C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E31	93090E	
RW_AZIMUTH(63)	V97U7297C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E32	93090E	
RW_AZIMUTH(65)	V97U7299C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E33	93090E	
RW_AZIMUTH(67)	V97U7301C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E34	93090E	
RW_AZIMUTH(69)	V97U7303C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E35	93090E	
RW_AZIMUTH(71)	V97U7349C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E36	93090E	
RW_AZIMUTH(73)	V97U7351C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E37	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_AZIMUTH(75)	V97U7353C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E38	93090E	
RW_AZIMUTH(77)	V97U7355C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E39	93090E	
RW_AZIMUTH(79)	V97U7357C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E40	93090E	
RW_AZIMUTH(81)	V97U7359C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E41	93090E	
RW_AZIMUTH(83)	V97U7361C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E42	93090E	
RW_AZIMUTH(85)	V97U7363C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E43	93090E	
RW_AZIMUTH(87)	V97U7365C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E44	93090E	
RW_AZIMUTH(89)	V97U7367C	RAD	F	S	D	C	G4.124 G4.238 G5.27	00	E45	93090E	
RW_LAT(01)	V98U8820C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E01	93090E	
RW_LAT(03)	V98U8822C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E02	93090E	
RW_LAT(05)	V98U8824C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E03	93090E	
RW_LAT(07)	V98U8826C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E04	93090E	
RW_LAT(09)	V98U8828C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E05	93090E	



TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_LAT(11)	V97U6572C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E06	93090E	
RW_LAT(13)	V97U6587C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E07	93090E	
RW_LAT(15)	V97U6601C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E08	93090E	
RW_LAT(17)	V97U6615C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E09	93090E	
RW_LAT(19)	V97U5696CC	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E10	93090E	
RW_LAT(21)	V97U5698CC	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E11	93090E	
RW_LAT(23)	V97U5697CB	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E12	93090E	
RW_LAT(25)	V99U7365C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E13	93090E	
RW_LAT(27)	V99U7379C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E14	93090E	
RW_LAT(29)	V99U7693C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E15	93090E	
RW_LAT(31)	V98U8301C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E16	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_LAT(33)	V98U8303C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E17	93090E	
RW_LAT(35)	V98U8305C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E18	93090E	
RW_LAT(37)	V98U8307C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E19	93090E	
RW_LAT(39)	V98U8309C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E20	93090E	
RW_LAT(41)	V98U8311C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E21	93090E	
RW_LAT(43)	V98U8313C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E22	93090E	
RW_LAT(45)	V98U8315C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E23	93090E	
RW_LAT(47)	V98U8317C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E24	93090E	
RW_LAT(49)	V98U8319C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E25	93090E	
RW_LAT(51)	V97U7745C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E26	93090E	
RW_LAT(53)	V97U7747C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E27	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_LAT(55)	V97U7749C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E28	93090E	
RW_LAT(57)	V97U7751C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E29	93090E	
RW_LAT(59)	V97U7753C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E30	93090E	
RW_LAT(61)	V97U8062C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E31	93090E	
RW_LAT(63)	V97U8064C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E32	93090E	
RW_LAT(65)	V97U8066C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E33	93090E	
RW_LAT(67)	V97U8068C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E34	93090E	
RW_LAT(69)	V97U8070C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E35	93090E	
RW_LAT(71)	V97U8143C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E36	93090E	
RW_LAT(73)	V97U8145C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E37	93090E	
RW_LAT(75)	V97U8147C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E38	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_LAT(77)	V97U8149C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E39	93090E	
RW_LAT(79)	V97U8151C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E40	93090E	
RW_LAT(81)	V97U8153C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E41	93090E	
RW_LAT(83)	V97U8155C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E42	93090E	
RW_LAT(85)	V97U8157C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E43	93090E	
RW_LAT(87)	V97U8159C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E44	93090E	
RW_LAT(89)	V97U8161C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E45	93090E	
RW_LON(01)	V98U8833C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E01	93090E	
RW_LON(03)	V98U8835C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E02	93090E	
RW_LON(05)	V98U8837C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E03	93090E	
RW_LON(07)	V98U8839C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E04	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_LON(09)	V98U8841C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E05	93090E	
RW_LON(11)	V97U6573C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E06	93090E	
RW_LON(13)	V97U6588C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E07	93090E	
RW_LON(15)	V97U6602C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E08	93090E	
RW_LON(17)	V97U6616C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E09	93090E	
RW_LON(19)	V98U9243CC	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E10	93090E	
RW_LON(21)	V98U9245CC	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E11	93090E	
RW_LON(23)	V98U9244CB	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E12	93090E	
RW_LON(25)	V99U7366C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E13	93090E	
RW_LON(27)	V99U7380C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E14	93090E	
RW_LON(29)	V99U7694C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E15	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_LON(31)	V98U8341C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E16	93090E	
RW_LON(33)	V98U8343C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E17	93090E	
RW_LON(35)	V98U8345C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E18	93090E	
RW_LON(37)	V98U8347C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E19	93090E	
RW_LON(39)	V98U8349C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E20	93090E	
RW_LON(41)	V98U8351C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E21	93090E	
RW_LON(43)	V98U8353C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E22	93090E	
RW_LON(45)	V98U8355C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E23	93090E	
RW_LON(47)	V98U8357C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E24	93090E	
RW_LON(49)	V98U8359C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E25	93090E	
RW_LON(51)	V97U8587C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E26	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_LON(53)	V97U8589C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E27	93090E	
RW_LON(55)	V97U8591C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E28	93090E	
RW_LON(57)	V97U8593C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E29	93090E	
RW_LON(59)	V97U8595C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E30	93090E	
RW_LON(61)	V97U8695C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E31	93090E	
RW_LON(63)	V97U8697C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E32	93090E	
RW_LON(65)	V97U8699C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E33	93090E	
RW_LON(67)	V97U8701C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E34	93090E	
RW_LON(69)	V97U8703C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E35	93090E	
RW_LON(71)	V97U8814C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E36	93090E	
RW_LON(73)	V97U8816C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E37	93090E	

TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RW_LON(75)	V97U8818C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E38	93090E	
RW_LON(77)	V97U8820C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E39	93090E	
RW_LON(79)	V97U8822C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E40	93090E	
RW_LON(81)	V97U8824C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E41	93090E	
RW_LON(83)	V97U8826C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E42	93090E	
RW_LON(85)	V97U8828C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E43	93090E	
RW_LON(87)	V97U8830C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E44	93090E	
RW_LON(89)	V97U8832C	RAD	F	S	D	C	G4.124 G4.238 G5.26 G5.27	00	E45	93090E	
SCALE_LEN	V97U6926C	AU	F	S	D	C	G4.154 G5.27	00	ZFG	93090E	
WT_GS1	V97U0444C	SLUGS	F	S	M	C	G4.10 G4.220 G4.23 G4.24 G4.25 G4.9 G5.27	00	GLC	93090E	



TABLE B.5.27-7. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
X_AIM_PT	V97U0445C	FT	F	S	M	C	G4.10 G4.154 G4.220 G4.234 G4.237 G4.252 G5.27 G5.7	01 03	GL1 GL3	93090E	
X_HAC_HIGH_MASS	V96U8679C	FT	F	S	D	C	G4.23 G4.24 G4.25 G5.27	00	XS6	93090E	
X_HAC_LOW_MASS	V96U8678C	FT	F	S	D	C	G4.23 G4.24 G4.25 G5.27	00	XS6	93090E	
Y1	V97U0467C	RAD	F	S	D	C	G4.8 G5.27	00	ZFI	93090E	
Y3	V97U0478C	RAD	F	S	D	C	G4.8 G5.27	00	ZFI	93090E	
YMAX	V97U7016C	AU	F	S	D	C	G4.154 G5.27	00	ZFG	93090E	
YMEP	V97U7017C	AU	F	S	D	C	G4.154 G5.27	00	ZFG	93090E	
YMIN	V97U7018C	AU	F	S	D	C	G4.154 G5.27	00	ZFG	93090E	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

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TABLE B.5.27-8. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
A3_TOL	V98U9425C	00	-3.0	E-03	RAD	F	S	C G4.127 G4.144 G4.19 G4.20 G4.205 G4.23 G5.27	93090E	
RI	V96U8680C	00 01 03	+2.0	E+04	FT	F	S	C G4.20 G4.23 G5.27	93090E	
X_NB_CG X_STRUCT_BODY DIST NAV BASE CG	V97U5573C	00	+5.61360	E+01	FT	F	S	C G4.20 G4.23 G4.24 G4.25 G5.27	93090E	
Z_NB_CG Z_STRUCT_BODY DIS CG NAV BASE	V97U5580C	00	+4.0580	E+00	FT	F	S	C G4.20 G4.23 G4.24 G4.25 G5.27	93090E	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE B.5.27-9. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
DEG_PER_RAD RADIAN TO DEGREE CONVERSION FACTOR	V97U0112C	00	+5.72957795131E+01	DEG/RAD	F		S	C A6.9 G4.10 G4.126 G4.127 G4.128 G4.175 G4.20 G4.201 G4.204 G4.208 G4.21 G4.213 G4.220 G4.226 G4.227 G4.23 G4.234 G4.237 G4.24 G4.25 G4.35 G4.36 G4.5 G4.6 G4.66 G4.8 G4.9 G4.97 G5.26 G5.27 V4.10 V4.11 V4.11B V4.11C V4.9A	93090E	

TABLE B.5.27-9. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
EARTH_MU EARTH GRAVITATIONAL CONSTANT	V97U4378C	00	+1.40764487566E+16	FT**3/SEC**2	F		D C	A6.9 G4.126 G4.127 G4.13 G4.139 G4.144 G4.148 G4.15 G4.158 G4.2 G4.205 G4.209 G4.210 G4.211 G4.224 G4.236 G4.3 G4.4 G5.10 G5.24 G5.26 G5.27	93090E	
EARTH_RADIUS_EQUATOR EARTH EQUATORIAL RADIUS	V97U5324C	00	+2.09257414698E+07	FT	F		D C	A6.9 G4.126 G4.127 G4.13 G4.139 G4.144 G4.148 G4.15 G4.158 G4.19 G4.20 G4.205 G4.210 G4.211 G4.213 G4.23 G4.236 G4.238 G4.24 G4.25 G5.26 G5.27 V5.1.8	93090E	
EB_MAX_RING_RADIUS MAXIMUM DISP RING RADIUS	V94H6720C	00	511.0	AU	F		S P	G5.27	93090E	

TABLE B.5.27-9. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
EB_N_X ENT BRG ORBITER X POS	V94H6360C	00	135.0	AU	F	S	P	G5.27 G6.56	93167A	*
EB_N_Y ENT BRG ORBITER Y POS	V94H6361C	00	-242.0	AU	F	S	P	G5.27 G6.56	93167A	*
EB_PLOT_X_MAX ENT BRG PLOT MAX X DISPLAY	V94H6362C	00	484.0	AU	F	S	P	G5.27	93167A	*
EB_PLOT_X_MIN ENT BRG PLOT MIN X DISPLAY	V94H6363C	00	-136.0	AU	F	S	P	G5.27	93167A	*
EB_PLOT_Y_MAX ENT BRG PLOT MAX Y DISPLAY	V94H6364C	00	324.0	AU	F	S	P	G5.27	93167A	*
EB_PLOT_Y_MIN ENT BRG PLOT MIN Y DISPLAY	V94H6365C	00	-296.0	AU	F	S	P	G5.27	93167A	*
EB_RANGE_RING_RADIUS(1) RANGE RING 1 RADIUS	V94H6721C	00	4000.0	NMI	F	S	P	G5.27	93090E	
EB_RANGE_RING_RADIUS(2) RANGE RING 2 RADIUS	V94H6722C	00	2000.0	NMI	F	S	P	G5.27	93090E	
EB_RANGE_RING_RADIUS(3) RANGE RING 3 RADIUS	V94H6723C	00	1000.0	NMI	F	S	P	G5.27	93090E	
EB_RANGE_RING_RADIUS(4) RANGE RING 4 RADIUS	V94H6724C	00	500.0	NMI	F	S	P	G5.27	93090E	
EB_RANGE_RING_RADIUS(5) RANGE RING 5 RADIUS	V94H6725C	00	250.0	NMI	F	S	P	G5.27	93090E	
EB_RANGE_RING_RADIUS(6) RANGE RING 6 RADIUS	V94H6726C	00	125.0	NMI	F	S	P	G5.27	93090E	
EB_RANGE_RING_RADIUS(7) RANGE RING 7 RADIUS	V94H6727C	00	60.0	NMI	F	S	P	G5.27	93090E	
EB_RANGE_RING_RADIUS(8) RANGE RING 8 RADIUS	V94H6728C	00	30.0	NMI	F	S	P	G5.27	93090E	
EB_RANGE_RING_RADIUS(9) RANGE RING 9 RADIUS	V94H6729C	00	15.0	NMI	F	S	P	G5.27	93090E	
EB_RING_DISP_THRESH(1) RANGE RING 3 DISP THRESHOLD	V94H6730C	00	3400.0	NMI	F	S	P	G5.27	93090E	
EB_RING_DISP_THRESH(2) RANGE RING 4 DISP THRESHOLD	V94H6731C	00	1700.0	NMI	F	S	P	G5.27	93090E	
EB_RING_DISP_THRESH(3) RANGE RING 5 DISP THRESHOLD	V94H6732C	00	850.0	NMI	F	S	P	G5.27	93090E	
EB_RING_DISP_THRESH(4) RANGE RING 6 DISP THRESHOLD	V94H6733C	00	430.0	NMI	F	S	P	G5.27	93090E	
EB_RING_DISP_THRESH(5) RANGE RING 7 DISP THRESHOLD	V94H6734C	00	215.0	NMI	F	S	P	G5.27	93090E	
EB_RING_DISP_THRESH(6) RANGE RING 8 DISP THRESHOLD	V94H6735C	00	110.0	NMI	F	S	P	G5.27	93090E	
EB_RING_DISP_THRESH(7) RANGE RING 9 DISP THRESHOLD	V94H6736C	00	55.0	NMI	F	S	P	G5.27	93090E	
EB_RNG_FACTOR ENG BRG PLOT RANGE FACTOR	V94H6366C	00	1.3	ND	F	S	P	G5.27	93090E	

TABLE B.5.27-9. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
ELLIPT EARTH'S ELLIPTICITY CONSTANT	V97U5332C	00	+3.352329869 E-03	ND	F	D	C	A6.9 G4.126 G4.127 G4.139 G4.144 G4.148 G4.15 G4.19 G4.20 G4.205 G4.213 G4.23 G4.236 G4.237 G4.238 G4.24 G4.25 G5.26 G5.27 V5.1.8	93090E	
GO EARTH GRAV ACCEL CONSTANT	V90A7622C	00	+3.2174049 E+01	FT/SEC**2	F	S	P	A6.9 G4.10 G4.105 G4.126 G4.204 G4.208 G4.22 G4.220 G4.227 G4.234 G4.237 G4.36 G4.8 G4.9 G5.27 V4.10 V4.11 V4.11B V4.11C V4.9A G5.27	93090E	
LENGTH_RW_DISP ENT BRG RW LENGTH FOR DISPLAY	V94H6367C	00	2.4686826 E+00	NMI	F	S	P	G5.27	93090E	

TABLE B.5.27-9. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
NAUTMI_PER_FT FEET TO NAUTICAL MILES CONVERSION FACTOR	V97U5423C	00	+1.6457884	E-04	NMI/FT	F	S	C A6.9 G4.127 G4.144 G4.158 G4.19 G4.20 G4.205 G4.21 G4.210 G4.211 G4.220 G4.23 G4.237 G4.24 G4.25 G4.8 G5.27	93090E	
PI RATIO OF CIRCUMFERENCE TO DIAMETER	V98U8725C	00	+3.14159265358E+00	ND		F	D	C A6.9 G4.126 G4.127 G4.13 G4.144 G4.15 G4.158 G4.16 G4.19 G4.2 G4.20 G4.205 G4.209 G4.210 G4.213 G4.220 G4.236 G4.237 G4.3 G4.4 G4.5 G4.97 G5.10 G5.24 G5.26 G5.27	93090E	



TABLE B.5.27-9. ENTRY BEARING SPEC FUNCTION (PFS) (REF DISP 6.56) (G5.27) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
RAD_PER_DEG DEGREE TO RADIAN CONVERSION FACTOR	V97U0383C	00	+1.7453293	E-02	RAD/DEG	F	S	C A6.9 G4.1 G4.126 G4.127 G4.128 G4.144 G4.15 G4.158 G4.175 G4.20 G4.201 G4.204 G4.205 G4.209 G4.210 G4.211 G4.213 G4.220 G4.223 G4.226 G4.227 G4.236 G4.237 G4.3 G4.35 G4.36 G4.7 G4.72 G4.9 G4.97 G5.27	93090E	
RANGE_OFFSET RANGE OFFSET FROM SYMBOL	V94H5539C	00	27.0		AU	F	S	P G5.27	93167A	*
RR_LINE_FACT ROLL REVERSAL LINES RNG FACTOR	V94H6719C	00	0.55		ND	F	S	P G5.27	93090E	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

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**APPENDIX F – DEDICATED DISPLAY PROCESSING**

**F.4.103 ENTRY/LANDING ADI PROCESSING (PFS)**

The EL\_ADI\_PROC function must serve two indicators, each with independent scale select switches for attitude rates and attitude errors. The requirements for generating the outputs are discussed in the following paragraphs (see Table F.4.103.0–1 for definition of the output data). For the requirements which follow the phrase “Integer part of” or term “integer” is defined to mean “the largest integer which is algebraically less than or equal to”.

Left/Right ADI Control Word (LADIWORD1/RADIWORD1) 160 ms

This word contains 13 validity bits, one for each of the other 13 words in the left ADI message.

LADI\_C2=LADI\_C3=LADI\_C4=LADI\_C5=LADI\_C6=LADI\_C7=LADI\_C8=LADI\_C9=LADI\_C10=  
LADI\_C11=LADI\_C12=LADI\_C13=LADI\_C14 = 1

RADI\_C2=RADI\_C3=RADI\_C4=RADI\_C5=RADI\_C6=RADI\_C7=RADI\_C8=RADI\_C9=RADI\_C10=  
RADI\_C11=RADI\_C12=RADI\_C13= RADI\_14 = 1

Left/Right ADI Test Word (LADIWORD2/RADIWORD2)

This word must contain the fixed bit pattern shown in Table F.4.103.0–1.

Attitude Data

The attitude data are supplied to the instruments as the sine and cosine of the three attitude angles. The data are received at 3.125 Hz as floating–point quantities which are the appropriate sines and cosines. The data are then passed through a first–order hold (FOH) with outputs at 12.5 Hz. The generic requirements for a FOH are stated in paragraph 3.15. For the ADI, the FOH output data must be limited to the range of –1 to +1 (denoted in the equations below by LIMITED). These values must then be converted into signed 16–bit integers such that the integer +32760 corresponds to full–scale.

Left/Right ADI Roll Sine(LADIRS/RADIRS) 80 ms

LADIRS/RADIRS = 8\*Integer (4095\*(LIMITED (FOH(ROLLSINE1/ROLLSINE2))))

Left/Right ADI Roll Cosine(LADIRC/RADIRC) 80 ms

LADIRC/RADIRC = 8\*Integer (4095\*(LIMITED(FOH(ROLLCOS1/ROLLCOS2))))

Left/Right ADI Pitch Sine(LADIPS/RADIPS) 80 ms

LADIPS/RADIPS = 8\*Integer (4095\*(LIMITED(FOH(PTCHSINE1/PTCHSINE2))))

Left/Right ADI Pitch Cosine(LADIPC/RADIPC) 80 ms

LADIPC/RADIPC = 8\*Integer (4095\*(LIMITED(FOH(PTCHCOS1/PTCHCOS2))))

Left/Right ADI Yaw Sine(LADIYS/RADIYS) 80 ms

LADIYS/RADIYS = 8\*Integer (4095\*(LIMITED(FOH(YAWSINE1/YAWSINE2))))

Left/Right ADI Yaw Cosine(LADIYC/RADIYC) 80 ms

$$\text{LADIYC/RADIYC} = 8 * \text{Integer} (4095 * (\text{LIMITED}(\text{FOH}(\text{YAWCOS1}/\text{YAWCOS2}))))$$

Attitude Rate Data

Each ADI has a corresponding rate scale select switch that has three positions. Table F.4.103.0–2 defines the range of indicated values by axis for each of the three positions. The full-scale value shall be scaled by the LSB of 0.25 and passed to the MEDS FC GNC XFER for the purpose of labeling on the MEDS composite flight instrument display. Equation set 4.103.0-2 defines the appropriate values to be sent to MEDS. As shown in Table F.4.103.0–1, the rate data are output as signed 16-bit integers.

If MM = 301 or MM = 302 or MM = 303, Perform the following computations:

Left/Right ADI Roll Rate (LADIRR/RADIRR) 160 ms

If LADIRSW/RADIRSW = +1 Then

$$\text{LADIRR/RADIRR} = 8 * \text{INTEGER} ((4095/10) * \text{P\_ORB})$$

If LADIRSW/RADIRSW = 0 Then

$$\text{LADIRR/RADIRR} = 8 * \text{INTEGER} ((4095/5) * \text{P\_ORB})$$

If LADIRSW/RADIRSW = -1 Then

$$\text{LADIRR/RADIRR} = 8 * \text{INTEGER} ((4095/1) * \text{P\_ORB})$$

Left/Right ADI Pitch Rate (LADIPR/RADIPR) 160 ms

If LADIRSW/RADIRSW = +1 Then

$$\text{LADIPR/RADIPR} = 8 * \text{INTEGER} ((4095/10) * \text{Q\_ORB})$$

If LADIRSW/RADIRSW = 0 Then

$$\text{LADIPR/RADIPR} = 8 * \text{INTEGER} ((4095/5) * \text{Q\_ORB})$$

If LADIRSW/RADIRSW = -1 Then

$$\text{LADIPR/RADIPR} = 8 * \text{INTEGER} ((4095/1) * \text{Q\_ORB})$$

Left/Right ADI Yaw Rate (LADIYR/RADIYR) 160 ms

If LADIRSW/RADIRSW = +1 Then

$$\text{LADIYR/RADIYR} = 8 * \text{INTEGER} ((4095/10) * \text{R\_ORB})$$

If LADIRSW/RADIRSW = 0 Then

$$\text{LADIYR/RADIYR} = 8 * \text{INTEGER} ((4095/5) * \text{R\_ORB})$$

If LADIRSW/RADIRSW = -1 Then

$$\text{LADIYR/RADIYR} = 8 * \text{INTEGER} ((4095/1) * \text{R\_ORB})$$

If (DISPLAY\_OPTION = OFF and (MM = 305 or MM = 603)) or MM = 304 or MM = 602 Perform the following computations:

Left/Right ADI Roll Rate (LADIRR/RADIRR) 160 ms

If LADIRSW/RADIRSW = +1 Then

$$\text{LADIRR/RADIRR} = 8 * \text{INTEGER} ((4095/\text{HIGH\_RATE}) * \text{P\_STAB})$$

If LADIRSW/RADIRSW = 0 Then

$$\text{LADIRR/RADIRR} = 8 * \text{INTEGER} ((4095/\text{MED\_RATE}) * \text{P\_STAB})$$

If LADIRSW/RADIRSW = -1 Then

$$\text{LADIRR/RADIRR} = 8 * \text{INTEGER} ((4095/\text{LOW\_RATE}) * \text{P\_STAB})$$

Left/Right ADI Pitch Rate (LADIPR/RADIPR) 160 ms

If LADIRSW/RADIRSW = +1 Then

$$\text{LADIPR/RADIPR} = 8 * \text{INTEGER} ((4095/\text{HIGH\_RATE}) * \text{Q\_ORB})$$

If LADIRSW/RADIRSW = 0 Then

$$\text{LADIPR/RADIPR} = 8 * \text{INTEGER} ((4095/\text{MED\_RATE}) * \text{Q\_ORB})$$

If LADIRSW/RADIRSW = -1 Then

$$\text{LADIPR/RADIPR} = 8 * \text{INTEGER} ((4095/\text{LOW\_RATE}) * \text{Q\_ORB})$$

Left/Right ADI Yaw Rate (LADIYR/RADIYR) 160 ms

If LADIRSW/RADIRSW = +1 Then

$$\text{LADIYR/RADIYR} = 8 * \text{INTEGER} ((4095/\text{HIGH\_RATE}) * \text{R\_STAB})$$

If LADIRSW/RADIRSW = 0 Then

$$\text{LADIYR/RADIYR} = 8 * \text{INTEGER} ((4095/\text{MED\_RATE}) * \text{R\_STAB})$$

If LADIRSW/RADIRSW = -1 Then

$$\text{LADIYR/RADIYR} = 8 * \text{INTEGER} ((4095/\text{LOW\_RATE}) * \text{R\_STAB})$$

If DISPLAY\_OPTION = ON and (MM = 305 or (MM = 603 and IPHASE < 4)) Perform the following computations:

MM 305/603 Initialization (first pass only)

DO\_ADI\_TGO\_DISPLAY = ON

DISPLAY\_RATE\_MED = OFF

STOW\_MED = OFF

HAC\_TIME\_SNAPPED = OFF

ALT\_TIME\_SNAPPED = OFF

Determine Status of ADI Rate Pointers

In major modes 305 and 603, the roll rate pointer shall first display the time to HAC intercept when the ADI rate select switch is in the medium position. Once the Heading Alignment phase has begun and an I-

Loaded time delay expired, the computation of TGO\_HAC is no longer required and the roll rate pointer shall stow out of view until it displays roll rate as described below.

If IPHASE = 2 and DO\_ADI\_TGO\_DISPLAY = ON then

If HAC\_TIME\_SNAPPED = OFF  
then HAC\_TIME = T\_STATE  
HAC\_TIME\_SNAPPED = ON

If T\_STATE > HAC\_TIME + ROLL\_STOW\_DELAY\_TIME  
then DO\_ADI\_TGO\_DISPLAY = OFF

If the ADI rate select switch is in the medium position, once altitude becomes less than an I-Loaded value (H\_BLANK), the ADI roll, pitch, and yaw rate pointers shall stow out of view until an I-Loaded timer has expired. When this I-Loaded timer has expired or WOWLON = 1, then the ADI rate pointers shall display vehicle rates. For example, if the I-Loaded timer was set to zero seconds, the pointers would display vehicle rates as soon as altitude became less than H\_BLANK. For another example, if the I-Loaded timer was set to 999 seconds, the pointers would stow below an altitude of H\_BLANK and not display vehicle rates until WOWLON = 1.

If ALT\_WHEELS < H\_BLANK then

If ALT\_TIME\_SNAPPED = OFF  
then ALT\_TIME = T\_STATE  
ALT\_TIME\_SNAPPED = ON

If T\_STATE < ALT\_TIME + UNSTOW\_DELAY\_TIME  
then STOW\_MED = ON  
else DISPLAY\_RATE\_MED = ON  
STOW\_MED = OFF

If WOWLON = 1

then DISPLAY\_RATE\_MED = ON  
STOW\_MED = OFF

Left/Right MM 305/603 ADI Roll Rate (LADIRR/RADIRR) 160 ms

In major mode 305 and 603, the roll rate pointer shall display roll rate when the ADI rate select switch is in the high or low position.

If LADIRSW/RADIRSW = +1 Then

$$\text{LADIRR/RADIRR} = 8 * \text{INTEGER}((4095/\text{HIGH\_RATE\_305603}) * \text{P\_STAB})$$

If LADIRSW/RADIRSW = -1 Then

$$\text{LADIRR/RADIRR} = 8 * \text{INTEGER}((4095/\text{LOW\_RATE\_305603}) * \text{P\_STAB})$$

If LADIRSW/RADIRSW = 0 Then

In major modes 305 and 603, the roll rate pointer shall first display time to HAC intercept when the ADI rate select switch is in the medium position. The pointer shall initially be displayed in view at the left end of the scale for a right HAC or at the right end of the scale for a left HAC. Once the computed time to HAC intercept is less than full scale deflection, the pointer will begin moving to the other end of the scale (full scale deflection is I-Load dependent). For a right turn onto the HAC, the pointer shall move from the left end to the right end of the scale. For a left turn onto the HAC, the pointer shall move from the right end to the left end of the scale. The pointer moving along the scale provides an anticipatory cue for the initial bank onto the HAC.

If DO\_ADI\_TGO\_DISPLAY = ON Then

$$\text{TGO\_HAC} = \frac{(\text{RTAN-RTURN} \sqrt{\text{P2TRNC1} * \text{P2TRNC1} - 1.})}{(\text{V\_GROUNDSPEED})}$$

$$\text{LADIRR/RADIRR} = -8 * \text{INTEGER} (4095 * ((2. * \text{TGO\_HAC}/\text{TGOSC}) - 1.) * \text{YSGNP})$$

The roll rate pointer shall stow out of view if DO\_ADI\_TGO\_DISPLAY = OFF.

If DO\_ADI\_TGO\_DISPLAY = OFF Then

stow pointer out of view until DISPLAY\_RATE\_MED = ON

The roll rate pointer shall display roll rate if DISPLAY\_RATE\_MED = ON.

If DISPLAY\_RATE\_MED = ON Then

$$\text{LADIRR/RADIRR} = 8 * \text{INTEGER} ((4095/\text{MED\_RATE}) * \text{P\_STAB})$$

#### Left/Right MM 305/603 ADI Pitch Rate (LADIPR/RADIPR) 160 ms

In major mode 305 and 603, the pitch rate pointer shall display pitch rate when the ADI rate select switch is in the high or low position.

If LADIRSW/RADIRSW = +1 Then

$$\text{LADIPR/RADIPR} = 8 * \text{INTEGER}((4095/\text{HIGH\_RATE\_305603}) * \text{Q\_ORB})$$

If LADIRSW/RADIRSW = -1 Then

$$\text{LADIPR/RADIPR} = 8 * \text{INTEGER}((4095/\text{LOW\_RATE\_305603}) * \text{Q\_ORB})$$

If LADIRSW/RADIRSW = 0 Then

In major modes 305 and 603, the pitch rate pointer shall first display guidance computed altitude error when the ADI rate select switch is in the medium position. This pointer is a “fly-to” indicator. The magnitude of full scale deflection depends on the guidance phase.

If DISPLAY\_RATE\_MED = OFF and STOW\_MED = OFF Then

If TAEM GUID or GRTLS TAEM GUID is active,  
then HERR\_GUID = HERROR

If A/L GUID or GRTLS A/L GUID is active,  
then HERR\_GUID = H\_ERROR

If IPHASE = 3 or TG\_END = TRUE,  
then HERROR\_MAX = HERRSC2  
else HERROR\_MAX = HERRSC1

LADIPR/RADIPR = +8\*INTEGER((4095/HERROR\_MAX)\*HERR\_GUID)

The pitch rate pointer shall stow out of view if STOW\_MED = ON.

If STOW\_MED = ON Then  
stow pointer out of view

The pitch rate pointer shall display pitch rate if DISPLAY\_RATE\_MED = ON.

If DISPLAY\_RATE\_MED = ON Then  
LADIPR/RADIPR = 8\*INTEGER((4095/MED\_RATE)\*Q\_ORB)

Left/Right MM305/603 ADI Yaw Rate (LADIYR/RADIYR) 160 ms

In major modes 305 and 603, the yaw rate pointer shall display yaw rate when the ADI rate select switch is in the high or low position.

If LADIRSW/RADIRSW = +1 Then  
LADIYR/RADIYR = 8\*INTEGER((4095/HIGH\_RATE\_305603)\*R\_STAB)

If LADIRSW/RADIRSW = -1 Then  
LADIYR/RADIYR = 8\*INTEGER((4095/LOW\_RATE\_305603)\*R\_STAB)

If LADIRSW/RADIRSW = 0 Then

In major modes 305 and 603, the yaw rate pointer shall first display “groundtrack” error when the ADI rate select switch is in the medium position. In the S-turn or Acquisition phase, the yaw rate pointer shall display heading error. In the Heading Alignment phase, the yaw rate pointer shall display radial error. In the prefinal phase and approach and landing guidance, the yaw rate pointer shall display y position in runway coordinates. This pointer is a “fly-to” indicator. The YSGNP multiplier on RERRC and sign reversal on Y are required to provide a “fly-to” sense. The sign convention on DPSAC is such that no sign reversal is required to provide a “fly-to” indicator.

If DISPLAY\_RATE\_MED = OFF and STOW\_MED = OFF Then

If IPHASE = 0 or IPHASE = 1 Then  
LATERR = DPSAC  
LATSC = DPSACSC



If IPHASE = 2 Then  
    LATERR = RERRC YSGNP  
    LATSC = RERRCSC

If IPHASE = 3 or TG\_END = TRUE Then  
    LATERR = -Y  
    LATSC = YSC

LADIYR/RADIYR = +8\*INTEGER((4095/LATSC)\*LATERR)

The yaw rate pointer shall stow out of view if STOW\_MED = ON.

If STOW\_MED = ON Then  
    stow pointer out of view

The yaw rate pointer shall display yaw rate if DISPLAY\_RATE\_MED = ON.

If DISPLAY\_RATE\_MED = ON Then  
    LADIYR/RADIYR = 8\*INTEGER((4095/MED\_RATE)\*R\_STAB)

#### Attitude Error Data

Each ADI also has a corresponding error scale select switch that has three positions. Table F.4.103.0-3 defines the range of indicated values by axis for each of the three positions. The appropriate full scale value shall be passed to the MEDS FC GNC XFER for the purpose of labeling on the MEDS composite flight instrument display. This value shall be scaled by the LSB of 0.25. The appropriate full scale value shall be determined by equation set F.4.103.0-3. The error data are output as signed 16-bit integers (Table F.4.103.0-1).

#### Left/Right ADI Roll/Pitch Error Integrator Monitoring - 160 ms

Initialize on the first pass of E/L ADI PROC in MM304 or MM602

IPHASE_PREV	=	IPHASE
RW_ID_PREV	=	RW_ID
YSGN_PREV	=	YSGN
NEP_FB_PREV	=	NEP_FB
CSSRY_IND_PREV	=	CSSRY_IND
CSSP_IND_PREV	=	CSSP_IND
ZERO_PR_INT	=	OFF
ZERO_R_INT	=	OFF
ZERO_P_INT	=	OFF
ZERO_5_INT	=	OFF

IF MM\_CODE\_304 OR MM\_CODE\_305 OR MM\_CODE\_602 OR MM\_CODE\_603  
THEN

Determine whether to zero the input to the error integrators:

The inputs to the roll and normal acceleration error integrators shall be set to zero for TIDELAY cycles for the following conditions: upon transition into MM305 or MM603, OPS3 TAEM or

GRTL5 TAEM guidance IPHASE transition, Runway redesignation, Change from Overhead to Straight-in HAC or Straight-in to Overhead HAC, or Change from MEP to NEP HAC or NEP to MEP HAC.

IF (1ST PASS IN MM305 or MM603) OR (IPHASE  $\neq$  IPHASE\_PREV) OR  
 (RW\_ID  $\neq$  RW\_ID\_PREV) OR (YSGN  $\neq$  YSGN\_PREV) OR  
 (NEP\_FB  $\neq$  NEP\_FB\_PREV)  
 THEN set ZERO\_PR\_INT = ON for TIDELAY cycles

The input to the roll error integrator shall be set to zero for TIDELAYC cycles upon transition from AUTO to CSS mode in roll/yaw.

IF (CSSRY\_IND = 1) AND (CSSRY\_IND\_PREV = 0)  
 THEN set ZERO\_R\_INT = ON for TIDELAYC cycles

The input to the normal acceleration error integrators shall be set to zero for TIDELAYC cycles upon transition from AUTO to CSS mode in pitch.

IF (CSSP\_IND = 1) AND (CSSP\_IND\_PREV = 0)  
 THEN set ZERO\_P\_INT = ON for TIDELAYC cycles

The input to the IPHASE5 normal acceleration error integrator shall be set to zero for TIDELAY5 cycles upon transition into Nz Hold RTLS (IPHASE5).

IF (IPHASE = 5) AND (IPHASE  $\neq$  IPHASE\_PREV)  
 THEN set ZERO\_5\_INT = ON for TIDELAY5 cycles

Save previous values:

IPHASE\_PREV = IPHASE  
 RW\_ID\_PREV = RW\_ID  
 YSGN\_PREV = YSGN  
 NEP\_FB\_PREV = NEP\_FB  
 CSSRY\_IND\_PREV = CSSRY\_IND  
 CSSP\_IND\_PREV = CSSP\_IND

Left/Right ADI Roll Error (LADIRE/RADIRE) 160 ms

IF MM\_CODE\_301 OR MM\_CODE\_302 OR MM\_CODE\_303  
 THEN LADIRE/RADIRE = 8\*INTEGER (RECC1\*BODY\_ERR\_ANG(1))  
 where  
 IF LADIESW/RADIESW = +1 THEN RECC1 = 4095/10  
 IF LADIESW/RADIESW = 0 THEN RECC1 = 4095/5  
 IF LADIESW/RADIESW = -1 THEN RECC1 = 4095

IF MM\_CODE\_304  
 THEN LADIRE/RADIRE = 8\*INTEGER (RECC2\*(PHI-ROLLC(1)))  
 HUD\_ROLLERR = 0

where

IF LADIESW/RADIESW = +1 THEN RECC2 = 4095/25  
IF LADIESW/RADIESW = 0 THEN RECC2 = 4095/25  
IF LADIESW/RADIESW = -1 THEN RECC2 = 4095/10

IF MM\_CODE\_602 OR IPHASE = 0  
THEN LADIRE/RADIRE = 8\*INTEGER (RECC2\*(PHI - PHIC\_AT))  
HUD\_ROLLERR = INTEGER ((100\*(PHI-PHIC\_AT)) \* (GROLL))

where

IF LADIESW/RADIESW = +1 THEN RECC2 = 4095/25  
IF LADIESW/RADIESW = 0 THEN RECC2 = 4095/25  
IF LADIESW/RADIESW = -1 THEN RECC2 = 4095/10

IF (MM\_CODE\_305 OR MM\_CODE\_603) AND TG\_END = 0 AND IPHASE ≠ 0,  
THEN

IF CSSRY\_IND = 0  
THEN LADIRE/RADIRE = 8\*INTEGER (RECC2\*(PHI - PHIC\_AT))  
HUD\_ROLLERR = INTEGER ((100\*(PHI-PHIC\_AT)) \* (GROLL))

where

IF LADIESW/RADIESW = +1 THEN RECC2 = 4095/25  
IF LADIESW/RADIESW = 0 THEN RECC2 = 4095/25  
IF LADIESW/RADIESW = -1 THEN RECC2 = 4095/10

ELSE

When in CSS, apply an integrator to the roll error. The input to the integrator (ROLL\_IERR) is equal to the Roll angle minus TAEM Guidance commanded Roll angle. However, the input to the integrator (ROLL\_IERR) shall be set to zero for TIDELAY cycles for the following conditions: upon transition into MM305 or MM603, Iphase transition, Runway redesignation. Change from Overhead to Straight-In HAC or Straight-In to Overhead HAC, or Change from MEP to NEP HAC or NEP to MEP HAC. The input to the integrator shall be set to zero for TIDELAYC cycles upon transition from AUTO to CSS mode.

ROLL\_IERR = PHI - PHIC\_AT

IF (ZERO\_PR\_INT = ON) OR (ZERO\_R\_INT = ON)  
THEN set ROLL\_IERR = 0.0

Integrate and Limit the Positive Roll Error.

IF ROLL\_IERR ≥ RERR\_DB  
THEN RERR\_SLOPEP = (ROLL\_IERR - RERR\_DB) \* GR\_INTUP  
ELSE RERR\_SLOPEP = (ROLL\_IERR - RERR\_DB) \* GR\_INTDN

RERR\_INTP = RERR\_INTP + 0.16 \* RERR\_SLOPEP  
RERR\_INTP = MIDVAL(0, RERR\_INTP, RINT\_LIM)

Integrate and Limit the Negative Roll Error.

```
IF ROLL_IERR ≤ -RERR_DB  
    THEN RERR_SLOPEN = (ROLL_IERR + RERR_DB) * GR_INTUP  
    ELSE RERR_SLOPEN = (ROLL_IERR + RERR_DB) * GR_INTDN
```

```
RERR_INTN = RERR_INTN + 0.16 * RERR_SLOPEN  
RERR_INTN = MIDVAL(0, RERR_INTN, -RINT_LIM)
```

Sum the Integrated Roll Errors.

```
RERR_INTT = RERR_INTP + RERR_INTN
```

Determine the Total Roll Error to be Displayed.

```
RERR_TOTAL = (PHI - PHIC_AT) + RERR_INTT  
LADIRE/RADIRE = 8 * INTEGER (RECC2 * (RERR_TOTAL))  
HUD_ROLLER = INTEGER (RERR_TOTAL * 100 * GROLL)
```

where

```
IF LADIESW/RADIESW = +1 THEN RECC2 = 4095/25  
IF LADIESW/RADIESW = 0 THEN RECC2 = 4095/25  
IF LADIESW/RADIESW = -1 THEN RECC2 = 4095/10
```

```
IF TG_END = 1
```

```
    THEN LADIRE/RADIRE = 8 * INTEGER(RECC3 * (PHI - PHIC_AL))  
    HUD_ROLLERR = INTEGER ((100 * (PHI - PHIC_AL)) * (GROLL))
```

where

```
    IF WOWLON = 1  
    THEN  
        IF LADIESW/RADIESW = +1 THEN RECC3 = 4095/20  
        IF LADIESW/RADIESW = 0 THEN RECC3 = 4095/5  
        IF LADIESW/RADIESW = -1 THEN RECC3 = 4095  
    ELSE RECC3 = RECC2
```

Left/Right ADI Pitch Error (LADIPE/RADIPE) 160 ms

```
IF MM_CODE_301 OR MM_CODE_302 OR MM_CODE_303
```

```
    THEN LADIPE/RADIPE = 8*INTEGER (RECC1*BODY_ERR_ANG(2))
```

where

```
IF LADIESW/RADIESW = +1 THEN RECC1 = 4095/10  
IF LADIESW/RADIESW = 0 THEN RECC1 = 4095/5  
IF LADIESW/RADIESW = -1 THEN RECC1 = 4095
```

```
IF MM_CODE_304 OR ((MM_CODE_602 OR MM_CODE_603) AND IPHASE = 4 or 6)
    THEN LADIPE/RADIPE = 8*INTEGER (PSFE*ALFERR_FDC)
        HUD_PITCHERR = 0
        where
            IF LADIESW/RADIESW = +1 THEN PSFE = 4095/5
            IF LADIESW/RADIESW = 0 THEN PSFE = 4095/2
            IF LADIESW/RADIESW = -1 THEN PSFE = 4095
```

```
IF (MM_CODE_602 OR MM_CODE_603) AND IPHASE = 5
    THEN
```

```
    IF CSSP_IND = 0
        THEN LADIPE/RADIPE = 8 * INTEGER (PSFC*NZERRFD)
            HUD_PITCHERR = INTEGER((NZERRFD*100) * (GPITCH))
            where
                IF LADIESW/RADIES = +1 THEN PSFC = 4095/1.25
                IF LADIESW/RADIES = 0 THEN PSFC = 4095/1.25
                IF LADIESW/RADIES = -1 THEN PSFC = 4095/.5
```

```
    ELSE
```

When in CSS, apply an integrator to the normal acceleration error. The input to the integrator (NZ\_IERR) is equal to the Nz error flight director command from GRTLS AERO-JET DAP. However, the input to the integrator (NZ\_IERR) shall be set to zero for TIDELAY5 cycles upon transition into Nz Hold RTLS (IPHASE = 5) or for TIDELAYC cycles upon Transition from AUTO to CSS Mode.

```
NZ_IERR = NZERRFD
```

```
IF (ZERO_5_INT = ON) OR (ZERO_P_INT = ON)
    THEN set NZ_IERR = 0.0
```

Integrate and Limit the Positive Nz Error.

```
IF NZ_IERR ≥ PERR_DB5
    THEN NZ_SLOPEP = (NZ_IERR - PERR_DB5) * GP_INTUP5
    ELSE NZ_SLOPEP = (NZ_IERR - PERR_DB5) * GP_INTDN5
```

```
NZ_INTTP = NZ_INTTP + 0.16 * NZ_SLOPEP
NZ_INTTP = MIDVAL(0, NZ_INTTP, PINT_LIM5)
```

Integrate and Limit the Negative Nz Error.

```
IF NZ_IERR ≤ -PERR_DB5
    THEN NZ_SLOPEN = (NZ_IERR + PERR_DB5) * GP_INTUP5
    ELSE NZ_SLOPEN = (NZ_IERR + PERR_DB5) * GP_INTDN5
```

```
NZ_INTTN = NZ_INTTN + 0.16 * NZ_SLOPEN
NZ_INTTN = MIDVAL(0, NZ_INTTN, -PINT_LIM5)
```

Sum the Integrated Nz Errors.

$$NZ\_INTT = NZ\_INTP + NZ\_INTN$$

Determine the Total Nz Error to be Displayed.

$$NZERR\_TOTAL = NZERRFD + NZ\_INTT$$

$$LADIPE/RADIPE = 8 * INTEGER (PSFC * NZERR\_TOTAL)$$

$$HUD\_PITCHERR = INTEGER (NZERR\_TOTAL * 100 * GPITCH)$$

where

$$\text{IF LADIESW/RADIESW} = +1 \text{ THEN PSFC} = 4095/1.25$$

$$\text{IF LADIESW/RADIESW} = 0 \text{ THEN PSFC} = 4095/1.25$$

$$\text{IF LADIESW/RADIESW} = -1 \text{ THEN PSFC} = 4095/.5$$

IF (MM\_CODE\_305 OR MM\_CODE\_603) AND TG\_END = 0 AND IPHASE = 1, 2, or 3  
THEN

IF CSSP\_IND = 0

THEN LADIPE/RADIPE = 8\*INTEGER (PSFC\*NZERRFD)

HUD\_PITCHERR = INTEGER((NZERRFD\*100) \* (GPITCH))

where

$$\text{IF LADIESW/RADIESW} = +1 \text{ THEN PSFC} = 4095/1.25$$

$$\text{IF LADIESW/RADIESW} = 0 \text{ THEN PSFC} = 4095/1.25$$

$$\text{IF LADIESW/RADIESW} = -1 \text{ THEN PSFC} = 4095/.5$$

ELSE

When in CSS, apply an integrator to the normal acceleration error. The input to the integrator (NZ\_IERR) is equal to the Nz error flight director command from the AERO\_JET DAP or GRTL5 AERO\_JET DAP. However, the input to the integrator (NZ\_IERR) shall be set to zero for TIDELAY cycles for the following conditions: upon transition into MM305 or MM603. Iphase transition. Runway redesignation. Change from Overhead to Straight-In HAC or Stright-In to Overhead HAC, or Change from MEP to NEP HAC or NEP to MEP HAC. The input to the integrator shall be set to zero for TIDELAYC cycles upon transition from AUTO to CSS mode.

$$NZ\_IERR = NZERRFD$$

IF (ZERO\_PR\_INT = ON) OR (ZERO\_P\_INT = ON)

THEN set NZ\_IERR = 0.0

Integrate and Limit the Positive Nz Error.

IF NZ\_IERR ≥ PERR\_DB

THEN NZ\_SLOPEP = (NZ\_IERR - PERR\_DB) \* GP\_INTUP

ELSE NZ\_SLOPEP = (NZ\_IERR - PERR\_DB) \* GP\_INTDN

$$NZ\_INTP = NZ\_INTP + 0.16 * NZ\_SLOPEP$$

$$NZ\_INTP = MIDVAL(0, NZ\_INTP, PINT\_LIM)$$

Integrate and Limit the Negative Nz Error.

```
IF NZ_IERR ≤ -PERR_DB
    THEN NZ_SLOPEN = (NZ_IERR + PERR_DB) * GP_INTUP
    ELSE NZ_SLOPEN = (NZ_IERR + PERR_DB) * GP_INTDN
```

```
NZ_INTN = NZ_INTN + 0.16 * NZ_SLOPEN
NZ_INTN = MIDVAL(0, NZ_INTN, -PINT_LIM)
```

Sum the Integrated Nz Errors.

```
NZ_INTT = NZ_INTP + NZ_INTN
```

Determine the Total Nz Error to be Displayed.

```
NZERR_TOTAL = NZERRFD + NZ_INTT
LADIPE/RADIPE = 8 * INTEGER (PSFC * NZERR_TOTAL)
HUD_PITCHERR = INTEGER (NZERR_TOTAL * 100 * GPITCH)
```

where

```
IF LADIESW/RADIESW = +1 THEN PSFC = 4095/1.25
IF LADIESW/RADIESW = 0 THEN PSFC = 4095/1.25
IF LADIESW/RADIESW = -1 THEN PSFC = 4095/.5
```

```
IF (TG_END = 1 AND WOWLON = 0) OR IPHASE = 0
    THEN LADIPE/RADIPE = 8*INTEGER (PSFC*NZERRFD)
    HUD_PITCHERR = INTEGER((NZERRFD*100)*(GPITCH))
```

where

```
IF LADIESW/RADIESW = +1 THEN PSFC = 4095/1.25
IF LADIESW/RADIESW = 0 THEN PSFC = 4095/1.25
IF LADIESW/RADIESW = -1 THEN PSFC = 4095/.5
```

```
IF WOWLON = 1
    THEN LADIPE/RADIPE = 8*INTEGER(PSFD*QFFDC)
```

where

```
IF LADIESW/RADIESW = +1 THEN PSFD = 4095/10
IF LADIESW/RADIESW = 0 THEN PSFD = 4095/5
IF LADIESW/RADIESW = -1 THEN PSFD = 4095
```

Left/Right ADI Yaw Error (LADIYE/RADIYE) 160 ms

```
IF MM_CODE_301 OR MM_CODE_302 OR MM_CODE_303
    THEN LADIYE/RADIYE = 8*INTEGER (RECC1*BODY_ERR_ANG(3))
```

where

```
IF LADIESW/RADIESW = +1 THEN RECC1 = 4095/10
IF LADIESW/RADIESW = 0 THEN RECC1 = 4095/5
IF LADIESW/RADIESW = 1 THEN RECC1 = 4095
ELSE LADIYE/RADIYE = -8*INTEGER(1638*BETA_FDC)
```

Left/Right HUD HEADING

```
IF MM_CODE_602 OR MM_CODE_603 OR MM_CODE_304 OR MM_CODE_305
    THEN LEFT/RIGHT HUD_HEADING = INTEGER (PSI_HSIMV*RADTODEG*50)
```

Limiting of Rate and Error Data

Prior to the integer conversions called for in requirements statements for LADIRR, LADIPR, LADIYR, LADIRE, LADIPE, LADIYE, RADIRR, RADIPR, RADIYR, RADIRE, RADIFE, and RADIYE, the value to be converted must be limited to the range of -4096 to +4095, inclusive. For example, in the statement of LADIRR requirements, if 5 degrees per second full scale is selected, then  $((4095/5)*P\_STAB)$  must be limited to satisfy

$$-4096 \leq ((4095/5)*P\_STAB) \leq + 4095$$

If values outside the range -4096 to + 4095 occur, the nearest limit value must be used instead.

Transport Lag

The GPC transport lag (MDM read to DDU write) for each of the ADI parameters shall not exceed the values specified below:

Pitch, Roll Attitude	210ms
Yaw Attitude	350ms
Attitude Rates	210ms
Attitude Errors	210ms
Off Flags	350ms

The interfaces are shown in Tables F.4.103-5 and F.4.103-6. The K-Load constant functions are defined in Table F.4.103-8 PFS K-Loads Update B/L.



Table F.4.103.0-1. DEFINITION OF THE ADI OUTPUT DATA

Bit #	Word 1 ADI Contl Word	Word 2 Test Word	Wrd 3 Roll Sine	Word 4 Roll Cosine	Word 5 Pitch Sine	Word 6 Pitch Cosine	Wrd 7 Yaw Sine	Word 8 Yaw Cosine	Word 9 Roll Rate	Wrd 10 Pitch Rate	Word 11 Yaw Rate	Word 12 Roll Error	Word 13 Pitch Error	Word 14 Yaw Error
1	C <sub>2</sub>	0	S	S	S	S	S	S	S	S	S	S	S	S
2	C <sub>3</sub>	1	MSB	MSB	MSB	MSB	MSB	MSB	MSB	MSB	MSB	MSB	MSB	MSB
3	C <sub>4</sub>	1	┌											
4	C <sub>5</sub>	1												
5	C <sub>6</sub>	1												
6	C <sub>7</sub>	1												
7	C <sub>8</sub>	1												
8	C <sub>9</sub>	1	<	Binary–negative values in 2’s complement										
9	C <sub>10</sub>	1												
10	C <sub>11</sub>	1												
11	C <sub>12</sub>	1												
12	C <sub>13</sub>	1	└											
13	C <sub>14</sub>	1	LSB	LSB	LSB	LSB	LSB	LSB	LSB	LSB	LSB	LSB	LSB	LSB
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0

- NOTES:
1. The scale factor for Words 3 through 8 is a pure numeric with the value of the most significant bit equal to 0.5.
  2. Words 9 through 14 are scaled such that the most positive binary number corresponds to a +5 volts (nominal) output analog signal and the most negative binary number corresponds to a –5 volts (nominal) output analog signal. The scaling is a function of panel switch settings.

Table F.4.103.0-2. ADI Rate Scale Deflection - Entry/Landing			
Major Mode Switch Position	Roll Rate Full Scale Value *(Deg/Sec)	Pitch Rate Full Scale Value *(Deg/Sec)	Yaw Rate Full Scale Value *(Deg/Sec)
Major Modes 301 - 303 High Med Low	10 5 1	10 5 1	10 5 1
(Major Modes 304 or 602) or (DISPLAY_OPTION = OFF and (MM = 305 or MM = 603)) High Med Low	HIGH_RATE MED_RATE LOW_RATE	HIGH_RATE MED_RATE LOW_RATE	HIGH_RATE MED_RATE LOW_RATE
(DISPLAY_OPTION = ON and (MM = 305 or MM = 603) and IPHASE ≤ 1) High Med Low	HIGH_RATE_305603 TGOSC (sec) LOW_RATE_305603	HIGH_RATE_305603 HERRSC1 (ft) LOW_RATE_305603	HIGH_RATE_305603 DPSACSC (ft) LOW_RATE_305603
(DISPLAY_OPTION = ON and (MM = 305 or MM = 603) and IPHASE = 2) High Med Low	HIGH_RATE_305603 TGOSC (sec) LOW_RATE_305603	HIGH_RATE_305603 HERRSC1 (ft) LOW_RATE_305603	HIGH_RATE_305603 RERRCSC (ft) LOW_RATE_305603
(DISPLAY_OPTION = ON and (MM = 305 or MM = 603) and IPHASE = 3) High Med Low	HIGH_RATE_305603 N/A (needle stowed) LOW_RATE_305603	HIGH_RATE_305603 HERRSC2 (ft) LOW_RATE_305603	HIGH_RATE_305603 YSC (ft) LOW_RATE_305603
(DISPLAY_OPTION = ON and (MM = 305 or MM = 603) and TG_END = TRUE and ALT_WHEELS ≥ H_BLANK) High Med Low	HIGH_RATE_305603 N/A (needle stowed) LOW_RATE_305603	HIGH_RATE_305603 HERRSC2 (ft) LOW_RATE_305603	HIGH_RATE_305603 YSC (ft) LOW_RATE_305603

Table F.4.103.0-2. ADI Rate Scale Deflection - Entry/Landing			
Major Mode Switch Position	Roll Rate Full Scale Value *(Deg/Sec)	Pitch Rate Full Scale Value *(Deg/Sec)	Yaw Rate Full Scale Value *(Deg/Sec)
(DISPLAY_OPTION = ON and (MM = 305 or MM = 603) and TG_END = TRUE and ALT_WHEELS < H_BLANK and I-Loaded timer not expired) High Med Low	HIGH_RATE_305603 N/A (needle stowed) LOW_RATE_305603	HIGH_RATE_305603 N/A (needle stowed) LOW_RATE_305603	HIGH_RATE_305603 N/A (needle stowed) LOW_RATE_305603
(DISPLAY_OPTION = ON and (MM = 305 or MM = 603) and TG_END = TRUE and ALT_WHEELS < H_BLANK and I-Loaded timer expired) High Med Low	HIGH_RATE_305603 MED_RATE LOW_RATE_305603	HIGH_RATE_305603 MED_RATE LOW_RATE_305603	HIGH_RATE_305603 MED_RATE LOW_RATE_305603
(DISPLAY_OPTION = ON and (MM = 305 or MM = 603) and WOWLON = 1) High Med Low	MED_RATE MED_RATE MED_RATE	MED_RATE MED_RATE MED_RATE	MED_RATE MED_RATE MED_RATE
* Except where noted			

NOTE: During TAEM or A/L when WOWLON = 0, the yaw rate pointer shows heading error (DPSAC) when IPHASE = 0 or 1, radial error (RERRC) when IPHASE = 2, and y runway position (Y) when IPHASE = 3 or in A/L.  
In MM 305 and 603 when WOWLON = 0 and the ADI rate select switch is in the MED position, the rate pointers stow when ALT\_WHEELS < H\_BLANK and revert to rate information once an I-Loaded time delay has expired.  
HIGH\_RATE, MED\_RATE, LOW\_RATE, HIGH\_RATE\_305603, and LOW\_RATE\_305603 are I-Loads.  
The above checks on MM 603 assume normal that is, IPHASE < 4.

Equation Set F.4.103.0-2

MEDS\_LADIRR/RADIRR\_SCALE = INTEGER (Roll Rate Full Scale Value)  
MEDS\_LADIPR/RADIPR\_SCALE = INTEGER (Pitch Rate Full Scale Value)  
MEDS\_LADIYR/RADIYR\_SCALE = INTEGER (Yaw Rate Full Scale Value)

If Roll Rate Full Scale Value is defined by TGOSC, then set MEDS\_LH/RH\_TGOSC\_FLAG = 1 otherwise set MEDS\_LH/RH\_TGOSC\_FLAG = 0.

If Roll/Pitch/Yaw Rate needle is to be stowed, its associated MEDS SCALE term shall be set to 0.

Table F.4.103.0-3. ADI Error Scale Deflection - Entry/Landing			
Major Mode Switch Position	Roll Error Full Scale Value	Pitch Error Full Scale Value	Yaw Error Full Scale Value
Major Modes 301 - 303	Deg	Deg	Deg
High	10	10	10
Med	5	5	5
Low	1	1	1
Major Modes 304 or 602 when IPHASE = 4 or 6	Deg	Deg	Deg
High	25	5	2.5
Med	25	2	2.5
Low	10	1	2.5
Major Mode 602 when IPHASE = 5	Deg	G	Deg
High	25	1.25	2.5
Med	25	1.25	2.5
Low	10	0.5	2.5
Major Modes 305 or 603 when WOWLON = 0	Deg	G	Deg
High	25	1.25	2.5
Med	25	1.25	2.5
Low	10	0.5	2.5
WOWLON = 1	Deg	Deg/Sec	Deg
High	20	10	2.5
Med	5	5	2.5
Low	1	1	2.5

NOTE: When WOWLON = 1 (ROLLOUT), the pitch error indicator shows the pitch rate error; during TAEM or A/L, when WOWLON = 0, the pitch error indicator shows normal acceleration error.

Equation Set F.4.103.0-3

MEDS\_LADIPE/RADIPE\_SCALE = INTEGER (Pitch Error Full Scale Value/0.25)

Table F.4.103-10 E/L\_ADI\_PROC Initialization Requirements

Variable	Initialize On Transition		Initial Value
	From	To	
RERR_INTP	$\overline{(\text{MM305} + \text{MM603})} \cdot \text{CSSRY\_IND}$ $\text{IPHASE0} \cdot \text{CSSRY\_IND}$	$(\text{MM305} + \text{MM603}) \cdot \text{CSSRY\_IND}$ $\overline{\text{IPHASE0}} \cdot \text{CSSRY\_IND}$	0.0 0.0
RERR_INTN	$\overline{(\text{MM305} + \text{MM603})} \cdot \text{CSSRY\_IND}$ $\text{IPHASE0} \cdot \text{CSSRY\_IND}$	$(\text{MM305} + \text{MM603}) \cdot \text{CSSRY\_IND}$ $\overline{\text{IPHASE0}} \cdot \text{CSSRY\_IND}$	0.0 0.0
NZ_INTP	$\text{Not}[(\text{MM305} + (\text{MM603} \cdot \overline{\text{IPHASE5}})) \cdot \text{CSSP\_IND}]$ $\overline{\text{IPHASE5}} \cdot \text{CSSP\_IND}$ $\text{IPHASE0} \cdot \text{CSSP\_IND}$	$(\text{MM305} + (\text{MM603} \cdot \overline{\text{IPHASE5}})) \cdot \text{CSSP\_IND}$ $\text{IPHASE5} \cdot \text{CSSP\_IND}$ $\overline{\text{IPHASE0}} \cdot \text{CSSP\_IND}$	0.0 0.0 0.0
NZ_INTN	$\text{Not}[(\text{MM305} + (\text{MM603} \cdot \overline{\text{IPHASE5}})) \cdot \text{CSSP\_IND}]$ $\overline{\text{IPHASE5}} \cdot \text{CSSP\_IND}$ $\text{IPHASE0} \cdot \text{CSSP\_IND}$	$(\text{MM305} + (\text{MM603} \cdot \overline{\text{IPHASE5}})) \cdot \text{CSSP\_IND}$ $\text{IPHASE5} \cdot \text{CSSP\_IND}$ $\overline{\text{IPHASE0}} \cdot \text{CSSP\_IND}$	0.0 0.0 0.0

Note: All variables listed above shall be initialized to 0.0 if any of the following parameters change state during IPHASE = 1, 2, or 3 during MM305 or MM603.

- RW\_ID
- YSGNP
- NEP\_FB

**F.4.103.1 Entry/Landing ADI Processing Interface Support Functions**

Table F.4.103-5	Input Functional Parameters
Table F.4.103-6	Output Functional Parameters
Table F.4.103-7	I-Loads
Table F.4.103-8	K-Loads
Table F.4.103-9	Constants
Table F.4.103-10	Initialization Requirements

TABLE F.4.103-5. INPUT FUNCTIONAL PARAMETERS FOR ENTRY/LANDING ATTITUDE DIRECTION INDICATOR PROC (G4.103)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
ALFERR_FDC	V90H1623CA	ANGLE OF ATTACK ERROR	GRTLS DAP					
ALFERR_FDC	V90H1623CB	ANGLE OF ATTACK ERROR	AEROJET DAP	DEG				
ALT_WHEELS	V95H0165CA	ALT TO REAR WHEELS/NAV BASE(ENTRY)	RTLS UPP	FT			93017G	*
ALT_WHEELS	V95H0165CC	ALT TO REAR WHEELS/NAV BASE(ENTRY)	TAEM UPP	FT	DPL		93017G	*
ALT_WHEELS	V95H0165CD	ALT TO REAR WHEELS/NAV BASE(ENTRY)	A/L UPP	FT	DPL		93017G	*
BETAFDC	V90U1664CA	DAP SIDESLIP ANGLE	AEROJET DAP	DEG				
BETAFDC	V90U1664CB	DAP SIDESLIP ANGLE	GRTLS DAP	DEG				
BODY_ERR_ANG(1)	V90H2234CA	BODY ROLL ATTITUDE ERROR	A/E ATT PROC	DEG			89366	
BODY_ERR_ANG(2)	V90H2233CA	BODY PITCH ATTITUDE ERROR	A/E ATT PROC	DEG			89366	
BODY_ERR_ANG(3)	V90H2235CA	BODY YAW ATTITUDE ERROR	A/E ATT PROC	DEG			89366B	
CSSP_IND/CSSP_LAMP	V90X1631XA	PITCH CSS FLAG	AEROJET DAP				92354	
CSSP_IND/CSSP_LAMP	V90X1631XB	PITCH CSS FLAG	GRTLS DAP				90996G	
CSSRY_IND/CSSRY_LAMP	V90X1641XA	ROLL/YAW CSS FLAG	AEROJET DAP				92354	
CSSRY_IND/CSSRY_LAMP	V90X1641XB	ROLL/YAW CSS FLAG	GRTLS DAP				90996G	
DPSAC	V90H1111CA	HDG ERROR FROM TANGENCY WITH HAC	TAEM GUID	DEG			93017G	*
DPSAC	V90H1111CB	HDG ERROR FROM TANGENCY WITH HAC	GRTLS TAEM GUID	DEG			93017G	*
HERROR	V90H1115CA	ALTITUDE ERROR	TAEM GUID	FT			90960E	
HERROR	V90H1115CB	ALTITUDE ERROR	GRTLS TAEM GUID	FT			90960E	
H_ERROR	V90H1061CA	ALTITUDE ERROR	A/L GUID	FT			93017G	*
H_ERROR	V90H1061CB	ALTITUDE ERROR	GRTLS A/L GUID	FT			93017G	*
IPHASE	V90J1117CA	TAEM GUIDANCE PHASE INDICATOR	TAEM GUID	ND			93017G	*
IPHASE	V90J1117CB	TAEM GUIDANCE PHASE INDICATOR	GRTLS TAEM GUID	ND			93017G	*
LADIESW	V90J7520C	LH ADI ERROR SCALE SELECT SW	GN&C SW RM				90960E	
LADIRSW	V90J7507C	LH ADI RATE SCALE SELECT SW	GN&C SW RM				90960E	
MM_CODE_301/MM_301	V90X8183X	MAJOR MODE 301 FLAG	MSC				93064D	
MM_CODE_302/MM_302	V90X8624X	MAJOR MODE 302 FLAG	MSC				92355B	
MM_CODE_303/MM_303	V90X8182X	MAJOR MODE 303 FLAG	MSC				92355B	
MM_CODE_304/MM_304	V90X8161X	MAJOR MODE 304 FLAG	MSC				92355B	
MM_CODE_305/MM_305	V90X8162X	MAJOR MODE 305 FLAG	MSC				92355B	
MM_CODE_601/MM_601	V90X8194X	MAJOR MODE 601 FLAG	MSC		BD		93012D	
MM_CODE_602/MM_602	V90X8174X	MAJOR MODE 602 FLAG	MSC				92355B	
MM_CODE_603/MM_603	V90X8122X	MAJOR MODE 603 FLAG	MSC				92355B	
NEP_FB	V90X1109XA	NEP/MEP FLAG	GRTLS TAEM GUID				93017G	*
NEP_FB	V90X1109XB	NEP/MEP FLAG	TAEM GUID				93017G	*
NZERRFD	V90A1619CA	NORMAL ACCEL ERROR	GRTLS DAP	G	SPL		93017G	*
NZERRFD	V90A1619CB	NORMAL ACCEL ERROR	AEROJET DAP	G	SPL		93017G	*
PHI/PHI_TOPO	V90H2202C	BODY ROLL ATTITUDE EULER ANGLE	A/E ATT PROC	DEG	SPL		93017G	*
PHIC_AL	V90H1044CA	COMMANDERED ROLL ANGLE	A/L GUID	DEG			93017G	*
PHIC_AL	V90H1044CD	COMMANDERED ROLL ANGLE	GRTLS A/L GUID	DEG			93017G	*
PHIC_AT	V90H1044CB	COMMANDERED ROLL ANGLE	TAEM GUID	DEG			93017G	*
PHIC_AT	V90H1044CE	COMMANDERED ROLL ANGLE	GRTLS TAEM GUID	DEG			93017G	*
POSN_WRT_RW(2)/Y	V95H0221CA	CROSSRANGE DISTANCE WRT RW	RTLS UPP	FT			93017G	*
POSN_WRT_RW(2)/Y	V95H0221CC	CROSSRANGE DISTANCE WRT RW	TAEM UPP	FT			93017G	*
POSN_WRT_RW(2)/Y	V95H0221CD	CROSSRANGE DISTANCE WRT RW	A/L UPP	FT			93017G	*
PSI_HSIMV	V90H2212C	HEADING RELATIVE TO MAG NORTH	A/E ATT PROC	RAD			93090E	

TABLE F.4.103-5. INPUT FUNCTIONAL PARAMETERS FOR ENTRY/LANDING ATTITUDE DIRECTION INDICATOR PROC  
(G4.103)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
PTCHCOS(1)	V90H2222CA	LH ADI SEL EULER ANG PITCH COSINE	A/E ATT PROC					
PTCHCOS(2)	V90H2218CA	RH ADI SEL EULER ANG PITCH COSINE	A/E ATT PROC					
PTCHSINE(1)	V90H2221CA	LH ADI SEL EULER ANG PITCH SINE	A/E ATT PROC					
PTCHSINE(2)	V90H2220CA	RH ADI SEL EULER ANG PITCH SINE	A/E ATT PROC					
P_ORB	V90R5301CA	SELECTED RGA ROLL RATE	SF	DEG/S			93017G	*
P_STAB	V90R1622CA	STABILITY ROLL RATE	GRTLS DAP					
P_STAB	V90R1622CB	STABILITY ROLL RATE	AEROJET DAP	DEG/S				
QFFDC	V90R1626CA	SLAPDOWN PITCH RATE ERROR	AEROJET DAP	DEG/S			92354	
QFFDC	V90R1626CB	SLAPDOWN PITCH RATE ERROR	GRTLS DAP	DEG/S				
Q_ORB/Q	V90R5321CA	SELECTED RGA PITCH RATE	SF	DEG/S			93017G	*
RADIESW	V90J7506C	RH ADI ERROR SCALE SELECT SW	GN&C SW RM				90960E	
RADIRSW	V90J7508C	RH ADI RATE SCALE SELECT SW	GN&C SW RM				90960E	
RERRC	V90H1128CA	ROLL CMD COMP-RADIAL ERR FROM HAC	TAEM GUID	FT			90960E	
RERRC	V90H1128CB	ROLL CMD COMP-RADIAL ERR FROM HAC	GRTLS TAEM GUID	FT			90960E	
ROLLC(1)	V90H1044CC	COMMANDED ROLL ANGLE	ENT GUID	DEG			93017G	*
ROLLCOS(1)	V90H2209CA	LH ADI SEL EULER ANG ROLL COSINE	A/E ATT PROC				89490B	
ROLLCOS(2)	V90H2207CA	RH ADI SEL EULER ANG ROLL COSINE	A/E ATT PROC				89490B	
ROLLSINE(1)	V90H2208CA	LH ADI SEL EULER ANG ROLL SINE	A/E ATT PROC				89490B	
ROLLSINE(2)	V90H2206CA	RH ADI SEL EULER ANG ROLL SINE	A/E ATT PROC				89490B	
RTAN	V90H0115CA	STRT LINE DIST TO TANGENCY POINT	TAEM GUID	FT			90960E	
RTAN	V90H0115CB	STRT LINE DIST TO TANGENCY POINT	GRTLS TAEM GUID	FT			90960E	
RTURN	V90H1159CA	SPIRAL TURN RADIUS	TAEM GUID	FT			92389C	
RTURN	V90H1159CB	SPIRAL TURN RADIUS	GRTLS TAEM GUID	FT			92389C	
RW_ID_UPP/RW_ID	V95U0205CA	INDEX OF CURRENT RW USED FOR UPP	RTLS UPP				90996G	
RW_ID_UPP/RW_ID	V95U0205CB	INDEX OF CURRENT RW USED FOR UPP	TAEM UPP				90996G	
R_ORB	V90R5341CA	SELECTED RGA YAW RATE	SF	DEG/S			93017G	*
R_STAB	V90R1627CA	STABILITY YAW RATE	GRTLS DAP					
R_STAB	V90R1627CB	STABILITY YAW RATE	AEROJET DAP	DEG/S				
TG_END	V90X1108XA	TAEM GUIDANCE TERMINATION FLAG	TAEM GUID				93017G	*
TG_END	V90X1108XB	TAEM GUIDANCE TERMINATION FLAG	GRTLS TAEM GUID				92355B	
T_STATE	V95W0200CA	TIME TAG ASSOC WITH CURRENT STATE	TAEM UPP	S			93017G	*
T_STATE	V95W0200CB	TIME TAG ASSOC WITH CURRENT STATE	A/L UPP	S			93017G	*
T_STATE	V95W0200CC	TIME TAG ASSOC WITH CURRENT STATE	RTLS UPP	S			93017G	*
V_GROUNDSPEED/VH	V95L0178CA	GROUNDSPEED	RTLS UPP	FT/S			92389C	
V_GROUNDSPEED/VH	V95L0178CC	GROUNDSPEED	TAEM UPP	FT/S			92389C	
V_GROUNDSPEED/VH	V95L0178CD	GROUNDSPEED	A/L UPP	FT/S			92450C	
WOWLON_IND	V96X0050X	WEIGHT ON MAIN WHEELS INDICATOR	LANDING SOP		BD		93017G	*
YAWCOS(1)	V90H2232CA	LH ADI SEL EULER ANG YAW COSINE	A/E ATT PROC				89490B	
YAWCOS(2)	V90H2294CA	RH ADI SEL EULER ANG YAW COSINE	A/E ATT PROC				92740D	
YAWSINE(1)	V90H2231CA	LH ADI SEL EULER ANG YAW SINE	A/E ATT PROC				89490B	
YAWSINE(2)	V90H2293CA	RH ADI SEL EULER ANG YAW SINE	A/E ATT PROC				89490B	
YSGNP/YSGN	V95J0153CB	R/L CONE IND PRI RW	TAEM UPP			SPL	93017G	*
YSGNP/YSGN	V95J0153CC	R/L CONE IND PRI RW	RTLS UPP			SPL	93017G	*



TABLE F.4.103-5. INPUT FUNCTIONAL PARAMETERS FOR ENTRY/LANDING ATTITUDE DIRECTION INDICATOR PROC  
(G4.103)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
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**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.103-6. OUTPUT FUNCTIONAL PARAMETERS FROM ENTRY/LANDING ATTITUDE DIRECTION INDICATOR PROC  
(G4.103)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
HUD_HEADING	V72H4090C	HUD HEADING	HUDE1 HUDE2 TLM	DEG	HXS			
HUD_PITCHERR	V72H4099C	HUD PITCHERR	DL FMT 23/1 HUDE1 HUDE2	G	HXS		93017G	*
HUD_ROLLERR	V72H4098C	HUD ROLLERR	DL FMT 23/1 HUDE1 HUDE2	DEG	HXS		93017G	*
LADIPC	V72H0913CB	LH ADI PITCH COSINE POSITION	DDU 1				93017G	*
LADIPE	V72H0927CB	LH ADI PITCH ATTITUDE ERROR	DL FMT 23/A DDU 1				93017G	*
LADIPR	V72R0917CB	LH ADI PITCH RATE	DL FMT 23/A DDU 1	DEG/S			93017G	*
LADIPS	V72H0912CB	LH ADI PITCH SINE POSITION	DL FMT 23/A DDU 1				93017G	*
LADIRC	V72H0911CB	LH ADI ROLL COSINE POSITION	DL FMT 23/A DDU 1				93017G	*
LADIRE	V72H0925CB	LH ADI ROLL ATTITUDE ERROR	DL FMT 23/A DDU 1	DEG			93017G	*
LADIRR	V72R0916CB	LH ADI ROLL RATE	DL FMT 23/A DDU 1	DEG/S			93017G	*
LADIRS	V72H0910CB	LH ADI ROLL SINE POSITION	DL FMT 23/A DDU 1				93017G	*
LADIWORD1	V72M0895PB	LH ADI CONTROL WORD	DL FMT 23/1 DDU 1				93017G	*
LADIWORD2	V72Q0909BB	LH ADI TEST WORD	DL FMT 23/1 DDU 1 TLM					
LADIYC	V72H0915CB	LH ADI YAW COSINE POSITION	DDU 1				93017G	*
LADIYE	V72H0929CB	LH ADI YAW ATTITUDE ERROR	DL FMT 23/A DDU 1	DEG			93017G	*
LADIYR	V72R0918CB	LH ADI YAW RATE	DL FMT 23/A DDU 1	DEG/S			93017G	*
LADIYS	V72H0914CB	LH ADI YAW SINE POSITION	DL FMT 23/A DDU 1				93017G	*
LADI_C10	V72X0904BB	LH ADI PITCH RATE CONTROL	DL FMT 23/A DDU 1				93017G	*
LADI_C11	V72X0905BB	LH ADI YAW RATE CONTROL	DL FMT 23/1 DDU 1				93017G	*
LADI_C12	V72X0906BB	LH ADI ROLL ERROR CONTROL	DL FMT 23/1 DDU 1				93017G	*
LADI_C13	V72X0907BB	LH ADI PITCH ERROR CONTROL	DL FMT 23/1 DDU 1				93017G	*

TABLE F.4.103-6. OUTPUT FUNCTIONAL PARAMETERS FROM ENTRY/LANDING ATTITUDE DIRECTION INDICATOR PROC (G4.103)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
LADI_C14	V72X0908BB	LH ADI YAW ERROR CONTROL	DDU 1				93017G	*
LADI_C2	V72X0896BB	LH ADI TEST WORD CONTROL	DL FMT 23/1 DDU 1				93017G	*
LADI_C3	V72X0897BB	LH ADI ROLL SINE CONTROL	DL FMT 23/1 DDU 1				93017G	*
LADI_C4	V72X0898BB	LH ADI ROLL COSINE CONTROL	DL FMT 23/1 DDU 1				93017G	*
LADI_C5	V72X0899BB	LH ADI PITCH SINE CONTROL	DL FMT 23/1 DDU 1				93017G	*
LADI_C6	V72X0900BB	LH ADI PITCH COSINE CONTROL	DL FMT 23/1 DDU 1				93017G	*
LADI_C7	V72X0901BB	LH ADI YAW SINE CONTROL	DL FMT 23/1 DDU 1				93017G	*
LADI_C8	V72X0902BB	LH ADI YAW COSINE CONTROL	DL FMT 23/1 DDU 1				93017G	*
LADI_C9	V72X0903BB	LH ADI ROLL RATE CONTROL	DL FMT 23/1 DDU 1				93017G	*
MEDS_LADIPE_SCALE	V90H3886CB	MEDS LH ADI PITCH ATT ERROR SCALE	MEDS FC GNC XFER		HXS		92522D	
MEDS_LADIPR_SCALE	V90R3880CB	MEDS LH ADI PITCH RATE SCALE	MEDS FC GNC XFER		HXS		92522D	
MEDS_LADIRR_SCALE	V90R3881CB	MEDS LH ADI ROLL RATE SCALE	MEDS FC GNC XFER		HXS		92522D	
MEDS_LADIYR_SCALE	V90R3882CB	MEDS LH ADI YAW RATE SCALE	MEDS FC GNC XFER		HXS		92522D	
MEDS_LH_TGOSC_FLAG	V85X0800X	MEDS LH ROLL RATE COUNTER FLAG	MEDS FC GNC XFER		BD		92522D	
MEDS_RADIFE_SCALE	V90H3889CB	MEDS RH ADI PITCH ATT ERROR SCALE	MEDS FC GNC XFER		HXS		92522D	
MEDS_RADIPR_SCALE	V90R3883CB	MEDS RH ADI PITCH RATE SCALE	MEDS FC GNC XFER		HXS		92522D	
MEDS_RADIRR_SCALE	V90R3884CB	MEDS RH ADI ROLL RATE SCALE	MEDS FC GNC XFER		HXS		92522D	
MEDS_RADIYR_SCALE	V90R3885CB	MEDS RH ADI YAW RATE SCALE	MEDS FC GNC XFER		HXS		92522D	
MEDS_RH_TGOSC_FLAG	V85X0801X	MEDS RH ROLL RATE COUNTER FLAG	MEDS FC GNC XFER		BD		92522D	
RADIPC	V72H1013CB	RH ADI PITCH COSINE POSITION	DDU 2				93017G	*
RADIPE	V72H1027CB	RH ADI PITCH ATTITUDE ERROR	DL FMT 23/1 DDU 2				93017G	*
RADIPR	V72R1017CB	RH ADI PITCH RATE	DL FMT 23/1 DDU 2	DEG/S			93017G	*
RADIPS	V72H1012CB	RH ADI PITCH SINE POSITION	DL FMT 23/1 DDU 2				93017G	*
RADIRC	V72H1011CB	RH ADI ROLL COSINE POSITION	DL FMT 23/1 DDU 2				93017G	*
RADIRE	V72H1025CB	RH ADI ROLL ATTITUDE ERROR	DL FMT 23/1 DDU 2	DEG			93017G	*
RADIRR	V72R1016CB	RH ADI ROLL RATE	DL FMT 23/1 DDU 2	DEG/S			93017G	*
RADIRS	V72H1010CB	RH ADI ROLL SINE POSITION	DL FMT 23/1 DDU 2				93017G	*

TABLE F.4.103-6. OUTPUT FUNCTIONAL PARAMETERS FROM ENTRY/LANDING ATTITUDE DIRECTION INDICATOR PROC  
(G4.103)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
RADIWORD1	V72M0995PB	RH ADI CONTROL WORD	DDU 2				93017G	*
RADIWORD2	V72Q1009BB	RH ADI TEST WORD	DL FMT 23/1 DDU 2					
RADIYC	V72H1015CB	RH ADI YAW COSINE POSITION	DDU 2				93017G	*
RADIYE	V72H1029CB	RH ADI YAW ATTITUDE ERROR	DL FMT 23/1 DDU 2	DEG			93017G	*
RADIYR	V72R1018CB	RH ADI YAW RATE	DDU 2	DEG/S			93017G	*
RADIYS	V72H1014CB	RH ADI YAW SINE POSITION	DL FMT 23/1 DDU 2				93017G	*
RADI_C10	V72X1004BB	RH ADI PITCH RATE CONTROL	DDU 2				93017G	*
RADI_C11	V72X1005BB	RH ADI YAW RATE CONTROL	DL FMT 23/1 DDU 2				93017G	*
RADI_C12	V72X1006BB	RH ADI ROLL ERROR CONTROL	DL FMT 23/1 DDU 2				93017G	*
RADI_C13	V72X1007BB	RH ADI PITCH ERROR CONTROL	DDU 2				93017G	*
RADI_C14	V72X1008BB	RH ADI YAW ERROR CONTROL	DL FMT 23/1 DDU 2				93017G	*
RADI_C2	V72X0996BB	RH ADI TEST WORD CONTROL	DL FMT 23/1 DDU 2				93017G	*
RADI_C3	V72X0997BB	RH ADI ROLL SINE CONTROL	DL FMT 23/1 DDU 2				93017G	*
RADI_C4	V72X0998BB	RH ADI ROLL COSINE CONTROL	DL FMT 23/1 DDU 2				93017G	*
RADI_C5	V72X0999BB	RH ADI PITCH SINE CONTROL	DL FMT 23/1 DDU 2				93017G	*
RADI_C6	V72X1000BB	RH ADI PITCH COSINE CONTROL	DL FMT 23/1 DDU 2				93017G	*
RADI_C7	V72X1001BB	RH ADI YAW SINE CONTROL	DL FMT 23/1 DDU 2				93017G	*
RADI_C8	V72X1002BB	RH ADI YAW COSINE CONTROL	DL FMT 23/1 DDU 2				93017G	*
RADI_C9	V72X1003BB	RH ADI ROLL RATE CONTROL	DL FMT 23/1 DDU 2				93017G	*

TABLE F.4.103-6. OUTPUT FUNCTIONAL PARAMETERS FROM ENTRY/LANDING ATTITUDE DIRECTION INDICATOR PROC  
(G4.103)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
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**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

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TABLE F.4.103-7. ENTRY/LANDING ATTITUDE DIRECTION INDICATOR PROC (G4.103) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
DISPLAY_OPTION	V97U6340C	ND	D		D	C	G4.103	00	ZFG	90960E	
DPSACSC	V97U8671C	DEG	F	S	D	C	G4.103	00	ZFG	90960E	
GP_INTDN	V97U1068C	ND	F	S	D	P	G4.103	00	ADI	90996G	
GP_INTDN5	V97U1073C	ND	F	S	D	P	G4.103	00	ADI	90996G	
GP_INTUP	V97U1067C	ND	F	S	D	P	G4.103	00	ADI	90996G	
GP_INTUP5	V97U1072C	ND	F	S	D	P	G4.103	00	ADI	90996G	
GR_INTDN	V97U1064C	ND	F	S	D	P	G4.103	00	ADI	90996G	
GR_INTUP	V97U1063C	ND	F	S	D	P	G4.103	00	ADI	90996G	
HERRSC1	V97U8672C	FT	F	S	D	C	G4.103	00	ZFG	90960E	
HERRSC2	V97U8673C	FT	F	S	D	C	G4.103 G5.7	00	ZFG	90960E	
HIGH_RATE	V97U6320C	DEG/SEC	F	S	D	P	G4.103	00	ZFG	90960E	
HIGH_RATE_305603	V97U6321C	DEG/SEC	F	S	D	P	G4.103	00	ZFG	90960E	
H_BLANK	V97U6316C	FT	F	S	D	C	G4.103 G5.7	00	ZFG	90960E	
LOW_RATE	V97U6324C	DEG/SEC	F	S	D	P	G4.103	00	ZFG	90960E	
LOW_RATE_305603	V97U6325C	DEG/SEC	F	S	D	P	G4.103	00	ZFG	90960E	
MED_RATE	V97U6326C	DEG/SEC	F	S	D	C	G4.103	00	ZFG	90960E	
P2TRNC1	V97U0351C	ND	F	S	D	C	G4.103 G4.204 G4.9 G5.7	00	ZSU	90960E	
PERR_DB	V97U1066C	G	F	S	D	P	G4.103	00	ADI	90996G	
PERR_DB5	V97U1071C	G	F	S	D	P	G4.103	00	ADI	90996G	
PINT_LIM	V97U1069C	G	F	S	D	P	G4.103	00	ADI	90996G	
PINT_LIM5	V97U1074C	G	F	S	D	P	G4.103	00	ADI	90996G	
RERRCSC	V97U8674C	FT	F	S	D	C	G4.103 G5.7	00	ZFG	90960E	
RERR_DB	V97U1062C	DEG	F	S	D	P	G4.103	00	ADI	90996G	
RINT_LIM	V97U1065C	DEG	F	S	D	P	G4.103	00	ADI	90996G	
ROLL_STOW_DELAY_TIME	V97U6322C	SEC	I	S	D	C	G4.103 G5.7	00	ZFG	90960E	
TGOSC	V97U8676C	SEC	F	S	D	C	G4.103 G5.7	00	ZFG	90960E	
TIDELAY	V97U1061C	ND	I	S	D	P	G4.103	00	ADI	90996G	
TIDELAY5	V97U1070C	ND	I	S	D	P	G4.103	00	ADI	90996G	
TIDELAYC	V97U1075C	ND	I	S	D	P	G4.103	00	ADI	90996G	
UNSTOW_DELAY_TIME	V97U6323C	SEC	I	S	D	C	G4.103	00	ZFG	90960E	
YSC	V97U8675C	FT	F	S	D	C	G4.103 G5.7	00	ZFG	90960E	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE F.4.103-8. ENTRY/LANDING ATTITUDE DIRECTION INDICATOR PROC (G4.103) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
GPITCH	V99U7577C	00	+1.0	E+00 ND	F	S	P	G4.103	79967G	
GROLL	V99U7576C	00	+1.0	E-01 ND	F	S	P	G4.103	79967G	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**



TABLE F.4.103-9. ENTRY/LANDING ATTITUDE DIRECTION INDICATOR PROC (G4.103) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

#### F.4.104 HORIZONTAL SITUATION INDICATOR PROCESSING (PFS)

HSI\_PROC prepares the GPC generated data for presentation on the HSI. The GPC data are either floating-point words or flags. The output data to drive the DDU are fixed format words (Table F.4.104.0-1).

The HSI\_PROC function formats data for each of the two HSI's. It accepts parameters from Ascent UPP, RTLS UPP and A/E Processor to drive both HSI's with same data in MM101, MM102, MM103 and MM601. In MM304, MM305, MM602 and MM603, it accepts the total list of parameters from area navigation to drive each HSI independently. The following paragraphs specify the processing required for the left HSI; with appropriate substitutions, the requirements for the right HSI may be obtained. For the following requirements, the phrase "Integer part of " or term "integer" is defined to mean "the largest integer which is algebraically less than or equal to".

The parameters for HSI are generated at a rate of 1.04 Hz. The HSI output parameters are required to drive the DDU at least 3.125 times per second (once each 320 ms). Because the input signals are provided to HSI processing at a lower rate than the output signals are required, a first-order hold (FOH) must be provided to extrapolate selected input parameter values between input updates (The FOH requirements are defined in paragraph 3.15); the remaining parameters are processed at a rate of 1.04 Hz. The (FOH) must be modified for those input parameters which are displayed by circular motion: arithmetic calculations must be modulo  $2*\text{PI}$  and the direction and magnitude of the increment must be selected consistent with the performance of the HSI which minimizes the resultant indicator motion.

As an example of the latter constraint, if two successive heading inputs are  $+0.1$  radians and  $(2*\text{PI} - 0.1)$  radians, respectively, then the FOH increment shall be  $-0.05$  radians for a four step FOH, i.e.,

$$-0.05 = (\text{MOD}((2*\text{PI}-0.1)-0.1, 2*\text{PI})-2*\text{PI})/4$$

In this case, the final subtraction of  $2*\text{PI}$  is required because the result of the modulo subtraction exceeds  $\text{PI}$ .

##### Control Word (HLWORD1) 960 ms

The control word controls the acceptance of succeeding words into the DDU. Bits 1 through 9 are designated as C2 through C10, respectively. Each bit controls the acceptance of its respective word (i.e., C2 controls acceptance of Word 2, etc.) The requirements for setting bits are as follows:

LHSI\_C2 = 1

IF MM\_CODE\_101 OR MM\_CODE\_102 OR MM\_CODE\_103 OR MM\_CODE\_601

THEN LHSI\_C4 = 1

LHSI\_C8 = LHSI\_C10 = 0

IF MM\_CODE\_601

THEN LHSI\_C5 = LHSI\_C7 = 1

LHSI\_C3 = LHSI\_C6 = LHSI\_C9 = 0

ELSE LHSI\_C3 = LHSI\_C6 = LHSI\_C9 = 1

IF TAL\_ABORT DECLARED

THEN LHSI\_C5 = LHSI\_C7 = 1

ELSE LHSI\_C5 = LHSI\_C7 = 0

ELSE LHSI\_C3 = LHSI\_C4 = HDG\_FLAG\_LEFT  
LHSI\_C5 = LHSI\_C6 = LHSI\_C7 = LHSI\_C8 = BRG\_FLAG\_LEFT  
LHSI\_C9 = CDI\_FLAG\_LEFT  
LHSI\_C10 = GSI\_FLAG\_LEFT

HSI Test Word (HLWORD2)

The HSI test word tests the DAC circuitry in the DDU. The HSI test word is a constant with the bit pattern shown in Table F.4.104.0-1.

Selected Course (HLWORD3) 320 ms

IF MM\_CODE\_304 OR MM\_CODE\_305 OR MM\_CODE\_602 OR MM\_CODE\_603  
THEN HLWORD3 = 16\*INTEGER ((1024/PI) MOD (AZIMUTH\_RW  
- ANGLE\_CORR\_TNTOMAG\_RW - FOH (HEADING\_LEFT), 2\*PI))

IF MM\_CODE\_101 OR MM\_CODE\_102 OR  
(MM\_CODE\_103 AND NOT TAL\_ABORT\_DECLARED)  
THEN HLWORD3 = 16\*INTEGER (MOD( -ROLL\_SW \* (YAW\_IY - FOH(HEADING\_ATO)),  
2\*PI) \* 1024/PI)

IF (MM\_CODE\_103 AND TAL\_ABORT\_DECLARED)  
THEN HLWORD3 = 16\*INTEGER (MOD (ROLL\_SW \* (FOH (HEADING\_TAL +  
HEADING\_V\_I) - YAW\_IY), 2\*PI) \* 1024/PI)

IF MM\_CODE\_601  
THEN HLWORD3 = 0

Heading (HLWORD4) 320 ms

IF MM\_CODE\_304 OR MM\_CODE\_305 OR MM\_CODE\_602 OR MM\_CODE\_603  
THEN HLWORD4 = 16\*INTEGER (FOH (HEADING\_LEFT) \* 1024/PI)

IF MM\_CODE\_101 OR MM\_CODE\_102 OR MM\_CODE\_103  
THEN HLWORD4 = 16\*INTEGER (MOD(YAW\_IY, 2\*PI) \* 1024/PI)

IF MM\_CODE\_601  
THEN HLWORD4 = 16\*INTEGER (MOD(PSI\_HSIMV, 2\*PI) \* 1024/PI)

Primary Bearing (HLWORD5) 320 ms

IF MM\_CODE\_304 OR MM\_CODE\_305 OR MM\_CODE\_602 OR MM\_CODE\_603  
THEN MOD (PRIBEAR\_LEFT - HEADING\_LEFT, 2\*PI) = INPUT FOH  
HLWORD5 = 16\*INTEGER (FOH (PRIBEAR\_LEFT) \* 1024/2\*PI)

IF MM\_CODE\_101 OR MM\_CODE\_102 OR (MM\_CODE\_103 AND NOT  
TAL\_ABORT\_DECLARED)  
THEN HLWORD5 = 16384

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IF MM\_CODE\_ 601 OR (MM\_CODE\_103 AND TAL\_ABORT\_DECLARED)  
THEN MOD ((ROLL\_SW \* (HEADING\_RW – YAW\_IY)), 2\*PI)  
HLWORD5 = 16\*INTEGER (FOH (HEADING\_RW) \* 1024/PI)

Secondary Bearing (HLWORD6) 320 ms

IF MM\_CODE\_ 304 OR MM\_CODE\_ 305 OR MM\_CODE\_ 602 OR MM\_CODE\_ 603  
THEN MOD (SECBEAR\_LEFT – HEADING\_LEFT, 2\*PI) = INPUT FOH  
HLWORD6 = 16\*INTEGER (FOH (SECBEAR\_LEFT) \* 1024/PI)

IF MM\_CODE\_101 OR MM\_CODE\_102 OR MM\_CODE\_103  
THEN MOD (ROLL\_SW \* (HEADING\_V\_I – YAW\_IY), 2\*PI) = INPUT FOH  
HLWORD6 = 16\* INTEGER (FOH (HEADING\_V\_I) \* 1024/PI)

If MM\_CODE\_601  
THEN HLWORD 6 = 16384

Primary/Secondary Distance (HLWORD7/HLWORD8) 960 ms

IF MM\_CODE\_ 304 OR MM\_CODE\_ 305 OR MM\_CODE\_ 602 OR MM\_CODE\_ 603  
THEN PRIRANGE\_LEFT/SECRANGE\_LEFT = BCD (BINARY CODED DECIMAL) as follows:

Bit 1	= 0		
Bit 2	= represents	2000	NM (NAUTICAL MILE)
Bit 3	= represents	1000	NM
Bit 4	= represents	800	NM
Bit 5	= represents	400	NM
Bit 6	= represents	200	NM
Bit 7	= represents	100	NM
Bit 8	= represents	80	NM
Bit 9	= represents	40	NM
Bit 10	= represents	20	NM
Bit 11	= represents	10	NM
Bit 12	= represents	8	NM
Bit 13	= represents	4	NM
Bit 14	= represents	2	NM
Bit 15	= represents	1	NM
Bit 16	= 0		

Note: Given the preceding bit arrangement, the BCD standard can only support a maximum distance of 3999 NM.

IF MM\_CODE\_ 304 OR MM\_CODE\_ 602 OR V\_GROUNDSPEED > 6000 fps  
THEN BITS 12 THRU 15 = 0

IF (MM\_CODE\_ 103 AND TAL\_ABORT\_DECLARED) OR MM\_CODE\_ 601  
THEN PW\_RANGE = BCD per PRIRANGE

IF MM\_CODE\_101 OR MM\_CODE\_102 OR (MM\_CODE\_103 AND  
NOT TAL\_ABORT\_DECLARED)  
THEN HLWORD7 NOT PROCESSED

IF MM\_CODE\_101 OR MM\_CODE\_102 OR MM\_CODE\_103 OR MM\_CODE\_601  
THEN HLWORD8 NOT PROCESSED

Course Deviation (HLWORD9) 320 ms

IF MM\_CODE\_304 OR MM\_CODE\_305 OR MM\_CODE\_602 OR MM\_CODE\_603  
THEN HLWORD9 = 64\*INTEGER (FOH (CDI\_LEFT) \* 24576/PI)

where the above term must be limited to the range -512 to +511 prior to the integer conversion. Scaling is based on 1.25 degrees per dot (1 volt) in AUTOLAND mode, and 5 degrees per dot in TAEM mode.

NOTE: AREA NAV scales the input to the HSI so that the full scale deflection is 10 degrees in TAEM and 2.5 degrees in AUTOLAND. Full scale on the HSI panel display represents 2/3 full range of the input signal (i.e. 15 degrees in TAEM and 3.75 degrees in AUTOLAND).

IF MM\_CODE\_101 OR MM\_CODE\_102 OR MM\_CODE\_103  
THEN HLWORD9 = 64\*INTEGER (ROLL\_SW \* FOH (XTRK\_CDI) \* 512/1.5/CDI\_SCALE)

where the above term must be limited to the range -512 to +511 prior to the integer conversion. Scaling is based on 1/2 CDI\_SCALE per dot (1 volt).

IF MM\_CODE\_601  
THEN HLWORD9 = 0

Glide Slope Deviation (HLWORD10) 320 ms

IF MM\_CODE\_304 OR MM\_CODE\_305 OR MM\_CODE\_602 OR MM\_CODE\_603  
THEN HLWORD10 = 64\*INTEGER FOH (GSI\_LEFT \* (256/750))

Where the above term must be limited to the range -512 to +511 prior to the integer conversion. Scaling is based on 500 feet per dot (1 volt) in AUTOLAND mode, and 2500 feet per dot in TAEM mode.

NOTE: AREA NAV scales the input to the HSI so that the full scale deflection is 5000 feet in TAEM and 1000 feet in AUTOLAND. Full scale on the HSI panel display represents 2/3 full range of the input signal (i.e. 7500 feet in TAEM and 1500 feet in AUTOLAND).

IF MM\_CODE\_101 or MM\_CODE\_102 or MM\_CODE\_103 or MM\_CODE\_601  
THEN NOT PROCESSED

MEDS Data Transfer

For all phases of nominal powered flight prior to MET\_HEAT and below ALT\_HEAT, or if MM\_CODE\_601 = ON then calculate the direction of the relative velocity vector for display. Additionally, set a MEDS data validity flag to true. For all other cases these parameters will be zero.

MET = CLOCKTIME - T\_GMTLO

MEDS\_BETAHVR\_VALID = 0

IF ((MM\_CODE\_102 OR MM\_CODE\_103) AND  
(MET < MET\_HEAT AND ALT < ALT\_HEAT))  
OR MM\_CODE\_601

```

THEN MEDS_H_VR = 16*INTEGER (MOD (ROLL_SW * (FOH (HEADING_V_REL) –
      YAW_IY), 2*PI) * (1024/PI))
MEDS_BETAHVR_VALID = 1
ELSE
MEDS_H_VR = 0
    
```

Initialization

```

CDI_SCALE = 50
    
```

Table F.4.104.0-1. DEFINITION OF THE HSI OUTPUT DATA										
Bit No.	Contl Word Wrd 1	HSI Word Wrd 2	Selctd Course Wrd 3	Hdng Wrd 4	Prim. Brng. Wrd 5	Sec. Brng. Wrd 6	Prim. Dist. Wrd 7	Sec. Dist. Wrd 8	Course Dev. Wrd 9	Glide Slope Deviation Word 10
1	C <sub>2</sub>	0	0	0	0	0	0		S	S
2	C <sub>3</sub>	1	MSB	MSB	MSB	MSB	2000	2000	MSB	MSB
3	C <sub>4</sub>	1					1000	1000	Binary negative values in 2's complement	
4	C <sub>5</sub>	1					800	800		
5	C <sub>6</sub>	1	B	B	B	B	400	400		
6	C <sub>7</sub>	1	i	i	i	i	200	200		
7	C <sub>8</sub>	1	n	n	n	n	100	100		
			a	a	a	a				
			r	r	r	r				
			y	y	y	y				
8	C <sub>9</sub>	1	v	v	v	v	80	80		
9	C <sub>10</sub>	1	a	a	a	a	40	40		
			l	l	l	l				
			u	u	u	u				
10	0	1	e	e	e	e	20	20	LSB	LSB
			s	s	s	s				
11	0	0					10	10	0	0
12	0	0	LSB	LSB	LSB	LSB	8	8	0	0
13	0	0	0	0	0	0	4	4	0	0
14	0	0	0	0	0	0	2	2	0	0
15	0	0	0	0	0	0	1	1	0	0
16	0	0	0	0	0	0	0	0	0	0

Table F.4.104.0-1. DEFINITION OF THE HSI OUTPUT DATA										
Bit No.	Contl Word Wrd 1	HSI Word Wrd 2	Selctd Course Wrd 3	Hdng Wrd 4	Prim. Brng. Wrd 5	Sec. Brng. Wrd 6	Prim. Dist. Wrd 7	Sec. Dist. Wrd 8	Course Dev. Wrd 9	Glide Slope Deviation Word 10
<p>NOTES:</p> <ol style="list-style-type: none"> <li>Words 5 and 6 indicate bearing with the weighting factor of the MSB equal to 180 degrees.</li> <li>Words 9 and 10 will be scaled such that the most positive binary number corresponds to a +3 volt (nominal) output analog signal and the most negative binary number corresponds to a -3 volt (nominal) output analog signal.</li> <li>Words 3 and 4 will have a MSB weighting factor of 180 degrees.</li> <li>Bearing, heading, and selected course data Words 3, 4, 5, and 6 will be referenced to HSI frame (i.e., the heading data word will be a binary word whose value corresponds to the vehicle heading and will be used to position the HSI compass card. The bearing and course data words will have a value equal to their true values corrected to HSI frame reference to make their pointers read with respect to the compass card calibration).</li> </ol>										

#### F.4.104.1 Horizontal Situation Indicator Interface Support Functions

Table F.4.104-5 Input Functional Parameters

Table F.4.104-6 Output Functional Parameters

Table F.4.104-7 I-Loads

Table F.4.104-8 K-Loads

Table F.4.104-9 Constants

TABLE F.4.104-5. INPUT FUNCTIONAL PARAMETERS FOR HORIZONTAL SITUATION INDICATOR PROCESSING (G4.104)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
ALT	V95H0175CB	CURR ORB ALT ABOVE REF ELLIPSOID	ASC UPP	FT			93017G	*
ANGLE_CORR_TNTOMAG_RW	V90H1820CA	MAGNETIC VARIATION OF RW	ENT SITE LOOKUP	RAD			92297B	
ANGLE_CORR_TNTOMAG_RW	V90H1820CB	MAGNETIC VARIATION OF RW	ASC SITE LOOKUP	RAD			92297B	
AZIMUTH_RW	V90H1817CA	AZIMUTH OF RW FROM TRUE NORTH	ENT SITE LOOKUP	RAD			93090E	
AZIMUTH_RW	V90H1817CB	AZIMUTH OF RW FROM TRUE NORTH	ASC SITE LOOKUP	RAD				
BRG_FLAG_LEFT	V90X0970XA	LH BEARING DATA - VALID FLAG	ENT AREA NAV					
BRG_FLAG_LEFT	V90X0970XB	LH BEARING DATA - VALID FLAG	ASC AREA NAV					
BRG_FLAG_RIGHT	V90X0971XA	RH BEARING DATA - VALID FLAG	ENT AREA NAV					
BRG_FLAG_RIGHT	V90X0971XB	RH BEARING DATA - VALID FLAG	ASC AREA NAV					
CDI_FLAG_LEFT	V90X0966XA	LH COURSE DEVIATION - VALID FLAG	ENT AREA NAV					
CDI_FLAG_LEFT	V90X0966XB	LH COURSE DEVIATION - VALID FLAG	ASC AREA NAV					
CDI_FLAG_RIGHT	V90X0967XA	RH COURSE DEVIATION - VALID FLAG	ENT AREA NAV					
CDI_FLAG_RIGHT	V90X0967XB	RH COURSE DEVIATION - VALID FLAG	ASC AREA NAV					
CDI_LEFT	V90H0958CA	LH COURSE DEVIATION	ENT AREA NAV	DEG				
CDI_LEFT	V90H0958CB	LH COURSE DEVIATION	ASC AREA NAV	DEG				
CDI_RIGHT	V90H0959CA	RH COURSE DEVIATION	ENT AREA NAV	DEG				
CDI_RIGHT	V90H0959CB	RH COURSE DEVIATION	ASC AREA NAV	DEG				
CDI_SCALE	V90H3893C	COURSE DEVIATION INDICATOR SCALE	ASC UPP	NM			92522D	
CLOCK/CLOCKTIME	V91W5000C	CLOCK-COMPUTER(GMT)	FCOS	S			93160B	*
GSI_FLAG_LEFT	V90X0972XA	LH GLIDESLOPE DEV DATA VALID FLAG	ENT AREA NAV					
GSI_FLAG_LEFT	V90X0972XB	LH GLIDESLOPE DEV DATA VALID FLAG	ASC AREA NAV					
GSI_FLAG_RIGHT	V90X0973XA	RH GLIDESLOPE DEV DATA VALID FLAG	ENT AREA NAV					
GSI_FLAG_RIGHT	V90X0973XB	RH GLIDESLOPE DEV DATA VALID FLAG	ASC AREA NAV					
GSI_LEFT	V90H0960CA	LH GLIDESLOPE DEVIATION	ENT AREA NAV	FT				
GSI_LEFT	V90H0960CB	LH GLIDESLOPE DEVIATION	ASC AREA NAV	FT				
GSI_RIGHT	V90H0961CA	RH GLIDESLOPE DEVIATION	ENT AREA NAV	FT				
GSI_RIGHT	V90H0961CB	RH GLIDESLOPE DEVIATION	ASC AREA NAV	FT				
HDG_FLAG_LEFT	V90X0968XA	LH HEADING DATA - VALID FLAG	ENT AREA NAV					
HDG_FLAG_LEFT	V90X0968XB	LH HEADING DATA - VALID FLAG	ASC AREA NAV					
HDG_FLAG_RIGHT	V90X0969XA	RH HEADING DATA - VALID FLAG	ENT AREA NAV					
HDG_FLAG_RIGHT	V90X0969XB	RH HEADING DATA - VALID FLAG	ASC AREA NAV					
HEADING_ATO	V90H3906C	ATO TARGET HEADING WRT TIO	ASC UPP				92522D	
HEADING_LEFT	V90H0878CA	LH MAG HEADING OF REL VEL VECTOR	ENT AREA NAV	DEG				
HEADING_LEFT	V90H0878CB	LH MAG HEADING OF REL VEL VECTOR	ASC AREA NAV	DEG				
HEADING_RIGHT	V90H0953CA	RH MAG HEADING OF REL VEL VECTOR	ENT AREA NAV	DEG				
HEADING_RIGHT	V90H0953CB	RH MAG HEADING OF REL VEL VECTOR	ASC AREA NAV	DEG				
HEADING_RW	V95H0461CA	BEAR VEH TO RW WRT ORB PL	ASC UPP	RAD				
HEADING_RW	V95H0461CB	BEAR VEH TO RW WRT ORB PL	RTLS UPP	RAD				
HEADING_TAL	V90H3898C	HEADING WRT TAL TARGET	ASC UPP	NM			92522D	
HEADING_V_I	V95H0515CA	ANG BETWN INER VEL AND ORB PL	ASC UPP	RAD				
HEADING_V_I	V95H0515CB	ANG BETWN INER VEL AND ORB PL	RTLS UPP	RAD				
HEADING_V_REL	V95H0516CA	ANG BETWN REL VEL AND ORB PL	ASC UPP	RAD				
HEADING_V_REL	V95H0516CB	ANG BETWN REL VEL AND ORB PL	RTLS UPP	RAD				
MM_CODE_101/MM_101	V90X8155X	MAJOR MODE 101 FLAG	MSC				93012D	
MM_CODE_103/MM_103	V90X8156X	MAJOR MODE 103 FLAG	MSC				93012D	
MM_CODE_304/MM_304	V90X8161X	MAJOR MODE 304 FLAG	MSC				92355B	



TABLE F.4.104-5. INPUT FUNCTIONAL PARAMETERS FOR HORIZONTAL SITUATION INDICATOR PROCESSING (G4.104)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
MM_CODE_305/MM_305	V90X8162X	MAJOR MODE 305 FLAG	MSC				92355B	
MM_CODE_601/MM_601	V90X8194X	MAJOR MODE 601 FLAG	MSC		BD		93012D	
MM_CODE_602/MM_602	V90X8174X	MAJOR MODE 602 FLAG	MSC				92355B	
MM_CODE_603/MM_603	V90X8122X	MAJOR MODE 603 FLAG	MSC				92355B	
PRIBEAR_LEFT	V90H0954CA	LH PRIMARY BEARING	ENT AREA NAV	DEG				
PRIBEAR_LEFT	V90H0954CB	LH PRIMARY BEARING	ASC AREA NAV	DEG				
PRIBEAR_RIGHT	V90H0955CA	RH PRIMARY BEARING	ENT AREA NAV	DEG				
PRIBEAR_RIGHT	V90H0955CB	RH PRIMARY BEARING	ASC AREA NAV	DEG				
PRIRANGE_LEFT	V90H0956CA	LH PRIMARY RANGE	ENT AREA NAV	NM				
PRIRANGE_LEFT	V90H0956CB	LH PRIMARY RANGE	ASC AREA NAV	NM				
PRIRANGE_RIGHT	V90H0957CA	RH PRIMARY RANGE	ENT AREA NAV	NM				
PRIRANGE_RIGHT	V90H0957CB	RH PRIMARY RANGE	ASC AREA NAV	NM				
PSI_HSIMV	V90H2212C	HEADING RELATIVE TO MAG NORTH	A/E ATT PROC	RAD			93090E	
PW_RANGE	V90H3899CA	PWRD RANGE TO LANDING SITE	ASC UPP	NM			92522D	
PW_RANGE	V90H3899CB	PWRD RANGE TO LANDING SITE	RTLS UPP	NM			92522D	
ROLL_SW	V90J2690C	HSI HEADS-UP/HEADS-DOWN INDICATOR	A/E ATT PROC				92522D	
SECBEAR_LEFT	V90H0964CA	LH SECONDARY BEARING	ENT AREA NAV	DEG				
SECBEAR_LEFT	V90H0964CB	LH SECONDARY BEARING	ASC AREA NAV	DEG				
SECBEAR_RIGHT	V90H0965CA	RH SECONDARY BEARING	ENT AREA NAV	DEG				
SECBEAR_RIGHT	V90H0965CB	RH SECONDARY BEARING	ASC AREA NAV	DEG				
SECRANGE_LEFT	V90H0962CA	LH SECONDARY RANGE	ENT AREA NAV	NM				
SECRANGE_LEFT	V90H0962CB	LH SECONDARY RANGE	ASC AREA NAV	NM				
SECRANGE_RIGHT	V90H0963CA	RH SECONDARY RANGE	ENT AREA NAV	NM				
SECRANGE_RIGHT	V90H0963CB	RH SECONDARY RANGE	ASC AREA NAV	NM				
TAL_ABORT_DECLARED	V90X8658X	TAL ABORT DECLARED	MSC				93090E	
T_GMTLO	V90W4380C	TIME OF LIFTOFF IN GMT	FCOS	S			93012D	
T_STATE	V95W0200CD	TIME TAG ASSOC WITH CURRENT STATE	ASC UPP	S			93017G	*
V_GROUNDSPEED/VH	V95L0178CA	GROUNDSPEED	RTLS UPP	FT/S			92389C	
V_GROUNDSPEED/VH	V95L0178CC	GROUNDSPEED	TAEM UPP	FT/S			92389C	
V_GROUNDSPEED/VH	V95L0178CD	GROUNDSPEED	A/L UPP	FT/S			92450C	
XTRK_CDI	V90H3902C	CROSS TRACK TO TIO/TAL MAX XRNG	ASC UPP	NM			92522D	
YAW_IY	V90U2689C	HSI YAW COMMAND	A/E ATT PROC	RAD			93090E	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE F.4.104-6. OUTPUT FUNCTIONAL PARAMETERS FROM HORIZONTAL SITUATION INDICATOR PROCESSING (G4.104)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
HLWORD1	V72M8799P	LH HSI CONTROL WORD	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		HMD		93017G	*
HLWORD10	V72H8830B	LH HSI GLIDESLOPE DEVIATION	DDU 1 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1 DL FMT 42/1 DL FMT 53/1	FT	BSS		93017G	*
HLWORD2	V72Q8820B	LH HSI TEST WORD	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 53/1		BMD		93017G	*
HLWORD3	V72H8821B	LH HSI SELECTED COURSE	DDU 1 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1 DL FMT 42/1 DL FMT 53/1	DEG	BSU		93017G	*
HLWORD4	V72H8822B	LH HSI HEADING	DDU 1 DL FMT 21/1 DL FMT 23/A DL FMT 32/1 DL FMT 42/1 DL FMT 53/1	DEG	BSU		93017G	*
HLWORD5	V72H8823B	LH HSI PRIMARY BEARING	DDU 1 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1 DL FMT 42/1 DL FMT 53/1	DEG	BSU		93017G	*
HLWORD6	V72H8824B	LH HSI SECONDARY BEARING	DDU 1 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1 DL FMT 42/1 DL FMT 53/1	DEG	BSU		93017G	*
HLWORD7	V72H8825B	LH HSI PRIMARY DISTANCE	DDU 1 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1 DL FMT 42/1 DL FMT 53/1	NM	BCD		93017G	*

TABLE F.4.104-6. OUTPUT FUNCTIONAL PARAMETERS FROM HORIZONTAL SITUATION INDICATOR PROCESSING (G4.104)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
HLWORD8	V72H8826B	LH HSI SECONDARY DISTANCE	DDU 1 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1 DL FMT 42/1 DL FMT 53/1	NM	BCD		93017G	*
HLWORD9	V72H8827B	LH HSI COURSE DEVIATION	DDU 1 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1 DL FMT 42/1 DL FMT 53/1	DEG	BSS		93017G	*
HRWORD1	V72M8849P	RH HSI CONTROL WORD	DDU 2 DL FMT 32/A		HMD		93017G	*
HRWORD10	V72H8890B	RH HSI GLIDESLOPE DEVIATION	DDU 2 DL FMT 32/1	FT	BSS		93017G	*
HRWORD2	V72Q8880B	RH HSI TEST WORD	DDU 2 TLM		BMD			
HRWORD3	V72H8881B	RH HSI SELECTED COURSE	DDU 2 DL FMT 32/1	DEG	BSU		93017G	*
HRWORD4	V72H8882B	RH HSI HEADING	DDU 2 DL FMT 32/1	DEG	BSU		93017G	*
HRWORD5	V72H8883B	RH HSI PRIMARY BEARING	DDU 2 DL FMT 32/1	DEG	BSU		93017G	*
HRWORD6	V72H8884B	RH HSI SECONDARY BEARING	DDU 2 DL FMT 32/1	DEG	BSU		93017G	*
HRWORD7	V72H8885B	RH HSI PRIMARY DISTANCE	DDU 2 DL FMT 32/1	NM	BCD		93017G	*
HRWORD8	V72H8886B	RH HSI SECONDARY DISTANCE	DDU 2 DL FMT 32/1	NM	BCD		93017G	*
HRWORD9	V72H8887B	RH HSI COURSE DEVIATION	DDU 2 DL FMT 32/1	DEG	BSS		93017G	*
LHSI_C10	V72X8810B	LH HSI GLIDESLOPE DEVN CONTROL	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		BD		93017G	*
LHSI_C2	V72X8800B	LH HSI TEST WORD CONTROL	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		BD		93017G	*

TABLE F.4.104-6. OUTPUT FUNCTIONAL PARAMETERS FROM HORIZONTAL SITUATION INDICATOR PROCESSING (G4.104)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
LHSI_C3	V72X8801B	LH HSI SELECTED COURSE CONTROL	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		BD		93017G	*
LHSI_C4	V72X8802B	LH HSI HEADING CONTROL	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		BD		93017G	*
LHSI_C5	V72X8803B	LH HSI PRIMARY BEARING CONTROL	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		BD		93017G	*
LHSI_C6	V72X8804B	LH HSI SECONDARY BEARING CONTROL	DDU 1 DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		BD		93017G	*
LHSI_C7	V72X8805B	LH HSI PRIMARY DISTANCE CONTROL	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		BD		93017G	*
LHSI_C8	V72X8806B	LH HSI SECONDARY DISTANCE CONTROL	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		BD		93017G	*
LHSI_C9	V72X8807B	LH HSI COURSE DEVIATION CONTROL	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		BD		93017G	*
MEDS_BETAHVR_VALID	V90X3904X	MEDS BETA AND HVR VALIDITY FLAG	MEDS FC GNC XFER		BD		92522D	
MEDS_H_VR	V90H3897CA	RELATIVE VELOCITY HEADING FOR MEDS	MEDS FC GNC XFER	RAD	SPL		92522D	
RHSI_C10	V72X8860B	RH HSI GLIDESLOPE DEV CONTROL	DDU 2 DL FMT 32/A		BD		93017G	*
RHSI_C2	V72X8850B	RH HSI TEST WORD CONTROL	DDU 2 DL FMT 32/A		BD		93017G	*
RHSI_C3	V72X8851B	RH HSI SELECTED COURSE CONTROL	DDU 2 DL FMT 32/A		BD		93017G	*
RHSI_C4	V72X8852B	RH HSI HEADING CONTROL	DDU 2 DL FMT 32/A		BD		93017G	*
RHSI_C5	V72X8853B	RH HSI PRIMARY BEARING CONTROL	DDU 2 DL FMT 32/A		BD		93017G	*

TABLE F.4.104-6. OUTPUT FUNCTIONAL PARAMETERS FROM HORIZONTAL SITUATION INDICATOR PROCESSING (G4.104)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
RHSI_C6	V72X8854B	RH HSI SECONDARY BEARING CONTROL	DDU 2		BD		93017G	*
			DL FMT 32/A					
RHSI_C7	V72X8855B	RH HSI PRIMARY DISTANCE CONTROL	DDU 2		BD		93017G	*
			DL FMT 32/A					
RHSI_C8	V72X8856B	RH HSI SECONDARY DISTANCE CONTROL	DDU 2		BD		93017G	*
			DL FMT 32/A					
RHSI_C9	V72X8857B	RH HSI COURSE DEVIATION CONTROL	DDU 2		BD		93017G	*
			DL FMT 32/A					

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
 (HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec

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TABLE F.4.104-7. HORIZONTAL SITUATION INDICATOR PROCESSING (G4.104) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
ALT_HEAT	V97U1408C	FT	F	S	D	C	G4.104 G4.175	00	ZFR	92522D	
MET_HEAT	V97U2060C	SEC	F	S	D	C	G4.104 G4.175	00	ZFR	92522D	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.104-8. HORIZONTAL SITUATION INDICATOR PROCESSING (G4.104) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**



TABLE F.4.104-9. HORIZONTAL SITUATION INDICATOR PROCESSING (G4.104) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**F.4.105 ALPHA/MACH INDICATOR PROCESSING (PFS)**

The AMI\_PROC function processes data for display on the left and right side AMI (alpha/mach indicator).

Most displays are to be updated at least 6.25 times per second (every 160 ms). However, input data are updated at lower rates. Therefore, the AMI\_PROC function must incorporate a first-order hold (FOH) for selected parameters that are not available 6.25 times per second; the remaining parameters are processed at the input rate. (The requirements of a FOH are defined in paragraph 3.15.)

Table F.4.105.0–1 provides a definition of the AMI output data words. The 16 bits shown are the 16 data bits of each output word. The requirements for generating each of the outputs are defined in the following discussion:

The Left/Right AMI data words are generated as follows:

Left/Right AMI Control Words (LAMI1/RAMI1)

This word contains five validity bits, one for each of the other five words in the left/right AMI message.

The validity bits for the AMI Test Word (LAMI\_C2 and RAMI\_C2) are always set on. The validity bits for the other words (Mach Number, Alpha, Equivalent Air Speed, and Vehicle Acceleration) are set on only when the associated parameter is being computed and is valid for display, with one exception: the validity bits for Mach Number (LAMI\_C3 and RAMI\_C3) are left on in Major Mode 104 to allow the Mach Number last computed in MM103 to continue to be displayed throughout MM104.

LAMI\_C2 = RAMI\_C2 = 1

if MM\_CODE\_102 or MM\_CODE\_103 or MM\_CODE\_601

then LAMI\_C3 = LAMI\_C4 = LAMI\_C5 = LAMI\_C6 = 1

RAMI\_C3 = RAMI\_C4 = RAMI\_C5 = RAMI\_C6 = 1

else if MM\_CODE\_304 or MM\_CODE\_305 or MM\_CODE\_602 or MM\_CODE\_603

then LAMI\_C3 = LAMI\_C4 = LAMI\_C5 = ADPVALIDC

RAMI\_C3 = RAMI\_C4 = RAMI\_C5 = ADPVALIDP

LAMI\_C6 = RAMI\_C6 = 1

For the following transitions, MSC initializes or modifies some or all of the validity bits:

OPS 9 to OPS 1

MM103 to MM104

MM104 to MM105

MM104 to MM301

OPS 0 to OPS 2

OPS 0 to OPS 3

All validity bits shall be carried across GNC OPS transitions.

Left/Right Test Words (LAMI2/RAMI2)

This word contains the fixed bit pattern shown in Table F.4.105.0–1.

Left/Right AMI Mach Number (LMACOUT/RMACOUT) 160 ms

The Mach parameter, DDM(C)/DDM(P) in MM 304,305,602 and 603 must be processed through a FOH. (FOH processing is found in Section 3.15.) The Mach parameter REL VEL\_MAG/1000 (MM 102 or (MM 601 and S\_RTLS\_TURN)) and V\_INERTIAL\_MAG/1000 (MM 103 or (MM 601 and not S\_RTLS\_TURN)) must be output at 160 ms and may undergo FOH processing dependent upon input rate and design implementation.

The result must be limited to the acceptable range of the DDU data word prior to scaling. The lower limit is zero mach and the upper limit is 27000 fps for this parameter. (NOTE: The input parameter DDM(C)/DDM(P) has already been converted to the range 0 to 27. Between 0 and 4 it represents Mach; between 4 and 27 it represents magnitude of relative velocity in thousands of feet per second). The limited parameter shall be scaled and converted to integer as follows:

LET LM = Limited Mach

IF  $0 \leq LM \leq 27$

THEN LMACOUT/RMACOUT =  $8 * \text{INTEGER}(LM/0.0075)$  (LSB = 0.0075 mach)

Left/Right AMI Alpha (LALPOUT/RALPOUT) 160 ms

The angle of attack parameter, DDALPHA(C)/DDALPHA(P) in MM304, MM305 and MM603, must be processed through a FOH. (FOH processing is found in section 3.15). The angle of attack parameter, MEDS\_ALPHA in MM102, MM103 and MM601, available at 160 ms, may be processed through a FOH dependent upon design implementation. The angle of attack parameter, MEDS\_ALPHA in MM 602 shall be processed at 160 ms without a FOH.

LET LAA = angle of attack

LALPOUT/RALPOUT =  $2 * \text{INTEGER}(LAA/0.015)$  (LSB = 0.015 DEG)

Left/Right AMI Equivalent Airspeed (LEASOUT/REASOUT) 960 ms

The equivalent airspeed input, DDEAS(C)/DDEAS(P) in MM304, MM305, MM602 and MM603, EAS in MM102, MM103 and MM601 must be multiplied by KTS\_PER\_FPS.

The results must be limited to the acceptable range of the DDU data word (0 to +500 knots) prior to scaling. The limited parameter shall be scaled and converted to integer as follows:

LET LEA = Limited equivalent airspeed

IF  $0 \leq LEA < 500$

THEN LEASOUT/REASOUT =  $8 * \text{INTEGER}(LEA/0.125)$  (LSB = 0.125 knots)

Left/Right AMI Vehicle Acceleration (LTACOUT/RTACOUT) 160 ms

Following Weight on Wheels in MM305 and MM603, parameter (ACC DRAG) must be converted from FPS<sup>2</sup> to G's, must be processed through a FOH (defined in Section 3.15) and must have its sign changed. During MM304, MM602, and prior to Weight on Wheels in MM305 and MM603, the input AA normal acceleration (NZ) (in g's) must be processed at 160 ms without a FOH. During MM102, MM103 and MM601 the input total load factor (LOAD TOTAL) (in g's) may be output at the input rate, 960 ms, dependent upon design implementation.

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The selected parameter must be limited to the acceptable range of the DDU data word (-5.0 to +10 g's) prior to scaling. The limited parameter shall be scaled and converted to integer as follows:

LET LTAC = limited acceleration

IF  $-5.0 \leq \text{LTAC} < 0$

THEN LTACOUT/RTACOUT =  $8 * \text{INTEGER}(\text{LTAC}/0.00125)$  (LSB = .00125 g's)

IF  $0 < \text{LTAC} < 10$

THEN LTACOUT/RTACOUT =  $8 * \text{INTEGER}(\text{LTAC}/0.00250)$  (LSB = .00250 g's)

Transport Lag

The GPC transport lag (MDM read to DDU write) for each of the AMI parameters shall not exceed the values specified below:

Alpha	210ms
Mach	350ms
Equiv. Airspeed	210ms
Total Acceleration	350ms

Table F.4.105.0-1. DEFINITION OF THE AMI OUTPUT DATA WORDS						
Bit Number	Word 1 Cont Word	Word 2 AMI Test Word	Word 3 Mach Number	Word 4 Alpha	Word 5 Equiv. Air Speed	Word 6 Vehicle Acceleration
1	C <sub>2</sub>	1	0	S	0	S
2	C <sub>3</sub>	0	MSB	MSB	MSB	MSB
3	C <sub>4</sub>	1				
4	C <sub>5</sub>	0				
5	C <sub>6</sub>	1				
6	0	0				
7	0	1		Binary, negative value in 2's complement		
8	0	0	Binary		Binary	Binary
9	0	1				
10	0	0				
11	0	1				
12	0	0				
13	0	1	LSB		LSB	LSB
14	0	0	0		0	0
15	0	0	0	LSB	0	0
16	0	1	0	0	0	0

Notes: 1. Word 2 is a negative alternating pattern test word with the MSB in the 0 state.  
2. Word 3 scale factor is 0.0075 mach per bit for speeds of 0 to 4 mach and a scale factor of 7.5 fps per bit for velocities of where the scale factor change is introduced.  
3. Word 4 scale factor is 0.015 degrees per bit from -180 to +180 degrees.  
4. Word 5 scale factor is 0.0125 knots per bit from 0 to 500 knots.  
5. Word 6 scale factor is 0.00125 g's per bit from -5.0 to 0.0 g's and 0.00250 g's per bit from 0.0 to + 10.0 g's.

**F.4.105.1 Alpha/Mach Indicator Interface Support Functions**

Table F.4.105-5 Input Functional Parameters

Table F.4.105-6 Output Functional Parameters

Table F.4.105-7 I-Loads

Table F.4.105-8 K-Loads

Table F.4.105-9 Constants

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TABLE F.4.105-5. INPUT FUNCTIONAL PARAMETERS FOR ALPHA/MACH INDICATOR PROCESSING (G4.105)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
ACC_DRAG	V95A0160CA	DRAG DECEL	RTLS UPP				89979F	
ACC_DRAG	V95A0160CB	DRAG DECEL	ENT UPP	FT/S2			93017G	*
ACC_DRAG	V95A0160CC	DRAG DECEL	TAEM UPP	FT/S2			93017G	*
ACC_DRAG	V95A0160CD	DRAG DECEL	A/L UPP	FT/S2			93017G	*
ADPVALIDC	V95X3115X	CMDR AIR DATA PARM VALIDITY FLAG	ADTA SOP					
ADPVALIDP	V95X3117X	PILOT AIR DATA PARM VALIDITY FLAG	ADTA SOP					
DDALPHAC	V95H3105C	CMDR ANGLE OF ATTACK DISPLAY	ADTA SOP	DEG				
DDALPHAP	V95H3107C	PILOT ANGLE OF ATTACK DISPLAY	ADTA SOP	DEG				
DDEASC	V95L3141C	CMDR EQUIVALENT AIRSPEED DISPLAY	ADTA SOP	FT/S				
DDEASP	V95L3143C	PILOT EQUIVALENT AIRSPEED DISPLAY	ADTA SOP	FT/S				
DDMC	V95L3101C	CMDR MACH NUMBER DISPLAY	ADTA SOP					
DDMP	V95L3103C	PILOT MACH NUMBER DISPLAY	ADTA SOP					
EAS	V95L0514CA	EQUIVALENT AIRSPEED	ASC UPP	FT/S			89990E	
LOAD_TOTAL	V95U0163CB	TOTAL LOAD FACTOR	ASC UPP	G			93017G	*
LOAD_TOTAL	V95U0163CC	TOTAL LOAD FACTOR	RTLS UPP				93017G	*
MEDS_ALPHA	V90H3908C	ANGLE OF ATTACK FOR MEDS	A/E ATT PROC				92619A	
MM_CODE_102/MM_102	V90X8158X	MAJOR MODE 102 FLAG	MSC				93012D	
MM_CODE_103/MM_103	V90X8156X	MAJOR MODE 103 FLAG	MSC				93012D	
MM_CODE_304/MM_304	V90X8161X	MAJOR MODE 304 FLAG	MSC				92355B	
MM_CODE_305/MM_305	V90X8162X	MAJOR MODE 305 FLAG	MSC				92355B	
MM_CODE_601/MM_601	V90X8194X	MAJOR MODE 601 FLAG	MSC		BD		93012D	
MM_CODE_602/MM_602	V90X8174X	MAJOR MODE 602 FLAG	MSC				92355B	
MM_CODE_603/MM_603	V90X8122X	MAJOR MODE 603 FLAG	MSC				92355B	
NZ	V90A5381C	SELECTED AA NORMAL ACCEL	SF	G		SPL	93017G	*
S_RTLS_TURN	V90X2089X	DSCR IND START OF TURN AROUND	PW RTLS GUID			BD	93017G	*
V_INERTIAL_MAG	V95L0510CA	MAG OF VEHICLE INERTIAL VELOCITY	ASC UPP	FT/S			93090E	
V_INERTIAL_MAG	V95L0510CB	MAG OF VEHICLE INERTIAL VELOCITY	RTLS UPP	FT/S			93090E	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE F.4.105-6. OUTPUT FUNCTIONAL PARAMETERS FROM ALPHA/MACH INDICATOR PROCESSING (G4.105)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
LALPOUT	V72H2006B	LH AMI ALPHA	DDU 1 DL FMT 21/1 DL FMT 23/A DL FMT 32/1 DL FMT 42/1 DL FMT 53/1	DEG	BSS		93017G	*
LAMI1	V72M7240P	LH AMI CONTROL WORD	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		HMD		93017G	*
LAMI2	V72Q7250B	LH AMI TEST WORD	DDU 1 DL FMT 42/1 DL FMT 53/1		BMD		93017G	*
LAMI_C2	V72X7241BA	LH AMI TEST WORD CONTROL	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		BD		93017G	*
LAMI_C3	V72X7242BA	LH AMI MACH NUMBER CONTROL	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		BD		93017G	*
LAMI_C4	V72X7243BA	LH AMI ALPHA CONTROL	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		BD		93017G	*
LAMI_C5	V72X7244BA	LH AMI EQUIV AIRSPEED CONTROL	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		BD		93017G	*
LAMI_C6	V72X7245BA	LH AMI VEHICLE ACCELN-CONTROL	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		BD		93017G	*
LEASOUT	V72L7256B	LH AMI EQUIVALENT AIRSPEED	DDU 1 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1 DL FMT 42/1 DL FMT 53/1	KT	BSU		93017G	*



TABLE F.4.105-6. OUTPUT FUNCTIONAL PARAMETERS FROM ALPHA/MACH INDICATOR PROCESSING (G4.105)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
LMACOUT	V72L7252B	LH AMI MACH/VELOCITY	DDU 1 DL FMT 21/1 DL FMT 23/A DL FMT 32/1 DL FMT 42/1 DL FMT 53/1	MACH	BSU		93017G	*
LTACOUT	V72L7258B	LH AMI VEHICLE ACCELERATION	DDU 1 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1 DL FMT 42/1 DL FMT 53/1	G	BSS		93017G	*
RALPOUT	V72H2007B	RH AMI ALPHA	DDU 2 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1	DEG	BSS		93017G	*
RAMI1	V72M7280P	RH AMI CONTROL WORD	DDU 2 DL FMT 32/1		HMD		93017G	*
RAMI2	V72Q7290B	RH AMI TEST WORD	DDU 2 DL FMT 32/1		BMD		93017G	*
RAMI_C2	V72X7281BA	RH AMI TEST WORD CONTROL	DDU 2 DL FMT 32/1		BD		93017G	*
RAMI_C3	V72X7282BA	RH AMI MACH NUMBER CONTROL	DDU 2 DL FMT 32/1		BD		93017G	*
RAMI_C4	V72X7283BA	RH AMI ALPHA CONTROL	DDU 2 DL FMT 32/1		BD		93017G	*
RAMI_C5	V72X7284BA	RH AMI EQUIV AIRSPEED CONTROL	DDU 2 DL FMT 32/1		BD		93017G	*
RAMI_C6	V72X7285BA	RH AMI VEHICLE ACCELN-CONTROL	DDU 2 DL FMT 32/1		BD		93017G	*
REASOUT	V72L7296B	RH AMI EQUIVALENT AIRSPEED	DDU 2 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1	KT	BSU		93017G	*
RMACOUT	V72L7292B	RH AMI MACH/VELOCITY	DDU 2 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1	MACH	BSU		93017G	*
RTACOUT	V72L7298B	RH AMI VEHICLE ACCELERATION	DDU 2 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1	G	BSS		93017G	*

TABLE F.4.105-6. OUTPUT FUNCTIONAL PARAMETERS FROM ALPHA/MACH INDICATOR PROCESSING (G4.105)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
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**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE F.4.105-7. ALPHA/MACH INDICATOR PROCESSING (G4.105) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.105-8. ALPHA/MACH INDICATOR PROCESSING (G4.105) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.105-9. ALPHA/MACH INDICATOR PROCESSING (G4.105) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
GO EARTH GRAV ACCEL CONSTANT	V90A7622C	00	+3.2174049	E+01 FT/SEC**2	F		S P	A6.9 G4.10 G4.105 G4.126 G4.204 G4.208 G4.22 G4.220 G4.227 G4.234 G4.237 G4.36 G4.8 G4.9 G5.27 V4.10 V4.11 V4.11B V4.11C V4.9A	93090E	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

#### F.4.106 ALTITUDE/VERTICAL VELOCITY INDICATOR PROCESSING (PFS)

The AVVI\_PROC function processes data for display on the left and right side AVVI (altitude/vertical velocity indicator). Each side is controlled by two independent switches. One switch selects air data from the left air data probe, the right probe, or from the air data parameters being used by GN&C. The second switch selects data from radar altimeter 1 or 2.

The displays are to be updated at least 6.25 times per second (every 160 ms). However, input data are updated at lower rates. Therefore, the AVVI\_PROC function must incorporate a first-order hold (FOH) for selected parameters that are not available 6.25 times per second; the remaining parameters are processed at the input rate. (The requirements of a FOH are defined in paragraph 3.15.)

Table F.4.106.0-1 provides a definition of the AVVI output data words. The 16 bits shown are the 16 data bits of each output word. The mission dependent I-Load values are defined in the JSC-19350 STS Flight Software Initialization Load. The requirements for generating each of the outputs are defined in the following discussion:

The left/right AVVI\_data words shall be generated as follows:

##### Left/Right AVVI Control Word (LAVVI1/RAVVI1) 960 ms

This word contains five validity bits, one for each of the other five words in the left/right AVVI message.

The validity bits for the AVVI Test Word (LAVVI\_C2 and RAVVI\_C2) are always set on. The validity bits for the other words (indicated Altitude, Vertical Velocity, Radar Altitude, and Vertical Acceleration) are set on only when the associated parameter is being computed and is valid for display, with one exception: the validity bits for Indicated Altitude (LAVVI\_C3 and RAVVI\_C3) and Vertical Velocity (LAVVI\_C4 and RAVVI\_C4) are left on in Major Mode 104 to allow the Altitude and Vertical Velocity last computed in MM103 to continue to be displayed throughout MM104.

```
LAVVI_C2 = RAVVI_C2 = 1
if MM_CODE_102 or MM_CODE_103 or MM_CODE_601
then LAVVI_C3 = LAVVI_C4 = RAVVI_C3 = RAVVI_C4 = 1
    LAVVI_C5 = LAVVI_C6 = RAVVI_C5 = RAVVI_C6 = 0
else if MM_CODE_304 or MM_CODE_305 or MM_CODE_602 or MM_CODE_603
then LAVVI_C3 = LAVVI_C4 = ADPVALIDC
    RAVVI_C3 = RAVVI_C4 = ADPVALIDP
        if (LRAS1 = 1 and RALT_CMLK(1) = 1) or (LRAS1 = 2 and RALT_CMLK(2) = 1)
        then LAVVI_C5 = 1
        else LAVVI_C5 = 0
        if (RRAS1 = 1 and RALT_CMLK(1) = 1) or (RRAS1 = 2 and RALT_CMLK(2) = 1)
        then RAVVI_C5 = 1
        else RAVVI_C5 = 0
    LAVVI_C6 = RAVVI_C6 = 1
```

For the following transitions, MSC initializes or modifies some or all of the validity bits:

- OPS 9 to OPS 1
- MM103 to MM104
- MM104 to MM105
- MM104 to MM301
- OPS 0 to OPS 2
- OPS 0 to OPS 3

All validity bits shall be carried across GNC OPS transitions.

Left/Right AVVI Test Word (LAVVI2/RAVVI2)

This word contains the fixed bit pattern shown in Table F.4.106.0-1.

Left/Right AVVI Indicated Altitude (LALTOU/RALTOU) 160 ms

During MM304, MM305, MM602 and MM603, process the input parameter dependent on the left or right air data select switch (LADS/RADS). The output altitude parameter shall be with respect to the runway. The air data input parameters are with respect to mean sea level, and thus the difference between mean sea level and the runway must be computed and subtracted from the input parameter. The altitude above mean sea level shall be computed as follows:

$$RW\_ALT\_MSL = ALT\_RW - DELH\_MSI\_ELLIPSOID\_RW$$

$$\begin{aligned} \text{Cmdr air data parameter} &= DDALTC/DDALTP - RW\_ALT\_MSL \\ \text{LADS/RADS} &= +1 \end{aligned}$$

When the select switch is in the computer position (LADS/RADS = 0), the parameter to be input is referenced to the Fischer ellipsoid, hence

$$\text{Cmdr air data parameter} = DDALTC/DDALTP - ALT\_RW$$

During MM102, MM103 and MM601 the output altitude parameter shall be with respect to the runway. The input parameter is with respect to the Fischer ellipsoid and thus must be corrected, as follows:

$$\text{Cmdr air data parameter} = ALT - ALT\_RW$$

The selected parameter must be processed through a FOH. (FOH processing is found in Section 3.15).

The selected altitude parameter must be limited to the acceptable range of the DDU data word (-1100 to  $10^6$  feet) prior to scaling. The limited parameter shall be scaled and converted to integer as follows:

LET LA = limited altitude

IF  $-1100 \leq LA < -100$

THEN  $LALTOU/RALTOU = 8 * \text{INTEGER}(220 + 0.2 * LA)$  (LSB = 5 ft)

IF  $-100 \leq LA \leq 0$

THEN  $LALTOU/RALTOU = 8 * \text{INTEGER}(280 + 0.8 * LA)$  (LSB = 1.25 ft)

IF  $0 \leq LA \leq 500$

THEN  $LALTOU/RALTOU = 8 * \text{INTEGER}(280 + 0.6343 * LA - 0.4686 * 10^{-3} * LA^2)$   
(LSB = Variable)

IF  $500 < LA < 10^5$

THEN LALTOUT/RALTOUT = 8\*INTEGER (470 + 0.02\* LA) (LSB = 50 ft)

IF  $10^5 \leq LA < 10^6$

THEN LALTOUT/RALTOUT = 8\*INTEGER (200 + 300 + 1970 + (LA -  $10^5$ )/625) (LSB = 625 ft)

Left/Right AVVI Vertical Velocity (LVVLOUT/RVVLOUT) 160 ms

During MM304, MM305, MM602 and MM603 the altitude rate parameter to be used is DDHDOTC/DDHDOTP. H\_DOT is to be used in MM102, MM103 and H\_DOT\_ELLIPSOID is to be used in MM601.

The selected parameter must be processed through a FOH. (FOH processing is found in Section 3.15).

The selected vertical velocity parameter must be limited to the acceptable range of the DDU data word (-2940 to +2940 fps) prior to scaling. The limited parameter shall be scaled and converted to integer as follows:

Let LVV = limited vertical velocity

IF  $|LVV| \leq 100$

THEN LVVLOUT/RVVLOUT = 8\*INTEGER (- SIGN(LVV)\*0.0292875\*LVV<sup>2</sup> + 7.92875\*LVV) (LSB = VAR)

IF  $100 < |LVV| \leq 740$

THEN LVVLOUT/RVVLOUT = 8\*INTEGER (187.5\*SIGN(LVV) + 3.125\*LVV) (LSB = .32 fps)

IF  $740 < |LVV| \leq 2940$

THEN LVVLOUT/RVVLOUT = 8\*INTEGER (2204\*SIGN (LVV) + 0.4\*LVV) (LSB = 2.5 fps)

Left/Right AVVI Radar Altitude (LRAOUT/RRAOUT) 160 ms

During MM304, MM305, MM602, and MM603, select the left or right AVVI input parameter dependent on the left or right radar altimeter select switch (LRAS1/RRAS1).

The selected input parameter must be corrected to compensate for antenna to wheel distance at a nominal landing attitude of 10 degrees.

LET SRA = Selected Radar Altitude

IF LRAS1/RRAS1 = 2

THEN SRA = RA\_ALTO(2) - RA\_CONST

ELSE SRA = RA\_ALTO(1) - RA\_CONST

The selected radar altitude must be limited to the acceptable range of the DDU data word (0 to 9000 feet) prior to scaling. The limited parameter shall be scaled and converted to integer as follows:

LET LRA = Limited Radar Altitude

IF  $0 \leq LRA < 500$

THEN LRAOUT/RRAOUT = 16\*INTEGER (3.1715\*LRA - 2.343 +  $10^{-3}$ \*LRA<sup>2</sup>)(LSB = variable)

IF  $500 \leq LRA < 9000$

THEN LRAOUT/RRAOUT = 16\*INTEGER (1000 + (LRA - 500)/10) (LSB = 10ft)



On the first pass a valid representation for +9000 feet must be sent to the AVVI to “Park” the Radar altitude scale at that value prior to “Lock-on”. This requirement pertains to both LRAOUT/RRAOUT and to LAVVI\_C5/RAVVI\_C5.

The value of the K-Load constant RA\_CONST (V97U6861C) may be found in Table F.4.106-8.

Left/Right AVVI Vertical Acceleration (LVACOUT/RVACOUT) 160 ms

During MM304, MM305, MM602 and MM603, the input vertical acceleration parameter (ACC\_VERT) must be processed through a FOH processing which is found in Section 3.15 and limited to the acceptable range of the DDU data word (-12.75 to +12.75 fps<sup>2</sup>) prior to scaling. The limited parameter shall be scaled and converted to integer as follows:

LET LVA = Limited vertical acceleration  
IF  $-12.75 \leq LVA < 12.75$   
THEN LVACOUT/RVACOUT = 128\*INTEGER (LVA/.05) (LSB = .05 fps<sup>2</sup>)

Transport Lag

The GPC transport lag (MDM read to DDU write) for each of the AVVI parameters shall not exceed the values specified below:

Radar Altitude	210 ms
Baro/Nav Altitude	210 ms
Altitude Rate	210 ms
Altitude Acceleration	350 ms
Validity Flags	50 ms

The K-Load constant values are defined in Table F.4.106-7.

Table F.4.106.0-1. DEFINITION OF THE AVVI OUTPUT DATA WORDS						
Bit Number	Word 1 AVVI Contl Word	Word 2 AVVI Test Word	Word 3 Indic Alt	Word 4 Vertical Velocity	Word 5 Radar Alt	Word 6 vertical Acceleration
1	C <sub>2</sub>	1	0	S	0	S
2	C <sub>3</sub>	0	MSB	MSB	MSB	MSB
3	C <sub>4</sub>	1				
4	C <sub>5</sub>	0				Binary, negative value in 2's complement
5	C <sub>6</sub>	1				
6	0	0				
7	0	1		Binary, negative value in 2's complement		
8	0	0	Binary		Binary	
9	0	1		complement		LSB
10	0	0				0
11	0	1				0
12	0	0			LSB	0

Table F.4.106.0-1. DEFINITION OF THE AVVI OUTPUT DATA WORDS						
Bit Number	Word 1 AVVI Contl Word	Word 2 AVVI Test Word	Word 3 Indic Alt	Word 4 Vertical Velocity	Word 5 Radar Alt	Word 6 vertical Acceleration
13	0	1	LSB	LSB	0	0
14	0	0	0	0	0	0
15	0	0	0	0	0	0
16	0	1	0	0	0	0

Notes: 1. Word 2 is a negative alternating pattern test word with MSB in the 0 state.  
 2. Word 3 scale factor is as follows: 5 ft/bit from -1100 to -100; 1.25 ft/bit from -100 to 0; variable from 0 to +500; 50 ft/bit from 500 to 10<sup>5</sup>; 625 ft/bit from 10<sup>5</sup> to 10<sup>6</sup>. A binary count of zero corresponds to -1100 ft of altitude.  
 3. Word 4 scale factor is as follows: 2.5 fps/bit from -2940 to -740 and from 740 to 2940 fps; 0.32 fps/bit from -740 to -100 and from 100 to 740 fps; variable from -100 to 100 fps.  
 4. Word 5 scale factor is as follows: variable from 0 to 500 ft; 10 ft/bit from 500 to 9000 ft.  
 5. Word 6 scale factor is as follows: 0.05 fps<sup>2</sup>/bit from -13.3 to +13.3 fps<sup>2</sup>.

**F.4.106.1 Altitude/Vertical Velocity Indicator Interface Support Functions**

Table F.4.106-5                      Input Functional Parameters

Table F.4.106-6                      Output Functional Parameters

Table F.4.106-7                      I-Loads

Table F.4.106-8                      K-Loads

Table F.4.106-9                      Constants

TABLE F.4.106-5. INPUT FUNCTIONAL PARAMETERS FOR ALTITUDE/VERTICAL VELOCITY INDICATOR PROCESSING (G4.106)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
ACC_VERT	V95A0170CA	VERTICAL ACCEL IN TOPODETTIC COORD	RTLS UPP				90724D	
ACC_VERT	V95A0170CB	VERTICAL ACCEL IN TOPODETTIC COORD	ENT UPP	FT/S2				
ACC_VERT	V95A0170CC	VERTICAL ACCEL IN TOPODETTIC COORD	A/L UPP	FT/S2				
ACC_VERT	V95A0170CD	VERTICAL ACCEL IN TOPODETTIC COORD	TAEM UPP	FT/S2				
ADPVALIDC	V95X3115X	CMDR AIR DATA PARM VALIDITY FLAG	ADTA SOP					
ADPVALIDP	V95X3117X	PILOT AIR DATA PARM VALIDITY FLAG	ADTA SOP					
ALT	V95H0175CA	CURR ORB ALT ABOVE REF ELLIPSOID	RTLS UPP	FT	SPL		93017G	*
ALT	V95H0175CB	CURR ORB ALT ABOVE REF ELLIPSOID	ASC UPP	FT			93017G	*
ALT_RW	V90H1818CA	ALTITUDE OF RW WRT REF ELLIPSOID	ENT SITE LOOKUP	FT			93155B	
ALT_RW	V90H1818CB	ALTITUDE OF RW WRT REF ELLIPSOID	ASC SITE LOOKUP	FT			93155B	
DDALTC	V95H3142C	CMDR ALTITUDE DISPLAY	ADTA SOP	KFT				
DDALTP	V95H3144C	PILOT ALTITUDE DISPLAY	ADTA SOP	KFT				
DDHDOTC	V95L3133C	CMDR PRESS ALTITUDE RATE DISPLAY	ADTA SOP	FT/S	SPL			
DDHDOTP	V95L3135C	PILOT PRESS ALTITUDE RATE DISPLAY	ADTA SOP	FT/S	SPL			
DELH_MSL_ELLIPSOID_RW	V90H1819CA	ALT OF MSL ABOVE REF ELLIP AT RW	ENT SITE LOOKUP	FT				
DELH_MSL_ELLIPSOID_RW	V90H1819CB	ALT OF MSL ABOVE REF ELLIP AT RW	ASC SITE LOOKUP	FT				
H_DOT	V95L0511C	RADIAL CMPNT OF INERTIAL VELOCITY	ASC UPP	FT/S	VAR			
H_DOT_ELLIPSOID/H_DOT	V95L0265CA	EST ALTITUDE RATE	RTLS UPP	FT/S	SPL		93017G	*
LADS	V96J2171C	SELECTED LEFT AIR DATA SELECT POS	GN&C SW RM		HXS		93017G	*
MM_CODE_102/MM_102	V90X8158X	MAJOR MODE 102 FLAG	MSC				93012D	
MM_CODE_103/MM_103	V90X8156X	MAJOR MODE 103 FLAG	MSC				93012D	
MM_CODE_304/MM_304	V90X8161X	MAJOR MODE 304 FLAG	MSC				92355B	
MM_CODE_305/MM_305	V90X8162X	MAJOR MODE 305 FLAG	MSC				92355B	
MM_CODE_601/MM_601	V90X8194X	MAJOR MODE 601 FLAG	MSC		BD		93012D	
MM_CODE_602/MM_602	V90X8174X	MAJOR MODE 602 FLAG	MSC				92355B	
MM_CODE_603/MM_603	V90X8122X	MAJOR MODE 603 FLAG	MSC				92355B	
RADS	V96J2271C	SELECTED RIGHT AIR DATA SELECT POS	GN&C SW RM		HXS		93017G	*
RALT_CMLK(1)	V95X7130X	RA 1 COMMFault/LOCKON FLAG	RA SOP					
RALT_CMLK(2)	V95X7230X	RA 2 COMMFault/LOCKON FLAG	RA SOP					
RA_ALTO(1)	V95H7100C	RADAR ALTIMETER NO 1 ALTITUDE	RA SOP	FT				
RA_ALTO(2)	V95H7200C	RADAR ALTIMETER NO 2 ALTITUDE	RA SOP	FT				
REL_VEL_MAG	V95L0151CE	GND REL VEL MAGNITUDE IN M50 SYS	ASC UPP	FT/S			93017G	*
	V90X7495X	LH RADAR ALTIMETER DISPLAY	GN&C SW RM					
	V90X7496X	RH RADAR ALTIMETER DISPLAY	GN&C SW RM					

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE F.4.106-6. OUTPUT FUNCTIONAL PARAMETERS FROM ALTITUDE/VERTICAL VELOCITY INDICATOR PROCESSING  
(G4.106)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
LALTOUT	V72H5352B	LH AVVI INDICATED ALTITUDE	DDU 1 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1 DL FMT 42/1 DL FMT 53/1	FT	BSU		93017G	*
LAVVI1	V72M5340P	LH AVVI CONTROL WORD	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		HMD		93017G	*
LAVVI2	V72Q5350B	LH AVVI TEST WORD	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 53/1		BMD		93017G	*
LAVVI_C2	V72X5341BA	LH AVVI TEST WORD CONTROL	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		BD		93017G	*
LAVVI_C3	V72X5342BA	LH AVVI INDICATED ALTITUDE CONTROL	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		BD		93017G	*
LAVVI_C4	V72X5343BA	LH AVVI VERTICAL VELOCITY CONTROL	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		BD		93017G	*
LAVVI_C5	V72X5344BA	LH AVVI RADAR ALTITUDE CONTROL	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		BD		93017G	*
LAVVI_C6	V72X5345BA	LH AVVI VERTICAL ACCELERATION CONT	DDU 1 DL FMT 32/A DL FMT 42/1 DL FMT 43/1 DL FMT 53/1		BD		93017G	*

TABLE F.4.106-6. OUTPUT FUNCTIONAL PARAMETERS FROM ALTITUDE/VERTICAL VELOCITY INDICATOR PROCESSING  
(G4.106)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
LRAOUT	V72H5356B	LH AVVI RADAR ALTITUDE	DDU 1 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1 DL FMT 42/1 DL FMT 53/1	FT	BSU		93017G	*
LVACOUT	V72A5358B	LH AVVI VERTICAL ACCELERATION	DDU 1 DL FMT 21/1 DL FMT 23/A DL FMT 32/1 DL FMT 42/1 DL FMT 53/1	FT/S2	BSS		93017G	*
LVVLOUT	V72R5354B	LH AVVI VERTICAL VELOCITY	DDU 1 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1 DL FMT 42/1 DL FMT 53/1	FT/S	BSS		93017G	*
RALTOUT	V72H5392B	RH AVVI INDICATED ALTITUDE	DDU 2 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1	FT	BSU		93017G	*
RAVVI1	V72M5380P	RH AVVI CONTROL WORD	DDU 2 DL FMT 32/A		HMD		93017G	*
RAVVI2	V72Q5390B	RH AVVI TEST WORD	DDU 2 TLM		BMD			
RAVVI_C2	V72X5381BA	RH AVVI TEST WORD CONTROL	DDU 2 DL FMT 32/A		BD		93017G	*
RAVVI_C3	V72X5382BA	RH AVVI INDICATED ALTITUDE CONTROL	DDU 2 DL FMT 32/A		BD		93017G	*
RAVVI_C4	V72X5383BA	RH AVVI VERTICAL VELOCITY CONTROL	DDU 2 DL FMT 32/A		BD		93017G	*
RAVVI_C5	V72X5384BA	RH AVVI RADAR ALTITUDE CONTROL	DDU 2 DL FMT 32/A		BD		93017G	*
RAVVI_C6	V72X5385BA	RH AVVI VERTICAL ACCELERATION CONT	DDU 2 DL FMT 32/A		BD		93017G	*
RRAOUT	V72H5396B	RH AVVI RADAR ALTITUDE	DDU 2 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1	FT	BSU		93017G	*
RVACOUT	V72A5398B	RH AVVI VERTICAL ACCELERATION	DDU 2 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1	FT/S2	BSS		93017G	*

TABLE F.4.106-6. OUTPUT FUNCTIONAL PARAMETERS FROM ALTITUDE/VERTICAL VELOCITY INDICATOR PROCESSING  
(G4.106)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
RVVLOUT	V72R5394B	RH AVVI VERTICAL VELOCITY	DDU 2 DL FMT 21/1 DL FMT 23/1 DL FMT 32/1	FT/S	BSS		93017G	*

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE F.4.106-7. ALTITUDE/VERTICAL VELOCITY INDICATOR PROCESSING (G4.106) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.106-8. ALTITUDE/VERTICAL VELOCITY INDICATOR PROCESSING (G4.106) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
RA_CONST ANT/WHEEL DIST-NOM LOG ATT	V97U6861C	00	+1.82	E+01 FT	F		S	P G4.106	89137C	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**



TABLE F.4.106-9. ALTITUDE/VERTICAL VELOCITY INDICATOR PROCESSING (G4.106) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

#### F.4.107 SURFACE POSITION INDICATOR PROCESSING (PFS)

The SPI\_PROC functional module prepares elevon position, rudder position, speedbrake position, speedbrake command, body flap position, and aileron position data for display on the surface position indicator (SPI).

The mission dependent I-Load values are defined in the JSC-19350 STS Flight Software Initialization Load.

##### Elevon Position 160 ms

The four selection filter elevon position measurements (DELOBOFB, DELIBOFB, DERIBOFB, DEROBOFB) are scaled and biased for display on the SPI. The input quantities range from -36.5 degrees to +21.5 degrees (floating point). The indicator recognizes +5 VDC as the full down position (+20 deg) and 0 VDC as the full up position (-35 deg). The output of the SPI\_PROC module is a 9-bit binary quantity where the least significant bit represents 0.01 VDC.

$$EL\_CONV\_C = \frac{100 \frac{CTS}{VDC} * 5 VDC}{55 DEG} = \frac{500CTS}{55 DEG} = 9.091 CTS/DEG$$

$$EL\_BIAS\_C = \frac{9.091 \frac{CTS}{DEG} * 35 DEG}{DEG} = 318.185 CTS$$

The output elevon position parameters shall be generated as follows:

$$\begin{aligned} SPIELOB &= 64 * \text{Integer} (EL\_CONV\_C * DELOBOFB + EL\_BIAS\_C) \\ SPIELIB &= 64 * \text{Integer} (EL\_CONV\_C * DELIBOFB + EL\_BIAS\_C) \\ SPIERIB &= 64 * \text{Integer} (EL\_CONV\_C * DERIBOFB + EL\_BIAS\_C) \\ SPIEROB &= 64 * \text{Integer} (EL\_CONV\_C * DEROBOFB + EL\_BIAS\_C) \end{aligned}$$

where DELOBOFB, DELIBOFB, DERIBOFB and DEROBOFB have each been limited to the range -35 to +20 degrees.

##### Rudder Position 160 ms

The selection filter rudder position (DROFB) ranges from -27.1 (right rudder) to +27.1 (left rudder) degrees. The SPI indicator recognizes 0 VDC as 30 degrees left rudder and 5 VDC as 30 degrees right rudder.

$$R\_CONV\_C = - \frac{100 \frac{CTS}{VDC} * 5 VDC}{60 DEG} = \frac{-500CTS}{60 DEG} = -8.333 CTS/DEG$$

$$R\_BIAS\_C = \frac{8.333 \frac{CTS}{DEG} * 30 DEG}{DEG} = 249.9 CTS = 250 CTS$$

The output rudder position parameter shall be generated as follows:

$$SPIRP = 64 * \text{Integer} (- R\_CONV\_C * DROFB + R\_BIAS\_C)$$

where DROFB has been limited to the range -30 to +30 degrees.

Speedbrake Position and Command 160 ms

The speedbrake position (DSBOFB) and the speedbrake command (DSB\_ENT\_SCHED, DSBC\_AT, DSBC\_AL) range from 0 (fully closed) to +98.6 (fully open) degrees. The indicator recognizes 0 VDC as 0 percent of full deflection and +5 VDC as 100 percent.

$$SB\_CONV\_C = \left[ \frac{100 \text{ CTS} * 5 \text{ VDC}}{\text{VDC} * 100\%} \right] = \frac{500}{100\%} = 5 \text{ CTS/PERCENT}$$

The SPI\_PROC module shall determine the speedbrake position percent deflection and speedbrake command percent deflection by forming the ratio of deflection to the maximum deflection  
DSBMAX = 98.6 deg \*100 as follows:

$$SPISBP = 64 * \text{Integer} (500 * \text{DSBOFB} / 98.6)$$

$$SPISBC = 64 * \text{Integer} (500 * \text{SBC} / 98.6)$$

$$\text{HUD\_SPBRK\_POS} = \text{INTEGER} (\text{DSBOFB})$$

$$\text{HUD\_SPBRK\_CMD} = \text{INTEGER} (\text{SBC})$$

where both DSBOFB and SBC have been limited to the range 0 to 98.6 degrees and where SBC is determined as follows:

$$\text{IF (MM\_CODE\_304)} \\ \text{THEN SBC} = \text{DSB\_ENT\_SCHED}$$

$$\text{IF (MM\_CODE\_305 OR MM\_CODE\_602 OR MM\_CODE\_603) AND TG\_END} = 0 \\ \text{THEN SBC} = \text{DSBC\_AT} \\ \text{ELSE SBC} = \text{DSBC\_AL (WHEN TG\_END} = 1)$$

$$\text{IF MM\_CODE\_301 OR MM\_CODE\_302 OR MM\_CODE\_303 OR MM\_CODE\_601} \\ \text{THEN SBC} = 0$$

Body Flap Position 160 ms

The body flap position (DBFOFB) ranges from -15.825 degrees to +26.675 degrees. The SPI indicator and GN&C Systems Summary 1 display recognizes 0 VDC as 0 percent of the full deflection and +5 VDC as 100 percent deflection.

$$BF\_CONV\_C = \left[ \frac{100 \text{ CTS} * 5 \text{ VDC}}{\text{VDC} * 100\%} \right] = \frac{500}{100\%} \text{ CTS} = 5 \text{ CTS/PERCENT}$$

The SPI\_PROC module shall generate the output body flap percent deflection as follows:

$$\text{BFP\_CRT} = 100 * (\text{DBFOFB} - \text{DBFMIN} / \text{DBFMAX} - \text{DBFMIN})$$

$$\text{SPIBFP} = 64 * \text{Integer} (\text{BF\_CONV\_C} * \text{BFP\_CRT})$$

where DBFOFB has been limited to the range DBFMIN to DBFMAX

DBFMIN (V97U6752C) and DBFMAX (V97U6751C) are K-Load parameters and their values may be found in Table F.4.107-8.

Aileron Position 160 ms

The SPI\_PROC module generates the aileron position and limits the output from -5 degrees to +5 degrees. The indicator recognizes 0 VDC as full left at -5 degrees and 5 VDC as full right at +5 degrees.

AILERON CONVERSION CONSTANT (A\_CONV\_C):

$$A\_CONV\_C = \frac{100 \text{ CTS} * 5 \text{ VDC}}{\text{VDC} \cdot 10 \text{ DEG}} = \frac{500 \text{ CTS}}{10 \text{ DEG}} = 50 \text{ CTS/DEG}$$

AILERON BIAS CONSTANT (A\_BIAS\_C):

$$A\_BIAS\_C = \frac{50 \text{ CTS} * 5 \text{ DEG}}{\text{DEG}} = 250 \text{ CTS}$$

The aileron position is one-half the difference between the average left elevon position and the average right elevon position.

$$DAILERON = (\text{DELIBOFOB} + \text{DELOBOFOB} - \text{DERIBOFOB} - \text{DEROBOFOB})/4$$

The aileron position is limited and the output aileron position parameter shall be generated as follows:

```
IF DAILERON < -5 DEG THEN DAILERON = -5
IF DAILERON > +5 DEG THEN DAILERON = +5
HUD_AIL_POS=INTEGER(100*DAILERON)
SPIAP = 64*INTEGER (50*DAILERON +250)
```

SPI VALID Flag

The SPI\_VALID flag is set to OFF indicate that some of the data being sent to the SPI are not valid. The position feedback data and the derived data are considered to be always valid due to quad redundancy. The speedbrake commands are always valid, also. Hence SPI\_VALID = ON.

TRANSPORT LAG:

The GPC transport lag (MDM read to MDM write) for each of the SPI parameters shall not exceed the values specified below:

Elevon Position	350ms
Rudder Position	350ms
Speedbrake Position	350ms
Speedbrake Command	350ms
Body Flap Position	350ms
Aileron Position	350ms

The K-Load constant values are defined in Table F.4.107-8.

**F.4.107.1 Surface Position Indicator Processing Interface Support Functions**

Table F.4.107-5	Input Functional Parameters
Table F.4.107-6	Output Functional Parameters
Table F.4.107-7	I-Loads
Table F.4.107-8	K-Loads
Table F.4.107-9	Constants

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TABLE F.4.107-5. INPUT FUNCTIONAL PARAMETERS FOR SURFACE POSITION INDICATOR PROCESSING (G4.107)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
DBFOFB	V95H8310C	COMP BODY FLAP POS	BF PFB SOP	DEG				
DELIBOFB	V95H8010C	COMP LIB ELEVON POS	ELVN PFB SOP	DEG	BSS			
DELOBOFB	V95H8060C	COMP LOB ELEVON POS	ELVN PFB SOP	DEG	BSS			
DERIBOFB	V95H8110C	COMP RIB ELEVON POS	ELVN PFB SOP	DEG	BSS		92230F	
DEROBOFB	V95H8160C	COMP ROB ELEVON POS	ELVN PFB SOP	DEG	BSS			
DROFB	V95H8210C	COMP RUDDER POS	RUD PFB SOP	DEG	BSS			
DSBC_AL	V90H1011CB	SPEEDBRAKE ANGLE COMMAND-AUTO LAND	A/L GUID	DEG			93017G	*
DSBC_AL	V90H1011CD	SPEEDBRAKE ANGLE COMMAND-AUTO LAND	GRTLS A/L GUID	DEG			93017G	*
DSBC_AT	V90H1011CA	SPEEDBRAKE ANGLE COMMAND-AUTO LAND	GRTLS TAEM GUID	DEG			93017G	*
DSBC_AT	V90H1011CC	SPEEDBRAKE ANGLE COMMAND-AUTO LAND	TAEM GUID	DEG			93017G	*
DSBOFB	V95H8260C	COMP SPDBK POS	SB PFB SOP	DEG			93087E	
DSB_ENT_SCHED	V90H1624CA	SCHEDULED SPDBK CMD	AEROJET DAP	DEG			92447C	
IPHASE	V90J1117CB	TAEM GUIDANCE PHASE INDICATOR	GRTLS TAEM GUID	ND			93017G	*
MM_CODE_301/MM_301	V90X8183X	MAJOR MODE 301 FLAG	MSC				93064D	
MM_CODE_302/MM_302	V90X8624X	MAJOR MODE 302 FLAG	MSC				92355B	
MM_CODE_303/MM_303	V90X8182X	MAJOR MODE 303 FLAG	MSC				92355B	
MM_CODE_304/MM_304	V90X8161X	MAJOR MODE 304 FLAG	MSC				92355B	
MM_CODE_305/MM_305	V90X8162X	MAJOR MODE 305 FLAG	MSC				92355B	
MM_CODE_601/MM_601	V90X8194X	MAJOR MODE 601 FLAG	MSC		BD		93012D	
MM_CODE_602/MM_602	V90X8174X	MAJOR MODE 602 FLAG	MSC				92355B	
MM_CODE_603/MM_603	V90X8122X	MAJOR MODE 603 FLAG	MSC				92355B	
OPS_6_INDICATOR	V90X8634X	OPS 6 IND	MSC				92578B	
TG_END	V90X1108XA	TAEM GUIDANCE TERMINATION FLAG	TAEM GUID				93017G	*
TG_END	V90X1108XB	TAEM GUIDANCE TERMINATION FLAG	GRTLS TAEM GUID				92355B	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE F.4.107-6. OUTPUT FUNCTIONAL PARAMETERS FROM SURFACE POSITION INDICATOR PROCESSING (G4.107)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
BFP_CRT	V96H2047C	BODY FLAP POSN PCT CRT	GNC SYS SUMM1 DISP	PCT	VAR			
DAILERON	V96H2045C	AILERON POSITION	DL FMT 23/A	DEG	SPL		93017G	*
HUD_AIL_POS	V72H4117C	HUD AILERON POSITION	GNC SYS SUMM1 DISP	DEG	BSS			
HUD_SPBRK_CMD	V72H4076C	HUD SPEEDBRAKE COMMAND	HUDE1	DEG	BSS			
HUD_SPBRK_POS	V72H4075C	HUD SPEEDBRAKE POSITION	HUDE2	DEG	BSS			
SBC	V96H2046C	SPDBRK CMD	HUDE1	DEG				
SPIAP	V72H5131C	AILERON POSITION-SPI	HUDE2	DEG	AMU		93017G	*
			E/L EV AN PROC	DEG				
			DL FMT 21/2	DEG				
			DL FMT 23/2					
			DL FMT 32/2					
			DL FMT 42/1					
			DL FMT 53/1					
			SPI					
SPIBFP	V72H5130C	BODY FLAP POSITION COMPUTED-SPI	DL FMT 23/1	PCT	AMU		93017G	*
			DL FMT 32/2					
			DL FMT 42/1					
			DL FMT 53/1					
			SPI					
SPIELIB	V72H5110C	LH INBD ELEVON POSN COMPUTED-SPI	DL FMT 23/1	DEG	AMU		93017G	*
			DL FMT 32/2					
			DL FMT 42/1					
			DL FMT 53/1					
			SPI					
SPIELOB	V72H5112C	LH OUTBD ELEVON POSN COMPUTED SPI	DL FMT 23/1	DEG	AMU		93017G	*
			DL FMT 32/2					
			DL FMT 42/1					
			DL FMT 53/1					
			SPI					
SPIERIB	V72H5120C	RH INBD ELEVON POSN COMPUTED-SPI	DL FMT 23/1	DEG	AMU		93017G	*
			DL FMT 32/2					
			DL FMT 42/1					
			DL FMT 53/1					
			SPI					
SPIEROB	V72H5122C	RH OUTBD ELEVON POSN COMPUTED-SPI	DL FMT 23/1	DEG	AMU		93017G	*
			DL FMT 32/2					
			DL FMT 42/1					
			DL FMT 53/1					
			SPI					
SPIRP	V72H5100C	RUDDER POSITION COMPUTED-SPI	DL FMT 23/1	DEG	AMU		93017G	*
			DL FMT 32/2					
			DL FMT 42/1					
			DL FMT 53/1					
			SPI					



TABLE F.4.107-6. OUTPUT FUNCTIONAL PARAMETERS FROM SURFACE POSITION INDICATOR PROCESSING (G4.107)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
SPISBC	V72H5106C	SPEED BRAKE COMMANDED POSN-SPI	DL FMT 23/1 DL FMT 32/2 DL FMT 42/1 DL FMT 53/1 SPI	PCT	AMU		93017G	*
SPISBP	V72H5105C	SPEED BRAKE POSN COMPUTED-SPI	DL FMT 23/1 DL FMT 32/2 DL FMT 42/1 DL FMT 53/1 SPI	PCT	AMU		93017G	*
SPI_VALID	V72X8283X	SPI DATA VALID FLAG	SPI		BD			

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
 (HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec

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TABLE F.4.107-7. SURFACE POSITION INDICATOR PROCESSING (G4.107) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
-----------	------	-----------	----	----	---	---	---------	----	-----	---------	-------------

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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.107-8. SURFACE POSITION INDICATOR PROCESSING (G4.107) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
DBFMAX MAXIMUM VALUE OF BODY FLAP POS	V97U6751C	00	+2.255	E+01 DEG	F	S	C	G4.107	79967G	
DBFMIN MINIMUM VALUE OF BODY FLAP POS	V97U6752C	00	-1.171	E+01 DEG	F	S	C	G4.107	79967G	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.107-9. SURFACE POSITION INDICATOR PROCESSING (G4.107) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
--------------------------	------	----	----------------	-----------	----	--------	---	---------	---------	-------------

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

#### F.4.108 ENTRY/LANDING EVENT ANNUNCIATION PROCESSING (PFS)

The LAMP PROC functional module provides data to drive the following types of lamps:

- Pitch lamps
- Roll/Yaw lamps
- Speedbrake lamps
- Body flap lamps
- HUD messages

The K-Load constants are defined in Table F.4.108-8 PFS K-Loads Update B/L.

##### Pitch and Roll/Yaw Lamps 320 ms

The pitch lamps and roll/yaw lamps are straight through drives with dual outputs. Each input signal is used to drive a lamp on the commander's panel and a corresponding lamp on the pilot's panel.

The pitch lamp signals shall be generated as follows:

```
IF AUTOP_IND = 1
    THEN      LAUTO_PLAMP = RAUTO_PLAMP = 1
              HUD_MODE_PITCH = 0
    ELSE      LAUTO_PLAMP = RAUTO_PLAMP = 0

IF CSSP_IND = 1
    THEN      LCSS_PLAMP = RCSS_PLAMP = HUD_MODE_PITCH = 1
    ELSE      LCSS_PLAMP = RCSS_PLAMP = 0

IF GEP_IND = 1
    THEN      LGAIN_ENA_PLAMP = RGAIN_ENA_PLAMP = 1
    ELSE      LGAIN_ENA_PLAMP = RGAIN_ENA_PLAMP = 0
```

The roll/yaw lamp signal shall be generated as follows:

```
IF AUTORY_IND = 1
    THEN      LAUTO_RYLAMP = RAUTO_RYLAMP = 1
              HUD_MODE_BANK = 0
    ELSE      LAUTO_RYLAMP = RAUTO_RYLAMP = 0

IF CSSRY_IND = 1
    THEN      LCSS_RYLAMP = RCSS_RYLAMP = 1
              HUD_MODE_BANK = 1
    ELSE      LCSS_RYLAMP = RCSS_RYLAMP = 0

IF GERY_IND = 1
    THEN      LGAIN_ENA_RYLAMP = RGAIN_ENA_RYLAMP = 1
    ELSE      LGAIN_ENA_RYLAMP = RGAIN_ENA_RYLAMP = 0
```

### Speedbrake Lamps 320 ms

The speedbrake lamp signals shall be generated as follows:

The speedbrake lamps are in part single-input, dual-output signals. The manual speedbrake lamp drives are separate inputs and outputs for commander and pilot.

The speedbrake lamps are controlled by the auto and manual modes and a flash indicator.

```
IF AUTOSB_IND = 1
    THEN          LAUTO_SBLAMP = RAUTO_SBLAMP = 1
                  MNLSB_CMDR_O = MNLSB_PLT = 0
                  HUD_MODE_SB = 0

IF AUTOSB_IND = MNLSB_CMDR_IND = 0 AND MNLSB_PLT_IND = 1
    THEN          MNLSB_CMDR_O = 0 AND MNLSB_PLT_O = 1
                  LAUTO_SBLAMP = RAUTO_SBLAMP = 0
                  HUD_MODE_SB = 1

IF AUTOSB_IND = MNLSB_PLT_IND = 0 AND MNLSB_CMDR_IND = 1
    THEN MNLSB_CMDR_O = 1 AND MNLSB_PLT_O = 0
                  LAUTO_SBLAMP = RAUTO_SBLAMP = 0
                  HUD_MODE_SB = 1
```

### Body Flap Lamps 320 ms

Both the manual and automatic body flap lamps are single input, dual output signals.

The manual and automatic body flap lamps shall be generated as follows:

```
IF MNLBF_IND = 1
    THEN          LMNL_BFLAMP = RMNL_BFLAMP = 1
    ELSE          LMNL_BFLAMP = RMNL_BFLAMP = 0

IF AUTOBF_IND = 1
    THEN          LAUTO_BFLAMP = RAUTO_BFLAMP = 1
    ELSE          LAUTO_BFLAMP = RAUTO_BFLAMP = 0
```

### ENTRY/LANDING EVENT ANNUNCIATION PROCESSING

The event annunciation processing function shall monitor several vehicle configuration and performance parameters and trigger annunciation whenever these parameters exceed pre-defined limits.

The event annunciation processing of NAV parameter NAV\_TAC\_ALERT will only trigger an annunciation when three TACANs are installed as indicated by less than three GPS receivers being installed. This avoids nuisance GAX annunciation messages for "TACAN NAV EDIT MSG" (MSID V94X4376X) when 3 GPS receivers and no TACANs are installed.

#### 1. G-LOAD

```
IF (MM_CODE_304 = 1 AND LOAD_TOTAL ≥ LOAD_FLASH) OR
   (MM_CODE_305 = 1 OR MM_CODE_602 = 1 OR MM_CODE_603 = 1 AND
   NZ ≥ LOAD_FLASH)
    THEN HI_G = HUD_HI_G = 1
    ELSE HI_G = HUD_HI_G = 0
```

LOAD\_LIMIT = LOAD\_LITE

IF (MM\_CODE\_304 = 1 AND LOAD\_TOTAL ≥ LOAD\_LIMIT) OR (MM\_CODE\_305 = 1  
OR MM\_CODE\_602 = 1 OR MM\_CODE\_603 = 1 AND NZ ≥ LOAD\_LIMIT)  
THEN HI\_G\_GAX = 1  
ELSE HI\_G\_GAX = 0

2. AIR DATA

IF (ADSM\_LL ≤ MACH ≤ ADSM\_UL) AND (L\_PROBE\_DEPLOY = 0  
OR R\_PROBE\_DEPLOY = 0)  
THEN PROBE\_ALERT = 1  
ELSE PROBE\_ALERT = 0

3. SPEED BRAKE

IF OPS3 THEN SB\_COMP=MIDVAL(DSB\_ENT\_SCHED, DSB\_MIN\_U, 200)  
IF OPS6 THEN SB\_COMP=MIDVAL(DSBC\_AT,DSB\_MIN U, 200)  
IF (SBM\_LL ≤ MACH ≤ SBM\_UL) AND (DSBOFB – SB\_COMP ≥ SB\_LIM)  
THEN HUD\_SPBRK = SPD\_BRK\_ALERT = 1  
ELSE HUD\_SPBRK = SPD\_BRK\_ALERT = 0

IF (ALT\_WHEELS ≤ CONF\_ALT\_SB AND WOWLOW\_IND = 0)  
THEN IF SB\_LL ≤ DSBOFB ≤ SB\_UL  
THEN HUD\_SPBRK = 0  
ELSE HUD\_SPBRK = 1  
ELSE HUD\_SPBRK = 0

4. BODY FLAP

IF (ALT\_WHEELS ≤ CONF\_ALT\_BF AND WOWLON\_IND = 0)  
THEN IF BF\_LL ≤ DBFOFB ≤ BF\_UL  
THEN HUD\_BF = 0  
ELSE HUD\_BF = 1  
ELSE HUD\_BF = 0

5. LANDING GEAR

IF (ALT\_WHEELS ≤ GEAR\_DOWN\_ALT AND DDEASC < GEAR\_EAS)  
THEN IF MLY\_GEAR\_NOTUP = 0  
THEN HUD\_GEAR\_UP = 1  
ELSE HUD\_GEAR\_UP = 0  
ELSE HUD\_GEAR\_UP = 0



6. NAV

```
IF NAV_ALT_FLAG = 1
  THEN IF ALT_WHEELS > NAV_ALT
    THEN NAV_ALT_ALERT = 1
    ELSE NAV_ALT_ALERT = 0

IF NAV_TAC_FLAG = 1
  THEN IF (ALT_WHEELS > NAV_ALT AND NUM_GPS_INSTALLED < 3)
    THEN NAV_TAC_ALERT = 1
    ELSE NAV_TAC_ALERT = 0
```

**F.4.108.1 Entry/Landing Event Annunciation Interface Support Functions**

Table F.4.108-5	Input Functional Parameters
Table F.4.108-6	Output Functional Parameters
Table F.4.108-7	I-Loads
Table F.4.108-8	K-Loads
Table F.4.108-9	Constants

TABLE F.4.108-5. INPUT FUNCTIONAL PARAMETERS FOR ENTRY/LANDING EVENT ANNUNCIATION PROCESSING (G4.108)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
ALT_WHEELS	V95H0165CA	ALT TO REAR WHEELS/NAV BASE(ENTRY)	RTLS UPP	FT			93017G	*
ALT_WHEELS	V95H0165CB	ALT TO REAR WHEELS/NAV BASE(ENTRY)	ENT UPP	FT	DPL		93017G	*
ALT_WHEELS	V95H0165CC	ALT TO REAR WHEELS/NAV BASE(ENTRY)	TAEM UPP	FT	DPL		93017G	*
ALT_WHEELS	V95H0165CD	ALT TO REAR WHEELS/NAV BASE(ENTRY)	A/L UPP	FT	DPL		93017G	*
AUTOBF_IND	V90X1582XA	BF AUTO FLAG	AEROJET DAP				92354	
AUTOBF_IND	V90X1582XB	BF AUTO FLAG	GRTLS DAP					
AUTOP_IND/AUTOP_LAMP	V90X1632XA	PITCH AUTO FLAG	AEROJET DAP				92522D	
AUTOP_IND/AUTOP_LAMP	V90X1632XB	PITCH AUTO FLAG	GRTLS DAP				92522D	
AUTORY_IND/AUTORY_LAMP	V90X1642XA	ROLL/YAW AUTO FLAG	AEROJET DAP				92522D	
AUTORY_IND/AUTORY_LAMP	V90X1642XB	ROLL/YAW AUTO FLAG	GRTLS DAP				92522D	
AUTOSB_IND/AUTOSB_LAMP	V90X1565XA	SPDBK AUTO FLAG	AEROJET DAP				92676B	
AUTOSB_IND/AUTOSB_LAMP	V90X1565XB	SPDBK AUTO FLAG	GRTLS DAP				92676B	
COURSE_WRT_RW/PSD	V95H0225CA	COURSE WRT RW CENTERLINE	ENT UPP	DEG			93017G	*
CSSP_IND/CSSP_LAMP	V90X1631XA	PITCH CSS FLAG	AEROJET DAP				92354	
CSSP_IND/CSSP_LAMP	V90X1631XB	PITCH CSS FLAG	GRTLS DAP				90996G	
CSSRY_IND/CSSRY_LAMP	V90X1641XA	ROLL/YAW CSS FLAG	AEROJET DAP				92354	
CSSRY_IND/CSSRY_LAMP	V90X1641XB	ROLL/YAW CSS FLAG	GRTLS DAP				90996G	
DBFOFB	V95H8310C	COMP BODY FLAP POS	BF PFB SOP	DEG				
DBFPC	V90H1647CA	BF POSITION CMD	AEROJET DAP	DEG				
DBFPC	V90H1647CB	BF POSITION CMD	GRTLS DAP					
DDEASC	V95L3141C	CMDR EQUIVALENT AIRSPEED DISPLAY	ADTA SOP	FT/S				
DSBC	V90H1634CA	SPDBK CMD	AEROJET DAP	DEG				
DSBC	V90H1634CB	SPDBK CMD	GRTLS DAP					
DSBOFB	V95H8260C	COMP SPDBK POS	SB PFB SOP	DEG			93087E	
DSB_ENT_SCHED	V90H1624CA	SCHEDULED SPDBK CMD	AEROJET DAP	DEG			92447C	
LOAD_TOTAL	V95U0163CA	TOTAL LOAD FACTOR	ENT UPP	FT/S2			93017G	*
L_PROBE_DEPLOY	V90X4870X	LEFT PROBE DEPLOYED FLAG	ADTA RM		BD		93017G	*
M/MACH	V95L3029C	GN&C MACH NUMBER	ADTA SOP		SPL		93017G	*
MLY_GEAR_NOTUP	V90X7500X	LANDING GEAR RELEASED	HYD SYS SOP					
MM_CODE_304/MM_304	V90X8161X	MAJOR MODE 304 FLAG	MSC				92355B	
MM_CODE_305/MM_305	V90X8162X	MAJOR MODE 305 FLAG	MSC				92355B	
MM_CODE_602/MM_602	V90X8174X	MAJOR MODE 602 FLAG	MSC				92355B	
MM_CODE_603/MM_603	V90X8122X	MAJOR MODE 603 FLAG	MSC				92355B	
MNLBF_IND	V90X1583XA	BF MD FLAG	AEROJET DAP				92354	
MNLBF_IND	V90X1583XB	BF MD FLAG	GRTLS DAP					
MNLSB_CMD_IND	V90X1567XA	CDR SPDBK MD FLAG	AEROJET DAP				92354	
MNLSB_CMD_IND	V90X1567XB	CDR SPDBK MD FLAG	GRTLS DAP					
MNLSB_PLT_IND	V90X1568XA	PLT SPDBK MD FLAG	AEROJET DAP				92354	
MNLSB_PLT_IND	V90X1568XB	PLT SPDBK MD FLAG	GRTLS DAP				92354	
NAV_ALT_FLAG	V90X8901XA	NAV EDIT ALTITUDE CREW ALERT	ENT NAV					
NAV_ALT_FLAG	V90X8901XB	NAV EDIT ALTITUDE CREW ALERT	PRELAND NAV					
NAV_ALT_FLAG	V90X8901XC	NAV EDIT ALTITUDE CREW ALERT	RTLS NAV					
NAV_TAC_FLAG	V90X8902XA	NAV EDIT TACAN CREW ALERT	ENT NAV					
NAV_TAC_FLAG	V90X8902XB	NAV EDIT TACAN CREW ALERT	PRELAND NAV					
NAV_TAC_FLAG	V90X8902XC	NAV EDIT TACAN CREW ALERT	RTLS NAV					
NUM_GPS_INSTALLED	V90U3671C	NUMBER OF GPS RCVR INSTALLED	GPS SOP		HXS		92067D	

TABLE F.4.108-5. INPUT FUNCTIONAL PARAMETERS FOR ENTRY/LANDING EVENT ANNUNCIATION PROCESSING (G4.108)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
NZ	V90A5381C	SELECTED AA NORMAL ACCEL	SF	G	SPL		93017G	*
R_PROBE_DEPLOY	V90X4871X	RIGHT PROBE DEPLOYED FLAG	ADTA RM		BD		93017G	*
SBC	V96H2046C	SPDBRK CMD	SPI PROC	DEG				
WOWLON_IND	V96X0050X	WEIGHT ON MAIN WHEELS INDICATOR	LANDING SOP		BD		93017G	*

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.108-6. OUTPUT FUNCTIONAL PARAMETERS FROM ENTRY/LANDING EVENT ANNUNCIATION PROCESSING  
(G4.108)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
HI_G	V94X0241X	HIGH G	UI					
HI_G_GAX	V94X4769X	HIGH G GAX FLAG	GAX					
HUD_BF	V72X4038X	HUD BODYFLAP FLAG	HUDE1		BD			
			HUDE2					
HUD_GEAR_UP	V72X4039X	HUD GEAR UP FLAG	HUDE1		BD			
			HUDE2					
HUD_HI_G	V72X4036X	HUD HIGH G FLAG	HUDE1		BD			
			HUDE2					
HUD_MODE_BANK	V72X4059X	HUD BANK AUTO/MANUAL FLAG	HUDE1		BD			
			HUDE2					
HUD_MODE_PITCH	V72X4057X	HUD PITCH AUTO/MANUAL FLAG	HUDE1		BD			
			HUDE2					
HUD_MODE_SB	V72X4061X	HUD SPDBRK AUTO/MANUAL FLAG	HUDE1		BD			
			HUDE2					
HUD_SPBRK	V72X4037X	HUD SPEEDBRAKE FLAG	HUDE1		BD			
			HUDE2					
LAUTO_BFLAMP	V72X4996XA	LH BODY FLAP AUTO	D&C PNL				93017G	*
			DL FMT 21/A					
			DL FMT 23/1					
LAUTO_PLAMP	V72X5240XA	FCS MODE-LH PITCH AUTO	D&C PNL				93017G	*
			DL FMT 21/A					
			DL FMT 23/1					
LAUTO_RYLAMP	V72X5243XA	FCS MODE-LH R-Y AUTO	D&C PNL				93017G	*
			DL FMT 21/A					
			DL FMT 23/1					
LAUTO_SBLAMP	V72X5136XC	LH SPEEDBRAKE AUTO	D&C PNL				93017G	*
			DL FMT 21/A					
			DL FMT 23/1					
LCSS_PLAMP	V72X5241XA	FCS MODE-LH PITCH CSS	D&C PNL				93017G	*
			DL FMT 21/A					
			DL FMT 23/1					
LCSS_RYLAMP	V72X5245XA	FCS MODE-LH R-Y CSS	D&C PNL				93017G	*
			DL FMT 21/A					
			DL FMT 23/1					
LGAIN_ENA_PLAMP	V72X6140X	FCS LH PITCH GAIN ENABLE	D&C PNL		BD		92230F	
LGAIN_ENA_RYLAMP	V72X6146X	FCS LH R-Y GAIN ENABLE	D&C PNL		BD		92230F	
LMNL_BFLAMP	V72X4997XA	LH BODY FLAP MANUAL	D&C PNL				93017G	*
			DL FMT 21/A					
			DL FMT 23/1					
MNLSB_CMDR_O	V72X5137XC	LH SPEEDBRAKE MANUAL	D&C PNL				93017G	*
			DL FMT 21/A					
			DL FMT 23/1					
MNLSB_PLT_O	V72X5135XC	RH SPEEDBRAKE MANUAL	D&C PNL				93017G	*
			DL FMT 21/A					
			DL FMT 23/1					

TABLE F.4.108-6. OUTPUT FUNCTIONAL PARAMETERS FROM ENTRY/LANDING EVENT ANNUNCIATION PROCESSING (G4.108)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
NAV_ALT_ALERT	V90X8747X	NAV EDIT ALTITUDE CREW ALERT	GAX					
NAV_TAC_ALERT	V90X8748X	NAV EDIT TACAN CREW ALERT	GAX					
PROBE_ALERT	V90X8745X	ADTA PROBES DEPLOY CREW ALERT	GAX					
RAUTO_BFLAMP	V72X4896XA	RH BODY FLAP AUTO	D&C PNL				93017G	*
			DL FMT 23/1					
RAUTO_PLAMP	V72X5140XA	FCS MODE-RH PITCH AUTO	D&C PNL				93017G	*
			DL FMT 23/1					
RAUTO_RYLAMP	V72X5143XA	FCS MODE-RH R-Y AUTO	D&C PNL				93017G	*
			DL FMT 23/1					
RAUTO_SBLAMP	V72X5134XC	RH SPEEDBRAKE AUTO	D&C PNL				93017G	*
			DL FMT 23/1					
RCSS_PLAMP	V72X5141XA	FCS MODE-RH PITCH CSS	D&C PNL				93017G	*
			DL FMT 21/A					
			DL FMT 23/1					
RCSS_RYLAMP	V72X5145XA	FCS MODE-RH R-Y CSS	D&C PNL				93017G	*
			DL FMT 21/A					
			DL FMT 23/1					
RGAIN_ENA_PLAMP	V72X6185X	FCS RH PITCH GAIN ENABLE	D&C PNL				92230F	
RGAIN_ENA_RYLAMP	V72X6130X	FCS RH R-Y GAIN ENABLE	D&C PNL		BD		92230F	
RMNL_BFLAMP	V72X4897XA	RH BODY FLAP MANUAL	D&C PNL				93017G	*
			DL FMT 21/A					
			DL FMT 23/1					
SPD_BRK_ALERT	V90X8746X	SPEEDBRAKE CREW ALERT	GAX					
	V72M6630PB	MDM FF01 DSCR OUT SET	CD 10 CH 0				93017G	*
			DL FMT 21/A					
			DL FMT 23/1					
	V72M6680PB	MDM FF02 DSCR OUT SET	CD 10 CH 0				93017G	*
			DL FMT 21/A					
			DL FMT 23/1					
	V72M6730P	MDM FF03 DSCR OUT SET	CD 10 CH 0				93017G	*
	V72M6780PB	MDM FF04 DSCR OUT SET	CD 10 CH 0				93017G	*
			DL FMT 21/A					
			DL FMT 23/1					

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
 (HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec

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TABLE F.4.108-7. ENTRY/LANDING EVENT ANNUNCIATION PROCESSING (G4.108) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.108-8. ENTRY/LANDING EVENT ANNUNCIATION PROCESSING (G4.108) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
ADSM_LL BODY FLAP LOWER LIMIT - CONF LT	V97U6747C	00	+1.0	E+00 MACH	F	S	P	G4.108	79967G	
ADSM_UL BODY FLAP UPPER LIMIT - CONF LT	V97U6748C	00	+2.5	E+00 MACH	F	S	P	G4.108	79967G	
BF_LL BODY FLAP LOWER LIMIT - CONF LT	V97U9092C	00	-5.0	E-01 DEG	F	S	C	G4.108	93194A	*
BF_UL BODY FLAP UPPER LIMIT -CONF LT	V97U9087C	00	+5.0	E-01 DEG	F	S	C	G4.108	93194A	*
CONF_ALT_BF MAX ALTITUDE LIMIT FOR HUD B/F WARNING MESSAGE	V99U7140C	00	+5.0	E+03 FT	F	S	C	G4.108	93194A	*
CONF_ALT_SB	V97U6749C	00	-1.00	E+02 FT	F	S	P	G4.108	79967G	
DSB_MIN_U SP BK LOWER POSITION LIMIT	V97U0666C	00	+1.5000000	E+01 DEG	F	S	C	G4.108 G4.227 G4.36	89674E	
GEAR_DOWN_ALT ALTITUDE THRESHOLD FOR GEAR LIGHT	V97U6792C	00	+3.0	E+02 FT	F	S	C	G4.108	92938B	
GEAR_EAS	V99U7141C	00	+5.063	E+02 FT/SEC	F	S	C	G4.108	92938B	
LOAD_FLASH G-LOAD LIMIT TO TRIGGER HUD NZ SYMBOL FLASHING	V97U7024C	00	+6.48	E+01 FT/SEC**2	F	S	C	G4.108	93194A	*
LOAD_LITE	V97U7025C	00	+7.29	E+01 FT/SEC**2	F	S	P	G4.108	79967G	
NAV_ALT	V99U7142C	00	+2.0	E+04 FT	F	S	P	G4.108	79967G	
SBM_LL SPEEDBRAKE LOWER LIMIT - CONF LT	V97U6924C	00	+9.5	E-01 MACH	F	S	P	G4.108	79967G	
SBM_UL SPEEDBRAKE UPPER LIMIT - CONF LT	V97U6925C	00	+9.8	E+00 MACH	F	S	P	G4.108	79967G	
SB_LIM	V97U7026C	00	+2.00	E+01 PCT	F	S	P	G4.108	79967G	
SB_LL SPEEDBRAKE LOWER LIMIT CONF LT	V97U9084C	00	+1.40	E+01 DEG	F	S	P	G4.108	79967G	
SB_UL SPEEDBRAKE UPPER LIMIT -CONF LT	V97U9085C	00	+1.80	E+01 DEG	F	S	P	G4.108	79967G	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.



TABLE F.4.108-9. ENTRY/LANDING EVENT ANNUNCIATION PROCESSING (G4.108) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

#### **F.4.128 MEDS FC GNC TRANSFER (PFS/BFS)**

This section specifies the detailed requirements for the PFS and BFS MEDS FC Bus GNC Data Transfer. The principal function number identifying MEDS FC Bus GNC Data Transfer is 4.128. The MEDS FC Bus GNC Data Transfer is responsible for assembling information and generating messages required for the MEDS IDP. These messages are sent to the MEDS IDP over the forward Flight Critical data buses. This transfer will only occur if this capability is enabled via I-load. All requirements in this section apply to both PFS and BFS unless stated otherwise.

##### **F.4.128.1 Processing Requirements**

PFS/BFS shall transfer the data words defined in Table F.4.128.1-2 to the MEDS via the forward Flight Critical data buses. The transfer from PFS shall occur at 25 Hz (see SS-P-0002-170 for requirements for FCOS to transfer the data). This function, which collects/processes the data to be transferred, shall execute in PFS at 6.25 Hz. The transfer from BFS shall occur at 12.5 Hz. The data collection function shall execute in BFS at 6.25 Hz. This transfer shall only occur if the I-load ENABLE\_MEDS\_DATA\_TRANSFER is true (logic 1). The format of this data transfer is defined in the GPC/IDP Interface Control Document, ICD 3-0070-01, paragraph 3.1.4.12. For those parameters that can be invalid due to LRU failure, communication failure, or are not calculated in certain flight phases, an indication of the parameter's validity shall be included in the data transfer, as specified in paragraph F.4.128.1.2. For PFS, this data transfer shall occur in all GNC flight OPS/Modes (e.g. G1/6, G2, G3, G8). For BFS, this data transfer shall occur in all valid BFS OPS/Modes except OPS 0 and MM 101.

##### BFS specific processing requirements.

The BFS shall transfer the data into the MEDS FC Bus Data Buffer as defined in Section F.128.1.3 prior to setting the validity bits as defined in Section F.128.1.2. This requirement will negate the possibility of having the validity bit set before there is valid data in the data buffer.

All data sent to the MEDS IDP will be calculated values unless data transfer occurs prior to calculation, in which case an initial value is explicitly specified.

##### **F.4.128.1.1 Initialization, I-Loads and K-Loads**

Initialization values are specified in Table F.4.128.1-1. I-loads are specified in Table F.4.128-7. K-loads are specified in Table F.4.128-8.

##### **F.4.128.1.2 Validity Bit Determination**

This section defines the requirements for determining validity bits for those parameters that can be invalid due to LRU failure, communication failure, or are not calculated in certain flight phases.

If a validity bit is off, the contents of the corresponding buffer word will be indeterminate and should not be used by the MEDS software.

##### **F.4.128.1.2.1 PFS Validity Bit Determination:**

Validity bit determination shall be performed after Major Mode Processing (Section F.4.128.1.3.1.1).

**F.4.128.1.2.1.1 PFS Major Mode Validity (Msg 1 Wd 8)**

```
If (MM_CODE_101 = 1) or (MM_CODE_102 = 1) or (MM_CODE_103 = 1) or (MM_CODE_104 = 1)
or (MM_CODE_105 = 1) or (MM_CODE_106 = 1) or (MM_CODE_201 = 1) or
(MM_202_FROM_MM_201_FLAG = 1) or (MM_801_FROM_MM_201 = 1) or (MM_CODE_601 = 1)
or (MM_CODE_602 = 1) or (MM_CODE_603 = 1) or (MM_CODE_301 = 1) or (MM_CODE_302 = 1)
or (MM_CODE_303 = 1) or (MM_CODE_304 = 1) or (MM_CODE_305 = 1) then
    MEDS_FC_WORD_8_VAL = 1
else
    MEDS_FC_WORD_8_VAL = 0
end if
```

**F.4.128.1.2.1.2 PFS Abort Mode, PPA and Roll Switch Flags Validity (Msg 1 Wd 9)**

```
If MEDS_FC_WORD_8_VAL = 1 and (MEDS_MM = 101 or MEDS_MM = 102 or MEDS_MM = 103
or MEDS_MM = 104 or MEDS_MM = 105 or MEDS_MM = 106 or MEDS_MM = 301 or MEDS_MM
= 302 or MEDS_MM = 303 or MEDS_MM = 304 or MEDS_MM = 305 or MEDS_MM = 601 or
MEDS_MM = 602 or MEDS_MM = 603) then
    MEDS_FC_WORD_9_VAL = 1
else
    MEDS_FC_WORD_9_VAL = 0
end if
```

An internal variable, TAL\_DECLARED\_IN\_103, shall be computed for subsequent validity determination for PFS Delta Azimuth, PFS Crosstrack Readout, and PFS Crosstrack Deviation Readout.

```
If MEDS_FC_WORD_8_VAL = 1 and MEDS_MM = 103 then
    If TAL_ABORT_DECLARED = 1 then
        TAL_DECLARED_IN_103 = 1
    else
        TAL_DECLARED_IN_103 = 0
    end if
end if
```

An internal variable, ATO\_DECLARED\_IN\_103, shall be computed for subsequent validity determination for PFS Target Inclination Readout.

```
If MEDS_FC_WORD_8_VAL = 1 and MEDS_MM = 103 then
    If S_ATO = 1 then
        ATO_DECLARED_IN_103 = 1
    else
        ATO_DECLARED_IN_103 = 0
    end if
end if
```

**F.4.128.1.2.1.3 PFS Guidance Phase Validity (Msg 1 Wds 10, 11)**

If MEDS\_FC\_WORD\_8\_VAL = 1 and (MEDS\_MM = 305 or MEDS\_MM = 602 or MEDS\_MM = 603)  
then

MEDS\_FC\_WORD\_10\_VAL = 1

else

MEDS\_FC\_WORD\_10\_VAL = 0

end if

If MEDS\_FC\_WORD\_8\_VAL = 1 and (MEDS\_MM = 304) then

MEDS\_FC\_WORD\_11\_VAL = 1

else

MEDS\_FC\_WORD\_11\_VAL = 0

end if

**F.4.128.1.2.1.4 PFS TAEM Guidance End and WOWLON Validity (Msg 1 Wd 12)**

If MEDS\_FC\_WORD\_8\_VAL = 1 and (MEDS\_MM = 305 or MEDS\_MM = 603) then

MEDS\_FC\_WORD\_12\_VAL = 1

else

MEDS\_FC\_WORD\_12\_VAL = 0

end if

**F.4.128.1.2.1.5 PFS HSI Mode Indicator Validity (Msg 1 Wd 13)**

If MEDS\_AREA\_NAV\_FIRST\_PASS = on then

MEDS\_FC\_WORD\_13\_VAL = 1

else

MEDS\_FC\_WORD\_13\_VAL = 0

end if

**F.4.128.1.2.1.6 PFS Theta Max/Min Delta Validity (Msg 1 Wds 14, 15)**

If MEDS\_FC\_WORD\_8\_VAL = 1 and (MEDS\_MM = 305 or MEDS\_MM = 602 or MEDS\_MM = 603)  
then

If (MACH <= 2.0) and ((GC\_A/I/F\_FB = INH) or D\_DILEMMA) then do

MEDS\_FC\_WORD\_14\_VAL = 1

MEDS\_FC\_WORD\_15\_VAL = 1

end

else do

MEDS\_FC\_WORD\_14\_VAL = 0

MEDS\_FC\_WORD\_15\_VAL = 0

end

else

MEDS\_FC\_WORD\_14\_VAL = 0

MEDS\_FC\_WORD\_15\_VAL = 0

end if

**F.4.128.1.2.1.7 PFS ADI Error Scale Labels & Status Indicators (ADI Attitude Sel, Auto/Man Indicators) Validity (Msg 1 Wds 16-21)**

If MEDS\_FC\_WORD\_8\_VAL = 1 and (MEDS\_MM=101 or MEDS\_MM=102 or MEDS\_MM=103 or MEDS\_MM=104 or MEDS\_MM=105 or MEDS\_MM=106 or MEDS\_MM=601 or MEDS\_MM=602 or MEDS\_MM=603 or MEDS\_MM=301 or MEDS\_MM=302 or MEDS\_MM=303 or MEDS\_MM=304 or MEDS\_MM=305) then

MEDS\_FC\_WORD\_16\_VAL = MEDS\_FC\_WORD\_17\_VAL = 1  
MEDS\_FC\_WORD\_18\_VAL = MEDS\_FC\_WORD\_19\_VAL = 1  
MEDS\_FC\_WORD\_20\_VAL = MEDS\_FC\_WORD\_21\_VAL = 1

else

MEDS\_FC\_WORD\_16\_VAL = MEDS\_FC\_WORD\_17\_VAL = 0  
MEDS\_FC\_WORD\_18\_VAL = MEDS\_FC\_WORD\_19\_VAL = 0  
MEDS\_FC\_WORD\_20\_VAL = MEDS\_FC\_WORD\_21\_VAL = 0

end if

**F.4.128.1.2.1.8 PFS CDI Scale Validity (Msg 1 Wd 22)**

If NAV\_INIT\_FLAG = True and MEDS\_FC\_WORD\_8\_VAL = 1 and (MEDS\_MM=101 or MEDS\_MM=102 or MEDS\_MM=103 or MEDS\_MM=104) then

MEDS\_FC\_WORD\_22\_VAL = 1

else

MEDS\_FC\_WORD\_22\_VAL = 0

end if

**F.4.128.1.2.1.9 PFS Delta Azimuth Validity (Msg 1 Wd 23)**

If MEDS\_FC\_WORD\_8\_VAL = 1 then

If TAL\_ABORT\_DECLARED = 1 and MEDS\_MM=103 then

MEDS\_FC\_WORD\_23\_VAL = 1

else if TAL\_DECLARED\_IN\_103 = 1 and MEDS\_MM = 104 and  
TAL\_ABORT\_DECLARED = 1 then

MEDS\_FC\_WORD\_23\_VAL = 1

else if MEDS\_MM=601 or MEDS\_MM=602 or MEDS\_MM=304 then

MEDS\_FC\_WORD\_23\_VAL = 1

else if IPHASE < 2 and (MEDS\_MM=305 or MEDS\_MM=603) then

MEDS\_FC\_WORD\_23\_VAL = 1

else

MEDS\_FC\_WORD\_23\_VAL = 0

end if

else

MEDS\_FC\_WORD\_23\_VAL = 0

end if

**F.4.128.1.2.1.10 PFS HSI Relative Velocity Heading Validity (Msg 1 Wd 24)**

If MEDS\_FC\_WORD\_8\_VAL = 1 and (MEDS\_MM=102 or MEDS\_MM=103 or MEDS\_MM=601)  
and MEDS\_BETAHVR\_VALID = 1 then

MEDS\_FC\_WORD\_24\_VAL = 1

else

MEDS\_FC\_WORD\_24\_VAL = 0

end if

**F.4.128.1.2.1.11 PFS HSI Runway Range Label Validity (Msg 1 Wds 25-27)**

If MEDS\_FC\_WORD\_8\_VAL = 1 and ((TAL\_ABORT\_DECLARED = 1 and (MEDS\_MM=103 or MEDS\_MM=104)) or MEDS\_MM=601 or MEDS\_MM=602 or MEDS\_MM=603 or MEDS\_MM=304 or MEDS\_MM=305) then

MEDS\_FC\_WORD\_25\_VAL = MEDS\_FC\_WORD\_26\_VAL = 1

MEDS\_FC\_WORD\_27\_VAL = 1

else

MEDS\_FC\_WORD\_25\_VAL = MEDS\_FC\_WORD\_26\_VAL = 0

MEDS\_FC\_WORD\_27\_VAL = 0

end if

**F.4.128.1.2.1.12 PFS Target Nz Validity (Msg 1 Wd 28)**

If MEDS\_FC\_WORD\_8\_VAL = 1 and (MEDS\_MM=602) and (IPHASE ≥ 5) and (DGRNZT ≠ 0) then

MEDS\_FC\_WORD\_28\_VAL = 1

else

MEDS\_FC\_WORD\_28\_VAL = 0

end if

**F.4.128.1.2.1.13 PFS Beta Readout Validity (Msg 1 Wd 29)**

If MEDS\_FC\_WORD\_8\_VAL = 1 and (MEDS\_MM=102 or MEDS\_MM=103 or MEDS\_MM=601) and MEDS\_BETAHVR\_VALID = 1 then

MEDS\_FC\_WORD\_29\_VAL = 1

else

MEDS\_FC\_WORD\_29\_VAL = 0

end if

**F.4.128.1.2.1.14 PFS Delta Inclination Readout Validity (Msg 1 Wd 30)**

If TAL\_ABORT\_DECLARED=False and MEDS\_FC\_WORD\_8\_VAL = 1 and (MEDS\_MM=102 or MEDS\_MM=103 or MEDS\_MM=104) then

MEDS\_FC\_WORD\_30\_VAL = 1

else

MEDS\_FC\_WORD\_30\_VAL = 0

end if

**F.4.128.1.2.1.15 PFS Cross Track Readout Validity (Msg 2 Wd 1)**

If MEDS\_FC\_WORD\_8\_VAL = 1 and (MEDS\_MM=102 or MEDS\_MM=103 or (MEDS\_MM=104 and (TAL\_ABORT\_DECLARED = 0 or TAL\_DECLARED\_IN\_103 = 1))) then

MEDS\_FC\_MSG2\_WORD\_1\_VAL = 1

else

MEDS\_FC\_MSG2\_WORD\_1\_VAL = 0

end if

**F.4.128.1.2.1.16 PFS Cross Track Deviation Readout Validity (Msg 2 Wd 2)**

```
If MEDS_FC_WORD_8_VAL = 1 and TAL_ABORT_DECLARED = 1 and MEDS_MM=103 then
    MEDS_FC_MSG2_WORD_2_VAL = 1
else if TAL_DECLARED_IN_103 = 1 and MEDS_MM = 104 and TAL_ABORT_DECLARED = 1 and
MEDS_FC_WORD_8_VAL = 1 then
    MEDS_FC_MSG2_WORD_2_VAL = 1
else
    MEDS_FC_MSG2_WORD_2_VAL = 0
end if
```

**F.4.128.1.2.1.17 PFS Target Inclination Readout Validity (Msg 2 Wd 3)**

```
If S_ATO = True and MEDS_FC_WORD_8_VAL = 1 and (MEDS_MM=103) then
    MEDS_FC_MSG2_WORD_3_VAL = 1
else if MEDS_FC_WORD_8_VAL = 1 and ATO_DECLARED_IN_103 = 1 and MEDS_MM = 104 and
S_ATO = True then
    MEDS_FC_MSG2_WORD_3_VAL = 1
else
    MEDS_FC_MSG2_WORD_3_VAL = 0
end if
```

**F.4.128.1.2.2 BFS Validity Bit Determination**

Validity bit determination shall be performed in the order defined by Section F.4.128.1.2.2.

**F.4.128.1.2.2.1 BFS Major Mode Validity (Msg 1 Wd 8)**

The Major Mode validity bit is always on:  
MEDS\_FC\_WORD\_8\_VAL = 1  
and will not be set off by BFS.

**F.4.128.1.2.2.2 BFS Abort Mode, PPA and Roll Switch Flags Validity (Msg 1 Wd 9)**

```
If MM_CODE = 102 or MM_CODE = 103 or MM_CODE = 104 or MM_CODE = 105
or MM_CODE = 106 or MM_CODE = 301 or MM_CODE = 302 or MM_CODE = 303
or MM_CODE = 304 or MM_CODE = 305 or MM_CODE = 601 or MM_CODE = 602
or MM_CODE = 603 then
    MEDS_FC_WORD_9_VAL = 1
else
    MEDS_FC_WORD_9_VAL = 0
end if
```

An internal variable, TAL\_DECLARED\_IN\_103, shall be computed for subsequent validity determination for BFS Delta Azimuth, BFS Crosstrack Readout, and BFS Crosstrack Deviation Readout.

```
If MM_CODE = 103 then
    If S_TAL = True then
        TAL_DECLARED_IN_103 = 1
    else
        TAL_DECLARED_IN_103 = 0
    end if
end if
```

An internal variable, ATO\_DECLARED\_IN\_103, shall be computed for subsequent validity determination for BFS Target Inclination Readout.

```
If MM_CODE = 103 then
    If S_ATO = 1 then
        ATO_DECLARED_IN_103 = 1
    else
        ATO_DECLARED_IN_103 = 0
    end if
end if
```

#### **F.4.128.1.2.2.3 BFS Guidance Phase Validity (Msg 1 Wds 10, 11)**

The Guidance Phase Indicator for TAEM (PFS only) validity bit is always off:

```
MEDS_FC_WORD_10_VAL = 0
and will not be set on by BFS.
```

Set BFS Guidance Phase Indicator validity bit:

```
If MM_CODE = 304 or MM_CODE = 305 or MM_CODE = 602 or MM_CODE = 603, then
    MEDS_FC_WORD_11_VAL = 1
else
    MEDS_FC_WORD_11_VAL = 0
end if
```

#### **F.4.128.1.2.2.4 BFS TAEM Guidance End and WOWLON Validity (Msg 1 Wd 12)**

```
If MM_CODE = 305 or MM_CODE = 603, then
    MEDS_FC_WORD_12_VAL = 1
else
    MEDS_FC_WORD_12_VAL = 0
end if
```

#### **F.4.128.1.2.2.5 BFS HSI Mode Indicator Validity (Msg 1 Wd 13)**

```
If [MM_CODE = 304 or MM_CODE = 305 or MM_CODE = 602 or MM_CODE = 603] and
HSI_MODE_INDICATOR > 0, then
    MEDS_FC_WORD_13_VAL = 1
else
    MEDS_FC_WORD_13_VAL = 0
end if
```



**F.4.128.1.2.2.6 BFS Theta Max/Min Delta Validity (Msg 1 Wds 14,15)**

The Theta Max/Min Delta (PFS only) validity bits are always off:

MEDS\_FC\_WORD\_14\_VAL = 0  
MEDS\_FC\_WORD\_15\_VAL = 0  
and will not be set on by BFS.

**F.4.128.1.2.2.7 BFS ADI Error Scale Labels & Status Indicators (ADI Attitude Sel, Auto/Man Indicators) Validity (Msg 1 Wds 16-21)**

If (MM\_CODE=102 or MM\_CODE=103 or MM\_CODE=104 or MM\_CODE=105 or MM\_CODE=106 or MM\_CODE=601 or MM\_CODE=602 or MM\_CODE=603 or MM\_CODE=301 or MM\_CODE=302 or MM\_CODE=303 or MM\_CODE=304 or MM\_CODE=305) and M\_DDUGOOD = True then

MEDS\_FC\_WORD\_16\_VAL = MEDS\_FC\_WORD\_17\_VAL = 1  
MEDS\_FC\_WORD\_18\_VAL = MEDS\_FC\_WORD\_19\_VAL = 1  
MEDS\_FC\_WORD\_20\_VAL = MEDS\_FC\_WORD\_21\_VAL = 1

else

MEDS\_FC\_WORD\_16\_VAL = MEDS\_FC\_WORD\_17\_VAL = 0  
MEDS\_FC\_WORD\_18\_VAL = MEDS\_FC\_WORD\_19\_VAL = 0  
MEDS\_FC\_WORD\_20\_VAL = MEDS\_FC\_WORD\_21\_VAL = 0

end if

**F.4.128.1.2.2.8 BFS CDI Scale Validity (Msg 1 Wd 22)**

If MM\_CODE=102 or MM\_CODE=103 or MM\_CODE=104 then

MEDS\_FC\_WORD\_22\_VAL = 1

else

MEDS\_FC\_WORD\_22\_VAL = 0

end if

**F.4.128.1.2.2.9 BFS Delta Azimuth Validity (Msg 1 Wd 23)**

If (S\_TAL=True and (MM\_CODE=103 or (MM\_CODE=104 and TAL\_DECLARED\_IN\_103 = 1))) or MM\_CODE=601 or MM\_CODE=602 or MM\_CODE=304 or ((ISLECT\_GUID = 6 or ISLECT\_GUID = 7) and (MM\_CODE=305 or MM\_CODE=603)) then

MEDS\_FC\_WORD\_23\_VAL = 1

else

MEDS\_FC\_WORD\_23\_VAL = 0

end if

**F.4.128.1.2.2.10 BFS HSI Relative Velocity Heading Validity (Msg 1 Wd 24)**

If (MM\_CODE=102 or MM\_CODE=103 or MM\_CODE=601) and MBHVRVAL = 1 then

MEDS\_FC\_WORD\_24\_VAL = 1

else

MEDS\_FC\_WORD\_24\_VAL = 0

end if

**F.4.128.1.2.2.11 BFS HSI Runway Range Label Validity (Msg 1 Wds 25-27)**

If (S\_TAL = True and (MM\_CODE=103 or MM\_CODE =104)) or MM\_CODE=601 or MM\_CODE=602 or MM\_CODE=603 or MM\_CODE=304 or MM\_CODE=305 then

MEDS\_FC\_WORD\_25\_VAL = MEDS\_FC\_WORD\_26\_VAL = 1

MEDS\_FC\_WORD\_27\_VAL = 1

else

MEDS\_FC\_WORD\_25\_VAL = MEDS\_FC\_WORD\_26\_VAL = 0

MEDS\_FC\_WORD\_27\_VAL = 0

end if

**F.4.128.1.2.2.12 BFS Target Nz Validity (Msg 1 Wd 28)**

If MM\_CODE=602 and (ISLECT\_GUID = 10 or ISLECT\_GUID = 11) and DGRNZT ≠ 0 then

MEDS\_FC\_WORD\_28\_VAL = 1

else

MEDS\_FC\_WORD\_28\_VAL = 0

end if

**F.4.128.1.2.2.13 BFS Beta Readout Validity (Msg 1 Wd 29)**

If (MM\_CODE=102 or MM\_CODE=103 or MM\_CODE=601) and MBHVRVAL = 1 then

MEDS\_FC\_WORD\_29\_VAL = 1

else

MEDS\_FC\_WORD\_29\_VAL = 0

end if

**F.4.128.1.2.2.14 BFS Delta Inclination Readout Validity (Msg 1 Wd 30)**

If S\_TAL=False and (MM\_CODE=102 or MM\_CODE=103 or MM\_CODE=104) then

MEDS\_FC\_WORD\_30\_VAL = 1

else

MEDS\_FC\_WORD\_30\_VAL = 0

end if

**F.4.128.1.2.2.15 BFS Cross Track Readout Validity (Msg 2 Wd 1)**

If MM\_CODE=102 or MM\_CODE =103 or (MM\_CODE=104 and (S\_TAL = False or TAL\_DECLARED\_IN\_103 = 1)) then

MEDS\_FC\_MSG2\_WORD\_1\_VAL = 1

else

MEDS\_FC\_MSG2\_WORD\_1\_VAL = 0

end if

**F.4.128.1.2.2.16 BFS Cross Track Deviation Readout Validity (Msg 2 Wd 2)**

If S\_TAL = True and (MM\_CODE=103 or (MM\_CODE=104 and TAL\_DECLARED\_IN\_103 = 1)) then

MEDS\_FC\_MSG2\_WORD\_2\_VAL = 1

else

MEDS\_FC\_MSG2\_WORD\_2\_VAL = 0

end if

#### F.4.128.1.2.2.17 BFS Target Inclination Readout Validity (Msg 2 Wd 3)

```
If S_ATO = True and (MM_CODE = 103 or (MM_CODE = 104 and ATO_DECLARED_IN_103 = 1))
then
    MEDS_FC_MSG2_WORD_3_VAL = 1
else
    MEDS_FC_MSG2_WORD_3_VAL = 0
end if
```

#### F.4.128.1.3 MEDS FC BUS GNC DATA TRANSFER Data Conversions

The IDD indicates the GNC parameters which are required to support the MEDS FC Bus GNC Data Transfer. The MEDS FC Bus GNC Data Transfer performs the conversions and scaling required to transform the GNC inputs into the 16-bit words to be sent to the MEDS IDP. This section describes the processing requirements (fetch, convert, scale, limit, etc.) for the data to be sent in this transfer.

#### F.4.128.1.3.1 PFS Processing Requirements

##### F.4.128.1.3.1.1 PFS Major Mode Processing (Msg 1 Wd 8)

An integer representing the current Major Mode shall be determined based on the MM flags from MSC:

```
If MM_CODE_101 = 1 then
    MEDS_MM = 101
If MM_CODE_102 = 1 then
    MEDS_MM = 102
If MM_CODE_103 = 1 then
    MEDS_MM = 103
If MM_CODE_104 = 1 then
    MEDS_MM = 104
If MM_CODE_105 = 1 then
    MEDS_MM = 105
If MM_CODE_106 = 1 then
    MEDS_MM = 106
If MM_CODE_201 = 1 then
    MEDS_MM = 201
If MM_202_FROM_MM_201_FLAG = 1 then
    MEDS_MM = 202
If MM_CODE_301 = 1 then
    MEDS_MM = 301
If MM_CODE_302 = 1 then
    MEDS_MM = 302
If MM_CODE_303 = 1 then
    MEDS_MM = 303
If MM_CODE_304 = 1 then
    MEDS_MM = 304
If MM_CODE_305 = 1 then
    MEDS_MM = 305
```

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```
If MM_CODE_601 = 1 then
    MEDS_MM = 601
If MM_CODE_602 = 1 then
    MEDS_MM = 602
If MM_CODE_603 = 1 then
    MEDS_MM = 603
If MM_801_FROM_MM_201 = 1 then
    MEDS_MM = 801
```

Note: MEDS\_MM only transitions from one value to another after all flight control processing has transitioned to the new Major Mode. The timing of MEDS\_MM transition will not exactly correspond to initial availability of the functional data which is calculated in that Major Mode.

**F.4.128.1.3.1.2 PFS Abort Mode, PPA, Roll Switch and EO Yaw Steering Flags Processing (Msg 1 Wd 9)**

Via various flag words, the MEDS FC GNC XFER shall provide phase indicators by setting or zeroing various bits in the flag words, as follows:

```
MEDS_CA_ABORT_DECLARED = GLIDE_RTLS_INHIBIT
MEDS_RTLS_ABORT_DECLARED = RTLS_ABORT_DECLARED
MEDS_AOA_ABORT_DECLARED = S_AOA
MEDS_ATO_ABORT_DECLARED = S_ATO
MEDS_TAL_ABORT_DECLARED = TAL_ABORT_DECLARED
```

```
If MEDS_MM=101 or MEDS_MM=102 or MEDS_MM=103 or MEDS_MM=601 then
    If ROLL_SW = -1 then
        MEDS_ROLL_SW = 1
    else
        MEDS_ROLL_SW = 0
    end if
    LAST_ROLL_SW = MEDS_ROLL_SW
else
    if MEDS_MM=104 then
        MEDS_ROLL_SW = LAST_ROLL_SW
    else
        MEDS_ROLL_SW = 0
    end if
end if
```

```
If MEDS_MM = 601 then
    MEDS_PPA = S_RTLS_TURN
else
    MEDS_PPA = False
end if
```

```
If (MEDS_MM = 102 or MEDS_MM = 103) and (RTLS_ABORT_DECLARED = OFF and S_ATO
= OFF and TAL_ABORT_DECLARED = OFF)
    MEDS_EO_YAW_STEERING_ON = ENGINE_OUT_YAW_STEERING
else
    MEDS_EO_YAW_STEERING_ON = OFF
end if
```

#### **F.4.128.1.3.1.3 PFS Guidance Phase Processing (Msg 1 Wds 10, 11)**

The initial value of IPHASE for OPS 3 is changed to 1 (the initial value of 6 in table F.4.128.1-1 is appropriate for OPS 6 only).

```
If MEDS_MM = 304 then
    MEDS_IPHASE = 1
else
    MEDS_IPHASE = IPHASE
end if
```

MEDS\_ISLECT = ISLECT

#### **F.4.128.1.3.1.4 PFS TAEM Guidance End and WOWLON Processing (Msg 1 Wd 12)**

```
MEDS_TAEM_GUIDANCE_END = TG_END
MEDS_WOWLON = WOWLON_IND
```

#### **F.4.128.1.3.1.5 PFS HSI Mode Indicator Processing (Msg 1 Wd 13)**

```
MEDS_HSI_MODE_LEFT = HSI_MODE_LEFT
MEDS_HSI_MODE_RIGHT = HSI_MODE_RIGHT
```

#### **F.4.128.1.3.1.6 PFS Theta Max/Min Delta Processing (Msg 1 Wds 14, 15)**

The MEDS\_THETA\_MAX\_DELTA and MEDS\_THETA\_MIN\_DELTA values for output are based on THETA (from ATT PROC), THETA\_MAX, and THETA\_MIN (from VERT SIT DIP) and are converted into signed 16-bit integers such that the integer +32760 corresponds to full scale. They shall be computed as follows:

```
THETA_MAX_DELTA_SIN = SIN (RAD_PER_DEG * (THETA_MAX – THETA))
THETA_MIN_DELTA_SIN = SIN (RAD_PER_DEG * (THETA – THETA_MIN))
```

```
MEDS_THETA_MAX_DELTA = 8 * INTEGER (4095 * (THETA_MAX_DELTA_SIN))
MEDS_THETA_MIN_DELTA = 8 * INTEGER (4095 * (THETA_MIN_DELTA_SIN))
```

#### **F.4.128.1.3.1.7 PFS ADI Error Scale Labels & Status Indicators (ADI Attitude Sel, Auto/Man Indicators) Processing (Msg 1 Wds 16-21)**

Left/Right ADI Pitch/Yaw Rate Scale Labels

The Left/Right ADI Pitch/Yaw rate scale label inputs (MEDS\_LADIPR\_SCALE, MEDS\_RADIPR\_SCALE, MEDS\_LADIYR\_SCALE, MEDS\_RADIYR\_SCALE) shall be limited to the acceptable range of the FC Bus transfer data word field (0 to 8191) prior to loading into the FC Bus transfer data word such that if values outside this range occur, the nearest limit value will be used instead.

Let MEDS\_L\_LADIPR\_SCALE = limited MEDS\_LADIPR\_SCALE  
Let MEDS\_L\_RADIPR\_SCALE = limited MEDS\_RADIPR\_SCALE  
Let MEDS\_L\_LADIYR\_SCALE = limited MEDS\_LADIYR\_SCALE  
Let MEDS\_L\_RADIYR\_SCALE = limited MEDS\_RADIYR\_SCALE

#### Left/Right ADI Roll Rate Scale Labels

The Left/Right ADI Roll rate scale label inputs (MEDS\_LADIRR\_SCALE, MEDS\_RADIRR\_SCALE) shall be limited to the acceptable range of the FC Bus transfer data word field (0 to 15) prior to loading into the FC Bus transfer data word such that if values outside this range occur, the nearest limit value will be used instead.

Let MEDS\_L\_LADIRR\_SCALE = limited MEDS\_LADIRR\_SCALE  
Let MEDS\_L\_RADIRR\_SCALE = limited MEDS\_RADIRR\_SCALE

When the ADI Roll rate scale represents time to go to initiate the turn on the HAC, the scale units change from the default of degrees/second to seconds. The MEDS must know when this occurs in order to display the scale label correctly and must also know which side of the scale represents zero. These indicators shall be implemented as flags:

```
If MEDS_MM=305 or MEDS_MM = 603 then
    MEDS_LADIRR_TGOSEC = MEDS_LH_TGOSC_FLAG
    MEDS_RADIRR_TGOSEC = MEDS_RH_TGOSC_FLAG
    If YSGNP > 0 then
        MEDS_ADIRR_0_ON_R = 1
    else
        MEDS_ADIRR_0_ON_R = 0
    end if
else
    MEDS_LADIRR_TGOSEC = MEDS_RADIRR_TGOSEC = 0
    MEDS_ADIRR_0_ON_R = 0
end if
```

#### Left/Right ADI Pitch Error Scale Labels

The Left/Right ADI Pitch Error Scale label inputs (MEDS\_LADIPE\_SCALE, MEDS\_RADIPE\_SCALE) shall be limited to the acceptable range of the FC Bus transfer word field (0 to 255) prior to loading into the FC Bus transfer data word such that if values outside this range occur, the nearest limit value will be used instead.

Note: The 0 to 255 limit corresponds to a limit of 0 to 63.75, LSB = 0.25 for a pre-scaled Left/Right ADI Pitch Error Scale Label.

Let MEDS\_L\_LADIPE\_SCALE = limited MEDS\_LADIPE\_SCALE  
Let MEDS\_L\_RADIPE\_SCALE = limited MEDS\_RADIPE\_SCALE

Status Fields for DAP, Throttle (THROT), PITCH & ROLL/YAW (RY), Speed Brake (SB) and ADI Attitude (ATT) Modes

```
MEDS_SB_AUTO = 1
If MEDS_MM=101 or MEDS_MM=102 or MEDS_MM=103 or MEDS_MM=104 or
MEDS_MM=105 or MEDS_MM=106 or MEDS_MM=601 then
  If ME_ZERO=False then
    MEDS_DAP_PITCH_AUTO = AUTO
    MEDS_THROT_RY_AUTO = NOT(S_MAN_THROT)
    MEDS_THROT_RY_AUTO_BLANK = 0
  else if ME_ZERO = True and (MEDS_MM=601) then
    MEDS_DAP_PITCH_AUTO = AUTO
    MEDS_THROT_RY_AUTO_BLANK = 1
  else
    MEDS_DAP_PITCH_AUTO = AUTO_MODE
    MEDS_THROT_RY_AUTO_BLANK = 1
  end if
else if MEDS_MM=301 or MEDS_MM=302 or MEDS_MM=303 then
  MEDS_DAP_PITCH_AUTO = AUTO_MODE
  MEDS_THROT_RY_AUTO_BLANK = 1
else if MEDS_MM=602 or MEDS_MM=603 or MEDS_MM=304 or MEDS_MM=305 then
  MEDS_DAP_PITCH_AUTO = AUTOP_IND/AUTOP_LAMP
  MEDS_THROT_RY_AUTO_BLANK = 0
  MEDS_THROT_RY_AUTO = AUTORY_IND/AUTORY_LAMP
  MEDS_SB_AUTO = AUTOSB_IND
end if

MEDS_L_ATT_SEL_SW = ATT_SEL_SW(1)
MEDS_R_ATT_SEL_SW = ATT_SEL_SW(2)
```

**F.4.128.1.3.1.8 PFS CDI Scale Processing (Msg 1 Wd 22)**

The CDI Scale label input (CDI\_SCALE) shall be limited to the acceptable range of the FC Bus transfer word field (0 to 511) prior to loading into the FC Bus transfer data word such that if values outside this range occur, the nearest limit value will be used instead.

Let L\_CDI\_SCALE = limited CDI\_SCALE

```
If MEDS_MM=101 or MEDS_MM=102 or MEDS_MM=103 then
  MEDS_CDI_SCALE = L_CDI_SCALE
  LAST_CDI_SCALE = MEDS_CDI_SCALE
else if MEDS_MM=104 then
  MEDS_CDI_SCALE = LAST_CDI_SCALE
end if
```

**F.4.128.1.3.1.9 PFS Delta Azimuth Processing (Msg 1 Wd 23)**

Delta Azimuth Digital Readout (MEDS\_D\_AZ\_OUT)

The Delta Azimuth input, MEDS\_D\_AZ in TAL MM103 & MM601, MEDS\_DELAZ in MM304, MEDS\_DPSAC in MM602, and MM305/MM603 IPHASE 0 & 1 shall be scaled and converted to integer as follows:

```

If MEDS_MM=601 or (TAL_ABORT_DECLARED=True and MEDS_MM=103) then
    MEDS_D_AZ_OUT = INTEGER(DEG_PER_RAD * MEDS_D_AZ)           (LSB=1°)
    LAST_D_AZ = MEDS_D_AZ_OUT
else if TAL_ABORT_DECLARED=True and MEDS_MM=104 then
    MEDS_D_AZ_OUT = LAST_D_AZ
else if MEDS_MM=304 then
    MEDS_D_AZ_OUT = INTEGER(DEG_PER_RAD * MEDS_DELAZ)         (LSB=1°)
else if MEDS_MM=602 then
    MEDS_D_AZ_OUT = INTEGER(MEDS_DPSAC)                       (LSB=1°)
else if (MEDS_MM=305 or MEDS_MM=603) and IPHASE < 2 then
    MEDS_D_AZ_OUT = INTEGER(MEDS_DPSAC)                       (LSB=1°)
end if
    
```

Delta Azimuth Warning Flag (MEDS\_D\_AZ\_WARN)

The Delta Azimuth warning flag shall be calculated as follows:

```

If MEDS_MM=304 and ISLECT ≥ 2 and ABS (ROLLC(1)) > MIN_ROLL_AZ_WARN then
    MEDS_D_AZ_WARN = BANK_FLAG
else
    MEDS_D_AZ_WARN = 0
end if
    
```

**F.4.128.1.3.1.10 PFS HSI Relative Velocity Heading Processing (Msg 1 Wd 24)**

PFS Processing requirements for PFS HSI Relative Velocity Heading (MEDS\_H\_VR) can be found in F.4.104, "HORIZONTAL SITUATION INDICATOR PROCESSING (PFS)".

**F.4.128.1.3.1.11 PFS HSI Runway Range Label Processing (Msg 1 Wds 25-27)**

```

If (TAL_ABORT_DECLARED=True and (MEDS_MM=103 or MEDS_MM = 104)) or
MEDS_MM=601 or MEDS_MM=602 or MEDS_MM=603 or MEDS_MM=304 or MEDS_MM=305
then
    MEDS_P_RANGE_LABEL_CHAR1 = first character of SEL_SITE_ID
    MEDS_P_RANGE_LABEL_CHAR2 = second character of SEL_SITE_ID
    MEDS_P_RANGE_LABEL_CHAR3 = third character of SEL_SITE_ID
    MEDS_P_RANGE_LABEL_CHAR4 = fourth character of SEL_SITE_ID
    MEDS_P_RANGE_LABEL_CHAR5 = fifth character of SEL_SITE_ID
end if
    
```



#### F.4.128.1.3.1.12 PFS Target Nz Processing (Msg 1 Wd 28)

The target Nz input, DGRNZT, shall be limited to the acceptable range of the FC bus transfer data word field (-5.0 to +10 g's) prior to scaling such that if values outside this range occur, the nearest limit value will be used instead. The limited parameter shall be scaled and converted to integer as follows (note: identical to AMI\_PROC Left/Right AMI Vehicle Acceleration):

Let LDGRNZT = limited DGRNZT

If  $-5.0 \leq \text{LDGRNZT} \leq 0$  then

$$\text{MEDS\_T\_NZ} = 8 * \text{INTEGER}(\text{LDGRNZT} / 0.00125) \quad (\text{LSB} = 0.00015625 \text{ g's})$$

If  $0 < \text{LDGRNZT} < 10$  then

$$\text{MEDS\_T\_NZ} = 8 * \text{INTEGER}(\text{LDGRNZT} / 0.00250) \quad (\text{LSB} = 0.0003125 \text{ g's})$$

#### F.4.128.1.3.1.13 PFS Beta Readout Processing (Msg 1 Wd 29)

The Beta input, MEDS\_BETA, shall be limited to the acceptable range of the FC bus transfer data word field (-99.9° to +99.9°) prior to scaling and converting such that if values outside this range occur, the nearest limit value will be used instead. The limited parameter shall be scaled and converted to integer as follows:

Let L\_MEDS\_BETA = limited MEDS\_BETA

$$\text{MEDS\_BETA\_OUT} = \text{INTEGER}(\text{L\_MEDS\_BETA} * 10) \quad (\text{LSB} = 0.1^\circ)$$

#### F.4.128.1.3.1.14 PFS Delta Inclination Readout Processing (Msg 1 Wd 30)

The Delta Inclination input, MEDS\_D\_INCL, shall be limited to the acceptable range of the FC bus transfer word (-99.99°/DEG\_PER\_RAD to +99.99°/DEG\_PER\_RAD) prior to scaling and converting such that if values outside this range occur, the nearest limit value will be used instead. The limited parameter shall be scaled and converted to integer as follows:

Let L\_MEDS\_D\_INCL = limited MEDS\_D\_INCL

If TAL\_ABORT\_DECLARED = False then

If MEDS\_MM=102 or MEDS\_MM=103 then

$$\text{MEDS\_D\_INCL\_OUT} = 2 * \text{INTEGER}(\text{DEG\_PER\_RAD} * \text{L\_MEDS\_D\_INCL} * 100) \quad (\text{LSB}=0.005^\circ)$$

$$\text{LAST\_D\_INCL} = \text{MEDS\_D\_INCL\_OUT}$$

else if MEDS\_MM=104 then

$$\text{MEDS\_D\_INCL\_OUT} = \text{LAST\_D\_INCL}$$

end if

end if

**F.4.128.1.3.1.15 PFS Cross Track Readout Processing (Msg 2 Wd 1)**

The Cross Track input, XTRK, shall be scaled and converted to integer as follows:

```

If MEDS_MM=102 or MEDS_MM=103 then
    MEDS_XTRK = INTEGER (XTRK * 10)                (LSB = 0.1 NM)
    LAST_MEDS_XTRK = MEDS_XTRK
else if MEDS_MM=104 then
    MEDS_XTRK = LAST_MEDS_XTRK
end if
    
```

**F.4.128.1.3.1.16 PFS Cross Track Deviation Readout Processing (Msg 2 Wd 2)**

The Cross Track Deviation input, XTRK\_CDI in MM103 following TAL abort declaration, shall be limited to the acceptable range of the FC bus transfer word (-2048 to 2047) prior to scaling and converting such that if values outside this range occur, the nearest limit value will be used instead. The limited parameter shall be scaled and converted to integer as follows:

Let L\_XTRK\_CDI = limited XTRK\_CDI

```

If TAL_ABORT_DECLARED = True then
    If MEDS_MM=103 then
        MEDS_XTRK_DEV = INTEGER(L_XTRK_CDI)        (LSB=1 NM)
        LAST_XTRK_DEV = MEDS_XTRK_DEV
    else if MEDS_MM=104 then
        MEDS_XTRK_DEV = LAST_XTRK_DEV
    end if
end if
    
```

**F.4.128.1.3.1.17 PFS Target Inclination Readout Processing (Msg 2 Wd 3)**

The Target Inclination input, INCL\_TARGET in MM103 following ATO abort declaration, shall be scaled and converted to integer as follows:

```

If S_ATO = True then
    If MEDS_MM=103 then
        MEDS_TGT_INCL = INTEGER(DEG_PER_RAD * INCL_TARGET * 10)
                                                                (LSB=0.1°)
        LAST_TGT_INCL = MEDS_TGT_INCL
    else if MEDS_MM=104 then
        MEDS_TGT_INCL = LAST_TGT_INCL
    end if
end if
    
```

**F.4.128.1.3.2 BFS Processing Requirements**

**F.4.128.1.3.2.1 BFS Major Mode Processing (Msg 1 Wd 8)**

MEDS\_MM = MM\_CODE

**F.4.128.1.3.2.2 BFS Abort Mode, PPA, Roll Switch and EO Yaw Steering Flags Processing (Msg 1 Wd 9)**

MEDS\_RTLS\_ABORT\_DECLARED = S\_RTLS

MEDS\_AOA\_ABORT\_DECLARED = S\_AOA

MEDS\_ATO\_ABORT\_DECLARED = S\_ATO

MEDS\_TAL\_ABORT\_DECLARED = S\_TAL

MEDS\_CA\_ABORT\_DECLARED is always zero (ref. initialization table F.4.128.1-1) and will not be set to one by BFS.

```
If MM_CODE = 601 then
    MEDS_PPA = S_RTLS_TURN
else
    MEDS_PPA = 0
end if
```

```
If MM_CODE=102 or MM_CODE=103 or MM_CODE=601 then
    If ROLL_SW = -1 then
        MEDS_ROLL_SW = 1
    else
        MEDS_ROLL_SW = 0
    end if
    LAST_ROLL_SW = MEDS_ROLL_SW
else if MM_CODE=104 then
    MEDS_ROLL_SW = LAST_ROLL_SW
else
    MEDS_ROLL_SW = 0
end if
```

```
If (MM_CODE = 102 or MM_CODE = 103) and (S_RTLS = OFF and S_ATO = OFF and
S_TAL = OFF)
    MEDS_EO_YAW_STEERING_ON = ENGINE_OUT_YAW_STEERING
else
    MEDS_EO_YAW_STEERING_ON = OFF
end if
```

**F.4.128.1.3.2.3 BFS Guidance Phase Processing (Msg 1 Wds 10, 11)**

MEDS\_ISLECT = ISLECT\_GUID

The Guidance Phase Indicator for TAEM will never be valid for BFS and, therefore, there are no BFS processing requirements for MEDS\_IPHASE.

**F.4.128.1.3.2.4 BFS TAEM Guidance End and WOWLON Processing (Msg 1 Wd 12)**

MEDS\_TAEM\_GUIDANCE\_END = TG\_END

MEDS\_WOWLON = WOWLON\_IND

**F.4.128.1.3.2.5 BFS HSI Mode Indicator Processing (Msg 1 Wd 13)**

MEDS\_HSI\_MODE\_LEFT = HSI\_MODE\_INDICATOR

MEDS\_HSI\_MODE\_RIGHT = HSI\_MODE\_INDICATOR

**F.4.128.1.3.2.6 BFS Theta Max/Min Delta Processing (Msg 1 Wds 14, 15)**

The Theta Max and Min Deltas will never be valid for BFS and, therefore, there are no BFS processing requirements for MEDS\_THETA\_MAX\_DELTA and MEDS\_THETA\_MIN\_DELTA.

**F.4.128.1.3.2.7 BFS ADI Error Scale Labels & Status Indicators (ADI Attitude Sel, Auto/Man Indicators) Processing (Msg 1 Wds 16-21)**

Left/Right ADI Pitch/Yaw Rate Scale Labels

MEDS\_L\_LADIPR\_SCALE = MEDS\_L\_RADIPR\_SCALE = MADIPRS  
MEDS\_L\_LADIYR\_SCALE = MEDS\_L\_RADIYR\_SCALE = MADIYRS

Left/Right ADI Roll Rate Scale Labels

MEDS\_L\_LADIRR\_SCALE = MEDS\_L\_RADIRR\_SCALE = MADIRRS

When the ADI Roll rate scale represents time to go to initiate the turn on the HAC, the scale units change from the default of degrees/second to seconds. The MEDS must know when this occurs in order to display the scale label correctly and must also know which side of the scale represents zero. These indicators shall be implemented as flags as follows:

```
If MM_CODE=305 or MM_CODE=603 then
    MEDS_LADIRR_TGOSEC = MEDS_RADIRR_TGOSEC = MTGOSCF
    If YSGNP > 0 then
        MEDS_ADIRR_0_ON_R = 1
    else
        MEDS_ADIRR_0_ON_R = 0
    end if
else
    MEDS_LADIRR_TGOSEC = MEDS_RADIRR_TGOSEC = 0
end if
```

Left/Right ADI Pitch Error Scale Labels

MEDS\_L\_LADIPE\_SCALE = MEDS\_L\_RADIPE\_SCALE = MADIPES

Status Fields for DAP, Throttle (THROT), PITCH & ROLL/YAW (RY), Speed Brake (SB) and ADI Attitude (ATT) Modes

If MM\_CODE=102 or MM\_CODE=103 or MM\_CODE=104 or MM\_CODE=105 or MM\_CODE=106 or MM\_CODE=601 then

    MEDS\_THROT\_RY\_AUTO\_BLANK = 1

    If AB39\_601\_TO\_602 = False and AS33B\_ZERO\_THRUST = False then

        MEDS\_DAP\_PITCH\_AUTO = 1

    else

        MEDS\_DAP\_PITCH\_AUTO = 0

    end if

else if MM\_CODE=301 or MM\_CODE=302 or MM\_CODE=303 then

    MEDS\_THROT\_RY\_AUTO\_BLANK = 1

    MEDS\_DAP\_PITCH\_AUTO = 0

else

    MEDS\_THROT\_RY\_AUTO\_BLANK = 0

    MEDS\_THROT\_RY\_AUTO = AUTO\_RY\_LAMP

    MEDS\_DAP\_PITCH\_AUTO = AUTO\_P\_LAMP

    MEDS\_SB\_AUTO = AUTO\_SB\_LAMP

end if

If ATT\_SEL\_SW = -1 then

    MEDS\_L\_ATT\_SEL\_SW = MEDS\_R\_ATT\_SEL\_SW = 1

else if ATT\_SEL\_SW = 0 then

    MEDS\_L\_ATT\_SEL\_SW = MEDS\_R\_ATT\_SEL\_SW = 2

else if ATT\_SEL\_SW = 1 then

    MEDS\_L\_ATT\_SEL\_SW = MEDS\_R\_ATT\_SEL\_SW = 3

end if

**F.4.128.1.3.2.8 BFS CDI Scale Processing (Msg 1 Wd 22)**

If MM\_CODE=102 or MM\_CODE=103 then

    MEDS\_CDI\_SCALE = CDI\_SCALE

    LAST\_CDI\_SCALE = MEDS\_CDI\_SCALE

else if MM\_CODE=104 then

    MEDS\_CDI\_SCALE = LAST\_CDI\_SCALE

end if

**F.4.128.1.3.2.9 BFS Delta Azimuth Processing (Msg 1 Wd 23)**

Delta Azimuth Digital Readout (MEDS\_D\_AZ\_OUT)

The Delta Azimuth input (MEDS\_D\_AZ in TAL MM103 & MM601; MEDS\_DELAZ in MM304; MEDS\_DPSAC in MM602 or in MM305/MM603 ISLECT\_GUID 6 & 7) shall be scaled and converted to integer as follows:

```

If MM_CODE=601 or (S_TAL=True and MM_CODE=103) then
    MEDS_D_AZ_OUT = INTEGER(RAD_TO_DEG * MEDS_D_AZ)           (LSB=1°)
    LAST_D_AZ = MEDS_D_AZ_OUT
else if S_TAL=True and MM_CODE=104 and TAL_DECLARED_IN_103 = 1 then
    MEDS_D_AZ_OUT = LAST_D_AZ
else if MM_CODE=304 then
    MEDS_D_AZ_OUT = INTEGER(MEDS_DELAZ)                       (LSB=1°)
else if MM_CODE=602 then
    MEDS_D_AZ_OUT = INTEGER(MEDS_DPSAC)                       (LSB=1°)
else if MM_CODE=305 or MM_CODE=603 then
    If ISLECT_GUID = 6 or ISLECT_GUID = 7 then
        MEDS_D_AZ_OUT = INTEGER(MEDS_DPSAC)                   (LSB=1°)
    end if
end if
end if

```

Delta Azimuth Warning Flag (MEDS\_D\_AZ\_WARN)

```

If MM_CODE=304 and (ISLECT_GUID = 2 or ISLECT_GUID = 3 or ISLECT_GUID = 4 or
ISLECT_GUID = 5) and ABS (ROLLC(1)) > MIN_ROLL_AZ_WARN then
    MEDS_D_AZ_WARN = BANK_FLAG
else
    MEDS_D_AZ_WARN = 0
end if

```

**F.4.128.1.3.2.10 BFS HSI Relative Velocity Heading Processing (Msg 1 Wd 24)**

MEDS\_H\_VR = MEDSHVR

**F.4.128.1.3.2.11 BFS HSI Runway Range Label Processing (Msg 1 Wds 25-27)**

```

If (S_TAL=True and (MM_CODE=103 or MM_CODE = 104)) or MM_CODE=601 or
MM_CODE=602 or MM_CODE=603 or MM_CODE=304 or MM_CODE=305 then
    MEDS_P_RANGE_LABEL_CHAR1 = first character of SEL_SITE_ID
    MEDS_P_RANGE_LABEL_CHAR2 = second character of SEL_SITE_ID
    MEDS_P_RANGE_LABEL_CHAR3 = third character of SEL_SITE_ID
    MEDS_P_RANGE_LABEL_CHAR4 = fourth character of SEL_SITE_ID
    MEDS_P_RANGE_LABEL_CHAR5 = fifth character of SEL_SITE_ID
end if

```

**F.4.128.1.3.2.12 BFS Target Nz Processing (Msg 1 Wd 28)**

The target Nz input, DGRNZT, shall be scaled and converted to integer as follows (note: identical to DDPF AMIACC scaling and integer conversion):

```

If DGRNZT < 0 then
    MEDS_T_NZ = INTEGER ([ -32000, 6400 * DGRNZT, 32000 ] MVS) (LSB = 0.00015625 g's)
else
    MEDS_T_NZ =INTEGER ([ -32000, 3200 * DGRNZT, 32000 ] MVS) (LSB = 0.0003125 g's)
end if

```

**F.4.128.1.3.2.13 BFS Beta Readout Processing (Msg 1 Wd 29)**

The Beta input, MEDS\_BETA, shall be limited to the acceptable range of the FC bus transfer data word field ( $-99.9^\circ$  to  $+99.9^\circ$ ) prior to scaling and converting such that if values outside this range occur, the nearest limit value will be used instead. The limited parameter shall be scaled and converted to integer as follows:

Let L\_MEDS\_BETA = limited MEDS\_BETA  
MEDS\_BETA\_OUT = INTEGER (L\_MEDS\_BETA \* 10) (LSB =  $0.1^\circ$ )

**F.4.128.1.3.2.14 BFS Delta Inclination Readout Processing (Msg 1 Wd 30)**

The Delta Inclination input, MEDS\_D\_INCL, shall be limited to the acceptable range of the FC bus transfer word ( $-99.99^\circ * \text{DEG\_TO\_RAD}$  to  $+99.99^\circ * \text{DEG\_TO\_RAD}$ ) prior to scaling and converting such that if values outside this range occur, the nearest limit value will be used instead. The limited parameter shall be scaled and converted to integer as follows:

Let L\_MEDS\_D\_INCL = limited MEDS\_D\_INCL

If S\_TAL = False then

    If MM\_CODE=102 or MM\_CODE=103 then

        MEDS\_D\_INCL\_OUT = 2 \* INTEGER(RAD\_TO\_DEG \* L\_MEDS\_D\_INCL \* 100)  
        (LSB= $0.005^\circ$ )

        LAST\_D\_INCL = MEDS\_D\_INCL\_OUT

    else if MM\_CODE=104 then

        MEDS\_D\_INCL\_OUT = LAST\_D\_INCL

    end if

end if

**F.4.128.1.3.2.15 BFS Cross Track Readout Processing (Msg 2 Wd 1)**

The Cross Track input, XTRK, shall be limited to the acceptable range of the FC bus transfer word ( $-3276.8 \text{ NM}$  to  $3276.7 \text{ NM}$ ) prior to scaling and converting to integer as follows:

Let L\_XTRK = limited XTRK

If MM\_CODE=102 or MM\_CODE=103 then

    MEDS\_XTRK = INTEGER (L\_XTRK \* 10) (LSB = 0.1 NM)

    LAST\_MEDS\_XTRK = MEDS\_XTRK

else if MM\_CODE=104 and (S\_TAL = False or TAL\_DECLARED\_IN\_103 = 1) then

    MEDS\_XTRK = LAST\_MEDS\_XTRK

end if

**F.4.128.1.3.2.16 BFS Cross Track Deviation Readout Processing (Msg 2 Wd 2)**

The Cross Track Deviation input, XTRK\_CDI in MM103 following TAL abort declaration, shall be limited to the acceptable range of the FC bus transfer word ( $-2048$  to  $2047$ ) prior to scaling and converting such that if values outside this range occur, the nearest limit value will be used instead. The limited parameter shall be scaled and converted to integer as follows:

Let L\_XTRK\_CDI = limited XTRK\_CDI

```

If S_TAL = True then
  If MM_CODE=103 then
    MEDS_XTRK_DEV = INTEGER(L_XTRK_CDI)           (LSB=1 NM)
    LAST_XTRK_DEV = MEDS_XTRK_DEV
  else if MM_CODE=104 and TAL_DECLARED_IN_103 = 1 then
    MEDS_XTRK_DEV = LAST_XTRK_DEV
  end if
end if

```

**F.4.128.1.3.2.17 BFS Target Inclination Readout Processing (Msg 2 Wd 3)**

The Target Inclination input, INCL\_TARGET in MM103 following ATO abort declaration, shall be scaled and converted to an integer as follows:

```

If S_ATO = True then
  If MM_CODE=103 then
    MEDS_TGT_INCL = INTEGER(RAD_TO_DEG * INCL_TARGET * 10)
                                                                (LSB=0.1°)
    LAST_TGT_INCL = MEDS_TGT_INCL
  else if MM_CODE=104 and ATO_DECLARED_IN_103 = 1 then
    MEDS_TGT_INCL = LAST_TGT_INCL
  end if
end if

```

**F.4.128.1.4 Time Consistency Requirements**

This section defines requirements for time consistency between outputs to MEDS by the MEDS FC GNC Transfer and outputs of other principal functions. For the purposes of MEDS data transfer, any data that are collected for output to MEDS IDP within 0.5 seconds of each other are considered time consistent. (0.5 Value was selected based on human factors with crew agreement.) Computation rates are defined by the parameter's source principal function.

**F.4.128.1.4.1 PFS Time Consistency**

MEDS HSI Parameter Time Consistency

1. MEDS\_HSI\_MODE\_LEFT, and MEDS\_HSI\_MODE\_RIGHT shall be time consistent with the following Ascent Area Nav (FSSR STS-83-0005, section 4.7) and Entry Area Nav (FSSR STS-83-0004, section 4.7) parameters that are output to the MEDS IDP via the HSI PROC.

BRG\_FLAG\_LEFT/RIGHT, CDI\_FLAG\_LEFT/RIGHT, CDI\_LEFT/RIGHT,  
 GSI\_FLAG\_LEFT/RIGHT, GSI\_LEFT/RIGHT, HDG\_FLAG\_LEFT/RIGHT,  
 HEADING\_LEFT/RIGHT, PRIBEAR\_LEFT/RIGHT, PRIRANGE\_LEFT/RIGHT,  
 SECBEAR\_LEFT/RIGHT, and SECRANGE\_LEFT/RIGHT.

2. MEDS\_CDI\_SCALE and MEDS\_H\_VR shall be time consistent with the following HSI PROC (FSSR STS-83-0020V3, section F.4.104) parameters that are output to the MEDS IDP.

HLWORD1, HLWORD3, HLWORD4, HLWORD5, HLWORD6, HLWORD7, HLWORD8,  
 HLWORD9, HLWORD10, HRWORD1, HRWORD3, HRWORD4, HRWORD5, HRWORD6,  
 HRWORD7, HRWORD8, HRWORD9, and HRWORD10.



MEDS THETA MAX/MIN DELTA Time Consistency

MEDS\_THETA\_MAX\_DELTA and MEDS\_THETA\_MIN\_DELTA shall be time consistent with the corresponding Ascent/Entry ATT PROC pitch angle data output to the DDU via the Entry/Landing ADI Proc.

Applicable Ascent/Entry ATT PROC parameters (see FSSR STS 83-0008V1, section 4.6) are PTCHSINE(1), PTCHSINE(2), PTCHCOS(1), and PTCHCOS(2).

**F.4.128.1.4.2 BFS Time Consistency**

MEDS HSI Parameter Time Consistency

MEDS\_HSI\_MODE\_LEFT, MEDS\_HSI\_MODE\_RIGHT, MEDS\_CDI\_SCALE, MEDS\_H\_VR, MEDS\_EO\_YAW\_STEERING\_ON, MEDS\_BETA\_OUT, and MEDS\_D\_AZ\_OUT shall be time consistent with corresponding Ascent and Entry Area Nav parameters that are output to the MEDS IDP via the DDPF (HSI).

Applicable DDPF HSI parameters (see BSS PRD MG038101 section 3.5.2.2.4) are: HSIVAL, HSISCRS, HSIHEAD, HSIPBEAR, HSISBEAR, HSIPDIST, HSISDIST, HSICDI, and HSIGSD.

Table F.4.128.1-1. MEDS FC BUS GNC DATA TRANSFER INITIALIZATION REQUIREMENTS*			
NAME	DESCRIPTION	INITIAL VALUE	
		PFS	BFS
MEDS_FC_XFER_IS_PFS	Indication of source of data	1	0
MEDS_FC_WORD_7_VAL	Word 7 validity bit (1 = valid)	1	1
MEDS_FC_WORD_8_VAL	Word 8 validity bit (1 = valid)	0	1
MEDS_FC_WORD_9_VAL	Word 9 validity bit (1 = valid)	0	0
MEDS_FC_WORD_10_VAL	Word 10 validity bit (1 = valid)	0	0
MEDS_FC_WORD_11_VAL	Word 11 validity bit (1 = valid)	0	0
MEDS_FC_WORD_12_VAL	Word 12 validity bit (1 = valid)	0	0
MEDS_FC_WORD_13_VAL	Word 13 validity bit (1 = valid)	0	0
MEDS_FC_WORD_14_VAL	Word 14 validity bit (1 = valid)	0	0
MEDS_FC_WORD_15_VAL	Word 15 validity bit (1 = valid)	0	0
MEDS_FC_WORD_16_VAL	Word 16 validity bit (1 = valid)	0	0
MEDS_FC_WORD_17_VAL	Word 17 validity bit (1 = valid)	0	0
MEDS_FC_WORD_18_VAL	Word 18 validity bit (1 = valid)	0	0
MEDS_FC_WORD_19_VAL	Word 19 validity bit (1 = valid)	0	0
MEDS_FC_WORD_20_VAL	Word 20 validity bit (1 = valid)	0	0
MEDS_FC_WORD_21_VAL	Word 21 validity bit (1 = valid)	0	0
MEDS_FC_WORD_22_VAL	Word 22 validity bit (1 = valid)	0	0
MEDS_FC_WORD_23_VAL	Word 23 validity bit (1 = valid)	0	0
MEDS_FC_WORD_24_VAL	Word 24 validity bit (1 = valid)	0	0
MEDS_FC_WORD_25_VAL	Word 25 validity bit (1 = valid)	0	0
MEDS_FC_WORD_26_VAL	Word 26 validity bit (1 = valid)	0	0
MEDS_FC_WORD_27_VAL	Word 27 validity bit (1 = valid)	0	0
MEDS_FC_WORD_28_VAL	Word 28 validity bit (1 = valid)	0	0
MEDS_FC_WORD_29_VAL	Word 29 validity bit (1 = valid)	0	0
MEDS_FC_WORD_30_VAL	Word 30 validity bit (1 = valid)	0	0
MEDS_FC_MSG2_WORD_1_VAL	Msg2 Word 1 validity bit (1 = valid)	0	0
MEDS_FC_MSG2_WORD_2_VAL	Msg2 Word 2 validity bit (1 = valid)	0	0
MEDS_FC_MSG2_WORD_3_VAL	Msg2 Word 3 validity bit (1 = valid)	0	0
MEDS_ROLL_SW	HSI Heads-down Flag (1 = heads-down)	0	0
MEDS_PPA	RTLS PPA Flag	0	0
MEDS_MM	Major Mode	0	0
MEDS_CA_ABORT_DECLARED	CA Abort Declared Flag	0	0
MEDS_RTLS_ABORT_DECLARED	RTLS Abort Declared Flag	0	0
MEDS_AOA_ABORT_DECLARED	AOA Abort Declared Flag	0	0
MEDS_ATO_ABORT_DECLARED	ATO Abort Declared Flag	0	0
MEDS_TAL_ABORT_DECLARED	TAL Abort Declared Flag	0	0
MEDS_IPHASE	Guidance Phase Indicator for TAEM / GRTLS TAEM	6***	0
MEDS_ISLECT	Guidance Phase Indicator for Entry	1	0
MEDS_TAEM_GUIDANCE_END	TAEM Guidance End Indicator	0	0
MEDS_WOWLON	Weight on Main Gear Indicator	0	0
MEDS_HSI_MODE_LEFT	HSI Mode Indicator - left	1	0
MEDS_HSI_MODE_RIGHT	HSI Mode Indicator - right	1	0
MEDS_THETA_MAX_DELTA	Sine of MAX Theta limit minus Theta	0	0
MEDS_THETA_MIN_DELTA	Sine of Theta minus MIN Theta limit	0	0
MEDS_LADIRR_TGOSEC	Left ADI Roll Rate Is TGO Counter	0	0
MEDS_RADIRR_TGOSEC	Right ADI Roll Rate Is TGO Counter	0	0

Table F.4.128.1-1. MEDS FC BUS GNC DATA TRANSFER INITIALIZATION REQUIREMENTS*			
NAME	DESCRIPTION	INITIAL VALUE	
		PFS	BFS
MEDS_D_AZ_WARN	Delta Azimuth Warning Flag	0	0
ENABLE_MEDS_DATA_TRANSFER	MEDS transfer enable discrete	**	**
TAL_DECLARED_IN_103	TAL Declared in MM 103 Flag	0	0
ATO_DECLARED_IN_103	ATO Declared in MM 103 Flag	0	0
M_DDUGOOD	DDU Output Validity Flag	N/A	0
MBHVRVAL	MEDS_BETA, MEDSHVR Validity Flag		0
MEDS_EO_YAW_STEERING_ON	Display indicator for engine out yaw steering active	0	0

\* Note: Before the first transmission to MEDS, the output buffer shall be initialized according to this table. Variables not contained in this table have requirements to assign a valid value prior to the associated validity bit being set.

\*\* see I-Load requirements document JSC-19350

\*\*\* Initial value changed to 1 for OPS 3

Table F.4.128.1-2. MEDS FC BUS GNC DATA TRANSFER BUFFER CONTENT REQUIREMENTS					
Data Word/Bits	Description	D&C FSSR NAME	Prin Func doing Computation		
			PFS	BFS	
MEDS FC TRANSFER MESSAGE 1					
00	MEDS FC XFER MSG1 COMMAND WORD		GPC/IDP ICD	GPC/IDP ICD	
01	MEDS FC XFER DATA VALIDITY WORD 1	MEDS_FC_XFER_VAL_WD1			
	1 MEDS FC XFER WORD 7 VALID	MEDS_FC_WORD_7_VAL	N/A - INIT	N/A - INIT	
	2 MEDS FC XFER WORD 8 VALIDITY	MEDS_FC_WORD_8_VAL	4.128	N/A - INIT	
	3 MEDS FC XFER WORD 9 VALIDITY	MEDS_FC_WORD_9_VAL	4.128	MEDS FC DATA COLLECTION	
	4 MEDS FC XFER WORD 10 VALIDITY	MEDS_FC_WORD_10_VAL	4.128	N/A - INIT	
	5 MEDS FC XFER WORD 11 VALIDITY	MEDS_FC_WORD_11_VAL	4.128	MEDS FC DATA COLLECTION	
	6 MEDS FC XFER WORD 12 VALIDITY	MEDS_FC_WORD_12_VAL	4.128	MEDS FC DATA COLLECTION	
	7 MEDS FC XFER WORD 13 VALIDITY	MEDS_FC_WORD_13_VAL	4.128	MEDS FC DATA COLLECTION	
	8 MEDS FC XFER WORD 14 VALIDITY	MEDS_FC_WORD_14_VAL	4.128	N/A - INIT	
	9 MEDS FC XFER WORD 15 VALIDITY	MEDS_FC_WORD_15_VAL	4.128	N/A - INIT	

Table F.4.128.1-2. MEDS FC BUS GNC DATA TRANSFER BUFFER CONTENT REQUIREMENTS					
Data Word/Bits		Description	D&C FSSR NAME	Prin Func doing Computation	
				PFS	BFS
02	10	MEDS FC XFER WORD 16 VALIDITY	MEDS_FC_WORD_16_VAL	4.128	MEDS FC DATA COLLECTION
	11	MEDS FC XFER WORD 17 VALIDITY	MEDS_FC_WORD_17_VAL	4.128	MEDS FC DATA COLLECTION
	12	MEDS FC XFER WORD 18 VALIDITY	MEDS_FC_WORD_18_VAL	4.128	MEDS FC DATA COLLECTION
	13	MEDS FC XFER WORD 19 VALIDITY	MEDS_FC_WORD_19_VAL	4.128	MEDS FC DATA COLLECTION
	14	MEDS FC XFER WORD 20 VALIDITY	MEDS_FC_WORD_20_VAL	4.128	MEDS FC DATA COLLECTION
	15	MEDS FC XFER WORD 21 VALIDITY	MEDS_FC_WORD_21_VAL	4.128	MEDS FC DATA COLLECTION
	16	MEDS FC XFER WORD 22 VALIDITY	MEDS_FC_WORD_22_VAL	4.128	MEDS FC DATA COLLECTION
		MEDS FC XFER DATA VALIDITY WORD 2	MEDS_FC_XFER_VAL_WD2		
	1	MEDS FC XFER WORD 23 VALIDITY	MEDS_FC_WORD_23_VAL	4.128	MEDS FC DATA COLLECTION
	2	MEDS FC XFER WORD 24 VALIDITY	MEDS_FC_WORD_24_VAL	4.128	MEDS FC DATA COLLECTION
	3	MEDS FC XFER WORD 25 VALIDITY	MEDS_FC_WORD_25_VAL	4.128	MEDS FC DATA COLLECTION
	4	MEDS FC XFER WORD 26 VALIDITY	MEDS_FC_WORD_26_VAL	4.128	MEDS FC DATA COLLECTION
	5	MEDS FC XFER WORD 27 VALIDITY	MEDS_FC_WORD_27_VAL	4.128	MEDS FC DATA COLLECTION
	6	MEDS FC XFER WORD 28 VALIDITY	MEDS_FC_WORD_28_VAL	4.128	MEDS FC DATA COLLECTION
	7	MEDS FC XFER WORD 29 VALIDITY	MEDS_FC_WORD_29_VAL	4.128	MEDS FC DATA COLLECTION
	8	MEDS FC XFER WORD 30 VALIDITY	MEDS_FC_WORD_30_VAL	4.128	MEDS FC DATA COLLECTION
	9	MEDS FC XFER MSG2 WORD 1 VALIDITY	MEDS_FC_MSG2_WORD_1_VAL	4.128	MEDS FC DATA COLLECTION
	10	MEDS FC XFER MSG2 WORD 2 VALIDITY	MEDS_FC_MSG2_WORD_2_VAL	4.128	MEDS FC DATA COLLECTION
	11	MEDS FC XFER MSG2 WORD 3 VALIDITY	MEDS_FC_MSG2_WORD_3_VAL	4.128	MEDS FC DATA COLLECTION
12-16	SPARE				

Table F.4.128.1-2. MEDS FC BUS GNC DATA TRANSFER BUFFER CONTENT REQUIREMENTS					
Data Word/Bits	Description	D&C FSSR NAME	Prin Func doing Computation		
			PFS	BFS	
03	1-16	MEDS FC XFER DATA VALIDITY WORD 3 SPARE	MEDS_FC_XFER_VAL_WD3		
04	1-16	MEDS FC XFER DATA VALIDITY WORD 4 SPARE	MEDS_FC_XFER_VAL_WD4		
05	1-16	MEDS FC XFER DATA VALIDITY WORD 5 SPARE	MEDS_FC_XFER_VAL_WD5		
06	1-16	MEDS FC XFER DATA VALIDITY WORD 6 SPARE	MEDS_FC_XFER_VAL_WD6		
07	1-15	GPC TO MEDS FLAGS WORD 1 SPARE	MEDS_FC_XFER_FLAGS_1		
08	16	MEDS PFS/BFS INDICATOR	MEDS_FC_XFER_IS_PFS	N/A - INIT	N/A - INIT
09	1-6	SPARE			
	7-16	Major Mode	MEDS_MM	4.128	BEC
	1-8	Spare			
	9	Display indicator for engine out yaw steering active	MEDS_EO_YAW_STEERING_ON	4.1	PF_GUIDANCE
	10	HSI Heads-down Flag	MEDS_ROLL_SW	4.226	IMU HIP
	11	RTLS PPA FLAG	MEDS_PPA	4.4	MEDS_DC
	12	Contingency Abort Declared Flag	MEDS_CA_ABORT_DECLARED	MSC, 4.4, 4.5, 4.6, 4.204	N/A - INIT
	13	RTLS Abort Declared flag	MEDS_RTLS_ABORT_DECLARED	MSC, 4.6, 4.116	BEC
	14	AOA Abort Declared flag	MEDS_AOA_ABORT_DECLARED	MSC	BEC
	15	ATO Abort Declared flag	MEDS_ATO_ABORT_DECLARED	MSC	BEC
	16	TAL Abort Declared flag	MEDS_TAL_ABORT_DECLARED	MSC	BEC
10	1-13	SPARE			
	14-16	Guidance Phase Indicator for TAEM and GRTLS TAEM (PFS only)	MEDS_IPHASE	4.9, 4.204	N/A
11	1-12	SPARE			
	13-16	Guidance Phase Indicator for Entry (PFS)/Guidance Phase Indicator (BFS)	MEDS_ISLECT	4.8	ETL_GUIDANCE
12	1-14	SPARE			

Table F.4.128.1-2. MEDS FC BUS GNC DATA TRANSFER BUFFER CONTENT REQUIREMENTS					
Data Word/Bits		Description	D&C FSSR NAME	Prin Func doing Computation	
				PFS	BFS
	15	TAEM Guidance End Indicator	MEDS_TAEM_GUIDANCE_END	4.9, 4.204	ETL_GUIDANCE
	16	Weight on Main Gear Indicator	MEDS_WOWLON	4.57	HIP_IN
13	1-12	SPARE			
	13-14	HSI Mode Indicator - left	MEDS_HSI_MODE_LEFT	4.220, 4.237	NAVIGATION
14	15-16	HSI Mode Indicator - right	MEDS_HSI_MODE_RIGHT	4.220, 4.237	NAVIGATION
	1-16	Sine of Max Theta Limit minus Theta	MEDS_THETA_MAX_DELTA	4.128	N/A - INIT
15	1-16	Sine of Theta minus Min Theta Limit	MEDS_THETA_MIN_DELTA	4.128	N/A - INIT
16	1	Left ADI Roll Rate Scale is TGOSEC Flag	MEDS_LADIRR_TGOSEC	4.103	DDPF
	2	ADI Roll Rate Scale 0 ON R	MEDS_ADIRR_0_ON_R	4.128	MEDS FC DATA COLLECTION
	3	SPARE			
	4-16	Left ADI Pitch Rate Scale Label	MEDS_L_LADIPR_SCALE	4.103, 4.168	DDPF
17	1	Right ADI Roll Rate Scale is TGOSEC Flag	MEDS_RADIRR_TGOSEC	4.103	DDPF
	2-3	SPARE			
18	4-16	Right ADI Pitch Rate Scale Label	MEDS_L_RADIPR_SCALE	4.103, 4.168	DDPF
	1-3	SPARE			
19	4-16	Left ADI Yaw Rate Scale Label	MEDS_L_LADIYR_SCALE	4.103, 4.168	DDPF
	1-3	SPARE			
20	4-16	Right ADI Yaw Rate Scale Label	MEDS_L_RADIYR_SCALE	4.103, 4.168	DDPF
	1-2	Left ADI Attitude Select Switch	MEDS_L_ATT_SEL_SW	4.180	GNC_SW_HIP
	3-4	Right ADI Attitude Select Switch	MEDS_R_ATT_SEL_SW	4.180	GNC_SW_HIP
	5	Speed Brake Auto Mode Indicator	MEDS_SB_AUTO	4.36, 4.227	D_DAP, R_DAP, T_DAP
	6	THROT & R/Y Auto Fields Blank Cmd	MEDS_THROT_RY_AUTO_BLANK	4.128	MEDS FC DATA COLLECTION
	7	THROT & R/Y Auto Mode Indicator	MEDS_THROT_RY_AUTO	4.36, 4.55, 4.227	MEDS FC DATA COLLECTION, D_DAP, R_DAP, T_DAP

Table F.4.128.1-2. MEDS FC BUS GNC DATA TRANSFER BUFFER CONTENT REQUIREMENTS					
Data Word/Bits		Description	D&C FSSR NAME	Prin Func doing Computation	
				PFS	BFS
	8	DAP & Pitch Auto Mode Indicator	MEDS_DAP_PITCH_AUTO	4.36, 4.176, 4.201, 4.227	MEDS FC DATA COLLECTION, D_DAP, R_DAP, T_DAP
	9-12	Left ADI Roll Rate Scale Label	MEDS_L_LADIRR_SCALE	4.103, 4.168	DDPF
	13-16	Right ADI Roll Rate Scale Label	MEDS_L_RADIRR_SCALE	4.103, 4.168	DDPF
21	1-8	Left ADI Pitch Error Scale Label	MEDS_L_LADIPE_SCALE	4.103, 4.168	DDPF
	9-16	Right ADI Pitch Error Scale Label	MEDS_L_RADIPE_SCALE	4.103, 4.168	DDPF
22	1-7	SPARE			
	8-16	HSI Course Deviation Scale Label	MEDS_CDI_SCALE	4.19	ASC UPP
23	1-6	SPARE			
	7	Delta Azimuth Warning Flag	MEDS_D_AZ_WARN	4.150	ETL_GUID
	8-16	Delta Azimuth Digital Readout	MEDS_D_AZ_OUT	4.9, 4.19, 4.23, 4.204	ASC UPP, TAEM_GUID, GRTLS_GUID
24	1-16	HSI Relative Velocity Heading for MEDS (see F4.104 and BSS-DDPF for format and scale factor)	MEDS_H_VR	4.104	DDPF
25	1-8	Selected Landing Site ID Char 2	MEDS_P_RANGE_LABEL_CHAR2	4.124, 4.238	SITE LOOKUP
	9-16	Selected Landing Site ID Char 1	MEDS_P_RANGE_LABEL_CHAR1	4.124, 4.238	SITE LOOKUP
26	1-8	Selected Landing Site ID Char 4	MEDS_P_RANGE_LABEL_CHAR4	4.124, 4.238	SITE LOOKUP
	9-16	Selected Landing Site ID Char 3	MEDS_P_RANGE_LABEL_CHAR3	4.124, 4.238	SITE LOOKUP
27	1-8	RESERVED AS AN EMPTY CHAR SPACE			
	9-16	Selected Landing Site ID Char 5	MEDS_P_RANGE_LABEL_CHAR5	4.124, 4.238	SITE LOOKUP
28	1-16	Target NZ for MEDS	MEDS_T_NZ	4.204	GRTLS_GUID
29	1-5	SPARE			
	6-16	Beta Digital Readout	MEDS_BETA_OUT	4.226	ATT_PROC

Table F.4.128.1-2. MEDS FC BUS GNC DATA TRANSFER BUFFER CONTENT REQUIREMENTS					
Data Word/Bits		Description	D&C FSSR NAME	Prin Func doing Computation	
				PFS	BFS
30	1-16	Delta Inclination Digital Readout	MEDS_D_INCL_OUT	4.19	ASC UPP
MEDS FC TRANSFER MESSAGE 2					
00		MEDS FC XFER MSG2 COMMAND WORD		GPC/IDP ICD	GPC/IDP ICD
01	1-16	Cross Track Digital Readout	MEDS_XTRK	4.19	ASC UPP
02	1-4	SPARE			
	5-16	Cross Track Dev Digital Readout	MEDS_XTRK_DEV	4.19	ASC UPP
03	1-6	SPARE			
	7-16	Target Inclination Digital Readout	MEDS_TGT_INCL	4.19	ASC UPP
04		SPARE			
05		SPARE			
06		SPARE			
07		SPARE			
08		SPARE			
09		SPARE			
10		SPARE			
11		SPARE			
12		SPARE			
13		SPARE			
14		SPARE			
15		SPARE			
16		SPARE			
17		SPARE			
18		SPARE			
19		SPARE			
20		SPARE			
21		SPARE			
22		SPARE			
23		SPARE			
24		SPARE			
25		SPARE			
26		SPARE			
27		SPARE			
28		SPARE			
29		SPARE			
30		SPARE			
MEDS FC TRANSFER MESSAGE 3					
00		MEDS FC XFER MSG3 COMMAND WORD		GPC/IDP ICD	GPC/IDP ICD
01		SPARE			
02		SPARE			
03		SPARE			



Table F.4.128.1-2. MEDS FC BUS GNC DATA TRANSFER BUFFER CONTENT REQUIREMENTS					
Data Word/Bits		Description	D&C FSSR NAME	Prin Func doing Computation	
				PFS	BFS
04		SPARE			
05		SPARE			
06		SPARE			
07		SPARE			
08		SPARE			
09		SPARE			
10		SPARE			
11		SPARE			
12		SPARE			
13		SPARE			
14		SPARE			
15		SPARE			
16		SPARE			
17		SPARE			
18		SPARE			
19		SPARE			
20		SPARE			
21		SPARE			
22		SPARE			
23		SPARE			
24		SPARE			
25		SPARE			
26		SPARE			
27		SPARE			
28		SPARE			
29		SPARE			
30		SPARE			
MEDS FC TRANSFER MESSAGE 4					
00		MEDS FC XFER MSG4 COMMAND WORD		GPC/IDP ICD	GPC/IDP ICD
01		SPARE			
02		SPARE			
03		SPARE			
04		SPARE			
05		SPARE			
06		SPARE			
07		SPARE			
08		SPARE			
09		SPARE			
10		SPARE			

**F.4.128.2 MEDS FC BUS GNC DATA TRANSFER Support Functions**

Table F.4.128-5	Input Functional Parameters
Table F.4.128-6	Output Functional Parameters
Table F.4.128-7	I-Loads
Table F.4.128-8	K-Loads
Table F.4.128-9	Constants

TABLE F.4.128-5. INPUT FUNCTIONAL PARAMETERS FOR MEDS FC BUS GNC DATA TRANSFER (G4.128)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
ATT_SEL_SW(1)	V90J7503C	LH ADI ATTITUDE SELECT SW	GN&C SW RM		HXS		93017G	*
ATT_SEL_SW(2)	V90J7504C	RH ADI ATTITUDE SELECT SW	GN&C SW RM		HXS		93017G	*
AUTO	V90X1710X	AUTO GUIDANCE MODE FLAG	ASC DAP		BD		93017G	*
AUTOP_IND/AUTOP_LAMP	V90X1632XA	PITCH AUTO FLAG	AEROJET DAP				92522D	
AUTOP_IND/AUTOP_LAMP	V90X1632XB	PITCH AUTO FLAG	GRTLS DAP				92522D	
AUTORY_IND/AUTORY_LAMP	V90X1642XA	ROLL/YAW AUTO FLAG	AEROJET DAP				92522D	
AUTORY_IND/AUTORY_LAMP	V90X1642XB	ROLL/YAW AUTO FLAG	GRTLS DAP				92522D	
AUTOSB_IND/AUTOSB_LAMP	V90X1565XA	SPDBK AUTO FLAG	AEROJET DAP				92676B	
AUTOSB_IND/AUTOSB_LAMP	V90X1565XB	SPDBK AUTO FLAG	GRTLS DAP				92676B	
AUTO_MODE	V72X2850XB	FWD DAP AUTO (LIGHT)	TRANS DAP				93017G	*
BANK_FLAG	V94X1238X	BANK ANGLE FLASH FLAG	ENT DIP				92522D	
CDI_SCALE	V90H3893C	COURSE DEVIATION INDICATOR SCALE	ASC UPP	NM			92522D	
DGRNZT	V90U1224C	GUID NZ PULL OUT CMD	GRTLS TAEM GUID	G			92522D	
D_DILEMMA	V90X4840X	DELAYED ADTA DILEMA FLAG	ADTA RM		BD		93017G	*
ENGINE_OUT_YAW_STEERING	V90X0431X	ENGINE OUT YAW STEERING	ASC 1STG GUID	ND	BD		92670D	
GC_A/I/F_FB	V95J3138C	ADTA TO GC A/I/F FEEDBACK	ADTA SOP		VAR		92571B	
GLIDE_RTLS_INHIBIT	V90X2090XA	RTLS CONTINGENCY FLAG	PW RTLS GUID		BD		93017G	*
GLIDE_RTLS_INHIBIT	V90X2090XB	RTLS CONTINGENCY FLAG	MSC		BD		93090E	
GLIDE_RTLS_INHIBIT	V90X2090XC	RTLS CONTINGENCY FLAG	PW CONT GUID		BD		93017G	*
GLIDE_RTLS_INHIBIT	V90X2090XD	RTLS CONTINGENCY FLAG	CONT 3E/O GUID		BD		93017G	*
GLIDE_RTLS_INHIBIT	V90X2090XE	RTLS CONTINGENCY FLAG	GRTLS TAEM GUID		BD		93017G	*
HSI_MODE_LEFT	V85J0627CA	LH HSI MODE	ASC AREA NAV				92355B	
HSI_MODE_LEFT	V85J0627CB	LH HSI MODE	ENT AREA NAV				92355B	
HSI_MODE_RIGHT	V85J0628CA	RH HSI MODE	ASC AREA NAV				92355B	
HSI_MODE_RIGHT	V85J0628CB	RH HSI MODE	ENT AREA NAV				92355B	
INCL_TARGET	V90H3903C	TARGET INCLINATION	ASC UPP	RAD			92522D	
IPHASE	V90J1117CA	TAEM GUIDANCE PHASE INDICATOR	TAEM GUID	ND			93017G	*
IPHASE	V90J1117CB	TAEM GUIDANCE PHASE INDICATOR	GRTLS TAEM GUID	ND			93017G	*
ISLECT	V90J1138C	ENTRY GUID SUBPHASE INDICATOR	ENT GUID		HXS		93017G	*
M/MACH	V95L3029C	GN&C MACH NUMBER	ADTA SOP		SPL		93017G	*
MEDS_AREA_NAV_FIRST_PASS	V85X0651XA	AREA NAV COMPLETE INDICATOR	ASC AREA NAV				92355B	
MEDS_AREA_NAV_FIRST_PASS	V85X0651XB	AREA NAV COMPLETE INDICATOR	ENT AREA NAV				92355B	
MEDS_BETA	V90H3894C	ANGLE OF SIDESLIP FOR MEDS	A/E ATT PROC	DEG			92676B	
MEDS_BETAHVR_VALID	V90X3904X	MEDS BETA AND HVR VALIDITY FLAG	HSI PROC		BD		92522D	
MEDS_DELAZ	V95H0148C	MEDS HEADING ERROR	ENT UPP	RAD	SPL		92522D	
MEDS_DPSAC	V90H3907CA	MEDS DISPLAY HEADING ERROR	TAEM GUID	DEG	SPL		92522D	
MEDS_DPSAC	V90H3907CB	MEDS DISPLAY HEADING ERROR	GRTLS TAEM GUID	DEG	SPL		92522D	
MEDS_D_AZ	V90H3895CA	DELTA AZIMUTH TO LANDING SITE	ASC UPP	RAD			92522D	
MEDS_D_AZ	V90H3895CB	DELTA AZIMUTH TO LANDING SITE	RTLS UPP	RAD			92522D	
MEDS_D_INCL	V90H3896C	DELTA INCLINATION FROM TARGET	ASC UPP	RAD			92522D	
MEDS_H_VR	V90H3897CA	RELATIVE VELOCITY HEADING FOR MEDS	HSI PROC	RAD	SPL		92522D	
MEDS_LADIPE_SCALE	V90H3886CA	MEDS LH ADI PITCH ATT ERROR SCALE	ASC ADI PROC		HXS		92522D	
MEDS_LADIPE_SCALE	V90H3886CB	MEDS LH ADI PITCH ATT ERROR SCALE	E/L ADI PROC		HXS		92522D	
MEDS_LADIPR_SCALE	V90R3880CA	MEDS LH ADI PITCH RATE SCALE	ASC ADI PROC		HXS		92522D	
MEDS_LADIPR_SCALE	V90R3880CB	MEDS LH ADI PITCH RATE SCALE	E/L ADI PROC		HXS		92522D	
MEDS_LADIRR_SCALE	V90R3881CA	MEDS LH ADI ROLL RATE SCALE	ASC ADI PROC		HXS		92522D	

TABLE F.4.128-5. INPUT FUNCTIONAL PARAMETERS FOR MEDS FC BUS GNC DATA TRANSFER (G4.128)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
MEDS_LADIRR_SCALE	V90R3881CB	MEDS LH ADI ROLL RATE SCALE	E/L ADI PROC		HXS		92522D	
MEDS_LADIYR_SCALE	V90R3882CA	MEDS LH ADI YAW RATE SCALE	ASC ADI PROC		HXS		92522D	
MEDS_LADIYR_SCALE	V90R3882CB	MEDS LH ADI YAW RATE SCALE	E/L ADI PROC		HXS		92522D	
MEDS_LH_TGOSC_FLAG	V85X0800X	MEDS LH ROLL RATE COUNTER FLAG	E/L ADI PROC		BD		92522D	
MEDS_RADIBE_SCALE	V90H3889CA	MEDS RH ADI PITCH ATT ERROR SCALE	ASC ADI PROC		HXS		92522D	
MEDS_RADIBE_SCALE	V90H3889CB	MEDS RH ADI PITCH ATT ERROR SCALE	E/L ADI PROC		HXS		92522D	
MEDS_RADIPR_SCALE	V90R3883CA	MEDS RH ADI PITCH RATE SCALE	ASC ADI PROC		HXS		92522D	
MEDS_RADIPR_SCALE	V90R3883CB	MEDS RH ADI PITCH RATE SCALE	E/L ADI PROC		HXS		92522D	
MEDS_RADIRR_SCALE	V90R3884CA	MEDS RH ADI ROLL RATE SCALE	ASC ADI PROC		HXS		92522D	
MEDS_RADIRR_SCALE	V90R3884CB	MEDS RH ADI ROLL RATE SCALE	E/L ADI PROC		HXS		92522D	
MEDS_RADIYR_SCALE	V90R3885CA	MEDS RH ADI YAW RATE SCALE	ASC ADI PROC		HXS		92522D	
MEDS_RADIYR_SCALE	V90R3885CB	MEDS RH ADI YAW RATE SCALE	E/L ADI PROC		HXS		92522D	
MEDS_RH_TGOSC_FLAG	V85X0801X	MEDS RH ROLL RATE COUNTER FLAG	E/L ADI PROC		BD		92522D	
ME_ZERO	V90X8638X	ZERO THRUST	MSC				92522D	
MM_CODE_101/MM_101	V90X8155X	MAJOR MODE 101 FLAG	MSC				93012D	
MM_CODE_102/MM_102	V90X8158X	MAJOR MODE 102 FLAG	MSC				93012D	
MM_CODE_103/MM_103	V90X8156X	MAJOR MODE 103 FLAG	MSC				93012D	
MM_CODE_104/MM_104	V90X8152X	MAJOR MODE 104 FLAG	MSC				92355B	
MM_CODE_105/MM_105	V90X8623X	MAJOR MODE 105 FLAG	MSC				92355B	
MM_CODE_106/MM_106	V90X8153X	MAJOR MODE 106 FLAG	MSC				92355B	
MM_CODE_201/MM_201	V90X8189X	MAJOR MODE 201 FLAG	MSC				92355B	
MM_CODE_301/MM_301	V90X8183X	MAJOR MODE 301 FLAG	MSC				93064D	
MM_CODE_302/MM_302	V90X8624X	MAJOR MODE 302 FLAG	MSC				92355B	
MM_CODE_303/MM_303	V90X8182X	MAJOR MODE 303 FLAG	MSC				92355B	
MM_CODE_304/MM_304	V90X8161X	MAJOR MODE 304 FLAG	MSC				92355B	
MM_CODE_305/MM_305	V90X8162X	MAJOR MODE 305 FLAG	MSC				92355B	
MM_CODE_601/MM_601	V90X8194X	MAJOR MODE 601 FLAG	MSC		BD		93012D	
MM_CODE_602/MM_602	V90X8174X	MAJOR MODE 602 FLAG	MSC				92355B	
MM_CODE_603/MM_603	V90X8122X	MAJOR MODE 603 FLAG	MSC				92355B	
NAV_INIT_FLAG	V90X8414X	NAV INIT FLAG	R/S LCH SEQ		BD		93017G	*
ROLLC(1)	V90H1044CC	COMMANDED ROLL ANGLE	ENT GUID	DEG			93017G	*
ROLL_SW	V90J2690C	HSI HEADS-UP/HEADS-DOWN INDICATOR	A/E ATT PROC				92522D	
RTLS_ABORT_DECLARED	V90X8637XA	RTLS ABORT DECLARED	MSC		BD		93167A	*
RTLS_ABORT_DECLARED	V90X8637XB	RTLS ABORT DECLARED	ET SEP SEQ		BD		93167A	*
RTLS_ABORT_DECLARED	V90X8637XC	RTLS ABORT DECLARED	CONT 3E/O GUID		BD		93167A	*
SEL_SITE_ID	V90U0378CA	SELECTED LANDING SITE ID	ASC SITE LOOKUP				92522D	
SEL_SITE_ID	V90U0378CB	SELECTED LANDING SITE ID	ENT SITE LOOKUP				92522D	
S_AOA	V90X8636X	AOA ABORT DECLARED	MSC		BD		92355B	
S_ATO	V90X8635X	ATO ABORT DECLARED	MSC				93012D	
S_MAN_THROT	V96X0006X	MANUAL THROTTLE DISCRETE	SBTC SOP		BD		93017G	*
S_RTLS_TURN	V90X2089X	DSCR IND START OF TURN AROUND	PW RTLS GUID		BD		93017G	*
TACAN_CHAN_VALID_SL1	V90X1858XB	TACAN CHANNEL VALIDITY FLAG(TAC 1)	ASC SITE LOOKUP				92522D	
TAL_ABORT_DECLARED	V90X8658X	TAL ABORT DECLARED	MSC				93090E	
TG_END	V90X1108XA	TAEM GUIDANCE TERMINATION FLAG	TAEM GUID				93017G	*
TG_END	V90X1108XB	TAEM GUIDANCE TERMINATION FLAG	GRTLS TAEM GUID				92355B	
THETA/THETA_TOPO	V90H2217C	BODY PITCH ATTITUDE EULER ANGLE	A/E ATT PROC	DEG	SPL		93017G	*

TABLE F.4.128-5. INPUT FUNCTIONAL PARAMETERS FOR MEDS FC BUS GNC DATA TRANSFER (G4.128)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
THETA_MAX	V85H0646C	PITCH ATTITUDE MAX LIMIT	VERT SIT DIP	DEG	SPL		92332D	
THETA_MIN	V85H0647C	PITCH ATTITUDE MIN LIMIT	VERT SIT DIP	DEG	SPL		92332D	
WOWLON_IND	V96X0050X	WEIGHT ON MAIN WHEELS INDICATOR	LANDING SOP		BD		93017G	*
XTRK	V90H3901C	CROSS TRACK TO TIO/TAL SITE	ASC UPP	NM			92522D	
XTRK_CDI	V90H3902C	CROSS TRACK TO TIO/TAL MAX XRNG	ASC UPP	NM			92522D	
YSGNP/YSGN	V95J0153CB	R/L CONE IND PRI RW	TAEM UPP		SPL		93017G	*
YSGNP/YSGN	V95J0153CC	R/L CONE IND PRI RW	RTLS UPP		SPL		93017G	*
	V90X8645X	MM 801 FROM MM 201 FLAG	MSC				92355B	
	V90X8646X	MM 202 FROM MM 201 FLAG	MSC				92355B	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE F.4.128-6. OUTPUT FUNCTIONAL PARAMETERS FROM MEDS FC BUS GNC DATA TRANSFER (G4.128)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
MEDS_ADIRR_0_ON_R	V85X0691X	ADI ROLL RATE SCALE 0 ON R	IDP		BD		92619A	
MEDS_AOA_ABORT_DECLARED	V85X0629X	AOA ABORT DECLARED FLAG	IDP				92355B	
MEDS_ATO_ABORT_DECLARED	V85X0630X	ATO ABORT DECLARED FLAG	IDP				92355B	
MEDS_BETA_OUT	V85H0674B	BETA DIGITAL READOUT	IDP	DEG	BSS		92522D	
MEDS_CA_ABORT_DECLARED	V85X0669X	CONTINGENCY ABORT DECLARED FLAG	IDP		BD		92522D	
MEDS_CDI_SCALE	V85U0670B	HSI COURSE DEVIATION SCALE LABEL	IDP		BSU		92522D	
MEDS_DAP_PITCH_AUTO	V85J0661X	DAP & PITCH AUTO MODE INDICATOR	IDP		BD		92522D	
MEDS_D_AZ_OUT	V85H0672B	DELTA AZIMUTH DIGITAL READOUT	IDP	DEG	BSU		92522D	
MEDS_D_AZ_WARN	V85X0671X	DELTA AZIMUTH WARNING FLAG	IDP		BD		92522D	
MEDS_D_INCL_OUT	V85H0675B	DELTA INCLINATION DIGITAL READOUT	IDP	DEG	BSS		92522D	
MEDS_FC_MSG2_WORD_1_VAL	V85X0027B	MEDS FC XFER MSG2 WORD 1 VALIDITY	IDP		BD		92522D	
MEDS_FC_MSG2_WORD_2_VAL	V85X0028B	MEDS FC XFER MSG2 WORD 2 VALIDITY	IDP		BD		92522D	
MEDS_FC_MSG2_WORD_3_VAL	V85X0029B	MEDS FC XFER MSG2 WORD 3 VALIDITY	IDP		BD		92522D	
MEDS_FC_WORD_10_VAL	V85X0005B	MEDS FC XFER WORD 10 VALIDITY	IDP		BD		92355B	
MEDS_FC_WORD_11_VAL	V85X0006B	MEDS FC XFER WORD 11 VALIDITY	IDP		BD		92355B	
MEDS_FC_WORD_12_VAL	V85X0007B	MEDS FC XFER WORD 12 VALIDITY	IDP		BD		92355B	
MEDS_FC_WORD_13_VAL	V85X0008B	MEDS FC XFER WORD 13 VALIDITY	IDP		BD		92355B	
MEDS_FC_WORD_14_VAL	V85X0009B	MEDS FC XFER WORD 14 VALIDITY	IDP		BD		92332D	
MEDS_FC_WORD_15_VAL	V85X0010B	MEDS FC XFER WORD 15 VALIDITY	IDP		BD		92332D	
MEDS_FC_WORD_16_VAL	V85X0011B	MEDS FC XFER WORD 16 VALIDITY	IDP		BD		92522D	
MEDS_FC_WORD_17_VAL	V85X0012B	MEDS FC XFER WORD 17 VALIDITY	IDP		BD		92522D	
MEDS_FC_WORD_18_VAL	V85X0013B	MEDS FC XFER WORD 18 VALIDITY	IDP		BD		92522D	
MEDS_FC_WORD_19_VAL	V85X0014B	MEDS FC XFER WORD 19 VALIDITY	IDP		BD		92522D	
MEDS_FC_WORD_20_VAL	V85X0015B	MEDS FC XFER WORD 20 VALIDITY	IDP		BD		92522D	
MEDS_FC_WORD_21_VAL	V85X0016B	MEDS FC XFER WORD 21 VALIDITY	IDP		BD		92522D	
MEDS_FC_WORD_22_VAL	V85X0017B	MEDS FC XFER WORD 22 VALIDITY	IDP		BD		92522D	
MEDS_FC_WORD_23_VAL	V85X0019B	MEDS FC XFER WORD 23 VALIDITY	IDP		BD		92522D	
MEDS_FC_WORD_24_VAL	V85X0020B	MEDS FC XFER WORD 24 VALIDITY	IDP		BD		92522D	
MEDS_FC_WORD_25_VAL	V85X0021B	MEDS FC XFER WORD 25 VALIDITY	IDP		BD		92522D	
MEDS_FC_WORD_26_VAL	V85X0022B	MEDS FC XFER WORD 26 VALIDITY	IDP		BD		92522D	
MEDS_FC_WORD_27_VAL	V85X0023B	MEDS FC XFER WORD 27 VALIDITY	IDP		BD		92522D	
MEDS_FC_WORD_28_VAL	V85X0024B	MEDS FC XFER WORD 28 VALIDITY	IDP		BD		92522D	
MEDS_FC_WORD_29_VAL	V85X0025B	MEDS FC XFER WORD 29 VALIDITY	IDP		BD		92522D	
MEDS_FC_WORD_30_VAL	V85X0026B	MEDS FC XFER WORD 30 VALIDITY	IDP		BD		92522D	
MEDS_FC_WORD_7_VAL	V85X0002B	MEDS FC XFER WORD 7 VALID	IDP		BD		92358B	
MEDS_FC_WORD_8_VAL	V85X0003B	MEDS FC XFER WORD 8 VALIDITY	IDP		BD		92355B	
MEDS_FC_WORD_9_VAL	V85X0004B	MEDS FC XFER WORD 9 VALIDITY	IDP		BD		92355B	
MEDS_FC_XFER_FLAGS_WORD1	V85M0400P	MEDS FC XFER FLAGS WORD1	IDP		HMD		92358B	
MEDS_FC_XFER_IS_PFS	V85X0401B	MEDS FC XFER SOURCE IS PFS FLAG	IDP		BD		92358B	
MEDS_FC_XFER_VAL_WD1	V85M0001P	MEDS FC XFER DATA VALIDITY WORD1	IDP		HMD		92358B	
MEDS_FC_XFER_VAL_WD2	V85M0018P	MEDS FC XFER DATA VALIDITY WORD2	IDP		HMD		92358B	
MEDS_FC_XFER_VAL_WD3	V85M0035P	MEDS FC XFER DATA VALIDITY WORD3	IDP		HMD		92358B	
MEDS_FC_XFER_VAL_WD4	V85M0052P	MEDS FC XFER DATA VALIDITY WORD4	IDP		HMD		92358B	
MEDS_FC_XFER_VAL_WD5	V85M0069P	MEDS FC XFER DATA VALIDITY WORD5	IDP		HMD		92358B	
MEDS_FC_XFER_VAL_WD6	V85M0086P	MEDS FC XFER DATA VALIDITY WORD6	IDP		HMD		92358B	
MEDS_HSI_MODE_LEFT	V85J0631C	HSI MODE INDICATOR - LEFT	IDP	ND			92355B	

TABLE F.4.128-6. OUTPUT FUNCTIONAL PARAMETERS FROM MEDS FC BUS GNC DATA TRANSFER (G4.128)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
MEDS_HSI_MODE_RIGHT	V85J0632C	HSI MODE INDICATOR - RIGHT	IDP	ND			92355B	
MEDS_H_VR	V90H3897CB	RELATIVE VELOCITY HEADING FOR MEDS	IDP	RAD	SPL		92522D	
MEDS_IPHASE	V85J0633C	GUIDANCE PHASE INDICATOR FOR TAEM	IDP				92355B	
MEDS_ISLECT	V85J0634C	GUIDANCE PHASE INDICATOR FOR ENTRY	IDP				92355B	
MEDS_LADIRR_TGOSEC	V85X0666X	LEFT ADI ROLL RATE IS TGO COUNTER	IDP		BD		92522D	
MEDS_L_ATT_SEL_SW	V85J0656B	LEFT ADI ATTITUDE SELECT SWITCH	IDP				92522D	
MEDS_L_LADIPE_SCALE	V85U0664B	LEFT ADI PITCH ERROR SCALE LABEL	IDP			BSU	92522D	
MEDS_L_LADIPR_SCALE	V85U0652B	LEFT ADI PITCH RATE SCALE LABEL	IDP			BSU	92522D	
MEDS_L_LADIRR_SCALE	V85U0662B	LEFT ADI ROLL RATE SCALE LABEL	IDP			BSU	92522D	
MEDS_L_LADIYR_SCALE	V85U0654B	LEFT ADI YAW RATE SCALE LABEL	IDP			BSU	92522D	
MEDS_L_RADIPE_SCALE	V85U0665B	RIGHT ADI PITCH ERROR SCALE LABEL	IDP			BSU	92522D	
MEDS_L_RADIPR_SCALE	V85U0653B	RIGHT ADI PITCH RATE SCALE LABEL	IDP			BSU	92522D	
MEDS_L_RADIRR_SCALE	V85U0663B	RIGHT ADI ROLL RATE SCALE LABEL	IDP			BSU	92522D	
MEDS_L_RADIYR_SCALE	V85U0655B	RIGHT ADI YAW RATE SCALE LABEL	IDP			BSU	92522D	
MEDS_MM	V85J0635C	MAJOR MODE	IDP				92355B	
MEDS_PPA	V85X0683X	RTLS PPA FLAG	IDP		BD		92522D	
MEDS_P_RANGE_LABEL_CHAR1	V85U0678B	SELECTED LANDING SITE ID CHAR 1	IDP		CHU		92522D	
MEDS_P_RANGE_LABEL_CHAR2	V85U0679B	SELECTED LANDING SITE ID CHAR 2	IDP		CHU		92522D	
MEDS_P_RANGE_LABEL_CHAR3	V85U0680B	SELECTED LANDING SITE ID CHAR 3	IDP		CHU		92522D	
MEDS_P_RANGE_LABEL_CHAR4	V85U0681B	SELECTED LANDING SITE ID CHAR 4	IDP		CHU		92522D	
MEDS_P_RANGE_LABEL_CHAR5	V85U0682B	SELECTED LANDING SITE ID CHAR 5	IDP		CHU		92522D	
MEDS_RADIRR_TGOSEC	V85X0667X	RIGHT ADI ROLL RATE IS TGO COUNTER	IDP		BD		92522D	
MEDS_ROLL_SW	V85X0684X	HSI HEADS-DOWN FLAG	IDP		BD		92522D	
MEDS_RTLS_ABORT_DECLARED	V85X0636X	RTLS ABORT DECLARED FLAG	IDP				92355B	
MEDS_R_ATT_SEL_SW	V85J0657B	RIGHT ADI ATTITUDE SELECT SWITCH	IDP				92522D	
MEDS_SB_AUTO	V85J0658X	SPEED BRAKE AUTO MODE INDICATOR	IDP		BD		92522D	
MEDS_TAEM_GUIDANCE_END	V85X0638X	TAEM GUIDANCE END INDICATOR	IDP				92355B	
MEDS_TAL_ABORT_DECLARED	V85X0637X	TAL ABORT DECLARED FLAG	IDP				92355B	
MEDS_TGT_INCL	V85H0677B	TARGET INCLINATION DIGITAL READOUT	IDP	DEG	BSS		92522D	
MEDS_THETA_MAX_DELTA	V85H0644C	SINE OF MAX THETA LIMIT MINUS THET	IDP		BSS		92332D	
MEDS_THETA_MIN_DELTA	V85H0645C	SINE OF THETA MINUS MIN THETA LIM	IDP		BSS		92332D	
MEDS_THROT_RY_AUTO	V85J0660X	THROT & R/Y AUTO MODE INDICATOR	IDP		BD		92522D	
MEDS_THROT_RY_AUTO_BLANK	V85J0659X	THROT & R/Y AUTO FIELDS BLANK CMD	IDP		BD		92522D	
MEDS_T_NZ	V85A0673B	TARGET NZ FOR MEDS	IDP	G	BSS		92522D	
MEDS_WOWLON	V85X0639X	WEIGHT ON MAIN GEAR INDICATOR	IDP				92355B	
MEDS_XTRK	V85H0676B	CROSS TRACK DIGITAL READOUT	IDP	NM	BSS		92522D	
MEDS_XTRK_DEV	V85H0668B	CROSS TRACK DEV DIGITAL READOUT	IDP	NM	BSS		92522D	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
 (HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec

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TABLE F.4.128-7. MEDS FC BUS GNC DATA TRANSFER (G4.128) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
ENABLE_MEDS_DATA_TRANSFER	V97U9999C	ND	D		D	C	G4.128 G4.129	00	MED	92619A	
MIN_ROLL_AZ_WARN	V97U9998C	DEG	F	S	D	C	G4.128	00	MED	92619A	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.128-8. MEDS FC BUS GNC DATA TRANSFER (G4.128) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.128-9. MEDS FC BUS GNC DATA TRANSFER (G4.128) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
DEG_PER_RAD RADIAN TO DEGREE CONVERSION FACTOR	V97U0112C	00	+5.72957795131E+01	DEG/RAD	F		S C	A6.9 G4.10 G4.126 G4.127 G4.128 G4.175 G4.20 G4.201 G4.204 G4.208 G4.21 G4.213 G4.220 G4.226 G4.227 G4.23 G4.234 G4.237 G4.24 G4.25 G4.35 G4.36 G4.5 G4.6 G4.66 G4.8 G4.9 G4.97 G5.26 G5.27 V4.10 V4.11 V4.11B V4.11C V4.9A	93090E	

TABLE F.4.128-9. MEDS FC BUS GNC DATA TRANSFER (G4.128) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
RAD_PER_DEG DEGREE TO RADIAN CONVERSION FACTOR	V97U0383C	00	+1.7453293	E-02	RAD/DEG	F	S	C A6.9 G4.1 G4.126 G4.127 G4.128 G4.144 G4.15 G4.158 G4.175 G4.20 G4.201 G4.204 G4.205 G4.209 G4.210 G4.211 G4.213 G4.220 G4.223 G4.226 G4.227 G4.236 G4.237 G4.3 G4.35 G4.36 G4.7 G4.72 G4.9 G4.97 G5.27	93090E	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

#### **F.4.129 MEDS DK BUS GNC DATA TRANSFER (PFS/BFS)**

This section specifies the detailed requirements for the PFS and BFS MEDS DK Bus GNC Data Transfer. The principal function number identifying MEDS DK Bus GNC Data Transfer is 4.129. The MEDS DK Bus GNC Data Transfer is responsible for assembling information and generating messages required for the MEDS IDP. These messages are sent to the MEDS IDP over the DEU Keyboard (DK) data buses. This transfer will only occur if this capability is enabled via I-load. All requirements in this section apply to both PFS and BFS unless stated otherwise.

##### **F.4.129.1 Processing Requirements**

PFS/BFS shall transfer the data words defined in Table F.4.129.1-2 to the MEDS via the DK data buses. The transfer from PFS shall occur at 2.08 Hz. The transfer from BFS shall occur at 3.125 Hz. This transfer shall only occur if the I-load ENABLE\_MEDS\_DATA\_TRANSFER is true (logic 1). The format of this data transfer is defined in the GPC/IDP Interface Control Document, ICD 3-0070-01, paragraph 3.1.3.10. For those parameters that can be invalid due to LRU failure, communication failure, or are not calculated in certain flight phases, an indication of the parameter's validity shall be included in the data transfer, as specified in paragraph F.4.129.1.2. This data transfer shall occur in all GNC OPS/Modes (e.g. G9, G1/6, G2, G3, G8).

##### **F.4.129.1.1 Initialization, I-Loads And K-Loads**

Initialization values are specified in Table F.4.129.1-1. I-loads are specified in Table F.4.129-7. K-loads are specified in Table F.4.129-8.

##### **F.4.129.1.2 Validity Bit Determination**

This section defines the requirements for determining validity bits for those parameters that can be invalid due to LRU failure, communication failure, or are not calculated in certain flight phases.

##### Edgekey Equivalent Validity Bit Determination

When PFS receives a new Launch Data Bus Operator Code 6 command containing an edgekey equivalent message, MEDS\_DK\_GNC\_WORD\_8\_VAL shall be set to one and transmitted to MEDS on the same cycle that the edgekey equivalent DK bus command is sent in MEDS DK Bus GNC Data Transfer, Word 8. MEDS\_DK\_GNC\_WORD\_8\_VAL shall be set to zero for all other MEDS DK Bus GNC Data Transfer output cycles.

##### **F.4.129.1.3 MEDS DK BUS GNC DATA TRANSFER Data Conversions**

The IDD indicates the GNC parameters which are required to support the MEDS DK Bus GNC Data Transfer. The MEDS DK Bus GNC Data Transfer performs the conversions and scaling required to transform the GNC inputs into the 16-bit words to be sent to the MEDS IDP. This section describes the processing requirements (fetch, convert, scale, limit, etc.) for the data to be sent in this transfer.

##### Edgekey Equivalent Command Processing

When PFS receives a new Launch Data Bus Operator Code 6 command containing an edgekey equivalent, the message shall be transmitted to MEDS on the next output cycle of the MEDS DK Bus GNC Data Transfer. The edgekey equivalent message shall be output for one cycle only. The data fields in the Launch Data Bus Command (refer to SS-P-0002-150) shall be formatted in Word 8 of the DK bus command as shown in the table below:

	<u>LDB Command Input</u>		<u>GPC-to-MEDS DK Bus Output</u>	
	Data Word	Bit(s)	Data Word	Bit(s)
MEDS Message Reset	3	13	8	9
IDP ID	3	14-16	8	1-3
MEDS Message Acknowledge	3	19	8	13
MDU ID	4	9-11	8	10-12
MEDS Menu ID	4	12-16	8	4-8
Edgekey ID	4	17-19	8	14-16

Table F.4.129.1-1. MEDS DK BUS GNC DATA TRANSFER INITIALIZATION REQUIREMENTS*			
NAME	DESCRIPTION	INITIAL VALUE	
		PFS	BFS
MEDS_DK_XFER_IS_PFS	Indication of source of data	1	0
MEDS_DK_MF	Indication of Major Function sending data (2 = GNC)	2	2
MEDS_DK_GNC_WORD_7_VAL	Word 7 Validity Bit (1 = valid)	1	1
MEDS_DK_GNC_WORD_8_VAL	Word 8 Validity Bit (1 = valid)	0	0
ENABLE_MEDS_DATA_TRANSFER	MEDS transfer enable discrete	**	**
* Note: Before the first transmission to MEDS, the output buffer shall be initialized according to this table.			
** See I-Load requirements document JSC-19350			

Table F.4.129.1-2. MEDS DK BUS GNC DATA TRANSFER BUFFER CONTENT REQUIREMENTS					
Data Word/Bits		Description	D&C FSSR NAME	Prin Func doing Computation	
				PFS	BFS
00		MEDS DK MSG DATA XFER COMMAND WORD		GPC/IDP ICD	GPC/IDP ICD
01		MEDS DK GNC DATA VALIDITY WORD 1	MEDS_DK_GNC_VAL_WD1		
	1	MEDS DK GNC WORD 7 VALID	MEDS_DK_GNC_WORD_7_VAL		
	2	MEDS DK GNC WORD 8 VALID (V85X0103B)	MEDS_DK_GNC_WORD_8_VAL	LDB	N/A
	3-16	SPARE			
02		MEDS DK GNC DATA VALIDITY WORD 2	MEDS_DK_GNC_VAL_WD2		
	1-16	SPARE			
03		MEDS DK GNC DATA VALIDITY WORD 3	MEDS_DK_GNC_VAL_WD3		
	1-16	SPARE			
04		MEDS DK GNC DATA VALIDITY WORD 4	MEDS_DK_GNC_VAL_WD4		
	1-16	SPARE			
05		MEDS DK GNC DATA VALIDITY WORD 5	MEDS_DK_GNC_VAL_WD5		
	1-16	SPARE			
06		MEDS DK GNC DATA VALIDITY WORD 6	MEDS_DK_GNC_VAL_WD6		
	1-16	SPARE			
07		GPC TO MEDS FLAGS WORD 1	MEDS_DK_GNC_FLAGS_1		
	1-13	SPARE			
	14	MEDS PFS/BFS INDICATOR	MEDS_DK_XFER_IS_PFS	N/A - INIT	N/A - INIT
	15-16	GPC MAJOR FUNCTION	MEDS_DK_MF	N/A - INIT	N/A - INIT
08		MEDS EDGEKEY EQ CMD WORD (V85M0620P)	MEDS_DK_EDGEKEY_EQ	LDB	N/A
09		SPARE			
10		SPARE			
11		SPARE			
12		SPARE			
13		SPARE			
14		SPARE			
15		SPARE			
16		SPARE			
17		SPARE			
18		SPARE			

Table F.4.129.1-2. MEDS DK BUS GNC DATA TRANSFER BUFFER CONTENT REQUIREMENTS					
Data Word/Bits		Description	D&C FSSR NAME	Prin Func doing Computation	
				PFS	BFS
19		SPARE			
20		SPARE			
21		SPARE			
22		SPARE			
23		SPARE			
24		SPARE			
25		SPARE			
26		SPARE			
27		SPARE			
28		SPARE			
29		SPARE			
30		SPARE			
31		SPARE			
32		SPARE			
33		SPARE			
34		SPARE			
35		SPARE			
36		SPARE			
37		SPARE			
38		SPARE			
39		SPARE			
40		SPARE			
41		SPARE			
42		SPARE			
43		SPARE			
44		SPARE			
45		SPARE			
46		SPARE			
47		SPARE			
48		SPARE			
49		SPARE			
50		SPARE			
51		SPARE			
52		SPARE			
53		SPARE			
54		SPARE			
55		SPARE			
56		SPARE			
57		SPARE			



Table F.4.129.1-2. MEDS DK BUS GNC DATA TRANSFER BUFFER CONTENT REQUIREMENTS					
Data Word/Bits		Description	D&C FSSR NAME	Prin Func doing Computation	
				PFS	BFS
58		SPARE			
59		SPARE			
60		SPARE			
61		SPARE			
62		SPARE			
63		SPARE			
64		SPARE			
65		SPARE			
66		SPARE			
67		SPARE			
68		SPARE			
69		SPARE			
70		SPARE			
71		SPARE			
72		SPARE			
73		SPARE			
74		SPARE			
75		SPARE			
76		SPARE			
77		SPARE			
78		SPARE			
79		SPARE			
80		SPARE			
81		SPARE			
82		SPARE			
83		SPARE			
84		SPARE			
85		SPARE			
86		SPARE			
87		SPARE			
88		SPARE			
89		SPARE			
90		SPARE			
91		SPARE			
92		SPARE			
93		SPARE			
94		SPARE			
95		SPARE			
96		SPARE			

Table F.4.129.1-2. MEDS DK BUS GNC DATA TRANSFER BUFFER CONTENT REQUIREMENTS					
Data Word/Bits		Description	D&C FSSR NAME	Prin Func doing Computation	
				PFS	BFS
97		SPARE			
98		SPARE			
99		SPARE			
100		SPARE			

**F.4.129.2 MEDS DK BUS GNC DATA TRANSFER Support Functions**

Table F.4.129-5                      Input Functional Parameters

Table F.4.129-6                      Output Functional Parameters

Table F.4.129-7                      I-Loads

Table F.4.129-8                      K-Loads

Table F.4.129-9                      Constants

TABLE F.4.129-5. INPUT FUNCTIONAL PARAMETERS FOR MEDS DK BUS GNC DATA TRANSFER (G4.129)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
MEDS_DK_EDGEKEY_EQ	V85M0620PA	MEDS EDGEKEY EQ CMD WORD	LDB		HMD		92356B	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.129-6. OUTPUT FUNCTIONAL PARAMETERS FROM MEDS DK BUS GNC DATA TRANSFER (G4.129)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
MEDS_DK_EDGEKEY_EQ	V85M0620PB	MEDS EDGEKEY EQ CMD WORD	IDP		HMD		92356B	
MEDS_DK_GNC_FLAGS_1	V85M0420P	MEDS DK GNC XFER FLAGS WORD1	IDP		HMD		92358B	
MEDS_DK_GNC_VAL_WD1	V85M0101P	MEDS DK GNC DATA VALIDITY WORD1	IDP		HMD		92358B	
MEDS_DK_GNC_VAL_WD2	V85M0118P	MEDS DK GNC DATA VALIDITY WORD2	IDP		HMD		92358B	
MEDS_DK_GNC_VAL_WD3	V85M0135P	MEDS DK GNC DATA VALIDITY WORD3	IDP		HMD		92358B	
MEDS_DK_GNC_VAL_WD4	V85M0152P	MEDS DK GNC DATA VALIDITY WORD4	IDP		HMD		92358B	
MEDS_DK_GNC_VAL_WD5	V85M0169P	MEDS DK GNC DATA VALIDITY WORD5	IDP		HMD		92358B	
MEDS_DK_GNC_VAL_WD6	V85M0186P	MEDS DK GNC DATA VALIDITY WORD6	IDP		HMD		92358B	
MEDS_DK_GNC_WORD_7_VAL	V85X0102B	MEDS DK GNC WORD 7 VALID	IDP		BD		92358B	
MEDS_DK_GNC_WORD_8_VAL	V85X0103B	MEDS DK GNC WORD 8 VALID	IDP		BD		92356B	
MEDS_DK_MF	V85J0422B	MEDS GPC FSW MAJOR FUNCTION	IDP		VAR		92358B	
MEDS_DK_XFER_IS_PFS	V85X0421X	MEDS DK XFER SOURCE IS PFS FLAG	IDP				92358B	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE F.4.129-7. MEDS DK BUS GNC DATA TRANSFER (G4.129) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
ENABLE_MEDS_DATA_TRANSFER	V97U9999C	ND	D		D	C	G4.128 G4.129	00	MED	92619A	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.129-8. MEDS DK BUS GNC DATA TRANSFER (G4.129) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.129-9. MEDS DK BUS GNC DATA TRANSFER (G4.129) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

#### **F.4.130 MEDS DK BUS SM DATA TRANSFER (PFS/BFS)**

This section specifies the detailed requirements for the PFS and BFS MEDS DK Bus SM Data Transfer. The MEDS DK Bus SM Data Transfer is responsible for assembling information and generating messages required for the MEDS IDP. These messages are sent to the MEDS IDP over the DEU Keyboard (DK) data buses. This transfer will only occur if this capability is enabled via I-load. All requirements in this section apply to both PFS and BFS unless stated otherwise.

##### **F.4.130.1 Processing Requirements**

PFS/BFS shall transfer the data words defined in Table F.4.130.1-2 to the MEDS via the DK data buses. The transfer from PFS shall occur at 2.08 Hz. The transfer from BFS shall occur at 3.125 Hz. This transfer shall only occur if the I-load ENABLE\_MEDS\_DATA\_TRANSFER is true (logic 1). The format of this data transfer is defined in the GPC/IDP Interface Control Document, ICD 3-0070-01, paragraph 3.1.3.10. For those parameters that can be invalid due to LRU failure, communication failure, or are not calculated in certain flight phases, an indication of the parameter's validity shall be included in the data transfer, as specified in paragraph F.4.130.1.2. This data transfer shall occur in all SM OPS/Modes (e.g. S2, S4).

##### **F.4.130.1.1 Initialization**

Initialization values are specified in Table F.4.130.1-1.

##### **F.4.130.1.2 Validity Bit Determination**

This section defines the requirements for determining validity bits for those parameters that can be invalid due to LRU failure, communication failure, or are not calculated in certain flight phases.

##### Edgekey Equivalent Validity Bit Determination

When PFS receives a new Launch Data Bus Operator Code 6 command containing an edgekey equivalent message, MEDS\_DK\_SM\_WORD\_8\_VAL shall be set to one and transmitted to MEDS on the same cycle that the edgekey equivalent DK bus command is sent in MEDS DK Bus SM Data Transfer, Word 8. MEDS\_DK\_SM\_WORD\_8\_VAL shall be set to zero for all other MEDS DK Bus SM Data Transfer output cycles.

##### **F.4.130.1.3 MEDS DK BUS SM DATA TRANSFER Data Conversions**

The input/output tables F.4.130.1-3 and F.4.130.1-4 indicate the SM parameters which are required to support the MEDS DK Bus SM Data Transfer. The MEDS DK Bus SM Data Transfer performs the conversions and scaling required to transform the SM inputs into the 16 bit words to be sent to the MEDS IDP. This section describes the processing requirements (fetch, convert, scale, limit, etc.) for the data to be sent in this transfer.

##### Edgekey Equivalent Command Processing

When PFS receives a new Launch Data Bus Operator Code 6 command containing an edgekey equivalent, the message shall be transmitted to MEDS on the next output cycle of the MEDS DK Bus SM Data Transfer. The edgekey equivalent message shall be output for one cycle only. The data fields in the



Launch Data Bus Command (refer to SS-P-0002-150) shall be formatted in Word 8 of the DK bus command as shown in the table below:

	<u>LDB Command Input</u>		<u>GPC-to-MEDS DK Bus Output</u>	
	Data Word	Bit(s)	Data Word	Bit(s)
MEDS Message Reset	3	13	8	9
IDP ID	3	14-16	8	1-3
MEDS Message Acknowledge	3	19	8	13
MDU ID	4	9-11	8	10-12
MEDS Menu ID	4	12-16	8	4-8
Edgekey ID	4	17-19	8	14-16

Table F.4.130.1-1. MEDS DK BUS SM DATA TRANSFER INITIALIZATION REQUIREMENTS*			
NAME	DESCRIPTION	INITIAL VALUE	
		PFS	BFS
MEDS_DK_XFER_IS_PFS	Indication of source of data	1	0
MEDS_DK_MF	Indication of Major Function sending data (3 = SM)	3	3
MEDS_DK_SM_WORD_7_VAL	Word 7 validity bit (1 = valid)	1	1
MEDS_DK_SM_WORD_8_VAL	Word 8 Validity Bit (1 = valid)	0	0
ENABLE_MEDS_DATA_TRANSFER	MEDS transfer enable discrete	**	**
* Note: Before the first transmission to MEDS, the output buffer shall be initialized according to this table.			
** See I-Load Requirements document JSC-19350.			

Table F.4.130.1-2. MEDS DK BUS SM DATA TRANSFER BUFFER CONTENT REQUIREMENTS				
Data Word/Bits	Description	D&C FSSR NAME	Prin Func doing Computation	
			PFS	BFS
00	MEDS DK MSG DATA XFER COMMAND WORD		GPC/IDP ICD	GPC/IDP ICD
01	MEDS DK SM DATA VALIDITY WORD 1	MEDS_DK_SM_VAL_WD1		
1	MEDS DK SM WORD 7 VALID	MEDS_DK_SM_WORD_7_VAL		
2	MEDS DK SM WORD 8 VALID (V85X0203B)	MEDS_DK_SM_WORD_8_VAL	LDB	N/A
3-16	SPARE			
02	MEDS DK SM DATA VALIDITY WORD 2	MEDS_DK_SM_VAL_WD2		
1-16	SPARE			
03	MEDS DK SM DATA VALIDITY WORD 3	MEDS_DK_SM_VAL_WD3		
1-16	SPARE			
04	MEDS DK SM DATA VALIDITY WORD 4	MEDS_DK_SM_VAL_WD4		
1-16	SPARE			
05	MEDS DK SM DATA VALIDITY WORD 5	MEDS_DK_SM_VAL_WD5		
1-16	SPARE			
06	MEDS DK SM DATA VALIDITY WORD 6	MEDS_DK_SM_VAL_WD6		
1-16	SPARE			
07	GPC TO MEDS FLAGS WORD 1	MEDS_DK_SM_FLAGS_1		
1-13	SPARE			
14	MEDS PFS/BFS INDICATOR	MEDS_DK_XFER_IS_PFS	N/A - INIT	N/A - INIT
15-16	GPC MAJOR FUNCTION	MEDS_DK_MF	N/A - INIT	N/A - INIT
08	MEDS EDGEKEY EQ CMD WORD (V85M0620P)	MEDS_DK_EDGEKEY_EQ	L 5.3	N/A
09	SPARE			
10	SPARE			
11	SPARE			
12	SPARE			
13	SPARE			
14	SPARE			
15	SPARE			

Table F.4.130.1-2. MEDS DK BUS SM DATA TRANSFER BUFFER CONTENT REQUIREMENTS				
Data Word/Bits	Description	D&C FSSR NAME	Prin Func doing Computation	
			PFS	BFS
16	SPARE			
17	SPARE			
18	SPARE			
19	SPARE			
20	SPARE			
21	SPARE			
22	SPARE			
23	SPARE			
24	SPARE			
25	SPARE			
26	SPARE			
27	SPARE			
28	SPARE			
29	SPARE			
30	SPARE			
31	SPARE			
32	SPARE			
33	SPARE			
34	SPARE			
35	SPARE			
36	SPARE			
37	SPARE			
38	SPARE			
39	SPARE			
40	SPARE			
41	SPARE			
42	SPARE			
43	SPARE			
44	SPARE			
45	SPARE			
46	SPARE			
47	SPARE			
48	SPARE			
49	SPARE			
50	SPARE			
51	SPARE			
52	SPARE			

Table F.4.130.1-2. MEDS DK BUS SM DATA TRANSFER BUFFER CONTENT REQUIREMENTS				
Data Word/Bits	Description	D&C FSSR NAME	Prin Func doing Computation	
			PFS	BFS
53	SPARE			
54	SPARE			
55	SPARE			
56	SPARE			
57	SPARE			
58	SPARE			
59	SPARE			
60	SPARE			
61	SPARE			
62	SPARE			
63	SPARE			
64	SPARE			
65	SPARE			
66	SPARE			
67	SPARE			
68	SPARE			
69	SPARE			
70	SPARE			
71	SPARE			
72	SPARE			
73	SPARE			
74	SPARE			
75	SPARE			
76	SPARE			
77	SPARE			
78	SPARE			
79	SPARE			
80	SPARE			
81	SPARE			
82	SPARE			
83	SPARE			
84	SPARE			
85	SPARE			
86	SPARE			
87	SPARE			
88	SPARE			
89	SPARE			

Table F.4.130.1-2. MEDS DK BUS SM DATA TRANSFER BUFFER CONTENT REQUIREMENTS					
Data Word/Bits		Description	D&C FSSR NAME	Prin Func doing Computation	
				PFS	BFS
90		SPARE			
91		SPARE			
92		SPARE			
93		SPARE			
94		SPARE			
95		SPARE			
96		SPARE			
97		SPARE			
98		SPARE			
99		SPARE			
100		SPARE			

Table F.4.130.1-3. MEDS DK BUS SM Data Transfer Inputs					
Name	MSID	Nomenclature	Source	Type	Units
MEDS_DK_EDGEKEY_EQ	V85M0620PA	MEDS EDGEKEY EQ CMD WORD	L 5.3	HMD	-

Table F.4.130.1-4. MEDS DK BUS SM Data Transfer Outputs					
Name	MSID	Nomenclature	Destination	Type	Units
MEDS_DK_MF	V85J0422B	MEDS GPC FSW MF MAJOR FUNCTION	IDP	INT	-
MEDS_DK_SM_ FLAGS_1	V85M0460P	MEDS DK SM XFER FLAGS WORD 1	IDP	HMD	-
MEDS_DK_SM_VAL_ WD1	V85M0201P	MEDS DK SM DATA VALIDITY WORD 1	IDP	HMD	-
MEDS_DK_SM_VAL_ WD2	V85M0218P	MEDS DK SM DATA VALIDITY WORD 2	IDP	HMD	-
MEDS_DK_SM_VAL_ WD3	V85M0235P	MEDS DK SM DATA VALIDITY WORD 3	IDP	HMD	-
MEDS_DK_SM_VAL_ WD4	V85M0252P	MEDS DK SM DATA VALIDITY WORD 4	IDP	HMD	-
MEDS_DK_SM_VAL_ WD5	V85M0269P	MEDS DK SM DATA VALIDITY WORD 5	IDP	HMD	-

Table F.4.130.1-4. MEDS DK BUS SM Data Transfer Outputs					
Name	MSID	Nomenclature	Destination	Type	Units
MEDS_DK_SM_VAL_ WD6	V85M0286P	MEDS DK SM DATA VALIDITY WORD 6	IDP	HMD	-
MEDS_DK_SM_ WORD_7_VAL	V85X0202B	MEDS DK SM WORD 7 VALID	IDP	BD	-
MEDS_DK_SM_ WORD_8_VAL	V85X0203B	MEDS DK SM WORD 8 VALID	IDP	BD	-
MEDS_DK_XFER_ IS_PFS	V85X0421X	MEDS DK XFER SOURCE IS PFS FLAG	IDP	BD	-
MEDS_DK_ EDGEKEY_EQ	V85M0620PB	MEDS EDGEKEY EQ CMD WORD	IDP	HMD	-

#### **F.4.131 MEDS DK BUS P9/SSW DATA TRANSFER (PFS)**

This section specifies the detailed requirements for the PFS MEDS DK Bus P9/SSW Data Transfer. The MEDS DK Bus P9/SSW Data Transfer is responsible for assembling information and generating messages required for the MEDS IDP. These messages are sent to the MEDS IDP over the DEU Keyboard (DK) data buses. This transfer will only occur if this capability is enabled via I-load.

##### **F.4.131.1 Processing Requirements**

PFS shall transfer the data words defined in Table F.4.131.1-2 to the MEDS via the DK data buses. The transfer shall occur at 2.08 Hz. This transfer shall only occur if the I-load ENABLE\_MEDS\_DATA\_TRANSFER is true (logic 1). The format of this data transfer is defined in the GPC/IDP Interface Control Document, ICD 3-0070-01, paragraph 3.1.3.10. For those parameters that can be invalid due to LRU failure, communication failure, or are not calculated in certain flight phases, an indication of the parameter's validity shall be included in the data transfer, as specified in paragraph F.4.131.1.2. This data transfer shall occur in P9 and SSW OPS 0.

##### **F.4.131.1.1 Initialization**

Initialization values are specified in Table F.4.131.1-1.

##### **F.4.131.1.2 Validity Bit Determination**

This section defines the requirements for determining validity bits for those parameters that can be invalid due to LRU failure, communication failure, or are not calculated in certain flight phases.

##### Edgekey Equivalent Validity Bit Determination

When PFS receives a new Launch Data Bus Operator Code 6 command containing an edgekey equivalent message, MEDS\_DK\_P9/SSW\_WORD\_8\_VAL shall be set to one and transmitted to MEDS on the same cycle that the edgekey equivalent DK bus command is sent in MEDS DK Bus P9/SSW Data Transfer, Word 8. MEDS\_DK\_P9/SSW\_WORD\_8\_VAL shall be set to zero for all other MEDS DK Bus P9/SSW Data Transfer output cycles

##### **F.4.131.1.3 MEDS DK BUS P9/SSW DATA TRANSFER Data Conversions**

The input/output tables F.4.131.1-3 and F.4.131.1-4 indicate the P9/SSW parameters which are required to support the MEDS DK Bus P9/SSW Data Transfer. The MEDS DK Bus P9/SSW Data Transfer performs the conversions and scaling required to transform the P9 and SSW inputs into the 16-bit words to be sent to the MEDS IDP. This section describes the processing requirements (fetch, convert, scale, limit, etc.) for the data to be sent in this transfer.

##### Edgekey Equivalent Command Processing

When PFS receives a new Launch Data Bus Operator Code 6 command containing an edgekey equivalent, the message shall be transmitted to MEDS on the next output cycle of the MEDS DK Bus P9/SSW Data Transfer. The edgekey equivalent message shall be output for one cycle only. The data fields in the Launch Data Bus Command (refer to SS-P-0002-150) shall be formatted in Word 8 of the DK bus command as shown in the table below:

	<u>LDB Command Input</u>		<u>GPC-to-MEDS DK Bus Output</u>	
	Data Word	Bit(s)	Data Word	Bit(s)
MEDS Message Reset	3	13	8	9
IDP ID	3	14-16	8	1-3
MEDS Message Acknowledge	3	19	8	13
MDU ID	4	9-11	8	10-12
MEDS Menu ID	4	12-16	8	4-8
Edgekey ID	4	17-19	8	14-16

Table F.4.131.1-1. MEDS DK BUS P9/SSW DATA TRANSFER INITIALIZATION REQUIREMENTS*		
NAME	DESCRIPTION	INITIAL VALUE
MEDS_DK_XFER_IS_PFS	Indication of source of data	1
MEDS_DK_MF	Indication of Major Function sending data (1=P9/SSW)	1
MEDS_DK_P9/SSW_WORD_7_VAL	Word 7 validity bit (1 = valid)	1
MEDS_DK_P9/SSW_WORD_8_VAL	Word 8 Validity Bit (1 = valid)	0
ENABLE_MEDS_DATA_TRANSFER	MEDS transfer enable discrete	**

\* Note: Before the first transmission to MEDS, the output buffer shall be initialized according to this table.  
 \*\* See I-Load Requirements document JSC-19350.

Table F.4.131.1-2. MEDS DK BUS P9/SSW DATA TRANSFER BUFFER CONTENT REQUIREMENTS			
Data Word/Bits	Description	D&C FSSR NAME	Prin Func doing Computation
00	MEDS DK MSG DATA XFER COMMAND WORD		GPC/IDP ICD
01	MEDS DK P9/SSW DATA VALIDITY WORD 1	MEDS_DK_P9/SSW_VAL_WD1	LDB
1	MEDS DK P9/SSW WORD 7 VALID	MEDS_DK_P9/SSW_WORD_7_VAL	
2	MEDS DK P9/SSW WORD 8 VALID (V85X0303B)	MEDS_DK_P9/SSW_WORD_8_VAL	
3-16	SPARE		
02	MEDS DK P9/SSW DATA VALIDITY WORD 2	MEDS_DK_P9/SSW_VAL_WD2	LDB
1-16	SPARE		
03	MEDS DK P9/SSW DATA VALIDITY WORD 3	MEDS_DK_P9/SSW_VAL_WD3	
1-16	SPARE		



Table F.4.131.1-2. MEDS DK BUS P9/SSW DATA TRANSFER BUFFER CONTENT REQUIREMENTS			
Data Word/Bits	Description	D&C FSSR NAME	Prin Func doing Computation
04	MEDS DK P9/SSW DATA VALIDITY WORD 4	MEDS_DK_P9/SSW_VAL_WD4	N/A - INIT N/A - INIT L 5.3
1-16	SPARE		
05	MEDS DK P9/SSW DATA VALIDITY WORD 5	MEDS_DK_P9/SSW_VAL_WD5	
1-16	SPARE		
06	MEDS DK P9/SSW DATA VALIDITY WORD 6	MEDS_DK_P9/SSW_VAL_WD6	
1-16	SPARE		
07	GPC TO MEDS FLAGS WORD 1	MEDS_DK_P9/SSW_FLAGS_1	
1-13	SPARE		
14	MEDS PFS/BFS INDICATOR	MEDS_DK_XFER_IS_PFS	
15-16	GPC MAJOR FUNCTION	MEDS_DK_MF	
08	MEDS EDGEKEY EQ CMD WORD (V85M0620P)	MEDS_DK_EDGEKEY_EQ	
09	SPARE		
10	SPARE		
11	SPARE		
12	SPARE		
13	SPARE		
14	SPARE		
15	SPARE		
16	SPARE		
17	SPARE		
18	SPARE		
19	SPARE		
20	SPARE		
21	SPARE		
22	SPARE		
23	SPARE		
24	SPARE		
25	SPARE		
26	SPARE		
27	SPARE		
28	SPARE		
29	SPARE		
30	SPARE		
31	SPARE		
32	SPARE		
33	SPARE		
34	SPARE		

Table F.4.131.1-2. MEDS DK BUS P9/SSW DATA TRANSFER BUFFER CONTENT REQUIREMENTS			
Data Word/Bits	Description	D&C FSSR NAME	Prin Func doing Computation
35	SPARE		
36	SPARE		
37	SPARE		
38	SPARE		
39	SPARE		
40	SPARE		
41	SPARE		
42	SPARE		
43	SPARE		
44	SPARE		
45	SPARE		
46	SPARE		
47	SPARE		
48	SPARE		
49	SPARE		
50	SPARE		
51	SPARE		
52	SPARE		
53	SPARE		
54	SPARE		
55	SPARE		
56	SPARE		
57	SPARE		
58	SPARE		
59	SPARE		
60	SPARE		
61	SPARE		
62	SPARE		
63	SPARE		
64	SPARE		
65	SPARE		
66	SPARE		
67	SPARE		
68	SPARE		
69	SPARE		
70	SPARE		
71	SPARE		
72	SPARE		
73	SPARE		
74	SPARE		

Table F.4.131.1-2. MEDS DK BUS P9/SSW DATA TRANSFER BUFFER CONTENT REQUIREMENTS			
Data Word/Bits	Description	D&C FSSR NAME	Prin Func doing Computation
75	SPARE		
76	SPARE		
77	SPARE		
78	SPARE		
79	SPARE		
80	SPARE		
81	SPARE		
82	SPARE		
83	SPARE		
84	SPARE		
85	SPARE		
86	SPARE		
87	SPARE		
88	SPARE		
89	SPARE		
90	SPARE		
91	SPARE		
92	SPARE		
93	SPARE		
94	SPARE		
95	SPARE		
96	SPARE		
97	SPARE		
98	SPARE		
99	SPARE		
100	SPARE		

Table F.4.131.1-3. MEDS DK BUS P9/SSW Data Transfer Inputs					
Name	MSID	Nomenclature	Source	Type	Units
MEDS_DK_EDGEKEY_EQ	V85M0620PA	MEDS EDGEKEY EQ CMD WORD	LDB	HMD	-

Table F.4.131.1-4. MEDS DK BUS P9/SSW Data Transfer Outputs					
Name	MSID	Nomenclature	Destination	Type	Units
MEDS_DK_MF	V85J0422B	MEDS GPC FSW MAJOR FUNCTION	IDP	INT	-
MEDS_DK_P9/SSW_FLAGS_1	V85M0480P	MEDS DK P9/SSW	IDP	HMD	-
MEDS_DK_P9/SSW_VAL_WD1	V85M0301P	MEDS DK P9/SSW DATA VALIDITY WORD 1	IDP	HMD	-
MEDS_DK_P9/SSW_VAL_WD2	V85M0318P	MEDS DK P9/SSW DATA VALIDITY WORD 2	IDP	HMD	-
MEDS_DK_P9/SSW_VAL_WD3	V85M0335P	MEDS DK P9/SSW DATA VALIDITY WORD 3	IDP	HMD	-
MEDS_DK_P9/SSW_VAL_WD4	V85M0352P	MEDS DK P9/SSW DATA VALIDITY WORD 4	IDP	HMD	-
MEDS_DK_P9/SSW_VAL_WD5	V85M0369P	MEDS DK P9/SSW DATA VALIDITY WORD 5	IDP	HMD	-
MEDS_DK_P9/SSW_VAL_WD6	V85M0368P	MEDS DK P9/SSW DATA VALIDITY WORD 6	IDP	HMD	-
MEDS_DK_P9/SSW_WORD_7_VAL	V85X0302B	MEDS DK P9/SSW WORD 7 VALID	IDP	BD	-
MEDS_DK_P9/SSW_WORD_8_VAL	V85X0303B	MEDS DK P9/SSW WORD 8 VALID	IDP	BD	-
MEDS_DK_XFER_IS_PFS	V85X0421X	MEDS DK XFER SOURCE IS PFS FLAG	IDP	BD	-
MEDS_DK_EDGEKEY_EQ	V85M0620PB	MEDS EDGEKEY EQ CMD WORD	IDP	HMD	-

#### F.4.168 ASCENT ATTITUDE DIRECTOR INDICATOR PROCESSING (PFS)

The ASC\_ADI\_PROC function must serve two indicators, each with independent scale select switches for attitude rates and attitude errors. The requirements for generating the outputs are discussed in the following paragraphs (see Table F.4.103.0-1 for definition of the output data). For the requirements which follow the phrase “integer part of” is defined to mean “the largest integer which is algebraically less than or equal to”.

##### Left/Right ADI Control Word (LADIWORD1/RADIWORD1) 160 ms

This word contains 13 validity bits, one for each of the other 13 words in the Left/Right ADI message.

LADI\_C2=LADI\_C3=LADI\_C4=LADI\_C5=LADI\_C6=LADI\_C7=LADI\_C8=LADI\_C9=LADI\_C10=  
LADI\_C11 = 1

RADI\_C2=RADI\_C3=RADI\_C4=RADI\_C5=RADI\_C6=RADI\_C7=RADI\_C8=RADI\_C9=RADI\_C10=  
RADI\_C11 = 1

##### LEFT/RIGHT RTLS CONVERGENCE CHECK

If powered explicit guidance does not converge, the ADI error needles are stowed.

```
IF S_UNCONV = ON
  THEN  LADI_C12=LADI_C13=LADI_C14 = 0
        RADI_C12=RADI_C13=RADI_C14 = 0
  ELSE  LADI_C12=LADI_C13=LADI_C14 = 1
        RADI_C12=RADI_C13=RADI_C14 = 1
```

##### Left/Right Test Word (LADIWORD2/RADIWORD2)

This word must contain the fixed bit pattern shown in Table F.4.103.0-1.

##### Attitude Data

The attitude data are supplied to the instruments as the sine and cosine of the three attitude angles. The data are received at 3.125 Hz as floating-point quantities which are the appropriate sines and cosines. The data are then passed through a first-order hold (FOH) with outputs at 12.5 Hz. The generic requirements for a FOH are stated in Paragraph 3.15. For the ADI, the FOH output data must be limited to the range of -1 to +1 (denoted in the equations below by LIMITED). These values must be then converted into signed 16-bit integers such that the integer +32760 corresponds to full-scale.

##### Left/Right ADI Roll Sine (LADIRS/RADIRS) 80 ms

LADIRS/RADIRS=8\*INTEGER(4095\*(LIMITED(FOH(ROLLSINE1/ROLLSINE2))))

##### Left/Right ADI Roll Cosine (LADIRC/RADIRC) 80 ms

LADIRC/RADIRC=8\*INTEGER(4095\*(LIMITED(FOH(ROLLCOS1/ROLLCOS2))))

##### Left/Right ADI Pitch Sine (LADIPS/RADIPS) 80 ms

LADIPS/RADIPS=8\*INTEGER(4095\*(LIMITED(FOH(PTCHSINE1/PTCHSINE2))))

Left/Right ADI Pitch Cosine (LADIPC/RADIPC) 80 ms

LADIPC/RADIPC=8\*INTEGER(4095\*(LIMITED(FOH(PTCHCOS1/PTCHCOS2))))

Left/Right ADI Yaw Sine (LADIYS/RADIYS) 80 ms

LADIYS/RADIYS=8\*INTEGER(4095\*(LIMITED(FOH(YAWSINE1/YAWSINE2))))

Left/Right ADI Yaw Cosine (LADIYC/RADIYC) 80 ms

LADIYC/RADIYC=8\*INTEGER (4095\*(LIMITED(FOH(YAWSINE1/YAWSINE2))))

Attitude Rate Data

Each ADI has a corresponding rate scale select switch that has three positions. Table F.4.168.0-1 shows the value of a full-scale reading for each of the three switch positions. The appropriate full scale value shall be passed to the MEDS FC GNC XFER for the purpose of labeling on the MEDS composite flight instrument display. The appropriate full scale value shall be determined by equation set 4.168.0-1. As shown in Table F.4.103.0-1, the rate data are output as signed 16-bit integers.

Left/Right ADI Roll Rate (LADIRR/RADIRR) 160 ms

IF LADIRSW/RADIRSW = +1 THEN LADIRR/RADIRR = 8\*INTEGER((4095/10)\*P\_ORB)  
 IF LADIRSW/RADIRSW = 0 THEN LADIRR/RADIRR = 8\*INTEGER((4095/5)\*P\_ORB)  
 IF LADIRSW/RADIRSW = -1 THEN LADIRR/RADIRR = 8\*INTEGER(4095\*P\_ORB)

Left/Right ADI Pitch Rate (LADIPR/RADIPR) 160 ms

IF LADIRSW/RADIRSW = +1 THEN LADIPR/RADIPR = 8\*INTEGER((4095/10)\*Q\_ORB)  
 IF LADIRSW/RADIRSW = 0 THEN LADIPR/RADIPR = 8\*INTEGER((4095/5)\*Q\_ORB)  
 IF LADIRSW/RADIRSW = -1 THEN LADIPR/RADIPR = 8\*INTEGER(4095\*Q\_ORB)

Left/Right ADI Yaw Rate (LADIYR/RADIYR) 160 ms

IF LADIRSW/RADIRSW = +1 THEN LADIYR/RADIYR = 8\*INTEGER((4095/10)\*R\_ORB)  
 IF LADIRSW/RADIRSW = 0 THEN LADIYR/RADIYR = 8\*INTEGER((4095/5)\*R\_ORB)  
 IF LADIRSW/RADIRSW = -1 THEN LADIYR/RADIYR = 8\*INTEGER(4095\*R\_ORB)

Attitude Error Data

Each ADI also has a corresponding error scale select switch that has three positions. Table F.4.168.0-1 shows the value of a full-scale reading for each of the three switch positions. The full-scale value shall be scaled by the LSB of 0.25 and passed to the MEDS FC GNC XFER for the purpose of labeling on the MEDS composite flight instrument display. Equation set 4.168.0-1 defines the appropriate values to be sent to MEDS. The error data are output as signed 16-bit integers (Table F.4.103.0-1).

IF MM\_CODE\_601 OR MECO\_CMD = 0  
 THEN ROLL\_ERR = EBDB\_1

```
PITCH_ERR = EBDB_2
YAW_ERR   = EBDB_3
ELSE      ROLL_ERR = BODY_ERR_ANG(1)
          PITCH_ERR = BODY_ERR_ANG(2)
          YAW_ERR   = BODY_ERR_ANG(3)
```

Left/Right ADI Roll Error (LADIRE/RADIRE) 160 ms

LADIRE/RADIRE = 8\*INTEGER(RECC\*ROLL\_ERR)

where

```
IF LADIESW/RADIESW = +1 THEN RECC = 4095/10
IF LADIESW/RADIESW = 0 THEN RECC = 4095/5
IF LADIESW/RADIESW = -1 THEN RECC = 4095
```

Left/Right ADI Pitch Error (LADIPE/RADIPE) 160 ms

LADIPE/RADIPE = 8\*INTEGER(RECC\*PITCH\_ERR)

where

```
IF LADIESW/RADIESW = +1 THEN RECC = 4095/10
IF LADIESW/RADIESW = 0 THEN RECC = 4095/5
IF LADIESW/RADIESW = -1 THEN RECC = 4095
```

Left/Right ADI Yaw Error (LADIYE/RADIYE) 160 ms

LADIYE/RADIYE = 8\*INTEGER(RECC\*ROLL\_ERR)

where

```
IF LADIESW/RADIESW = +1 THEN RECC = 4095/10
IF LADIESW/RADIESW = 0 THEN RECC = 4095/5
IF LADIESW/RADIESW = -1 THEN RECC = 4095
```

Limiting of Rate and Error Data

Prior to the integer conversions called for in requirements statements for LADIRR, LADIPR, LADIYR, LADIRE, LADIPE, LADIYE, RADIRR, RADIPR, RADIYR, RADIRE, RADIFE, and RADIYE, the value to be converted must be limited to the range of -4096 to +4095, inclusive. For example, in the statement of LADIRR requirements, if 5 degrees per second full scale is selected, then  $(4095/5)*(P)$  must be limited to satisfy

$$-4096 \leq ((4095/5)* P) \leq +4095$$

If values outside the range -4096 to +4095 occur, the nearest limit value must be used instead.

Transport Lag

The GPC transport lag (MDM read to DDU write) for each of the ADI parameters shall not exceed the values specified below:

Pitch, Roll Attitude	210 ms
Yaw Attitude	350 ms
Attitude Rates	210 ms
Attitude Errors	210 ms
Off Flag	250 ms

Table F.4.168.0-1. ADI SCALE SELECTION-ASCENT						
Switch	Full Scale Value					
	Attitude Rate			Attitude Error		
Position	Roll	Pitch (Deg/Sec)	Yaw	Roll	Pitch (Deg)	Yaw
High	10	10	10	10	10	10
Med	5	5	5	5	5	5
Low	1	1	1	1	1	1

Equation Set F.4.168.0-1

MEDS\_LADIRR/RADIRR\_SCALE = INTEGER (Roll Rate Full Scale Value)

MEDS\_LADIPR/RADIPR\_SCALE = INTEGER (Pitch Rate Full Scale Value)

MEDS\_LADIYR/RADIYR\_SCALE = INTEGER (Yaw Rate Full Scale Value)

MEDS\_LADIPE/RADIPE\_SCALE = INTEGER (Pitch Error Full Scale Value/0.25)

**F.4.168.1 Ascent Attitude Director Indicator Interface Support Functions**

Table F.4.168-5 Input Functional Parameters

Table F.4.168-6 Output Functional Parameters

Table F.4.168-7 I-Loads

Table F.4.168-8 K-Loads

Table F.4.168-9 Constants



TABLE F.4.168-5. INPUT FUNCTIONAL PARAMETERS FOR ASCENT ATTITUDE DIRECTION INDICATOR PROCESSING (G4.168)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
BODY_ERR_ANG(1)	V90H2234CA	BODY ROLL ATTITUDE ERROR	A/E ATT PROC	DEG			89366	
BODY_ERR_ANG(2)	V90H2233CA	BODY PITCH ATTITUDE ERROR	A/E ATT PROC	DEG			89366	
BODY_ERR_ANG(3)	V90H2235CA	BODY YAW ATTITUDE ERROR	A/E ATT PROC	DEG			89366B	
EBDB(1)	V95H3534C	ROLL ERROR DISPLAY	G/C STEER	DEG			89219B	
EBDB(2)	V95H3532C	PITCH ERROR DISPLAY	G/C STEER	DEG			89219B	
EBDB(3)	V95H3533C	YAW ERROR DISPLAY	G/C STEER	DEG			89219B	
LADIESW	V90J7520C	LH ADI ERROR SCALE SELECT SW	GN&C SW RM				90960E	
LADIRSW	V90J7507C	LH ADI RATE SCALE SELECT SW	GN&C SW RM				90960E	
MECO_CMD	V90X8569XA	MECO COMMAND FLAG	SSME OPS		BD		93017G	*
MM_CODE_601/MM_601	V90X8194X	MAJOR MODE 601 FLAG	MSC		BD		93012D	
PTCHCOS(1)	V90H2222CA	LH ADI SEL EULER ANG PITCH COSINE	A/E ATT PROC					
PTCHCOS(2)	V90H2218CA	RH ADI SEL EULER ANG PITCH COSINE	A/E ATT PROC					
PTCHSINE(1)	V90H2221CA	LH ADI SEL EULER ANG PITCH SINE	A/E ATT PROC					
PTCHSINE(2)	V90H2220CA	RH ADI SEL EULER ANG PITCH SINE	A/E ATT PROC					
P_ORB	V90R5301CA	SELECTED RGA ROLL RATE	SF	DEG/S			93017G	*
Q_ORB/Q	V90R5321CA	SELECTED RGA PITCH RATE	SF	DEG/S			93017G	*
RADIESW	V90J7506C	RH ADI ERROR SCALE SELECT SW	GN&C SW RM				90960E	
RADIRSW	V90J7508C	RH ADI RATE SCALE SELECT SW	GN&C SW RM				90960E	
ROLLCOS(1)	V90H2209CA	LH ADI SEL EULER ANG ROLL COSINE	A/E ATT PROC				89490B	
ROLLCOS(2)	V90H2207CA	RH ADI SEL EULER ANG ROLL COSINE	A/E ATT PROC				89490B	
ROLLSINE(1)	V90H2208CA	LH ADI SEL EULER ANG ROLL SINE	A/E ATT PROC				89490B	
ROLLSINE(2)	V90H2206CA	RH ADI SEL EULER ANG ROLL SINE	A/E ATT PROC				89490B	
R_ORB	V90R5341CA	SELECTED RGA YAW RATE	SF	DEG/S			93017G	*
S_UNCONV	V90X2084XA	PEG UNCONVERGED DSCR IND	ASC 2STG GUID		BD		90964	
S_UNCONV	V90X2084XB	PEG UNCONVERGED DSCR IND	PW RTLS GUID		BD		90964	
S_UNCONV	V90X2084XC	PEG UNCONVERGED DSCR IND	PW CONT GUID		BD		90964	
S_UNCONV	V90X2084XD	PEG UNCONVERGED DSCR IND	CONT 3E/O GUID		BD		90964	
YAWCOS(1)	V90H2232CA	LH ADI SEL EULER ANG YAW COSINE	A/E ATT PROC				89490B	
YAWCOS(2)	V90H2294CA	RH ADI SEL EULER ANG YAW COSINE	A/E ATT PROC				92740D	
YAWSINE(1)	V90H2231CA	LH ADI SEL EULER ANG YAW SINE	A/E ATT PROC				89490B	
YAWSINE(2)	V90H2293CA	RH ADI SEL EULER ANG YAW SINE	A/E ATT PROC				89490B	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE F.4.168-6. OUTPUT FUNCTIONAL PARAMETERS FROM ASCENT ATTITUDE DIRECTION INDICATOR PROCESSING  
(G4.168)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
LADIPC	V72H0913CA	LH ADI PITCH COSINE POSITION	DDU 1				93017G	*
LADIPE	V72H0927CA	LH ADI PITCH ATTITUDE ERROR	DL FMT 21/A DDU 1				93017G	*
LADIPR	V72R0917CA	LH ADI PITCH RATE	DL FMT 21/B DDU 1	DEG/S			93017G	*
LADIPS	V72H0912CA	LH ADI PITCH SINE POSITION	DL FMT 21/A DDU 1				93017G	*
LADIRC	V72H0911CA	LH ADI ROLL COSINE POSITION	DL FMT 21/A DDU 1				93017G	*
LADIRE	V72H0925CA	LH ADI ROLL ATTITUDE ERROR	DL FMT 21/B DDU 1	DEG			93017G	*
LADIRR	V72R0916CA	LH ADI ROLL RATE	DL FMT 21/B DDU 1	DEG/S			93017G	*
LADIRS	V72H0910CA	LH ADI ROLL SINE POSITION	DL FMT 21/A DDU 1				93017G	*
LADIWORD1	V72M0895PA	LH ADI CONTROL WORD	DL FMT 21/1 DDU 1				93017G	*
LADIWORD2	V72Q0909BA	LH ADI TEST WORD	DL FMT 21/1 DDU 1				93017G	*
LADIYC	V72H0915CA	LH ADI YAW COSINE POSITION	DL FMT 21/A DDU 1				93017G	*
LADIYE	V72H0929CA	LH ADI YAW ATTITUDE ERROR	DL FMT 21/B DDU 1	DEG			93017G	*
LADIYR	V72R0918CA	LH ADI YAW RATE	DL FMT 21/B DDU 1	DEG/S			93017G	*
LADIYS	V72H0914CA	LH ADI YAW SINE POSITION	DL FMT 21/A DDU 1				93017G	*
LADI_C10	V72X0904BA	LH ADI PITCH RATE CONTROL	DL FMT 21/1 DDU 1				93017G	*
LADI_C11	V72X0905BA	LH ADI YAW RATE CONTROL	DL FMT 21/1 DDU 1				93017G	*
LADI_C12	V72X0906BA	LH ADI ROLL ERROR CONTROL	DL FMT 21/1 DDU 1				93017G	*
LADI_C13	V72X0907BA	LH ADI PITCH ERROR CONTROL	DL FMT 21/1 DDU 1				93017G	*
LADI_C14	V72X0908BA	LH ADI YAW ERROR CONTROL	DL FMT 21/1 DDU 1				93017G	*
LADI_C2	V72X0896BA	LH ADI TEST WORD CONTROL	DL FMT 21/1 DDU 1				93017G	*
LADI_C3	V72X0897BA	LH ADI ROLL SINE CONTROL	DL FMT 21/1 DDU 1				93017G	*
LADI_C4	V72X0898BA	LH ADI ROLL COSINE CONTROL	DL FMT 21/1 DDU 1				93017G	*

TABLE F.4.168-6. OUTPUT FUNCTIONAL PARAMETERS FROM ASCENT ATTITUDE DIRECTION INDICATOR PROCESSING (G4.168)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
LADI_C5	V72X0899BA	LH ADI PITCH SINE CONTROL	DDU 1				93017G	*
			DL FMT 21/1					
LADI_C6	V72X0900BA	LH ADI PITCH COSINE CONTROL	DDU 1				93017G	*
			DL FMT 21/1					
LADI_C7	V72X0901BA	LH ADI YAW SINE CONTROL	DDU 1				93017G	*
			DL FMT 21/1					
LADI_C8	V72X0902BA	LH ADI YAW COSINE CONTROL	DDU 1				93017G	*
			DL FMT 21/1					
LADI_C9	V72X0903BA	LH ADI ROLL RATE CONTROL	DDU 1				93017G	*
			DL FMT 21/1					
MEDS_LADIPE_SCALE	V90H3886CA	MEDS LH ADI PITCH ATT ERROR SCALE	MEDS FC GNC XFER		HXS		92522D	
MEDS_LADIPR_SCALE	V90R3880CA	MEDS LH ADI PITCH RATE SCALE	MEDS FC GNC XFER		HXS		92522D	
MEDS_LADIRR_SCALE	V90R3881CA	MEDS LH ADI ROLL RATE SCALE	MEDS FC GNC XFER		HXS		92522D	
MEDS_LADIYR_SCALE	V90R3882CA	MEDS LH ADI YAW RATE SCALE	MEDS FC GNC XFER		HXS		92522D	
MEDS_RADIPR_SCALE	V90H3889CA	MEDS RH ADI PITCH ATT ERROR SCALE	MEDS FC GNC XFER		HXS		92522D	
MEDS_RADIPR_SCALE	V90R3883CA	MEDS RH ADI PITCH RATE SCALE	MEDS FC GNC XFER		HXS		92522D	
MEDS_RADIRR_SCALE	V90R3884CA	MEDS RH ADI ROLL RATE SCALE	MEDS FC GNC XFER		HXS		92522D	
MEDS_RADIRYR_SCALE	V90R3885CA	MEDS RH ADI YAW RATE SCALE	MEDS FC GNC XFER		HXS		92522D	
RADIPC	V72H1013CA	RH ADI PITCH COSINE POSITION	DDU 2				93017G	*
			DL FMT 21/1					
RADIPE	V72H1027CA	RH ADI PITCH ATTITUDE ERROR	DDU 2				93017G	*
			DL FMT 21/1					
RADIPR	V72R1017CA	RH ADI PITCH RATE	DDU 2	DEG/S			93017G	*
			DL FMT 21/1					
RADIPS	V72H1012CA	RH ADI PITCH SINE POSITION	DDU 2				93017G	*
			DL FMT 21/1					
RADIRC	V72H1011CA	RH ADI ROLL COSINE POSITION	DDU 2				93017G	*
			DL FMT 21/1					
RADIRE	V72H1025CA	RH ADI ROLL ATTITUDE ERROR	DDU 2	DEG			93017G	*
			DL FMT 21/1					
RADIRR	V72R1016CA	RH ADI ROLL RATE	DDU 2	DEG/S			93017G	*
			DL FMT 21/1					
RADIRS	V72H1010CA	RH ADI ROLL SINE POSITION	DDU 2				93017G	*
			DL FMT 21/1					
RADIWORD1	V72M0995PA	RH ADI CONTROL WORD	DDU 2				93017G	*
			DL FMT 21/1					
RADIWORD2	V72Q1009BA	RH ADI TEST WORD	DDU 2				93017G	*
			DL FMT 21/1					
RADIYC	V72H1015CA	RH ADI YAW COSINE POSITION	DDU 2				93017G	*
			DL FMT 21/1					
RADIYE	V72H1029CA	RH ADI YAW ATTITUDE ERROR	DDU 2	DEG			93017G	*
			DL FMT 21/1					
RADIYR	V72R1018CA	RH ADI YAW RATE	DDU 2	DEG/S			93017G	*
			DL FMT 21/1					

TABLE F.4.168-6. OUTPUT FUNCTIONAL PARAMETERS FROM ASCENT ATTITUDE DIRECTION INDICATOR PROCESSING  
(G4.168)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
RADIYS	V72H1014CA	RH ADI YAW SINE POSITION	DDU 2				93017G	*
RADI_C10	V72X1004BA	RH ADI PITCH RATE CONTROL	DL FMT 21/1 DDU 2				93017G	*
RADI_C11	V72X1005BA	RH ADI YAW RATE CONTROL	DL FMT 21/1 DDU 2				93017G	*
RADI_C12	V72X1006BA	RH ADI ROLL ERROR CONTROL	DL FMT 21/1 DDU 2				93017G	*
RADI_C13	V72X1007BA	RH ADI PITCH ERROR CONTROL	DL FMT 21/1 DDU 2				93017G	*
RADI_C14	V72X1008BA	RH ADI YAW ERROR CONTROL	DL FMT 21/1 DDU 2				93017G	*
RADI_C2	V72X0996BA	RH ADI TEST WORD CONTROL	DL FMT 21/1 DDU 2				93017G	*
RADI_C3	V72X0997BA	RH ADI ROLL SINE CONTROL	DL FMT 21/1 DDU 2				93017G	*
RADI_C4	V72X0998BA	RH ADI ROLL COSINE CONTROL	DL FMT 21/1 DDU 2				93017G	*
RADI_C5	V72X0999BA	RH ADI PITCH SINE CONTROL	DL FMT 21/1 DDU 2				93017G	*
RADI_C6	V72X1000BA	RH ADI PITCH COSINE CONTROL	DL FMT 21/1 DDU 2				93017G	*
RADI_C7	V72X1001BA	RH ADI YAW SINE CONTROL	DL FMT 21/1 DDU 2				93017G	*
RADI_C8	V72X1002BA	RH ADI YAW COSINE CONTROL	DL FMT 21/1 DDU 2				93017G	*
RADI_C9	V72X1003BA	RH ADI ROLL RATE CONTROL	DL FMT 21/1 DDU 2				93017G	*

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE F.4.168-7. ASCENT ATTITUDE DIRECTION INDICATOR PROCESSING (G4.168) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.168-8. ASCENT ATTITUDE DIRECTION INDICATOR PROCESSING (G4.168) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.168-9. ASCENT ATTITUDE DIRECTION INDICATOR PROCESSING (G4.168) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

#### F.4.169 ON-ORBIT ATTITUDE DIRECTOR INDICATOR PROCESSING (PFS)

The ORB\_ADI\_PROC function must serve three indicators, each with independent scale select switches for attitude rates and attitude errors. The attitude data sets for the three indicators are also independent (the selection and transformations are done in the attitude processing function). The requirements for generating the outputs are discussed in the following paragraphs (see Table F.4.103.0–1 for definition of the output data). For the requirements which follow the phrase “integer part of” is defined to mean “the largest integer which is algebraically less than or equal to”.

##### Left/Right ADI Control Word (LADIWORD1/RADIWORD1) 160 ms

This word contains 13 validity bits, one for each of the other 13 words in the Left/Right ADI message.

LADI\_C2 = 1

LADI\_C3=LADI\_C4=LADI\_C5=LADI\_C6=LADI\_C7=LADI\_C8=LADI\_C9=LADI\_C10=LADI\_C11=  
LADI\_C12=LADI\_C13=LADI\_C14 = ADI\_ATT

RADI\_C2 = 1

RADI\_C3=RADI\_C4=RADI\_C5=RADI\_C6=RADI\_C7=RADI\_C8=RADI\_C9=RADI\_C10=RADI\_C11  
= RADI\_C12=RADI\_C13=RADI\_C14 = ADI\_ATT

##### Left/Right Test Word (LADIWORD2/RTADIWORD2)

This word must contain the fixed bit pattern shown in Table F.4.103.0–1.

##### Attitude Data

The attitude data are supplied to the instruments as the sine and cosine of the three attitude angles. The data are received by the SOP at 3.125 Hz as floating–point quantities which are the appropriate sines and cosines. The data are then passed through a first–order hold (FOH) with outputs at 12.5 Hz. The generic requirements for a FOH are stated in Paragraph 3.15. For the ADI, the FOH output data must be limited to the range of –1 to +1 (denoted in the equations below by LIMITED). These values must be then converted into signed 16–bit integers such that the integer +32760 corresponds to full–scale.

##### Left/Right ADI Roll Sine (LADIRS/RADIRS) 80 ms

LADIRS/RADIRS=8\*INTEGER(4095\*(LIMITED(FOH(ROLLSINE1/ROLLSINE2))))

##### Left/Right ADI Roll Cosine (LADIRC/RADIRC) 80 ms

LADIRC/RADIRC=8\*INTEGER(4095\*(LIMITED(FOH(ROLLCOS1/ROLLCOS2))))

##### Left/Right ADI Pitch Sine (LADIPS/RADIPS) 80 ms

LADIPS/RADIPS=8\*INTEGER(4095\*(LIMITED(FOH(PTCHSINE1/PTCHSINE2))))

##### Left/Right ADI Pitch Cosine (LADIPC/RADIPC) 80 ms

LADIPC/RADIPC=8\*INTEGER(4095\*(LIMITED(FOH(PTCHCOS1/PTCHCOS2))))



Left/Right ADI Yaw Sine (LADIYS/RADIYS) 80 ms

LADIYS/RADIYS=8\*INTEGER(4095\*(LIMITED(FOH(YAWSINE1/YAWSINE2))))

Left/Right ADI Yaw Cosine (LADIYC/RADIYC) 80 ms

LADIYC/RADIYC=8\*INTEGER(4095\*(LIMITED(FOH(YAWCOS1/YAWCOS2))))

Attitude Rate Data

Each ADI has a corresponding rate scale select switch that has three positions. Table F.4.169.0–1 shows the value of a full–scale reading for each of the three switch positions. As shown in Table F.4.103.0–1, the rate data are output as signed 16–bit integers.

Left/Right ADI Roll Rate (LADIRR/RADIRR) 160 ms

IF LADIRSW/RADIRSW = +1 THEN LADIRR/RADIRR =  
8\*INTEGER((4095/5)\*RATE\_EST\_1)  
IF LADIRSW/RADIRSW = 0 THEN LADIRR/RADIRR =  
8\*INTEGER((4095/1.0)\*RATE\_EST\_1)  
IF LADIRSW/RADIRSW = –1 THEN LADIRR/RADIRR =  
8\*INTEGER((4095/0.2)\*RATE\_EST\_1)

Left/Right ADI Pitch Rate (LADIPR/RADIPR) 160 ms

IF LADIRSW/RADIRSW = +1 THEN LADIPR/RADIPR =  
8\*INTEGER((4095/5)\*RATE\_EST\_2)  
IF LADIRSW/RADIRSW = 0 THEN LADIPR/RADIPR =  
8\*INTEGER((4095/1.0)\*RATE\_EST\_2)  
IF LADIRSW/RADIRSW = –1 THEN LADIPR/RADIPR =  
8\*INTEGER((4095/0.2)\*RATE\_EST\_2)

Left/Right ADI Yaw Rate (LADIYR/RADIYR) 160 ms

IF LADIRSW/RADIRSW = +1 THEN LADIYR/RADIYR =  
8\*INTEGER((4095/5)\*RATE\_EST\_3)  
IF LADIRSW/RADIRSW = 0 THEN LADIYR/RADIYR =  
8\*INTEGER((4095/1.0)\*RATE\_EST\_3)  
IF LADIRSW/RADIRSW = –1 THEN LADIYR/RADIYR =  
8\*INTEGER((4095/0.2)\*RATE\_EST\_3)

Attitude Error Data

Each ADI also has a corresponding error scale select switch that has three positions. Table F.4.169.0–1 shows the value of a full–scale reading for each of the three switch positions. The error data are output as signed 16–bit integers (Table F.4.103.0–1).

IF ERR\_SEL = 1 OR MM\_CODE\_202  
THEN ROLL\_ERR = BODY\_ERR\_ANG(1)  
PITCH\_ERR = BODY\_ERR\_ANG(2)

```

        YAW_ERR = BODY_ERR_ANG(3)
ELSE   ROLL_ERR = ATTITUDE_ERROR_1
        PITCH_ERR = ATTITUDE_ERROR_2
        YAW_ERR = ATTITUDE_ERROR_3
    
```

Left/Right ADI Roll Error (LADIRE/RADIRE) 80 ms

```

LADIRE/RADIRE = 8*INTEGER(RECC*ROLL_ERR)
where
IF LADIESW/RADIESW = +1 THEN RECC = 4095/10
IF LADIESW/RADIESW = 0 THEN RECC = 4095/5
IF LADIESW/RADIESW = -1 THEN RECC = 4095
    
```

Left/Right ADI Pitch Error (LADIPE/RADIPE) 80 ms

```

LADIPE/RADIPE = 8*INTEGER(RECC*PITCH_ERR)
where
IF LADIESW/RADIESW = +1 THEN RECC = 4095/10
IF LADIESW/RADIESW = 0 THEN RECC = 4095/5
IF LADIESW/RADIESW = -1 THEN RECC = 4095
    
```

Left/Right ADI Yaw Error (LADIYE/RADIYE) 80 ms

```

LADIYE/RADIYE = 8*INTEGER(RECC*YAW_ERR)
where
IF LADIESW/RADIESW = +1 THEN RECC = 4095/10
IF LADIESW/RADIESW = 0 THEN RECC = 4095/5
IF LADIESW/RADIESW = -1 THEN RECC = 4095
    
```

FORWARD (FWD) AND (AFT) ADI INTERRUPT PROCESSING (OPS 8)

These interrupts allow checkout of the ADI via the FCS Dedicated Checkout display.

```

IF FWD_ADI_INT = 1 THEN DISCONTINUE BOTH LEFT AND RIGHT ADI PROCESSING
                    (Resume when FWD_ADI_INT=0)
IF AFT_ADI_INT = 1 THEN DISCONTINUE AFT ADI PROCESSING
                    (Resume when AFT_ADI_INT=0)
    
```

AFT ADI Control Word (AADIWORD1) 160 ms

This word contains 13 validity bits, one for each of the other 13 words in the AFT ADI message.

```

AADI_C2 = 1
AADI_C3=AADI_C4=AADI_C5=AADI_C6=AADI_C7=AADI_C8=AADI_C9=AADI_C10=
AADI_C11=AADI_C12= AADI_C13=AADI_C14 = ADI_ATT
    
```

AFT ADI Test Word (AADIWORD2)

This word must contain the fixed bit pattern shown in Table F.4.103.0-1.

AFT ADI Roll Sine (AADIRS) 80 ms

AADIRS=8\*INTEGER(4095\*(LIMITED(FOH(ROLLSINE3))))

AFT ADI Roll Cosine (AADIRC) 80 ms

AADIRC=8\*INTEGER(4095\*(LIMITED(FOH(ROLLCOS3))))

AFT ADI Pitch Sine (AADIPS) 80 ms

AADIPS=8\*INTEGER(4095\*(LIMITED(FOH(PTCHSINE3))))

AFT ADI Pitch Cosine (AADIPC) 80 ms

AADIPC=8\*INTEGER(4095\*(LIMITED(FOH(PTCHCOS3))))

AFT ADI Yaw Sine (AADIYS) 80 ms

AADIYS=8\*INTEGER(4095\*(LIMITED(FOH(YAWSINE3))))

AFT ADI Yaw Cosine (AADIYC) 80 ms

AADIYC=8\*INTEGER(4095\*(LIMITED(FOH(YAWCOS3))))

Aft Rate and Error Data

In addition to the requirements stated above for the forward ADI's, the AFT ADI must reflect the position of the sense switch and the difference in orientation. For the sense switch in the -X position: the pitch indicators are reversed, the roll indicators are reversed, and the yaw indicators are unchanged. For the sense switch in the -Z position: the pitch indicators are reversed, the roll indicators are reversed from the forward yaw indicators, and the yaw indicators are reversed from the forward roll indicators.

AFT ADI Roll Rate (AADIRR) 160 ms

IF SEN\_SW = "-X"

THEN

IF AADIRSW = +1 THEN AADIRR = 8\*INTEGER((4095/5)\*(-RATE\_EST\_1))

IF AADIRSW = 0 THEN AADIRR = 8\*INTEGER((4095/1.0)\*(-RATE\_EST\_1))

IF AADIRSW = -1 THEN AADIRR = 8\*INTEGER((4095/0.2)\*(-RATE\_EST\_1))

IF SEN\_SW = "-Z"

THEN

IF AADIRSW = +1 THEN AADIRR = 8\*INTEGER((4095/5)\*(-RATE\_EST\_3))

IF AADIRSW = 0 THEN AADIRR = 8\*INTEGER((4095/1.0)\*(-RATE\_EST\_3))

IF AADIRSW = -1 THEN AADIRR = 8\*INTEGER((4095/0.2)\*(-RATE\_EST\_3))

AFT ADI Pitch Rate (AADIPR) 160 ms

IF AADIRSW = +1 THEN AADIPR = 8\*INTEGER((4095/5)\*(-RATE\_EST\_2))

IF AADIRSW = 0 THEN AADIPR = 8\*INTEGER((4095/1.0)\*(-RATE\_EST\_2))

IF AADIRSW = -1 THEN AADIPR = 8\*INTEGER((4095/0.2)\*(-RATE\_EST\_2))

AFT ADI Yaw Rate (AADIYR) 160 ms

```
IF SEN_SW = "-X"
  THEN
    IF AADIRSW = +1 THEN AADIYR = 8*INTEGER((4095/5.0)*(RATE_EST_3))
    IF AADIRSW = 0 THEN AADIYR = 8*INTEGER((4095/1.0)*(RATE_EST_3))
    IF AADIRSW = -1 THEN AADIYR = 8*INTEGER((4095/0.2)*(RATE_EST_3))
```

```
IF SEN_SW = "-Z"
  THEN
    IF AADIRSW = +1 THEN AADIYR = 8*INTEGER((4095/5)*(-RATE_EST_1))
    IF AADIRSW = 0 THEN AADIYR = 8*INTEGER((4095/1.0)*(-RATE_EST_1))
    IF AADIRSW = -1 THEN AADIYR = 8*INTEGER((4095/0.2)*(-RATE_EST_1))
```

AFT ADI Roll Error (AADIRE) 80 ms

```
IF SEN_SW = "-X"
  THEN AADIRE = 8*INTEGER((RECC)*(-ROLL_ERR))
  where
    IF AADIESW = +1 THEN RECC = 4095/10
    IF AADIESW = 0 THEN RECC = 4095/5
    IF AADIESW = -1 THEN RECC = 4095
```

```
IF SEN_SW = "-Z"
  THEN AADIRE = 8*INTEGER((RECC)*(-YAW_ERR))
  where
    IF AADIESW = +1 THEN RECC = 4095/10
    IF AADIESW = 0 THEN RECC = 4095/5
    IF AADIESW = -1 THEN RECC = 4095
```

AFT ADI Pitch Error (AADIFE) 80 ms

```
AADIFE = 8* INTEGER ((RECC)*(-PITCH_ERR))
  where
    IF AADIESW = +1 THEN RECC = 4095/10
    IF AADIESW = 0 THEN RECC = 4095/5
    IF AADIESW = -1 THEN RECC = 4095
```

AFT ADI Yaw Error (AADIYE) 80 ms

```
IF SEN_SW = "-X"
  THEN AADIYE = 8*INTEGER((RECC)*(YAW_ERR))
  where
    IF AADIESW = +1 THEN RECC = 4095/10
    IF AADIESW = 0 THEN RECC = 4095/5
    IF AADIESW = -1 THEN RECC = 4095
```

```
IF SEN_SW = "-Z"
  THEN AADIYE = 8*INTEGER((RECC)*(-ROLL_ERR))
```

where  
 IF AADIESW = +1 THEN RECC = 4095/10  
 IF AADIESW = 0 THEN RECC = 4095/5  
 IF AADIESW = -1 THEN RECC = 4095

Limiting of Rate and Error Data

Prior to the integer conversions called for in requirements statements for LADIRR, LADIPR, LADIYR, LADIRE, LADIPE, LADIYE, RADIRR, RADIPR, RADIYR, RADIRE, RADIPE, RADIYE, AADIRR, AADIPR, AADIYR, AADIRE, AADIPE, and AADIYE, the value to be converted must be limited to the range of -4096 to +4095, inclusive. For example, in the statement of LADIRR requirements, if 1.0 degrees per second full scale is selected, then  $(4095/1.0)*(RATE\_EST\_1)$

$$-4096 \leq ((4095/1.0)*(RATE\_EST\_1)) \leq +4095$$

If values outside the range -4096 to +4095 occur, the nearest limit value must be used instead.

Transport Lag

The GPC transport lag (MDM read to DDU write) for each of the ADI parameters shall not exceed the values specified below:

Pitch, Roll Attitude	210 ms
Yaw Attitude	350 ms
Attitude Rates	210 ms
Attitude Errors	210 ms
Off Flags	250 ms

Table F.4.169.0-1. ADI SCALE SELECTION-ON-ORBIT						
Switch	Full Scale Value					
	Attitude Rate			Attitude Error		
Position	Roll	Pitch	Yaw	Roll	Pitch	Yaw
	(Deg/Sec)			(Deg)		
High	5	5	5	10	10	10
Med	1.0	1.0	1.0	5	5	5
Low	0.2	0.2	0.2	1	1	1

**F.4.169.1 On-orbit Attitude Director Indicator Interface Support Functions**

- Table F.4.169-5 Input Functional Parameters
- Table F.4.169-6 Output Functional Parameters
- Table F.4.169-7 I-Loads
- Table F.4.169-8 K-Loads
- Table F.4.169-9 Constants

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TABLE F.4.169-5. INPUT FUNCTIONAL PARAMETERS FOR ONORBIT ATTITUDE DIRECTION INDICATOR PROCESSING (G4.169)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
AADIESW	V90X7745X	AFT ADI ERROR SCALE SELECT SW	GN&C SW RM				93007B	
AADIRSW	V90X7746X	AFT ADI RATE SCALE SELECT SW	GN&C SW RM				93007B	
ADI_ATT	V90X2573X	ADI ATTITUDE FLAG	IMU RM					
BODY_ERR_ANG(1)	V90H2234CB	BODY ROLL ATTITUDE ERROR	ORB ATT PROC	DEG			89366	
BODY_ERR_ANG(2)	V90H2233CB	BODY PITCH ATTITUDE ERROR	ORB ATT PROC	DEG			89366	
BODY_ERR_ANG(3)	V90H2235CB	BODY YAW ATTITUDE ERROR	ORB ATT PROC	DEG				
DAP_ERR(1)	V90H2143C	BODY ATTITUDE ERROR-ROLL	ORB DAP	DEG	SPL		93017G	*
DAP_ERR(2)	V90H2141C	BODY ATTITUDE ERROR-PITCH	ORB DAP	DEG	SPL		93017G	*
DAP_ERR(3)	V90H2142C	BODY ATTITUDE ERROR-YAW	ORB DAP	DEG	SPL		93017G	*
ERR_SEL	V93X6845X	TOTAL/DAP ERROR SELECT FLAG	UNIV PTG DISP		BD		93017G	*
LADIESW	V90J7520C	LH ADI ERROR SCALE SELECT SW	GN&C SW RM				90960E	
LADIRSW	V90J7507C	LH ADI RATE SCALE SELECT SW	GN&C SW RM				90960E	
OPS_2_INDICATOR	V90X8633X	OPS 2 IND	MSC				90837G	
PTCHCOS(1)	V90H2222CB	LH ADI SEL EULER ANG PITCH COSINE	ORB ATT PROC					
PTCHCOS(2)	V90H2218CB	RH ADI SEL EULER ANG PITCH COSINE	ORB ATT PROC					
PTCHCOS(3)	V90H2292C	AFT ADI SEL EULER ANG PITCH COSINE	ORB ATT PROC		SPL			
PTCHSINE(1)	V90H2221CB	LH ADI SEL EULER ANG PITCH SINE	ORB ATT PROC					
PTCHSINE(2)	V90H2220CB	RH ADI SEL EULER ANG PITCH SINE	ORB ATT PROC					
PTCHSINE(3)	V90H2291C	AFT ADI SEL EULER ANG PITCH SINE	ORB ATT PROC		SPL			
RADIESW	V90J7506C	RH ADI ERROR SCALE SELECT SW	GN&C SW RM				90960E	
RADIRSW	V90J7508C	RH ADI RATE SCALE SELECT SW	GN&C SW RM				90960E	
RATE_EST(1)/BOD_RATE(1)	V90R2223C	IMU DERIVED BODY RATE X-AXIS	ORB DAP	DEG/S	SPL		93017G	*
RATE_EST(2)/BOD_RATE(2)	V90R2224C	IMU DERIVED BODY RATE Y-AXIS	ORB DAP	DEG/S	SPL		93017G	*
RATE_EST(3)/BOD_RATE(3)	V90R2225C	IMU DERIVED BODY RATE Z-AXIS	ORB DAP	DEG/S	SPL		93017G	*
ROLLCOS(1)	V90H2209CB	LH ADI SEL EULER ANG ROLL COSINE	ORB ATT PROC				89490B	
ROLLCOS(2)	V90H2207CB	RH ADI SEL EULER ANG ROLL COSINE	ORB ATT PROC				89490B	
ROLLCOS(3)	V90H2290C	AFT ADI SEL EULER ANG ROLL COSINE	ORB ATT PROC		SPL		89490B	
ROLLSINE(1)	V90H2208CB	LH ADI SEL EULER ANG ROLL SINE	ORB ATT PROC				89490B	
ROLLSINE(2)	V90H2206CB	RH ADI SEL EULER ANG ROLL SINE	ORB ATT PROC				89490B	
ROLLSINE(3)	V90H2289C	AFT ADI SEL EULER ANG ROLL SINE	ORB ATT PROC		SPL		89490B	
SENSE_SW	V90X7700X	SEL SENSE -X	GN&C SW RM		BD		93017G	*
YAWCOS(1)	V90H2232CB	LH ADI SEL EULER ANG YAW COSINE	ORB ATT PROC					
YAWCOS(2)	V90H2294CB	RH ADI SEL EULER ANG YAW COSINE	ORB ATT PROC					
YAWCOS(3)	V90H2296C	AFT ADI SEL EULER ANG YAW COSINE	ORB ATT PROC		SPL			
YAWSINE(1)	V90H2231CB	LH ADI SEL EULER ANG YAW SINE	ORB ATT PROC					
YAWSINE(2)	V90H2293CB	RH ADI SEL EULER ANG YAW SINE	ORB ATT PROC					
YAWSINE(3)	V90H2295C	AFT ADI SEL EULER ANG YAW SINE	ORB ATT PROC		SPL			
	V99X2340X	FWD STA ADI SST INT	DDC					
	V99X2341X	AFT STA ADI SST INT	DDC					

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE F.4.169-6. OUTPUT FUNCTIONAL PARAMETERS FROM ONORBIT ATTITUDE DIRECTION INDICATOR PROCESSING  
(G4.169)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
AADIPC	V72H1114C	AFT ADI PITCH COSINE POSITION	DDU 3		BSS		93017G	*
			DL FMT 22/A					
			DL FMT 32/A					
AADIPE	V72H1127C	AFT ADI PITCH ATTITUDE ERROR	DDU 3		BSS		93017G	*
			DL FMT 22/A					
			DL FMT 32/A					
AADIPR	V72R1117C	AFT ADI PITCH RATE	DDU 3		BSS		93017G	*
			DL FMT 22/A					
			DL FMT 32/A					
AADIPS	V72H1111C	AFT ADI PITCH SINE POSITION	DDU 3		BSS		93017G	*
			DL FMT 22/A					
			DL FMT 32/A					
AADIRC	V72H1113C	AFT ADI ROLL COSINE POSITION	DDU 3		BSS		93017G	*
			DL FMT 22/A					
			DL FMT 32/A					
AADIRE	V72H1125C	AFT ADI ROLL ATTITUDE ERROR	DDU 3		BSS		93017G	*
			DL FMT 22/A					
			DL FMT 32/A					
AADIRR	V72R1116C	AFT ADI ROLL RATE	DDU 3		BSS		93017G	*
			DL FMT 22/A					
			DL FMT 32/A					
AADIRS	V72H1110C	AFT ADI ROLL SINE POSITION	DDU 3		BSS		93017G	*
			DL FMT 22/A					
			DL FMT 32/A					
AADIWORD1	V72M1095P	AFT ADI CONTROL WORD	DDU 3		HMD		93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
AADIWORD2	V72Q1109C	AFT ADI TEST WORD	DDU 3		HMD		92230F	
AADIYC	V72H1115C	AFT ADI YAW COSINE POSITION	DDU 3		BSS		93017G	*
			DL FMT 22/A					
			DL FMT 32/A					
AADIYE	V72H1129C	AFT ADI YAW ATTITUDE ERROR	DDU 3		BSS		93017G	*
			DL FMT 22/A					
			DL FMT 32/A					
AADIYR	V72R1118C	AFT ADI YAW RATE	DDU 3		BSS		93017G	*
			DL FMT 22/A					
			DL FMT 32/A					
AADIYS	V72H1112C	AFT ADI YAW SINE POSITION	DDU 3		BSS		93017G	*
			DL FMT 22/A					
			DL FMT 32/A					
AADI_C10	V72X1104B	AFT ADI PITCH RATE CONTROL	DDU 3		BD		93017G	*
			DL FMT 22/1					
			DL FMT 32/1					



TABLE F.4.169-6. OUTPUT FUNCTIONAL PARAMETERS FROM ONORBIT ATTITUDE DIRECTION INDICATOR PROCESSING  
(G4.169)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
AADI_C11	V72X1105B	AFT ADI YAW RATE CONTROL	DDU 3		BD		93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
AADI_C12	V72X1106B	AFT ADI ROLL ERROR CONTROL	DDU 3		BD		93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
AADI_C13	V72X1107B	AFT ADI PITCH ERROR CONTROL	DDU 3		BD		93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
AADI_C14	V72X1108B	AFT ADI YAW ERROR CONTROL	DDU 3		BD		93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
AADI_C2	V72X1096B	AFT ADI TEST WORD CONTROL	DDU 3		BD		93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
AADI_C3	V72X1097B	AFT ADI ROLL SINE CONTROL	DDU 3		BD		93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
AADI_C4	V72X1098B	AFT ADI ROLL COSINE CONTROL	DDU 3		BD		93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
AADI_C5	V72X1099B	AFT ADI PITCH SINE CONTROL	DDU 3		BD		93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
AADI_C6	V72X1100B	AFT ADI PITCH COSINE CONTROL	DDU 3		BD		93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
AADI_C7	V72X1101B	AFT ADI YAW SINE CONTROL	DDU 3		BD		93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
AADI_C8	V72X1102B	AFT ADI YAW COSINE CONTROL	DDU 3		BD		93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
AADI_C9	V72X1103B	AFT ADI ROLL RATE CONTROL	DDU 3		BD		93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
LADIPC	V72H0913CC	LH ADI PITCH COSINE POSITION	DDU 1				93017G	*
			DL FMT 22/A					
			DL FMT 32/A					
			DL FMT 42/1					
			DL FMT 53/1					

TABLE F.4.169-6. OUTPUT FUNCTIONAL PARAMETERS FROM ONORBIT ATTITUDE DIRECTION INDICATOR PROCESSING  
(G4.169)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
LADIPE	V72H0927CC	LH ADI PITCH ATTITUDE ERROR	DDU 1 DL FMT 22/A DL FMT 32/A DL FMT 42/1 DL FMT 53/1				93017G	*
LADIPR	V72R0917CC	LH ADI PITCH RATE	DDU 1 DL FMT 22/A DL FMT 32/A DL FMT 42/1 DL FMT 53/1	DEG/S			93017G	*
LADIPS	V72H0912CC	LH ADI PITCH SINE POSITION	DDU 1 DL FMT 22/A DL FMT 32/A DL FMT 42/1 DL FMT 53/1				93017G	*
LADIRC	V72H0911CC	LH ADI ROLL COSINE POSITION	DDU 1 DL FMT 22/A DL FMT 32/A DL FMT 42/1 DL FMT 53/1				93017G	*
LADIRE	V72H0925CC	LH ADI ROLL ATTITUDE ERROR	DDU 1 DL FMT 22/A DL FMT 32/A DL FMT 42/1 DL FMT 53/1	DEG			93017G	*
LADIRR	V72R0916CC	LH ADI ROLL RATE	DDU 1 DL FMT 22/A DL FMT 32/A DL FMT 42/1 DL FMT 53/1	DEG/S			93017G	*
LADIRS	V72H0910CC	LH ADI ROLL SINE POSITION	DDU 1 DL FMT 22/A DL FMT 32/A DL FMT 42/1 DL FMT 53/1				93017G	*
LADIWORD1	V72M0895PC	LH ADI CONTROL WORD	DDU 1 DL FMT 22/1 DL FMT 32/1 DL FMT 42/1 DL FMT 43/1 DL FMT 53/1				93017G	*
LADIWORD2	V72Q0909BC	LH ADI TEST WORD	DDU 1 TLM					

TABLE F.4.169-6. OUTPUT FUNCTIONAL PARAMETERS FROM ONORBIT ATTITUDE DIRECTION INDICATOR PROCESSING (G4.169)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
LADIYC	V72H0915CC	LH ADI YAW COSINE POSITION	DDU 1 DL FMT 22/A DL FMT 32/A DL FMT 42/1 DL FMT 53/1				93017G	*
LADIYE	V72H0929CC	LH ADI YAW ATTITUDE ERROR	DDU 1 DL FMT 22/A DL FMT 32/A DL FMT 42/1 DL FMT 53/1	DEG			93017G	*
LADIYR	V72R0918CC	LH ADI YAW RATE	DDU 1 DL FMT 22/A DL FMT 32/A DL FMT 42/1 DL FMT 53/1	DEG/S			93017G	*
LADIYS	V72H0914CC	LH ADI YAW SINE POSITION	DDU 1 DL FMT 22/A DL FMT 32/A DL FMT 42/1 DL FMT 53/1				93017G	*
LADI_C10	V72X0904BC	LH ADI PITCH RATE CONTROL	DDU 1 DL FMT 22/1 DL FMT 32/1 DL FMT 42/1 DL FMT 43/1 DL FMT 53/1				93017G	*
LADI_C11	V72X0905BC	LH ADI YAW RATE CONTROL	DDU 1 DL FMT 22/1 DL FMT 32/1 DL FMT 42/1 DL FMT 43/1 DL FMT 53/1				93017G	*
LADI_C12	V72X0906BC	LH ADI ROLL ERROR CONTROL	DDU 1 DL FMT 22/1 DL FMT 32/1 DL FMT 42/1 DL FMT 43/1 DL FMT 53/1				93017G	*
LADI_C13	V72X0907BC	LH ADI PITCH ERROR CONTROL	DDU 1 DL FMT 22/1 DL FMT 32/1 DL FMT 42/1 DL FMT 43/1 DL FMT 53/1				93017G	*

TABLE F.4.169-6. OUTPUT FUNCTIONAL PARAMETERS FROM ONORBIT ATTITUDE DIRECTION INDICATOR PROCESSING  
(G4.169)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
LADI_C14	V72X0908BC	LH ADI YAW ERROR CONTROL	DDU 1				93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
			DL FMT 42/1					
			DL FMT 43/1					
			DL FMT 53/1					
LADI_C2	V72X0896BC	LH ADI TEST WORD CONTROL	DDU 1				93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
			DL FMT 42/1					
			DL FMT 43/1					
			DL FMT 53/1					
LADI_C3	V72X0897BC	LH ADI ROLL SINE CONTROL	DDU 1				93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
			DL FMT 42/1					
			DL FMT 43/1					
			DL FMT 53/1					
LADI_C4	V72X0898BC	LH ADI ROLL COSINE CONTROL	DDU 1				93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
			DL FMT 42/1					
			DL FMT 43/1					
			DL FMT 53/1					
LADI_C5	V72X0899BC	LH ADI PITCH SINE CONTROL	DDU 1				93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
			DL FMT 42/1					
			DL FMT 43/1					
			DL FMT 53/1					
LADI_C6	V72X0900BC	LH ADI PITCH COSINE CONTROL	DDU 1				93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
			DL FMT 42/1					
			DL FMT 43/1					
			DL FMT 53/1					
LADI_C7	V72X0901BC	LH ADI YAW SINE CONTROL	DDU 1				93017G	*
			DL FMT 22/1					
			DL FMT 32/1					
			DL FMT 42/1					
			DL FMT 43/1					
			DL FMT 53/1					

TABLE F.4.169-6. OUTPUT FUNCTIONAL PARAMETERS FROM ONORBIT ATTITUDE DIRECTION INDICATOR PROCESSING  
(G4.169)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
LADI_C8	V72X0902BC	LH ADI YAW COSINE CONTROL	DDU 1 DL FMT 22/1 DL FMT 32/1 DL FMT 42/1 DL FMT 43/1 DL FMT 53/1				93017G	*
LADI_C9	V72X0903BC	LH ADI ROLL RATE CONTROL	DDU 1 DL FMT 22/1 DL FMT 32/1 DL FMT 42/1 DL FMT 43/1 DL FMT 53/1				93017G	*
RADIPC	V72H1013CC	RH ADI PITCH COSINE POSITION	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*
RADIPE	V72H1027CC	RH ADI PITCH ATTITUDE ERROR	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*
RADIPR	V72R1017CC	RH ADI PITCH RATE	DDU 2 DL FMT 22/1 DL FMT 32/1	DEG/S			93017G	*
RADIPS	V72H1012CC	RH ADI PITCH SINE POSITION	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*
RADIRC	V72H1011CC	RH ADI ROLL COSINE POSITION	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*
RADIRE	V72H1025CC	RH ADI ROLL ATTITUDE ERROR	DDU 2 DL FMT 22/1 DL FMT 32/1	DEG			93017G	*
RADIRR	V72R1016CC	RH ADI ROLL RATE	DDU 2 DL FMT 22/1 DL FMT 32/1	DEG/S			93017G	*
RADIRS	V72H1010CC	RH ADI ROLL SINE POSITION	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*
RADIWORD1	V72M0995PC	RH ADI CONTROL WORD	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*
RADIWORD2	V72Q1009BC	RH ADI TEST WORD	DDU 2 TLM					
RADIYC	V72H1015CC	RH ADI YAW COSINE POSITION	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*

TABLE F.4.169-6. OUTPUT FUNCTIONAL PARAMETERS FROM ONORBIT ATTITUDE DIRECTION INDICATOR PROCESSING  
(G4.169)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
RADIYE	V72H1029CC	RH ADI YAW ATTITUDE ERROR	DDU 2 DL FMT 22/1 DL FMT 32/1	DEG			93017G	*
RADIYR	V72R1018CC	RH ADI YAW RATE	DDU 2 DL FMT 22/1 DL FMT 32/1	DEG/S			93017G	*
RADIYS	V72H1014CC	RH ADI YAW SINE POSITION	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*
RADI_C10	V72X1004BC	RH ADI PITCH RATE CONTROL	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*
RADI_C11	V72X1005BC	RH ADI YAW RATE CONTROL	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*
RADI_C12	V72X1006BC	RH ADI ROLL ERROR CONTROL	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*
RADI_C13	V72X1007BC	RH ADI PITCH ERROR CONTROL	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*
RADI_C14	V72X1008BC	RH ADI YAW ERROR CONTROL	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*
RADI_C2	V72X0996BC	RH ADI TEST WORD CONTROL	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*
RADI_C3	V72X0997BC	RH ADI ROLL SINE CONTROL	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*
RADI_C4	V72X0998BC	RH ADI ROLL COSINE CONTROL	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*
RADI_C5	V72X0999BC	RH ADI PITCH SINE CONTROL	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*
RADI_C6	V72X1000BC	RH ADI PITCH COSINE CONTROL	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*
RADI_C7	V72X1001BC	RH ADI YAW SINE CONTROL	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*
RADI_C8	V72X1002BC	RH ADI YAW COSINE CONTROL	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*

TABLE F.4.169-6. OUTPUT FUNCTIONAL PARAMETERS FROM ONORBIT ATTITUDE DIRECTION INDICATOR PROCESSING (G4.169)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
RADI_C9	V72X1003BC	RH ADI ROLL RATE CONTROL	DDU 2 DL FMT 22/1 DL FMT 32/1				93017G	*

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

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TABLE F.4.169-7. ONORBIT ATTITUDE DIRECTION INDICATOR PROCESSING (G4.169) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.169-8. ONORBIT ATTITUDE DIRECTION INDICATOR PROCESSING (G4.169) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.169-9. ONORBIT ATTITUDE DIRECTION INDICATOR PROCESSING (G4.169) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

#### F.4.230 RCS ACTIVITY LIGHT PROCESSING (PFS)

The RCS activity light processing function will perform the processing necessary to drive the roll, pitch, and yaw RCS command lights located on panel F6A. The RCS lights indicate the presence of a RCS command. The RCS commands are stretched to provide increased visibility. During entry, after the roll and pitch jets have been deactivated, both roll command lights are used to indicate that 3 or more yaw jets have been requested and both pitch lights are used to indicate elevator or aileron rate saturation.

The I-Load values are defined in the JSC-19350 STS Flight Software Initialization Load; all are category A (never changed by onboard software). The processing required is described in the following paragraphs:

##### F.4.230.1 RCS Indicator Light Processing (25 HZ) - MM304, 305, 602, 603

```
NUM = NUM_MAX (INITIAL CONDITIONS ONLY)
EVEN_PASS_FLAG = ON (INITIAL CONDITIONS ONLY)
IF EVEN_PASS_FLAG = ON
    THEN IF UZCMD < 0 THEN YL= ON
          IF UZCMD > 0 THEN YR = ON
          IF UYCMD < 0 THEN PD = ON
          IF UYCMD > 0 THEN PU = ON
          IF UXCMD < 0 THEN RL = ON
          IF UXCMD > 0 THEN RR = ON
          IF |UZCMD| > 2 THEN YAW_SAT = ON
          EVEN_PASS_FLAG = OFF
    ELSE EVEN_PASS_FLAG = ON
IF RS_ELEVATOR = ON OR RS_AILERON = ON
    THEN RATE_SAT = ON
NUM = NUM + 1
IF NUM ≥ NUM_MAX
    THEN RCS_YL_LAMP = YL
          RCS_YR_LAMP = YR
          IF QBAR < QBAR_PITCH
              THEN RCS_PD_LAMP = PD
                   RCS_PU_LAMP = PU
          IF QBAR < QBAR_ROLL
              THEN RCS_RL_LAMP = RL
                   RCS_RR_LAMP = RR
          IF QBAR > QBAR_SAT
              THEN IF YAW_SAT = ON
                     THEN RCS_RL_LAMP = ON
                          RCS_RR_LAMP = ON
                   IF RATE_SAT = ON
                       THEN RCS_PD_LAMP = ON
                              RCS_PU_LAMP = ON
                                   HUD_HYDSAT = ON
          YL=YR=PD=PU=RL=RR=YAW_SAT=RATE_SAT = OFF
    NUM = 0
```

**F.4.230.2 DELETED**

**F.4.230.3 DELETED**

**F.4.230.4 RCS YAW Indicator Light Processing (12.5HZ) - MM104-106, MM301-303**

Right Yaw Indicator Light Processing

```
IF ROT_JET_CMD(3) = +1.0
    THEN          RCS_YR_LAMP = ON
    ELSE          RCS_YR_LAMP = OFF
```

Left Yaw Indicator Light Processing

```
IF ROT_JET_CMD(3) = -1.0
    THEN          RCS_YL_LAMP = ON
    ELSE          RCS_YL_LAMP = OFF
```

**F.4.230.5 RCS Pitch Indicator Light Processing (12.5HZ) - MM104-106, MM301-303**

Pitch Down Indicator Light Processing

```
IF ROT_JET_CMD(2) = -1.0
    THEN          RCS_PD_LAMP = ON
    ELSE          RCS_PD_LAMP = OFF
```

Pitch Up Indicator Light Processing

```
IF ROT_JET_CMD(2) = +1.0
    THEN          RCS_PU_LAMP = ON
    ELSE          RCS_PU_LAMP = OFF
```

**F.4.230.6 RCS Roll Indicator Light Processing (12.5HZ) - MM104-106, MM301-303**

Left Roll Indicator Light Processing

```
IF ROT_JET_CMD(1) = -1.0
    THEN          RCS_RL_LAMP = ON
    ELSE          RCS_RL_LAMP = OFF
```

Right Roll Indicator Light Processing

```
IF ROT_JET_CMD(1) = +1.0
    THEN          RCS_RR_LAMP = ON
    ELSE          RCS_RR_LAMP = OFF
```

**F.4.230.7 RCS YAW Indicator Light Processing (12.5HZ) - OPS 2, OPS 8**

Right Yaw Indicator Light Processing

```
IF ROT_COMMAND(3) = +1.0
    THEN          RCS_YR_LAMP = ON
    ELSE          RCS_YR_LAMP = OFF
```

Left Yaw Indicator Light Processing

```
IF ROT_COMMAND(3) = -1.0
    THEN          RCS_YL_LAMP = ON
    ELSE          RCS_YL_LAMP = OFF
```

**F.4.230.8 RCS Pitch Indicator Light Processing (12.5HZ) - OPS 2, OPS 8**

Pitch Down Indicator Light Processing

```
IF ROT_COMMAND(2) = -1.0
    THEN          RCS_PD_LAMP = ON
    ELSE          RCS_PD_LAMP = OFF
```

Pitch Up Indicator Light Processing

```
IF ROT_COMMAND(2) = +1.0
    THEN          RCS_PU_LAMP = ON
    ELSE          RCS_PU_LAMP = OFF
```

**F.4.230.9 RCS Roll Indicator Light Processing (12.5HZ) - OPS 2, OPS 8**

Left Roll Indicator Light Processing

```
IF ROT_COMMAND(1) = -1.0
    THEN          RCS_RL_LAMP = ON
    ELSE          RCS_RL_LAMP = OFF
```

Right Roll Indicator Light Processing

```
IF ROT_COMMAND(1) = +1.0
    THEN          RCS_RR_LAMP = ON
    ELSE          RCS_RR_LAMP = OFF
```

**F.4.230.10 RCS Activity Light Processing Interface Support Functions**

Table F.4.230-5                    Input Functional Parameters

Table F.4.230-6                    Output Functional Parameters

Table F.4.230-7                    I-Loads

Table F.4.230-8                    K-Loads

Table F.4.230-9                    Constants

TABLE F.4.230-5. INPUT FUNCTIONAL PARAMETERS FOR REACTION CONTROL SYSTEM ACTIVITY LIGHTS (G4.230)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
QBAR/QBAR_AD	V95P3011C	GN&C DYNAMIC PRESSURE	ADTA SOP	LBF/FT2	SPL		93017G	*
ROT_COMMAND(1)	V90U2416C	RCS ROT CMD FOR DISPLAY(ROLL)	ORB DAP				89921C	
ROT_COMMAND(2)	V90U2417C	RCS ROT CMD FOR DISPLAY(PITCH)	ORB DAP				89921C	
ROT_COMMAND(3)	V90U2418C	RCS ROT CMD FOR DISPLAY(YAW)	ORB DAP				89921C	
ROT_JET_CMD(1)	V90U1697C	RCS ROTATION COMMAND(ROLL)	TRANS DAP				89921C	
ROT_JET_CMD(2)	V90U1698C	RCS ROTATION COMMAND(PITCH)	TRANS DAP				89921C	
ROT_JET_CMD(3)	V90U1699C	RCS ROTATION COMMAND(YAW)	TRANS DAP				89921C	
RS_AILERON	V90X1604XA	AILERON RATE SATURATION FLAG	GRTLS DAP					
RS_AILERON	V90X1604XB	AILERON RATE SATURATION FLAG	AEROJET DAP					
RS_ELEVATOR	V90X1602XA	ELEVATOR RATE SATURATION FLAG	GRTLS DAP					
RS_ELEVATOR	V90X1602XB	ELEVATOR RATE SATURATION FLAG	AEROJET DAP					
UXCMD	V90J1636CA	ROLL JET COMMAND	AEROJET DAP					
UXCMD	V90J1636CB	ROLL JET COMMAND	GRTLS DAP					
UYCMD	V90J1638CA	PITCH JET COMMAND	AEROJET DAP					
UYCMD	V90J1638CB	PITCH JET COMMAND	GRTLS DAP					
UZCMD	V90H2736CA	ROTATION JET COMMAND YAW	AEROJET DAP				93017G	*
UZCMD	V90H2736CB	ROTATION JET COMMAND YAW	GRTLS DAP				93017G	*

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE F.4.230-6. OUTPUT FUNCTIONAL PARAMETERS FROM REACTION CONTROL SYSTEM ACTIVITY LIGHTS (G4.230)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
HUD_HYDSAT	V72X4045X	HUD HYD SATURATION FLAG	HUDE1		BD			
RCS_PD_LAMP	V72X1231X	RCS CMD PITCH DOWN A	HUDE2 D&C PNL DL FMT 21/A DL FMT 22/A DL FMT 32/B		BD		93017G	*
RCS_PD_LAMP	V72X1232X	RCS CMD PITCH DOWN B	D&C PNL DL FMT 23/1 DL FMT 32/2		BD		93017G	*
RCS_PU_LAMP	V72X1181X	RCS CMD PITCH UP A	D&C PNL DL FMT 21/A DL FMT 22/A DL FMT 32/B		BD		93017G	*
RCS_PU_LAMP	V72X1182X	RCS CMD PITCH UP B	D&C PNL DL FMT 23/1 DL FMT 32/2		BD		93017G	*
RCS_RL_LAMP	V72X1174X	RCS CMD ROLL LEFT LAMP A	D&C PNL TLM		BD			
RCS_RL_LAMP	V72X1175X	RCS CMD ROLL LEFT LAMP B	D&C PNL TLM		BD			
RCS_RR_LAMP	V72X1224X	RCS CMD ROLL RIGHT LAMP A	D&C PNL TLM		BD			
RCS_RR_LAMP	V72X1225X	RCS CMD ROLL RIGHT LAMP B	D&C PNL TLM		BD			
RCS_YL_LAMP	V72X1178X	RCS CMD YAW LEFT LAMP A	D&C PNL TLM		BD			
RCS_YL_LAMP	V72X1179X	RCS CMD YAW LEFT LAMP B	D&C PNL TLM		BD			
RCS_YR_LAMP	V72X1228X	RCS CMD YAW RIGHT LAMP A	D&C PNL TLM		BD			
RCS_YR_LAMP	V72X1229X	RCS CMD YAW RIGHT LAMP B	D&C PNL TLM		BD			
	V72M6625PA	MDM FF01 DSCR OUT SET	CD 02 CH 1	DL FMT 21/A DL FMT 22/A DL FMT 32/B			93017G	*
	V72M6725P	MDM FF03 DSCR OUT SET	CD 02 CH 1	DL FMT 23/1 DL FMT 32/2			93017G	*

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec



TABLE F.4.230-7. REACTION CONTROL SYSTEM ACTIVITY LIGHTS (G4.230) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
NUM_MAX	V97U6836C	ND	I	S	D	P	G4.230	00	ZF4	DC0617	
QBAR_PITCH	V97U6858C	LBS/FT**2	F	S	D	P	G4.230	00	ZF4	DC0617	
QBAR_ROLL	V97U6859C	LBS/FT**2	F	S	D	P	G4.230	00	ZF4	DC0617	
QBAR_SAT	V97U6860C	LBS/FT**2	F	S	D	C	G4.230	00	ZF4	DC0617	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.230-8. REACTION CONTROL SYSTEM ACTIVITY LIGHTS (G4.230) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
--------------------------	------	----	-------------	-----------	----	--------	---	---------	---------	-------------

---

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.230-9. REACTION CONTROL SYSTEM ACTIVITY LIGHTS (G4.230) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
--------------------------	------	----	----------------	-----------	----	--------	---	---------	---------	-------------

NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

#### **F.4.252 HEAD UP DISPLAY PROCESSING (HUD PROC) - (PFS)**

This section specifies the detailed requirements for the Head Up Display Processor (HUD PROC). The principle function number identifying HUD PROC is 4.252. The HUD PROC is responsible for assembling information and generating the messages required for the Head Up Display (HUD).

##### **F.4.252.1 COMMON PROCESSING REQUIREMENTS**

The HUD PROC shall send a set of data words as defined in Table 3.4-3 in the GPC/HUDE ICD to both the left and right HUDEs, at a rate which minimizes the transport lag to the HUDEs. The input data for the HUDE-unique data shall be updated per rates specified in GPC/HUDE ICD.

Section F.4.252.4 shows the interfaces associated with the HUD PROC. The requirements for generating each of the outputs are defined in the following discussion.

##### INITIALIZATION, I-LOADS AND K-LOADS

Initialization requirements are specified in Table F.4.252.1-1. I-LOADS are specified in Table F.4.252-7 and values can be found in the STS Flight Software Initialization Load (JSC-19350). The K-Load constants are defined in Table F.4.252-8.

##### HUD PROC GPC-TO-HUDE MESSAGES

The HUDE-unique transmissions generated by the HUD PROC shall conform to the formats defined by the GPC/HUDE ICD. These transmissions can be chained with the DDU transmissions, and sent together. The HUD-unique transmissions comprise HUD-unique messages 1 & 2, as per the GPC/HUDE ICD.

The command word and test word shall be set in accordance with Table 3.4-1 of the GPC/HUDE ICD.

There shall be two sets of HUDE-unique transmissions, one for the right HUDE and one for the left HUDE. The only difference between the two sets are the format selection code (if different formats are to be displayed on the left and right HUDEs), the HSI source selection, and ADI rate scaling. An index to the processing requirements for the HUDE-unique data is found in Table F.4.252.1-2.

##### HUD PROC DATA CONVERSIONS

The IDD indicates the GNC parameters which are specifically required to support the HUDE display formats, different from those already supplied to support the DDU displays. The HUD PROC performs the conversions and scaling to transform the GNC inputs into the 16-bit data words to be sent to the left and right HUDEs.

The conversions consist of converting the various parameters to fixed-point, 16-bit, two's complement integers. The term INTEGER in the following computations should be interpreted as taking the largest integer less than or equal to the floating-point value. For POSITION\_WRT\_RW, the following algorithm shall be used.

Let HUD\_I\_RW\_POS and HUD\_I\_RW\_SCL equal HUD\_X\_RW\_POS and HUD\_X\_RW\_SCL, if I = 1; HUD\_Y\_RW\_POS and HUD\_Y\_RW\_SCL, if I = 2; and HUD\_Z\_RW\_POS and HUD\_Z\_RW\_SCL, if I = 3, then:

Do for I = 1, 2, 3

```
IF ABS(POSITION_WRT_RW(I)) ≤ 32768,  
    THEN HUD_I_RW_POS = INTEGER(POSITION_WRT_RW(I))  
        HUD_I_RW_SCL = 0  
IF 32768 < ABS(POSITION_WRT_RW(I)) ≤ 327680,  
    THEN HUD_I_RW_POS = INTEGER(POSITION_WRT_RW(I)/10)  
        HUD_I_RW_SCL = 1  
IF 327680 < ABS(POSITION_WRT_RW(I)) ≤ 3276800,  
    THEN HUD_I_RW_POS = INTEGER(POSITION_WRT_RW(I)/100)  
        HUD_I_RW_SCL = 2
```

Additional GN&C parameters shall be provided to the HUDEs as follows:

```
HUD_ACC_DRAG = INTEGER(ACC_DRAG 100)  
HUD_HDOT = INTEGER(H_DOT_ELLIPSOID)  
IF MM304 or MM602  
    HUD_X_RW_VEL = INTEGER(VELOCITY_WRT_RW(1))  
    HUD_Y_RW_VEL = INTEGER(VELOCITY_WRT_RW(2))  
    HUD_Z_RW_VEL = INTEGER(VELOCITY_WRT_RW(3))  
    HUD_VEL_SCL = 0  
IF MM305 or MM603  
    HUD_X_RW_VEL = INTEGER(VELOCITY_WRT_RW(1) * 10)  
    HUD_Y_RW_VEL = INTEGER(VELOCITY_WRT_RW(2) * 10)  
    HUD_Z_RW_VEL = INTEGER(VELOCITY_WRT_RW(3) * 10)  
    HUD_VEL_SCL = 1
```

where HUD\_VEL\_SCL refers to bit 15 in HUD MSG1 Control Word.

To provide adequate resolution at the HUDE, various angles shall be scaled to an integer significance of 0.02 degrees, by multiplying the input by a decimal 50:

```
HUD_RWY_HDG = INTEGER((AZIMUTH_RW_ANGLE_CORR_TNTOMAG_RW) *  
    RADTODEG * 50)
```

The HUD PROC shall also provide I-LOAD constants to the HUDEs:

```
IF MM_CODE_602 = 1 OR MM_CODE_603 = 1
  THEN HUD_IGS = 1
  ELSE HUD_IGS = IGS
```

```
HUD_EAS_REF = INTEGER(V_REF(HUD_IGS))
IF (MM_CODE_305 = 1 OR MM_CODE_603 = 1) AND WOWLON = 0)
  THEN HUD_X_ZERO = INTEGER(X_ZERO(IGI))
HUD_VV_FILT_FREQ = VV_FILT_FREQ
```

Note: the K-LOAD VV\_FILT\_FREQ is externally computed as follows:

```
VV_FILT_FREQ = Integer(Exp(-FTCON/50) 32768)
where FTCON is the frequency of the filter.
```

```
HUD_PITCH_ADJ = PITCH_ADJ
```

Note: the K-LOAD PITCH\_ADJ is externally computed as follows:

```
PITCH_ADJ = Integer(Exp(-PDCY/50) 32768)
Where PDCY in the Pitch Decay time constant.
```

Via various flag words, the HUD PROC provides indicators to the HUDEs by setting or zeroing various bits in the flag words:

```
IF NEP_FB = 1 and (ALT_WHEELS ≤ HUD_NEP_PFNL_MIN_ALT)
  THEN HUD_IPHASE = 3
  ELSE HUD_IPHASE = IPHASE
```

```
HUD_P_MODE = P_MODE
```

```
HUD_ALTNV = NAV_ALT_FLAG
HUD_TACNV = NAV_TAC_FLAG
HUD_MLSNV = NAV_MLS_FLAG
HUD_RALNV = RA_FLAG
```

```
IF (TG_END = 0)
  THEN HUD_HERROR = INTEGER(MIDVAL(HERROR,-32768,32767))
  ELSE HUD_HERROR = INTEGER(H_ERROR)
HUD_HERROR = -HUD_HERROR
```

GAMMA REFERENCE CALCULATION

This algorithm shall be used in the GPC HUD PROC. It will output two parameters to the HUDE to enable it to display the two sets of references for OGS/Flare symbology.

This section calculates the moving Flare references.

```

IF (HUD_P MODE = 4)
THEN
  BEGIN
    TEMP = Abs(H_NO_ACC – ALT_WHEELS)/TAU_TD2F
    HDOT_REFF = H_TD2_DOT – TEMP
    GREF2 = Arctand(HDOT_REFF/VELOCITY_WRT_RW(1))
  END
ELSE
  BEGIN
    IF ((ALT_WHEELS < HEXP (HUD_IGS, IGI)) AND (HUD_P_MODE = 3))
      THEN
        BEGIN
          XEST1 = Exp((ALT_WHEELS – HEXP(HUD_IGS, IGI))/
            SIGMAH(HUD_IGS))
          XEST2 = X_AIM_PT + ALT_WHEELS/Tand (GAMMA_REF_2)
          XEST = XEST1 * XDECAY(HUD_IGS, IGI) + XEST2
          TEMP = Exp((X_EXP(HUD_IGS, IGI) – XEST)/SIGMA(HUD_IGS))
          TEMP2 = Arctand((TEMP * HDECAY2 (HUD_IGS, IGI))/
            SIGMA(HUD_IGS))
          GREF2 = GAMMA_REF_2 – TEMP2
        END
      IF HEXP(HUD_IGS, IGI) ≤ ALT_WHEELS ≤ HCLOOP2 (HUD_IGS, IGI)
        THEN
          BEGIN
            TEMP = (H_K2(HUD_IGS, IGI) – ALT_WHEELS)/RH(HUD_IGS, IGI)
            GREF2 = Arcsind(TEMP) – 90
          END
        END
  END
HUD_GAMMA_REF2 = INTEGER(100 * GREF2) ; SCALE VALUE TO SEND TO HUDE

```

This section calculates the non–moving OGS references.

```

GREF1 = GAMMA_REF_1(HUD_IGS)

HUD_GAMMA_REF1 = INTEGER(100 * GREF1)

```

HUD\_GAMMA\_REF1 will enable the HUDE to display the non–moving references plus take them off at the right time. HUD\_GAMMA\_REF2 will provide the values for the moving set of references. They will come up from the bottom of the FOV and move smoothly towards the fixed ones. When the two intersect, the non–moving set will disappear and the moving set will continue moving.

NOTE: GREF1 and GREF2 are in degrees. This calculation shall be performed when in MM305 or MM603. HUD\_GAMMA\_REF2 shall be updated at 6.25 Hz minimum. The calculation need not be performed after HUD\_WOWLON = TRUE.

HUD VELOCITY VECTOR CAGE/UNCAGE

To provide velocity vector cage/uncage conditions, the HUD PROC shall perform the following:

```
IF (SEL_LH_ADI_ATT_REF_PB = 1 AND HUD_LH_ATT_PB_LAST = 0)
OR (SEL_RH_ADI_ATT_REF_PB = 1 AND HUD_RH_ATT_PB_LAST = 0)
  THEN HUD_ATT_REF = NOT HUD_ATT_REF_LAST
```

```
      HUD_ATT_REF_LAST = HUD_ATT_REF
SET HUD_LH_ATT_PB_LAST = SEL_LH_ADI_ATT_REF_PB
SET HUD_RH_ATT_PB_LAST = SEL_RH_ADI_ATT_REF_PB
```

**F.4.252.2 DELETED**

**F.4.252.3 HUD TAEM PROCESSING REQUIREMENTS**

This section describes the processing requirements to support the HUD TAEM Pre-Approach display. The processing consists of fetching certain GN&C parameters for transmission to the HUDEs, including arithmetic conversions, as follows:

```
HUD_EMIN = INTEGER(ENER_LL_Y)
HUD_EOW = INTEGER(SHUTTLE_ENER_Y)
HUD_ESTURN = INTEGER(ENER_UL_Y)
HUD_ENOM = INTEGER(NOM_ENERGY_Y)
```



Table F.4.252.1-1. HUD PROC INITIALIZATION REQUIREMENTS*		
NAME	DESCRIPTION	INITIAL VALUE
HUD_ACC_DRAG	HUD DRAG ACCEL	0
HUD_ALTNV	HUD NAV ALT ERROR FLAG	0
HUD_BF	HUD BODYFLAP FLAG	0
HUD_BFS_IND	HUD PFS/BFS INDICATOR	0
HUD_BFS_TGEND	HUD BFS END-OF-TAEM FLAG	0
HUD_EAS_REF	HUD AIRSPEED REF	0
HUD_GAMMA_REF1	HUD GAMMA REF1	0
HUD_GAMMA_REF2	HUD GAMMA REF2	-50
HUD_GEAR_TRANS	HUD GEAR-IN-TRANSIT FLAG	0
HUD_GEAR_UP	HUD GEAR UP FLAG	0
HUD_HDOT	HUD EST ALT RATE	0
HUD_HEADING	HUD MAG HEADING	0
HUD_HERROR	HUD A/L ALT ERROR	0
HUD_HI_G	HUD HIGH G FLAG	0
HUD_HYDSAT	HUD HYD SATURATION FLAG	0
HUD_IPHASE	HUD GUIDANCE PHASE INDICATOR	0
HUD_L_ADI_SCL	LH HUD ADI RATE SCALING	0
HUD_L_FORMAT	LH HUD FORMAT SELECT	0
HUD_L_HSI_SEL	LH HUD HSI SOURCE SELECT	0
HUD_MLSNV	HUD NAV MLS ERROR FLAG	0
HUD_MM	HUD MM TRANSITION INDICATOR	0
HUD_MODE_BANK	HUD BANK AUTO/MANUAL FLAG	0
HUD_MODE_PITCH	HUD PITCH AUTO/MANUAL FLAG	0
HUD_MODE_SB	HUD SPDBRK AUTO/MANUAL FLAG	0
HUD_P_MODE	HUD A/L PITCH MODE	0
HUD_PITCHERR	HUD PITCH ERROR	0
HUD_R_ADI_SCL	RH HUD ADI RATE SCALING	0
HUD_R_FORMAT	RH HUD FORMAT SELECT	0
HUD_R_HSI_SEL	RH HUD HSI SOURCE SELECT	0
HUD_RALNV	HUD NAV RADAR ALT ERROR FLAG	0
HUD_ROLLERR	HUD ROLL ERROR	0
HUD_ROLLOUT	HUD WEIGHT ON NOSE FLAG	0
HUD_RW_HDG	HUD RUNWAY HDG	0
HUD_SB_RETRACT	HUD SPEEDBRAKE RETRACT	0
HUD_SPBRK	HUD SPEEDBRAKE FLAG	0
HUD_SPBRK_POS	HUD SPEEDBRAKE POS	0
HUD_SPBRK_CMD	HUD SPEEDBRAKE CMD	0
HUD_TACNV	HUD NAV TACAN ERROR FLAG	0
HUD_WOWLON	HUD WEIGHT ON WHEELS FLAG	0
HUD_X_RW_POS	HUD X RUNWAY POS	0
HUD_X_RW_SCL	HUD X RUNWAY POS SCALING	0
HUD_X_RW_VEL	HUD X RUNWAY VEL	0
HUD_X_ZERO	HUD STEEP AIMPOINT	0
HUD_Y_RW_POS	HUD Y RUNWAY POS	0

Table F.4.252.1-1. HUD PROC INITIALIZATION REQUIREMENTS*		
NAME	DESCRIPTION	INITIAL VALUE
HUD_Y_RW_SCL	HUD Y RUNWAY POS SCALING	0
HUD_Y_RW_VEL	HUD Y RUNWAY VEL	0
HUD_Z_RW_POS	HUD Z RUNWAY POS	0
HUD_Z_RW_SCL	HUD Z RUNWAY POS SCALING	0
HUD_Z_RW_VEL	HUD Z RUNWAY VEL	0
HUD_TEST_WORD	HUD TEST WORD	-68
HUD_EMIN	HUD MIN ENERGY	0
HUD_ENOM	HUD NOM ENERGY	0
HUD_EOW	HUD ENERGY/WEIGHT	0
HUD_ESTURN	HUD ENERGY S-TURN	0
HUD_RW_REM_STP	HUD RW REMAIN AT STOP	RW_REM_STP (K-LOAD)
HUD_RW_TGO_MIN	HUD RW TO GO MINIMUM	RW_TGO_MIN (K-LOAD)
HUD_DCL_CMD_MAX	HUD MAX DECEL COMMAND	DECEL_CMD_MAX (K-LOAD)
HUD_RW_LENGTH	HUD RW LENGTH	0
HUD_ATT_REF	HUD ATTITUDE REFERENCE FLAG	0
HUD_ATT_REF_LAST	HUD ATTITUDE REF LAST FLAG	0
HUD_LH_ATT_PB_LAST	HUD LH ATTITUDE PB LAST PASS	0
HUD_RH_ATT_PB_LAST	HUD RH ATTITUDE PB LAST PASS	0
<b>SLAPDOWN/ROLLOUT DISPLAY OUTPUT PARAMETERS</b>		
HUD_AIL_CMD	HUD AILERON COMMAND	0
HUD_AIL_POS	HUD AILERON POSITION	0
<b>AUTOLAND DISPLAY OUTPUT PARAMETERS</b>		
HUD_PITCH_ADJ	HUD PITCH ADJUSTMENT	PITCH_ADJ(K-LOAD)
HUD_VV_FILT_FREQ	HUD VV FILTER FREQUENCY	VV_FILT_FREQ (K-LOAD)
<b>UNALLOCATED HUD DISPLAY OUTPUT PARAMETERS</b>		
HUD_SPARE_CDW_06	HUD SPARE WORD 6	0
HUD_SPARE_CDW_07	HUD SPARE WORD 7	0
HUD_SPARE_CDW_08	HUD SPARE WORD 8	0
HUD_SPARE_CDW_09	HUD SPARE WORD 9	0
HUD_SPARE_CDW_10	HUD SPARE WORD 10	0
HUD_SPARE_CDW_11	HUD SPARE WORD 11	0
HUD_SPARE_CDW_12	HUD SPARE WORD 12	0
<p>* Note: Before the first transmission to HUDE, the output buffer shall be initialized according to this table. The parameters shall be initialized by their principal function source.</p>		

Table F.4.252.1-2. HUD UNIQUE DATA REQUIREMENTS INDEX

HUD Unique Message 1			
Data Word/BITS	Description	D&C FSSR NAME	Prin Func doing Computation
00	HUD MSG1 COMMAND WORD		GPC/HUDE ICD
01	HUD MSG1 CONTROL WORD	HUD_CNTL1	
1-2	X POSITION WRT RUNWAY SCALE	HUD_X_RW_SCL	4.252
3-4	Y POSITION WRT RUNWAY SCALE	HUD_Y_RW_SCL	4.252
5-6	Z POSITION WRT RUNWAY SCALE	HUD_Z_RW_SCL	4.252
7-8	UNUSED		
9	HUD PFS/BFS INDICATOR	HUD_BFS_IND	N/A – INIT
10-16	UNUSED		
02	TEST WORD	HUD_TEST_WORD	GPC/HUDE ICD
03	GPC TO HUD FLAGS WORD 1	HUD_FLAG_1	
1	HUD ATT REF FLAG	HUD_ATT_REF	4.252
2	WOWLON INDICATOR	HUD_WOWLON	4.57
3	ROLLOUT	HUD_ROLLOUT	4.57
4	HI G	HUD_HI_G	4.108
5	SPEEDBRAKE WARNING FLAG	HUD_SPBRK	4.108
6	BODY FLAP WARNING FLAG	HUD_BF	4.108
7	GEAR WARNING FLAG	HUD_GEAR_UP	4.108
8	ALTNV WARNING FLAG	HUD_ALTNV	4.252
9	TACNV WARNING FLAG	HUD_TACNV	4.252
10	MLSNV WARNING FLAG	HUD_MLSNV	4.252
11	RALNV WARNING FLAG	HUD_RALNV	4.252
12	SB RETRACT INDICATOR	HUD_SB_RETRACT	4.10, 4.234
13	HYD SAT WARNING FLAG	HUD_HYDSAT	4.230
14	GEAR TRANSIT INDICATOR	HUD_GEAR_TRANS	4.52
15	BFS TG END INDICATOR	HUD_BFS_TGEND	N/A – INIT
16	SPARE		
04	GPC TO HUD FLAGS WORD 2	HUD_FLAG_2	
1-3	UNUSED		
4-6	P MODE DESCRIPTOR	HUD_P_MODE	4.252
7-10	UNUSED		
11	PITCH CHANNEL AUTO/MANUAL FLAG	HUD_MODE_PITCH	4.108
12	SPEEDBRAKE CHANNEL AUTO/MANUAL FLAG	HUD_MODE_SB	4.108
13	ROLL/YAW CHANNEL AUTO/MANUAL FLAG	HUD_MODE_BANK	4.108

Table F.4.252.1-2. HUD UNIQUE DATA REQUIREMENTS INDEX

HUD Unique Message 1

Data Word/BITS		Description	D&C FSSR NAME	Prin Func doing Computation
	14-16	IPHASE DESCRIPTOR	HUD_IPHASE	4.252
05		SPEEDBRAKE POSITION	HUD_SPBRK_POS	4.107
06		SPEEDBRAKE COMMAND	HUD_SPBRK_CMD	4.107
07		X POSITION WRT RUNWAY	HUD_X_RW_POS	4.252
08		Y POSITION WRT RUNWAY	HUD_Y_RW_POS	4.252
09		Z POSITION WRT RUNWAY	HUD_Z_RW_POS	4.252
10		X VELOCITY WRT RUNWAY	HUD_X_RW_VEL	4.252
11		Y VELOCITY WRT RUNWAY	HUD_Y_RW_VEL	4.252
12		Z VELOCITY WRT RUNWAY	HUD_Z_RW_VEL	4.252
13		HEADING	HUD_HEADING	4.103
14		ACC DRAG	HUD_ACC_DRAG	4.252
15		H DOT ELLIPSOID	HUD_HDOT	4.252
16		FLIGHT PATH REFERENCE 2	HUD_GAMMA_REF2	4.252
17		ROLL ERROR	HUD_ROLLERR	4.103
18		PITCH ERROR	HUD_PITCHERR	4.103
19		RUNWAY HEADING	HUD_RWY_HDG	4. 52
20		AIRSPEED REFERENCE	HUD_EAS_REF	4.252
21		FLIGHT PATH REFERENCE 1	HUD_GAMMA_REF1	4.252
22		X ZERO	HUD_X_ZERO	4.252
23		HERROR/H_ERROR	HUD_HERROR	4.252
24		ENERGY UPPER LIMIT	HUD_ESTURN	4.252
25		ENERGY SHUTTLE	HUD_EOW	4.252
26		ENERGY LOWER LIMIT	HUD_EMIN	4.252
27		ENERGY NOMINAL	HUD_ENOM	4.252
28		AILERON POSITION	HUD_AIL_POS	4.107
29		AILERON LOAD BALANCE INCREMENT	HUD_AIL_CMD	4.36; 4.227
30		PITCH ADJUSTMENT	HUD_PITCH_ADJ	4.252
31		VELOCITY VECTOR FILTER FREQUENCY	HUD_VV_FILT_FREQ	4.252

Table F.4.252.1-2. HUD UNIQUE DATA REQUIREMENTS INDEX			
HUD Unique Message 1			
Data Word/BITS	Description	D&C FSSR NAME	Prin Func doing Computation
HUD_UNIQUE MESSAGE 2			
00	HUD MSG2 COMMAND WORD		GPC/HUDE ICD
01	HUD MSG2 CONTROL WORD	HUD_CNTL2_L	
		HUD_CNTL2_R	
1-2	ADI RATE SCALING	HUD_L_ADI_SCL, HUD_R_ADI_SCL	4.180
3-4	HSI SOURCE SELECTION	HUD_L_HSI_SCL, HUD_R_HSI_SCL	4.180
5-7	FORMAT SELECTION	HUD_L_FORMAT, HUD_R_FORMAT	4.252
8-16	UNUSED		
02	RUNWAY REMAINING TO STOP	HUD_RW_REM_STP	N/A – INIT
03	MINIMUM RUNWAY TO GO	HUD_RW_TGO_MIN	N/A – INIT
04	MAXIMUM DECELERATION COMMAND	HUD_DCL_CMD_MAX	N/A – INIT
05	RUNWAY LENGTH	HUD_RW_LENGTH	4.124; 4.238
06	SPARE	HUD_SPARE_CDW_06	4.252
07	SPARE	HUD_SPARE_CDW_07	4.252
08	SPARE	HUD_SPARE_CDW_08	4.252
09	SPARE	HUD_SPARE_CDW_09	4.252
10	SPARE	HUD_SPARE_CDW_10	4.252
11	SPARE	HUD_SPARE_CDW_11	4.252
12	SPARE	HUD_SPARE_CDW_12	4.252

#### F.4.252.4 Head Up Display Processing Interface Support Functions

Table F.4.252-5 Input Functional Parameters

Table F.4.252-6 Output Functional Parameters

Table F.4.252-7 I-Loads

Table F.4.252-8 K-Loads

Table F.4.252-9 Constants

TABLE F.4.252-5. INPUT FUNCTIONAL PARAMETERS FOR ENTRY/LANDING HEADS UP DISPLAY PROCESSING (G4.252)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
ACC_DRAG	V95A0160CA	DRAG DECEL	RTLS UPP				89979F	
ACC_DRAG	V95A0160CB	DRAG DECEL	ENT UPP	FT/S2			93017G	*
ACC_DRAG	V95A0160CC	DRAG DECEL	TAEM UPP	FT/S2			93017G	*
ACC_DRAG	V95A0160CD	DRAG DECEL	A/L UPP	FT/S2			93017G	*
ALT_WHEELS	V95H0165CA	ALT TO REAR WHEELS/NAV BASE(ENTRY)	RTLS UPP	FT			93017G	*
ALT_WHEELS	V95H0165CB	ALT TO REAR WHEELS/NAV BASE(ENTRY)	ENT UPP	FT	DPL		93017G	*
ALT_WHEELS	V95H0165CC	ALT TO REAR WHEELS/NAV BASE(ENTRY)	TAEM UPP	FT	DPL		93017G	*
ALT_WHEELS	V95H0165CD	ALT TO REAR WHEELS/NAV BASE(ENTRY)	A/L UPP	FT	DPL		93017G	*
ANGLE_CORR_TNTOMAG_RW	V90H1820CA	MAGNETIC VARIATION OF RW	ENT SITE LOOKUP	RAD			92297B	
ANGLE_CORR_TNTOMAG_RW	V90H1820CB	MAGNETIC VARIATION OF RW	ASC SITE LOOKUP	RAD			92297B	
AZIMUTH_RW	V90H1817CA	AZIMUTH OF RW FROM TRUE NORTH	ENT SITE LOOKUP	RAD			93090E	
AZIMUTH_RW	V90H1817CB	AZIMUTH OF RW FROM TRUE NORTH	ASC SITE LOOKUP	RAD				
COSTH	V90H2215C	EULER ANGLE PITCH COSINE	A/E ATT PROC				93090E	
DG_RADALT	V90X4003X	RALT HEIGHT DATA GOOD	SF		BD		93017G	*
EAS	V95L3145C	GN&C EQUIVALENT AIRSPEED	ADTA SOP	FT/S	SPL		93017G	*
ENER_LL_Y	V94H1310C	Y-COORD OF LOWER ENERGY LIMIT	VERT SIT DIP	AU	VAR		93090E	
ENER_UL_Y	V94H1309C	Y-COORD OF UPPER ENERGY LIMIT	VERT SIT DIP	AU	VAR		93090E	
HERROR	V90H1115CA	ALTITUDE ERROR	TAEM GUID	FT			90960E	
HERROR	V90H1115CB	ALTITUDE ERROR	GRTLS TAEM GUID	FT			90960E	
H_DOT_ELLIPSOID/H_DOT	V95L0265CA	EST ALTITUDE RATE	RTLS UPP	FT/S	SPL		93017G	*
H_DOT_ELLIPSOID/H_DOT	V95L0265CB	EST ALTITUDE RATE	TAEM UPP	FT/S	SPL		93017G	*
H_DOT_ELLIPSOID/H_DOT	V95L0265CC	EST ALTITUDE RATE	A/L UPP	FT/S	SPL		93017G	*
H_DOT_ELLIPSOID/H_DOT	V95L0265CD	EST ALTITUDE RATE	ENT UPP	FT/S	SPL		93017G	*
H_ERROR	V90H1061CA	ALTITUDE ERROR	A/L GUID	FT			93017G	*
H_ERROR	V90H1061CB	ALTITUDE ERROR	GRTLS A/L GUID	FT			93017G	*
IGI	V90J1047CA	GROUND INTERCEPT INDEX	TAEM GUID					
IGI	V90J1047CB	GROUND INTERCEPT INDEX	A/L GUID					
IGI	V90J1047CC	GROUND INTERCEPT INDEX	GRTLS TAEM GUID	FT				
IGI	V90J1047CD	GROUND INTERCEPT INDEX	GRTLS A/L GUID					
IGS	V90J1230CA	GLIDESLOPE INDEX	TAEM GUID		HXS		93017G	*
IGS	V90J1230CB	GLIDESLOPE INDEX	A/L GUID		HXS		93017G	*
IPHASE	V90J1117CA	TAEM GUIDANCE PHASE INDICATOR	TAEM GUID	ND			93017G	*
IPHASE	V90J1117CB	TAEM GUIDANCE PHASE INDICATOR	GRTLS TAEM GUID	ND			93017G	*
MLSAZ_DATA_GOOD	V90X3003X	MSBLS AZIMUTH DATA GOOD	SF		BD		93017G	*
MLSRANGE_DATA_GOOD	V90X3063X	MSBLS RANGE DATA GOOD	SF		BD		93017G	*
NAV_ALT_FLAG	V90X8901XA	NAV EDIT ALTITUDE CREW ALERT	ENT NAV					
NAV_ALT_FLAG	V90X8901XB	NAV EDIT ALTITUDE CREW ALERT	PRELAND NAV					
NAV_ALT_FLAG	V90X8901XC	NAV EDIT ALTITUDE CREW ALERT	RTLS NAV					
NAV_MLS_FLAG	V90X8903XA	NAV EDIT MSBLS CREW ALERT	ENT NAV					
NAV_MLS_FLAG	V90X8903XB	NAV EDIT MSBLS CREW ALERT	PRELAND NAV					
NAV_MLS_FLAG	V90X8903XC	NAV EDIT MSBLS CREW ALERT	RTLS NAV					
NAV_TAC_FLAG	V90X8902XA	NAV EDIT TACAN CREW ALERT	ENT NAV					
NAV_TAC_FLAG	V90X8902XB	NAV EDIT TACAN CREW ALERT	PRELAND NAV					
NAV_TAC_FLAG	V90X8902XC	NAV EDIT TACAN CREW ALERT	RTLS NAV					
NEP_FB	V90X1109XA	NEP/MEP FLAG	GRTLS TAEM GUID				93017G	*
NOM_ENERGY_Y	V94H1307C	Y-COORD OF NOMINAL ENERGY SYMBOL	VERT SIT DIP	AU	VAR		93090E	

TABLE F.4.252-5. INPUT FUNCTIONAL PARAMETERS FOR ENTRY/LANDING HEADS UP DISPLAY PROCESSING (G4.252)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
POSN_WRT_RW(1)/X	V95H0220CA	DOWNRANGE DISTANCE WRT RW	RTLS UPP	FT			93017G	*
POSN_WRT_RW(1)/X	V95H0220CB	DOWNRANGE DISTANCE WRT RW	ENT UPP	FT			93017G	*
POSN_WRT_RW(1)/X	V95H0220CC	DOWNRANGE DISTANCE WRT RW	TAEM UPP	FT			93017G	*
POSN_WRT_RW(1)/X	V95H0220CD	DOWNRANGE DISTANCE WRT RW	A/L UPP	FT			93017G	*
POSN_WRT_RW(2)/Y	V95H0221CA	CROSSRANGE DISTANCE WRT RW	RTLS UPP	FT			93017G	*
POSN_WRT_RW(2)/Y	V95H0221CB	CROSSRANGE DISTANCE WRT RW	ENT UPP	FT			93017G	*
POSN_WRT_RW(2)/Y	V95H0221CC	CROSSRANGE DISTANCE WRT RW	TAEM UPP	FT			93017G	*
POSN_WRT_RW(2)/Y	V95H0221CD	CROSSRANGE DISTANCE WRT RW	A/L UPP	FT			93017G	*
POSN_WRT_RW(3)/Z	V95H0300CA	VERTICAL DISTANCE WRT RW	RTLS UPP	FT				
POSN_WRT_RW(3)/Z	V95H0300CB	VERTICAL DISTANCE WRT RW	TAEM UPP	FT				
POSN_WRT_RW(3)/Z	V95H0300CC	VERTICAL DISTANCE WRT RW	A/L UPP	FT				
POSN_WRT_RW(3)/Z	V95H0300CD	VERTICAL DISTANCE WRT RW	ENT UPP	FT				
P_MODE	V90Q1100CA	PITCH SUBPHASE MODE INDICATOR	A/L GUID				93017G	*
P_MODE	V90Q1100CB	PITCH SUBPHASE MODE INDICATOR	GRTLS A/L GUID					
Q_RADALT	V90H4002C	SELECTED RALT HEIGHT-RAW	SF	FT	SPL		93017G	*
RA_FLAG	V90X0450XA	RADAR ALTIMETER CREW ALERT	TAEM UPP					
RA_FLAG	V90X0450XB	RADAR ALTIMETER CREW ALERT	A/L UPP					
RA_FLAG	V90X0450XC	RADAR ALTIMETER CREW ALERT	RTLS UPP					
SHUTTLE_ENER_Y	V94H1308C	Y-COORD OF CURRENT ENERGY SYMBOL	VERT SIT DIP	AU	VAR		93090E	
SINTH	V90H2216C	EULER ANGLE PITCH SINE	A/E ATT PROC				93090E	
TG_END	V90X1108XA	TAEM GUIDANCE TERMINATION FLAG	TAEM GUID				93017G	*
TG_END	V90X1108XB	TAEM GUIDANCE TERMINATION FLAG	GRTLS TAEM GUID				92355B	
VEL_WRT_RW(1)/XDOT	V95L0255CA	DOWNRANGE VEL WRT RW	TAEM UPP	FT/S			93017G	*
VEL_WRT_RW(1)/XDOT	V95L0255CB	DOWNRANGE VEL WRT RW	RTLS UPP	FT/S			89250B	
VEL_WRT_RW(1)/XDOT	V95L0255CC	DOWNRANGE VEL WRT RW	A/L UPP	FT/S			93017G	*
VEL_WRT_RW(1)/XDOT	V95L0255CD	DOWNRANGE VEL WRT RW	ENT UPP	FT/S			93017G	*
VEL_WRT_RW(2)/YDOT	V95L0256CA	CROSSRANGE VEL WRT RW	A/L UPP	FT/S			93017G	*
VEL_WRT_RW(2)/YDOT	V95L0256CB	CROSSRANGE VEL WRT RW	TAEM UPP	FT/S			93017G	*
VEL_WRT_RW(2)/YDOT	V95L0256CC	CROSSRANGE VEL WRT RW	RTLS UPP	FT/S			89250B	
VEL_WRT_RW(2)/YDOT	V95L0256CD	CROSSRANGE VEL WRT RW	ENT UPP	FT/S			93017G	*
VEL_WRT_RW(3)/ZDOT	V95L0257CA	VELOCITY WRT RUNWAY (3)	RTLS UPP	FT/S			93017G	*
VEL_WRT_RW(3)/ZDOT	V95L0257CB	VELOCITY WRT RUNWAY (3)	ENT UPP	FT/S			93017G	*
VEL_WRT_RW(3)/ZDOT	V95L0257CC	VELOCITY WRT RUNWAY (3)	TAEM UPP	FT/S			93017G	*
VEL_WRT_RW(3)/ZDOT	V95L0257CD	VELOCITY WRT RUNWAY (3)	A/L UPP	FT/S			93017G	*
WOWLON_IND	V96X0050X	WEIGHT ON MAIN WHEELS INDICATOR	LANDING SOP		BD		93017G	*
	V90X7536X	SEL LH ADI ATTITUDE REF PB	GN&C SW RM		BD		93017G	*
	V90X7537X	SEL RH ADI ATTITUDE REF PB	GN&C SW RM		BD		93017G	*

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE F.4.252-6. OUTPUT FUNCTIONAL PARAMETERS FROM ENTRY/LANDING HEADS UP DISPLAY PROCESSING (G4.252)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
HUD_ACC_DRAG	V72A4093C	HUD DRAG ACCEL	HUDE1	FT/S2	BSS			
			HUDE2					
HUD_ALTNV	V72X4040X	HUD NAV ALT ERROR FLAG	HUDE1		BD			
			HUDE2					
HUD_ATT_REF	V72X4032X	HUD ATT REF FLAG	HUDE1					
			HUDE2					
HUD_BFS_IND	V72J4005C	HUD PFS/BFS INDICATOR	HUDE1		BD			
			HUDE2					
HUD_BFS_TGEND	V72X4047X	HUD BFS END-OF-TAEM	HUDE1		BD			
			HUDE2					
HUD_CNTL1	V72M4001P	HUD MSG 1 CONTROL WORD	HUDE1		HMD			
			HUDE2					
HUD_CNTL2_L	V72M4125P	LH HUD CONTROL WORD MSG 2	HUDE1		HMD		92157	
HUD_CNTL2_R	V72M4140P	RH HUD CONTROL WORD MSG 2	HUDE2		HMD		92157	
HUD_DCL_CMD_MAX	V72L4160C	HUD MAX DECEL COMMAND	HUDE1	FT/SEC2	BSS			
			HUDE2					
HUD_EAS_REF	V72A4105C	HUD AIRSPEED REF	HUDE1	FT/S	BSS			
			HUDE2					
HUD_EMIN	V72U4113C	HUD MIN ENERGY	HUDE1	AU	BSS			
			HUDE2					
HUD_ENOM	V72U4114C	HUD NOM ENERGY	HUDE1	AU	BSS			
			HUDE2					
HUD_EOW	V72U4112C	HUD ENERGY/WEIGHT	HUDE1	AU	BSS			
			HUDE2					
HUD_ESTURN	V72U4111C	HUD ENERGY S-TURN	HUDE1	AU	BSS			
			HUDE2					
HUD_FLAG_1	V72M4033P	HUD FLAG WORD 1	HUDE1		HMD			
			HUDE2					
HUD_FLAG_2	V72M4053P	HUD FLAG WORD 2	HUDE1		HMD			
			HUDE2					
HUD_GAMMA_REF1	V72H4106C	HUD GAMMA REF1	HUDE1	DEG	HXS			
			HUDE2					
			TLM					
HUD_GAMMA_REF2	V72U4120C	HUD GAMMA REF2	HUDE1	DEG	HXS		92230F	
			HUDE2					
			TLM					
HUD_HDOT	V72A4095C	HUD EST ALT RATE	HUDE1	FT/S	BSS			
			HUDE2					
HUD_HERROR	V72H4108C	HUD A/L ALT ERROR	HUDE1	FT	BSS			
			HUDE2					
HUD_IPHASE	V72J4063C	HUD GUIDANCE PHASE INDICATOR	HUDE1		BSU			
			HUDE2					
HUD_MLSNV	V72X4042X	HUD NAV MLS ERROR FLAG	HUDE1		BD			
			HUDE2					
HUD_PITCH_ADJ	V72U4121C	HUD PITCH ADJUSTMENT	HUDE1		VAR			
			HUDE2					



TABLE F.4.252-6. OUTPUT FUNCTIONAL PARAMETERS FROM ENTRY/LANDING HEADS UP DISPLAY PROCESSING (G4.252)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
HUD_P_MODE	V72J4055C	HUD A/L PITCH MODE	HUDE1		BSU			
			HUDE2					
HUD_RALNV	V72X4043X	HUD NAV RADAR ALT ERROR FLAG	HUDE1		BD			
			HUDE2					
HUD_RW_HDG	V72H4100C	HUD RUNWAY HDG	HUDE1	DEG	BSS			
			HUDE2					
HUD_RW_REM_STP	V72H4155C	HUD RW REMAINING TO STOP	HUDE1	FT	BSS			
			HUDE2					
HUD_RW_TGO_MIN	V72H4156C	HUD RW TO GO MINIMUM	HUDE1	FT	BSS			
			HUDE2					
HUD_SPARE_CDW_06	V72U4165C	HUD SPARE WORD 06	HUDE1		VAR		92157	
			HUDE2					
HUD_SPARE_CDW_07	V72U4166C	HUD SPARE WORD 07	HUDE1		VAR		92157	
			HUDE2					
HUD_SPARE_CDW_08	V72U4167C	HUD SPARE WORD 08	HUDE1		VAR		92157	
			HUDE2					
HUD_SPARE_CDW_09	V72U4168C	HUD SPARE WORD 09	HUDE1		VAR		92157	
			HUDE2					
HUD_SPARE_CDW_10	V72U4169C	HUD SPARE WORD 10	HUDE1		VAR		92157	
			HUDE2					
HUD_SPARE_CDW_11	V72U4170C	HUD SPARE WORD 11	HUDE1		VAR		92157	
			HUDE2					
HUD_SPARE_CDW_12	V72U4171C	HUD SPARE WORD 12	HUDE1		VAR		92157	
			HUDE2					
HUD_TACNV	V72X4041X	HUD NAV TACAN ERROR FLAG	HUDE1		BD			
			HUDE2					
HUD_TEST_WD	V72M4016P	HUD TEST WORD	HUDE1		HMD			
			HUDE2					
HUD_VV_FILT_FREQ	V72U4122C	HUD VV FILTER FREQUENCY	HUDE1		VAR			
			HUDE2					
HUD_X_RW_POS	V72H4079C	HUD X RUNWAY POS	HUDE1	FT	BSS			
			HUDE2					
HUD_X_RW_SCL	V72J4002C	HUD X RUNWAY POS SCALING	HUDE1		BSU			
			HUDE2					
HUD_X_RW_WEL	V72L4085C	HUD X RUNWAY VEL	HUDE1	FT/S	BSS			
			HUDE2					
HUD_X_ZERO	V72H4107C	HUD STEEP AIMPOINT	HUDE1	FT	BSS			
			HUDE2					
HUD_Y_RW_POS	V72H4080C	HUD Y RUNWAY POS	HUDE1	FT	BSS			
			HUDE2					
HUD_Y_RW_SCL	V72J4003C	HUD Y RUNWAY POS SCALING	HUDE1		BSU			
			HUDE2					
HUD_Y_RW_VEL	V72L4086C	HUD Y RUNWAY VEL	HUDE1	FT/S	BSS			
			HUDE2					
HUD_Z_RW_POS	V72H4081C	HUD Z RUNWAY POS	HUDE1	FT	BSS			
			HUDE2					

TABLE F.4.252-6. OUTPUT FUNCTIONAL PARAMETERS FROM ENTRY/LANDING HEADS UP DISPLAY PROCESSING (G4.252)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V
HUD_Z_RW_SCL	V72J4004C	HUD Z RUNWAY POS SCALING	HUDE1 HUDE2		BSU			
HUD_Z_RW_VEL	V72L4087C	HUD Z RUNWAY VEL	HUDE1 HUDE2	FT/S	BSS			

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

**Rate Codes: (HDR Only) 1 = 1 sample/sec 2 = 5 samples/sec 3 = 12.5 samples/sec 4 = 25 samples/sec 5 = 100 samples/sec  
(HDR and LDR) A = 1 sample/sec B = 5 samples/sec C = 12.5 samples/sec D = 25 samples/sec E = 100 samples/sec**

TABLE F.4.252-7. ENTRY/LANDING HEADS UP DISPLAY PROCESSING (G4.252) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
GAMMA_REF_1(1)	V97U0233C	DEG	F	S	M	C	G4.10 G4.234 G4.252	01 03	GL1 GL3	92938B	
GAMMA_REF_1(2)	V97U0234C	DEG	F	S	M	C	G4.10 G4.252	00	GL3	92938B	
GAMMA_REF_2	V97U0235C	DEG	F	S	M	C	G4.10 G4.234 G4.252	00	GLC	92938B	
HCLOOP2(1,1)	V99U7146C	FT	F	S	M	C	G4.252	00	HUD	92938B	
HCLOOP2(1,2)	V99U7147C	FT	F	S	M	C	G4.252	00	HUD	92938B	
HCLOOP2(2,1)	V99U7148C	FT	F	S	M	C	G4.252	00	HUD	92938B	
HCLOOP2(2,2)	V99U7149C	FT	F	S	M	C	G4.252	00	HUD	92938B	
HDECAY2(1,1)	V99U7150C	FT	F	S	M	C	G4.252	01 03	HUD HUD	92938B	
HDECAY2(1,2)	V99U7151C	FT	F	S	M	C	G4.252	01 03	HUD HUD	92938B	
HDECAY2(2,1)	V99U7152C	FT	F	S	M	C	G4.252	00	HUD	92938B	
HDECAY2(2,2)	V99U7153C	FT	F	S	M	C	G4.252	00	HUD	92938B	
HEXP(1,1)	V99U7154C	FT	F	S	M	C	G4.252	01 03	HUD HUD	92938B	
HEXP(1,2)	V99U7155C	FT	F	S	M	C	G4.252	01 03	HUD HUD	92938B	
HEXP(2,1)	V99U7156C	FT	F	S	M	C	G4.252	00	HUD	92938B	
HEXP(2,2)	V99U7157C	FT	F	S	M	C	G4.252	00	HUD	92938B	
HUD_NEP_PFN_L_MIN_ALT	V99U9644C	FT	F	S	D	C	G4.252	00	HUD	92938B	
H_K2(1,1)	V96U7500C	FT	F	S	M	C	G4.252	01 03	HUD HUD	92938B	
H_K2(1,2)	V96U7501C	FT	F	S	M	C	G4.252	01 03	HUD HUD	92938B	
H_K2(2,1)	V96U7502C	FT	F	S	M	C	G4.252	00	HUD	92938B	
H_K2(2,2)	V96U7503C	FT	F	S	M	C	G4.252	00	HUD	92938B	
H_NO_ACC	V97U0278C	FT	F	S	D	C	G4.10 G4.234 G4.252	00	ZFH	92938B	
H_TD2_DOT	V97U0285C	FT/SEC	F	S	D	C	G4.10 G4.234 G4.252	00	ZFH	92938B	
RH(1,1)	V99U7162C	FT	F	S	M	C	G4.252	01 03	HUD HUD	92938B	
RH(1,2)	V99U7163C	FT	F	S	M	C	G4.252	01 03	HUD HUD	92938B	
RH(2,1)	V99U7164C	FT	F	S	M	C	G4.252	00	HUD	92938B	
RH(2,2)	V99U7165C	FT	F	S	M	C	G4.252	00	HUD	92938B	
SIGMA(1)	V97U0402C	FT	F	S	M	C	G4.10 G4.234 G4.252	01 03	GL1 GL3	92938B	

TABLE F.4.252-7. ENTRY/LANDING HEADS UP DISPLAY PROCESSING (G4.252) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
SIGMA(2)	V97U0403C	FT	F	S	M	C	G4.10 G4.252	00	GL3	92938B	
SIGMAH(1)	V99U7166C	FT	F	S	M	C	G4.252	00	HUD	92938B	
SIGMAH(2)	V99U7167C	FT	F	S	M	C	G4.252	00	HUD	92938B	
TAU_TD2	V97U0413C	SEC	F	S	D	P	G4.10 G4.234 G4.252	00	ZFH	DC2711	
TAU_TD2F	V99U7144C	SEC	F	S	M	C	G4.252	00	HUD	92938B	
XDECA(1,1)	V99U7158C	FT	F	S	M	C	G4.252	01	HUD	92938B	
XDECA(1,2)	V99U7159C	FT	F	S	M	C	G4.252	03	HUD	92938B	
XDECA(2,1)	V99U7160C	FT	F	S	M	C	G4.252	01	HUD	92938B	
XDECA(2,2)	V99U7161C	FT	F	S	M	C	G4.252	00	HUD	92938B	
X_AIM_PT	V97U0445C	FT	F	S	M	C	G4.10 G4.154 G4.220 G4.234 G4.237 G4.252 G5.27 G5.7	01 03	GL1 GL3	93090E	
X_EXP(1,1)	V97U0446C	FT	F	S	M	C	G4.10 G4.234 G4.252	01 03	GL1 GL3	92938B	
X_EXP(1,2)	V97U0447C	FT	F	S	M	C	G4.10 G4.234 G4.252	01 03	GL1 GL3	92938B	
X_EXP(2,1)	V97U0448C	FT	F	S	M	C	G4.10 G4.252	00	GL3	92938B	
X_EXP(2,2)	V97U0449C	FT	F	S	M	C	G4.10 G4.252	00	GL3	92938B	
X_ZERO(1)	V97U0454C	FT	F	S	M	C	G4.10 G4.234 G4.252	00	GLC	92938B	
X_ZERO(2)	V97U0455C	FT	F	S	M	C	G4.10 G4.234 G4.252	00	GLC	92938B	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE F.4.252-8. ENTRY/LANDING HEADS UP DISPLAY PROCESSING (G4.252) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
DECEL_CMD_MAX	V99U7145C	00	+16	FT/SEC**2	I	S	C	G4.252	92938B	
PITCH_ADJ	V99U7590C	00	+32119	ND	I	S	C	G4.252	92938B	
RW_REM_STP	V99U7143C	00	+1000	FT	I	S	P	G4.252	93187	*
RW_TGO_MIN	V99U7168C	00	+10	FT	I	S	C	G4.252	92938B	
VV_FILT_FREQ	V99U7592C	00	+22861	ND	I	S	C	G4.252	92938B	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.252-9. ENTRY/LANDING HEADS UP DISPLAY PROCESSING (G4.252) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

#### **F.4.260 BFS HEAD UP DISPLAY PROCESSING (BFS HUD PROC)**

This section specifies the detailed requirements for the BFS Head Up Display Processor (BFS HUD PROC). The BFS HUD PROC is responsible for assembling information and generating messages 1 & 2 required for the Head Up Display (HUD) when BFS is engaged. Data assembled reflects parameters not obtained by the HUDEs (Head Up Display Electronics) via DDU data. This BFS HUD PROC shall be executed in MM305 or MM603 only when ISLECT\_GUID is 6 through 9 or 13. This BFS HUD PROC shall run at 12.5 Hz.

##### **F.4.260.1 PROCESSING REQUIREMENTS**

The BFS HUD PROC shall send a set of data words as defined in Table 3.4-3 in the GPC/HUDE ICD to both the left and right HUDEs, at a rate that minimizes the transport lag to the HUDEs. The input data for the HUDE-unique data shall be updated per rates specified in GPC/HUDE ICD.

##### PFS / BFS Requirements Differences

The BFS Head Up Display Processor (HUD PROC) differs from the PFS HUD PROC in a number of ways: (1) For GRTLS, PFS HUD PROC uses only one set of I-Load data, whereas BFS HUD PROC selects light or heavy set of I-Load data, depending on the mission. (2) BFS Guidance is not supported below 2000 feet. (3) Several parameters in the HUD Unique Messages are not actually used by HUDE, so are not acquired, computed, provided or driven by BFS HUD PROC. These are marked as "N/A" in Table F.4.260.1-2 BFS HUD UNIQUE DATA REQUIREMENTS INDEX (BFS HUD Unique Messages 1 & 2).

Section F.4.260.2 defines the interfaces associated with the BFS HUD PROC. The requirements for generating each of the outputs are defined by the following paragraphs.

##### INITIALIZATION, I-LOADS AND K-LOADS

Initialization requirements are specified in Table F.4.260.1-1. I-Loads are specified in Table F.4.260-7. K-Loads and constants are defined in Table F.4.260-8. For the BFS as opposed to the PASS HUD PROC, the OPS 3 set of HUD I-Loads will be used for both OPS 3 and OPS 6 (GRTLS). Hence, the BFS HUD PROC shall have a glideslope index value, IGS, appropriate for GRTLS. The GRTLS IGS value will be obtained from the BFS\_HUD\_GRTLS\_IGS I-Load, where 1 = "light" and 2 = "heavy".

##### BFS HUD PROC GPC-TO-HUDE MESSAGES

The HUDE-unique transmissions generated by the BFS HUD PROC shall conform to the formats defined by the GPC/HUDE ICD. The HUDE-unique transmissions comprise HUD-unique messages 1 & 2, as per the GPC/HUDE ICD.

The command word and test word shall be set in accordance with Table 3.4-1 of the GPC/HUDE ICD.

There shall be two sets of HUDE-unique transmissions, one for the right HUDE and one for the left HUDE. These two sets of data will be identical in that the BFS only recognizes commander switch commands. An index to the processing requirements for the HUDE-unique data is found in Table F.4.260.1-2.

BFS HUD PROC DATA CONVERSIONS

Table F.4.260–5, BFS HUD PROC Input Parameters, in conjunction with Table F.4.260.1–2, BFS HUD UNIQUE DATA REQUIREMENTS INDEX (BFS HUD Unique Messages 1 & 2), indicates the GN&C parameters that are specifically required to support the HUDE display formats, different from those already supplied to support the DDU displays. The HUD PROC performs the conversions and scaling to transform the GNC inputs into the 16-bit data words to be sent to the left and right HUDEs.

The conversions consist of converting the various parameters to 16-bit, two's complement integers. The term INTEGER in the following computations should be interpreted as taking the largest integer less than or equal to the floating-point value. To provide resolution of 0.02 degrees at the HUDE, various angles are scaled to an integer by multiplying the input by a decimal 50. Other data will also be scaled as defined by the GPC/HUDE ICD. Note that for the BFS, in contrast to PASS HUD PROC requirements, certain data is not available for sending to the HUDEs. In these cases, the data bits or data word will be zeroed.

BFS HUD PROC PARAMETER PROCESSING REQUIREMENTS

Runway position data is first obtained. An appropriate scale factor for the HUDE is also set for each runway position component based on a given component's magnitude.

```

IF ABS(POSITION_WRT_RUNWAY(1)) < 32768,
    THEN HUD_X_RW_POS = INTEGER(POSITION_WRT_RUNWAY(1))
        HUD_X_RW_SCL = 0
IF 32768 <= ABS(POSITION_WRT_RUNWAY(1)) < 327680,
    THEN HUD_X_RW_POS = INTEGER(POSITION_WRT_RUNWAY(1)/10)
        HUD_X_RW_SCL = 1
IF 327680 <= ABS(POSITION_WRT_RUNWAY(1)) < 3276800,
    THEN HUD_X_RW_POS = INTEGER(POSITION_WRT_RUNWAY(1)/100)
        HUD_X_RW_SCL = 2

IF ABS(POSITION_WRT_RUNWAY(2)) < 32768,
    THEN HUD_Y_RW_POS = INTEGER(POSITION_WRT_RUNWAY(2))
        HUD_Y_RW_SCL = 0
IF 32768 <= ABS(POSITION_WRT_RUNWAY(2)) < 327680,
    THEN HUD_Y_RW_POS = INTEGER(POSITION_WRT_RUNWAY(2)/10)
        HUD_Y_RW_SCL = 1
IF 327680 <= ABS(POSITION_WRT_RUNWAY(2)) < 3276800,
    THEN HUD_Y_RW_POS = INTEGER(POSITION_WRT_RUNWAY(2)/100)
        HUD_Y_RW_SCL = 2

IF ABS(POSITION_WRT_RUNWAY(3)) < 32768,
    THEN HUD_Z_RW_POS = INTEGER(POSITION_WRT_RUNWAY(3))
        HUD_Z_RW_SCL = 0
IF 32768 <= ABS(POSITION_WRT_RUNWAY(3)) < 327680,
    THEN HUD_Z_RW_POS = INTEGER(POSITION_WRT_RUNWAY(3)/10)
        HUD_Z_RW_SCL = 1
IF 327680 <= ABS(POSITION_WRT_RUNWAY(3)) < 3276800,
    THEN HUD_Z_RW_POS = INTEGER(POSITION_WRT_RUNWAY(3)/100)
        HUD_Z_RW_SCL = 2

```



Additional GN&C parameters shall be provided to the HUDEs as follows:

```
HUD_ACC_DRAG = INTEGER(100 ACC_DRAG)
HUD_HDOT = INTEGER(H_DOT_ELLIPSOID)

HUD_X_RW_VEL = INTEGER(10 VELOCITY_WRT_RUNWAY(1))
HUD_Y_RW_VEL = INTEGER(10 VELOCITY_WRT_RUNWAY(2))
HUD_Z_RW_VEL = INTEGER(10 VELOCITY_WRT_RUNWAY(3))

HUD_RWY_HDG = (AZIMUTH_RW - ANGLE_CORR_TNTOMAG_RW) RAD_TO_DEG
HUD_RWY_HDG = INTEGER(50 HUD_RWY_HDG)
```

To enable proper I-Load value selection in subsequent requirements, the BFS HUD PROC will determine the vehicle weight dependent, steep glideslope index value where HUD\_IGS = 1 = "light" and where HUD\_IGS = 2 = "heavy". For OPS 3, the TAEM Guidance IGS value will be used directly to set HUD\_IGS. For OPS 6 (GRTLS), the glideslope used is determined by the I-Load BFS\_HUD\_GRTLS\_IGS, where 1 = "light" and 2 = "heavy".

```
IF MM_CODE = 603
  THEN HUD_IGS = BFS_HUD_GRTLS_IGS
  ELSE HUD_IGS = IGS
```

The BFS HUD PROC shall provide required I-Load and K-Load values to the HUDEs:

```
HUD_EAS_REF = INTEGER(V_REF(HUD_IGS))
IF WOWLON_IND = 0
  THEN HUD_X_ZERO = INTEGER(X_ZERO(IGI))
HUD_VV_FILT_FREQ = VV_FILT_FREQ
HUD_PITCH_ADJ = PITCH_ADJ
```

Via various flag words, the BFS HUD PROC provides indicators to the HUDEs by setting or zeroing various bits in the flag words:

```
HUD_BFS_TGEND = TG_END

IF NEP = 1 AND (ALT_WHEELS <= HUD_NEP_PFNL_MIN_ALT)
  THEN HUD_IPHASE = 3
  ELSE HUD_IPHASE = ISLECT_GUID - 6

IF HUD_BFS_TGEND = ON AND HUD_P_MODE < 3,
  THEN HUD_P_MODE = 3
IF ALT_WHEELS < BFS_H_FF AND HUD_P_MODE < 4
  THEN DO
    H_FINAL_FLARE = TAU_TD (H_TD2_DOT - H_DOT_ELLIPSOID)
      + H_NO_ACC
    IF ALT_WHEELS < H_FINAL_FLARE OR ALT_WHEELS < H_MIN
      THEN HUD_P_MODE = 4

  END DO

HUD_ALTNV = P_DISP_EDIT(3)
IF (P_DISP_EDIT(1) OR P_DISP_EDIT(2))
```

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```

THEN HUD_TACNV = ON
ELSE HUD_TACNV = OFF

```

```

HUD_HERROR = - INTEGER(MIDVAL(HERROR, -32767, +32767))
HUD_SPBRK_POS = INTEGER (DSBOFB)
HUD_SPBRK_CMD = INTEGER (DSBC_AET)
HUD_HEADING = INTEGER (50 PSI_HSIMV)
HUD_PITCHERR = INTEGER (100 ADI_ERROR_NEEDLES(2))
HUD_ROLLERR = INTEGER (10 ADI_ERROR_NEEDLES(1))
IF HUD_BFS_TGEND = ON
  THEN DO
    HUD_PITCHERR = 2000
    HUD_ROLLERR = 0
    HUD_HERROR = -2000
    HUD_SB_RETRACT = ON
  END DO

```

HSI source for HUD will use Nav as the default and is only reset if TACAN source selection made.

```

HUD_L_HSI_SEL, HUD_R_HSI_SEL = 0
IF HSI_SOURCE = 1
  THEN HUD_L_HSI_SEL, HUD_R_HSI_SEL = 1

```

The BFS HUD PROC will send the appropriate gear warning and gear transit flags to the HUDES:

```

GRUPLK = INTEGER (LMG_UPLK) + INTEGER(RMG_UPLK) +
          INTEGER (NLG_UPLOCKED)
GRDOORUP = INTEGER (NOT LMGDOORUP) + INTEGER(NOT RMGDOORUP) +
          INTEGER (NLGDOORUP)

IF (GRUPLK + GRDOORUP <= 3)
  THEN HUD_GEAR_TRANS = 1
  ELSE HUD_GEAR_TRANS = 0

IF (ALT_WHEELS <= GEAR_DOWN_ALT AND EAS <= GEAR_EAS)
  THEN
    IF (HUD_GEAR_TRANS = 0)
      THEN HUD_GEAR_UP = ON
      ELSE HUD_GEAR_UP = OFF
    ELSE HUD_GEAR_UP = OFF

```

#### GAMMA REFERENCE CALCULATION

This algorithm shall be used in the BFS HUD PROC to output two parameters to the HUDES: HUD\_GAMMA\_REF1 and HUD\_GAMMA\_REF2, to enable it to display the two sets of references for the OGS and Flare symbology. HUD\_GAMMA\_REF1 will enable the HUDES to display the non-moving references plus take them off at the right time. HUD\_GAMMA\_REF2 will provide the value for the moving references. These latter references will come up from the bottom of the field of view (FOV) and move smoothly towards the fixed reference. When the two intersect, the fixed set will disappear leaving only the moving set.

Note the following:

- GREF1 and GREF2 are in degrees.
- HUD\_GAMMA\_REF2 shall be updated at a minimum of 6.25 Hz.

This section calculates HUD\_GAMMA\_REF2, the moving Flare reference.

```

IF (HUD_P_MODE = 4)
  THEN DO
    TEMP = ABS(H_NO_ACC - ALT_WHEELS)/TAU_TD2F
    HDOT_REFF = H_TD2_DOT - TEMP
    GREF2
    = ARCTAN(HDOT_REFF/VELOCITY_WRT_RUNWAY(1)) RAD_TO_DEG
  END DO
ELSE DO
  IF ((ALT_WHEELS < HEXP(HUD_IGS, IGI)) AND (HUD_P_MODE = 3))
    THEN DO
      XEST1 = EXP((ALT_WHEELS
        - HEXP(HUD_IGS, IGI))/SIGMAH(HUD_IGS))
      XEST2 = X_WP2
        + ALT_WHEELS/TAN(GAMMA_REF_2 DEG_TO_RAD)
      XEST = XEST1 XDECAY(HUD_IGS, IGI) +XEST2
      TEMP = EXP((X_EXP(HUD_IGS, IGI) - XEST)/SIGMA(HUD_IGS))
      TEMP2 = (TEMP HDECAY2(HUD_IGS, IGI))/SIGMA(HUD_IGS)
      TEMP2 = RAD_TO_DEG ARCTAN(TEMP2)
      GREF2 = GAMMA_REF_2 - TEMP2
    END DO
  ELSE IF HEXP(HUD_IGS, IGI) <= ALT_WHEELS <= HCLOOP2(HUD_IGS, IGI)
    THEN DO
      TEMP = (H_K2(HUD_IGS, IGI) - ALT_WHEELS)/RH(HUD_IGS, IGI)
      GREF2 = RAD_TO_DEG ARCSIN(TEMP) - 90
    END DO
  END DO

```

GREF2 is then scaled for output to the HUDE:  
HUD\_GAMMA\_REF2 = INTEGER(100 GREF2)

This section calculates the non-moving OGS reference and is scaled appropriately for output to the HUDE.

```
HUD_GAMMA_REF1 = INTEGER(100 GAMMA_REF_1(HUD_IGS))
```

#### BFS HUD VELOCITY VECTOR CAGE/UNCAGE

To provide a HUD velocity vector cage/uncage option, the HUD PROC shall read the ADI attitude reference button state and reset the HUDE HUD\_ATT\_REF input per the following:

```

IF (ATT_BUTTON = 1 AND ATT_BUTTON_LAST = 0)
  THEN HUD_ATT_REF = NOT HUD_ATT_REF
  ATT_BUTTON_LAST = ATT_BUTTON

```

Note that only the commander's attitude reference switch is valid for BFS applications.

G-LOAD

This section sets HUD\_HI\_G, which is needed for the HUD G-Load Warning indication. GFACT is the Earth gravitational acceleration constant with a value of 32.174 ft/sec\*\*2.

```

IF ( GFACT NZ ≥ GLOAD_FLASH ) THEN
    HUD_HI_G = 1
ELSE
    HUD_HI_G = 0
ENDIF
    
```

BODY FLAP

This section sets HUD\_BF, which is needed for the HUD Body Flap Retract Warning.

```

IF ( ALT_WHEELS ≤ CONF_ALT_BF AND WOWLON_IND = 0 ) THEN
    IF ( BF_LL ≤ DBFOFB ≤ BF_UL ) THEN
        HUD_BF = 0
    ELSE
        HUD_BF = 1
    ENDIF
ELSE
    HUD_BF = 0
ENDIF
    
```

BFS HUD TAEM PROCESSING REQUIREMENTS

Not Applicable.

Table F.4.260.1-1. BFS HUD PROC INITIALIZATION REQUIREMENTS*		
NAME	DESCRIPTION	INITIAL VALUE
ATT_BUTTON_LAST	Attitude Button Last Pass	0
GREF2	GAMMA REF 2 Interim Variable	-50
HUD_ACC_DRAG	HUD Drag Acceleration	0
HUD_ALTNV	HUD Nav Altitude Error Flag	0
HUD_ATT_REF	HUD Attitude Reference Selection Flag	0
HUD_BF	HUD Bodyflap Flag	0
HUD_BFS_IND	HUD PFS/BFS Indicator	1
HUD_BFS_TGEND	HUD BFS End-of-TAEM Flag	0
HUD_DCL_CMD_MAX	HUD Max Deceleration Command	DECEL_CMD_MAX (K-Load)
HUD_EAS_REF	HUD Airspeed Reference	0
HUD_GAMMA_REF1	HUD GAMMA REF1	-50
HUD_GAMMA_REF2	HUD GAMMA REF2	-50
HUD_GEAR_TRANS	HUD Gear-in-Transit Flag	0

Table F.4.260.1-1. BFS HUD PROC INITIALIZATION REQUIREMENTS*		
NAME	DESCRIPTION	INITIAL VALUE
HUD_GEAR_UP	HUD Gear Up Flag	0
HUD_HDOT	HUD Estimated Altitude Rate	0
HUD_HEADING	HUD Magnetic Heading	0
HUD_HERROR	HUD A/L Altitude Error	0
HUD_HI_G	HUD High G Flag	0
HUD_IGS	HUD Steep Glideslope Index	1
HUD_IPHASE	HUD Guidance Phase Indicator	0
HUD_L_ADI_SCL	LH HUD ADI Rate Scaling	2
		Medium scale is only ADI option for BFS
HUD_L_FORMAT	LH HUD Format Select	0
HUD_L_HSI_SEL	LH HUD HSI Source Select	0
HUD_MLSNV	HUD NAV MLS Error Flag	0
HUD_P_MODE	HUD A/L Pitch Mode	0
HUD_PITCH_ADJ	HUD Pitch Adjustment	PITCH_ADJ (K-Load)
HUD_PITCHERR	HUD Pitch Error	0
HUD_R_ADI_SCL	RH HUD ADI Rate Scaling	2
		Medium scale is only ADI option for BFS
HUD_R_FORMAT	RH HUD Format Select	0
HUD_R_HSI_SEL	RH HUD HSI Source Select	0
HUD_RALNV	HUD Nav Radar Alt Error Flag	0
HUD_ROLLERR	HUD Roll Error	0
HUD_RW_LENGTH	HUD Runway Length	0
HUD_RW_REM_STP	HUD Runway Remaining at Stop	RW_REM_STP_BFS (K-Load)
HUD_RW_TGO_MIN	HUD Runway to Go Minimum	RW_TGO_MIN (K-Load)
HUD_RWY_HDG	HUD Runway Heading	0
HUD_SB_RETRACT	HUD Speedbrake Retract Indicator	0
HUD_SPARE_CDW_06	HUD Spare Word 6	0
HUD_SPARE_CDW_07	HUD Spare Word 7	0
HUD_SPARE_CDW_08	HUD Spare Word 8	0
HUD_SPARE_CDW_09	HUD Spare Word 9	0
HUD_SPARE_CDW_10	HUD Spare Word 10	0
HUD_SPARE_CDW_11	HUD Spare Word 11	0
HUD_SPARE_CDW_12	HUD Spare Word 12	0

Table F.4.260.1-1. BFS HUD PROC INITIALIZATION REQUIREMENTS*		
NAME	DESCRIPTION	INITIAL VALUE
HUD_SPBRK	HUD Speedbrake Flag	0
HUD_SPBRK_CMD	HUD Speedbrake Command	0
HUD_SPBRK_POS	HUD Speedbrake Position	0
HUD_TACNV	HUD Nav TACAN Error Flag	0
HUD_TEST_WORD	HUD Test Word	-68
HUD_VEL_SCL	HUD Velocity Scaling	1
HUD_VV_FILT_FREQ	HUD VV Filter Frequency	VV_FILT_FREQ (K-Load)
HUD_X_RW_POS	HUD X Runway Position	0
HUD_X_RW_SCL	HUD X Runway Position Scaling	0
HUD_X_RW_VEL	HUD X Runway Velocity	0
HUD_X_ZERO	HUD Steep Glideslope Aimpoint	0
HUD_Y_RW_POS	HUD Y Runway Position	0
HUD_Y_RW_SCL	HUD Y Runway Position Scaling	0
HUD_Y_RW_VEL	HUD Y Runway Velocity	0
HUD_Z_RW_POS	HUD Z Runway Position	0
HUD_Z_RW_SCL	HUD Z Runway Position Scaling	0
HUD_Z_RW_VEL	HUD Z Runway Velocity	0

\*Note: Before the first transmission to HUDE, the output buffer shall be initialized according to this table. Input parameters shall be initialized by their source.

Table F.4.260.1-2. BFS HUD UNIQUE DATA REQUIREMENTS INDEX BFS HUD Unique Messages 1 & 2			
Data Word/BITS	Description	D&C FSSR NAME	Source
BFS HUD Unique Message 1			
00	HUD MSG1 Command Word		GPC/HUDE ICD
01	HUD MSG1 Control Word	HUD_CNTL1	
1-2	X-Position wrt Runway Scaling	HUD_X_RW_SCL	BFS HUD PROC
3-4	Y-Position wrt Runway Scaling	HUD_Y_RW_SCL	BFS HUD PROC
5-6	Z-Position wrt Runway Scaling	HUD_Z_RW_SCL	BFS HUD PROC
7	Velocity wrt Runway Scaling	HUD_VEL_SCL	BFS HUD PROC
8	Unused		
9	HUD PFS/BFS Indicator	HUD_BFS_IND	INIT
10-16	Unused		

Table F.4.260.1-2. BFS HUD UNIQUE DATA REQUIREMENTS INDEX BFS HUD Unique Messages 1 & 2			
Data Word/BITS	Description	D&C FSSR NAME	Source
02	Test Word	HUD_TEST_WORD	GPC/HUDE ICD
03	GPC to HUD Flags Word 1	HUD_FLAG_1	
1	HUD Attitude Reference Flag	HUD_ATT_REF	BFS HUD PROC
2	WOWLON Indicator	WOWLON_IND	LANDING_HIP
3	Rollout Indicator	ROLLOUT_IND	LANDING_HIP
4	Hi G	HUD_HI_G	BFS HUD PROC
5	Speedbrake Warning Flag	HUD_SPBRK	INIT (no BFS E/L Annun Proc)
6	Body Flap Warning Flag	HUD_BF	BFS HUD PROC
7	Gear Warning Flag	HUD_GEAR_UP	BFS HUD PROC
8	ALTNV Warning Flag	HUD_ALTNV	BFS HUD PROC
9	TACNV Warning Flag	HUD_TACNV	BFS HUD PROC
10	MLSNV Warning Flag	HUD_MLSNV	INIT (no BFS MSBLS)
11	RALNV Warning Flag	HUD_RALNV	INIT (no BFS RA HIP)
12	SB Retract Indicator	HUD_SB_RETRACT	BFS HUD PROC
13	Hyd Sat Warning Flag	HUD_HYDSAT	N/A
14	Gear Transit Indicator	HUD_GEAR_TRANS	BFS HUD PROC
15	BFS TG END Indicator	HUD_BFS_TGEND	BFS HUD PROC
16	Spare		
04	GPC to HUD Flags Word 2	HUD_FLAG_2	
1-3	Unused		
4-6	Approach/Land Pitch Trajectory Mode Indicator	HUD_P_MODE	BFS HUD PROC
7-10	Unused		
11	Pitch Channel Auto/Manual Flag	AUTO_P_LAMP	N/A
12	Roll/Yaw Channel Auto/Manual Flag	AUTO_RY_LAMP	N/A
13	Speedbrake Channel Auto/Manual Flag	AUTO_SB_LAMP	D_DAP
14-16	TAEM IPHASE Descriptor	HUD_IPHASE	BFS HUD PROC
05	Speedbrake Position	HUD_SPBRK_POS	BFS HUD PROC
06	Speedbrake Command	HUD_SPBRK_CMD	BFS HUD PROC
07	X Position wrt Runway	HUD_X_RW_POS	BFS HUD PROC
08	Y Position wrt Runway	HUD_Y_RW_POS	BFS HUD PROC
09	Z Position wrt Runway	HUD_Z_RW_POS	BFS HUD PROC

Table F.4.260.1-2. BFS HUD UNIQUE DATA REQUIREMENTS INDEX BFS HUD Unique Messages 1 & 2				
Data Word/BITS		Description	D&C FSSR NAME	Source
10		X Velocity wrt Runway	HUD_X_RW_VEL	BFS HUD PROC
11		Y Velocity wrt Runway	HUD_Y_RW_VEL	BFS HUD PROC
12		Z Velocity wrt Runway	HUD_Z_RW_VEL	BFS HUD PROC
13		Heading	HUD_HEADING	BFS HUD PROC
14		Acc Drag	HUD_ACC_DRAG	BFS HUD PROC
15		H Dot Ellipsoid	HUD_HDOT	BFS HUD PROC
16		Flight Path Reference 2	HUD_GAMMA_REF2	BFS HUD PROC
17		Roll Error	HUD_ROLLERR	BFS HUD PROC
18		Pitch Error	HUD_PITCHERR	BFS HUD PROC
19		Runway Heading	HUD_RWY_HDG	BFS HUD PROC
20		Airspeed Reference	HUD_EAS_REF	BFS HUD PROC
21		Flight Path Reference 1	HUD_GAMMA_REF1	BFS HUD PROC
22		X Zero	HUD_X_ZERO	BFS HUD PROC
23		HERROR/H_ERROR	HUD_HERROR	BFS HUD PROC
24		Energy/Weight Upper Limit	HUD_EMAX	N/A
25		Vehicle Energy/Weight	HUD_EOW	N/A
26		Energy/Weight Lower Limit	HUD_EMIN	N/A
27		Nominal Energy/Weight Ref.	HUD_ENOM	N/A
28		Aileron Position	HUD_AIL_POS	N/A
29		Aileron Load Balance Increment	HUD_AIL_CMD	N/A
30		Pitch Adjustment	HUD_PITCH_ADJ	BFS HUD PROC
31		Velocity Vector Filter Frequency	HUD_VV_FILT_FREQ	BFS HUD PROC
BFS HUD Unique Message 2				
00		HUD MSG2 Command Word		GPC/HUDE ICD
01		HUD MSG2 Control Word	HUD_CNTL2_L, HUD_CNTL2_R	
	1-2	ADI Rate Scaling	HUD_L_ADI_SCL, HUD_R_ADI_SCL	INIT INIT
	3-4	HSI Source Selection	HUD_L_HSI_SEL, HUD_R_HSI_SEL	BFS HUD PROC BFS HUD PROC
	5-7	Format Selection	HUD_L_FORMAT, HUD_R_FORMAT	INIT INIT
	8-16	Unused		
02		Runway Remaining to Stop	HUD_RW_REM_STP	INIT
03		Minimum Runway to Go	HUD_RW_TGO_MIN	INIT



Table F.4.260.1–2. BFS HUD UNIQUE DATA REQUIREMENTS INDEX BFS HUD Unique Messages 1 & 2				
Data Word/BITS		Description	D&C FSSR NAME	Source
04		Maximum Deceleration Command	HUD_DCL_CMD_MAX	INIT
05		Runway Length	HUD_RW_LENGTH	Descent Nav
06		Spare	HUD_SPARE_CDW_06	BFS HUD PROC
07		Spare	HUD_SPARE_CDW_07	BFS HUD PROC
08		Spare	HUD_SPARE_CDW_08	BFS HUD PROC
09		Spare	HUD_SPARE_CDW_09	BFS HUD PROC
10		Spare	HUD_SPARE_CDW_10	BFS HUD PROC
11		Spare	HUD_SPARE_CDW_11	BFS HUD PROC
12		Spare	HUD_SPARE_CDW_12	BFS HUD PROC

Note: N/A indicates that this data word or data bit is required by GPC–HUDE ICD–3–1070–01, but not used by HUDE Display Format Algorithms as documented in STS 83–0020V2 section 4.7.10 and the HUD PRD MF0004–068. See F.4.260.1, PFS/BFS Requirements Difference paragraph, item 5.

#### F.4.260.2 BFS Head Up Display Processing Interface Definition

Table F.4.260–5 Input Functional Parameters

Table F.4.260–6 Output Functional Parameters N/A

Table F.4.260–7 I–Loads

Table F.4.260–8 K–Loads/Constants

Table F.4.260–5. BFS HUD PROC Input Parameters				
Parameter	Description	Data Type	Units	Source
ACC_DRAG	Vehicle cg drag acceleration	S	Ft/sec <sup>2</sup>	Descent Nav
ADI_ERROR_NEEDLES(1)	ADI error needle deflection commands: roll	S	Degrees	D_DAP
ADI_ERROR_NEEDLES(2)	ADI error needle deflection commands: pitch	S	Var (Degrees) or (G's)	D_DAP
ALT_WHEELS	Altitude of the Nav Base or altitude of rear wheels above	S	Ft	Descent Nav

Table F.4.260-5. BFS HUD PROC Input Parameters				
Parameter	Description	Data Type	Units	Source
	runway			
ANGLE_CORR_TNTOMAG_RW	Variation of rw magnetic north from true north, obtained from runway site lookup procedure	S	Radians	Descent Nav
ATT_BUTTON	ADI attitude reference button	I	ND	GNC_SW_HIP
AUTO_SB_LAMP	Speed brake auto lamp indicator	I	ND	D_DAP
AZIMUTH_RW	Bearing from true north of rw coordinate system +X-axis obtained from runway site lookup procedure	S	Radians	Descent Nav
DBFOFB	Compensated body flap position feedback	S	Degrees	BF_PFB_HIP
DSBC_AET	Auto speedbrake command	S	Degrees	D_DAP
DSBOFB	Compensated speedbrake position feedback	S	Degrees	SB_PFB_HIP
EAS	Equivalent airspeed	S	Ft/Sec	ADTA_HIP
HERROR	Altitude error relative to H ref.	S	Ft	TAEM & RTLS TAEM Guidance
HSI_SOURCE	HSI source	I	ND	GNC_SW_HIP
HUD_RW_LENGTH	Selected Runway Length used by HUD	I	Ft	Descent Nav
H_DOT_ELLIPSOID	Estimated topodetic altitude rate	S	Ft/sec	Descent Nav
IGI	Glideslope intercept index	I	ND	TAEM & RTLS TAEM Guidance
IGS	Glideslope index	I	ND	TAEM Guidance
ISLECT_GUID	TAEM & RTLS TAEM Guidance subphase indicator	I	ND	TAEM & RTLS TAEM Guidance
LMGDOORUP	LMG Door	D	ND	*LCA F3

Table F.4.260-5. BFS HUD PROC Input Parameters				
Parameter	Description	Data Type	Units	Source
	Uplocked			
LMG_UPLK	LMG Uplocked	D	ND	*LCA F2
MM_CODE	Major Mode index	I	ND	BEC
NEP	Nominal entry point indicator	D	ND	UI (H-Sit), TAEM & RTLS TAEM Guidance
NLGDOORUP	NLG Door Uplocked	D	ND	*LCA F3
NLG_UPLOCKED	NLG Uplocked	D	ND	*LCA F2
NZ	Selected AA Normal Accel	S	G's	AA_HIP
P_DISP_EDIT(1)	Display copy of edit history indicator for TACAN bearing measurement	D	ND	Descent Nav
P_DISP_EDIT(2)	Display copy of edit history indicator for TACAN range measurement	D	ND	Descent Nav
P_DISP_EDIT(3)	Display copy of edit history indicator for baro altitude measurement	D	ND	Descent Nav
POSITION_WRT_RUNWAY(1)	Downrange position wrt runway	S	Ft	Descent Nav
POSITION_WRT_RUNWAY(2)	Crossrange position wrt runway	S	Ft	Descent Nav
POSITION_WRT_RUNWAY(3)	Vertical position wrt runway	S	Ft	Descent Nav
PSI_HSIMV	Heading with respect to magnetic north at the runway	S	Degrees	Att Proc
RMGDOORUP	RMG Door Uplocked	D	ND	*LCA F2
RMG_UPLK	RMG Uplocked	D	ND	*LCA F3
ROLLOUT_IND	Rollout indicator	D	ND	LANDING_HIP
TG_END	TAEM & RTLS TAEM guidance termination flag	D	ND	TAEM & RTLS TAEM Guidance

Table F.4.260-5. BFS HUD PROC Input Parameters

Parameter	Description	Data Type	Units	Source
VELOCITY_WRT_RUNWAY(1)	Downrange velocity wrt runway	S	Ft/sec	Descent Nav
VELOCITY_WRT_RUNWAY(2)	Crossrange velocity wrt runway	S	Ft/sec	Descent Nav
VELOCITY_WRT_RUNWAY(3)	Vertical velocity wrt runway	S	Ft/sec	Descent Nav
WOWLON_IND	Weight on main wheels indicator	D	ND	LANDING_HIP
* Reference PRD 106, Table 3.2.5.4.5-1. HYD_SYS_HIP Input Parameters for MSIDs.				

TABLE F.4.260-7. BFS HEAD UP DISPLAY PROCESSING (4.260) I-LOADS

BFS NAME	MSID	ENG UNITS	DT	PR	D	S	PARA	MC	CAT	LAST CR	R E V
BFS_H_FF	V99U6999C	FT	F	S	D	B	4.260	00	HUD	92938B	
BFS_HUD_GRTLS_IGS	V99U6979C	ND	I	S	M	B	4.260	00	HUD	92938B	
GAMMA_REF_1(1)	V97U0233C	DEG	F	S	M	C	4.260	03	GL3	92938B	
GAMMA_REF_1(2)	V97U0234C	DEG	F	S	M	C	4.260	00	GL3	92938B	
GAMMA_REF_2	V97U0235C	DEG	F	S	M	C	4.260	00	GLC	92938B	
H_K2(1,1)	V96U7500C	FT	F	S	M	C	4.260	03	HUD	92938B	
H_K2(1,2)	V96U7501C	FT	F	S	M	C	4.260	03	HUD	92938B	
H_K2(2,1)	V96U7502C	FT	F	S	M	C	4.260	00	HUD	92938B	
H_K2(2,2)	V96U7503C	FT	F	S	M	C	4.260	00	HUD	92938B	
H_MIN	V97U0277C	FT	F	S	D	C	4.260	00	ZFH	92938B	
H_NO_ACC	V97U0278C	FT	F	S	D	C	4.260	00	ZFH	92938B	
H_TD2_DOT	V97U0285C	FT/SEC	F	S	D	C	4.260	00	ZFH	92938B	
HCLOOP2(1,1)	V99U7146C	FT	F	S	M	C	4.260	00	HUD	92938B	
HCLOOP2(1,2)	V99U7147C	FT	F	S	M	C	4.260	00	HUD	92938B	
HCLOOP2(2,1)	V99U7148C	FT	F	S	M	C	4.260	00	HUD	92938B	
HCLOOP2(2,2)	V99U7149C	FT	F	S	M	C	4.260	00	HUD	92938B	
HDECAY2(1,1)	V99U7150C	FT	F	S	M	C	4.260	03	HUD	92938B	
HDECAY2(1,2)	V99U7151C	FT	F	S	M	C	4.260	03	HUD	92938B	
HDECAY2(2,1)	V99U7152C	FT	F	S	M	C	4.260	00	HUD	92938B	
HDECAY2(2,2)	V99U7153C	FT	F	S	M	C	4.260	00	HUD	92938B	
HEXP(1,1)	V99U7154C	FT	F	S	M	C	4.260	03	HUD	92938B	
HEXP(1,2)	V99U7155C	FT	F	S	M	C	4.260	03	HUD	92938B	
HEXP(2,1)	V99U7156C	FT	F	S	M	C	4.260	00	HUD	92938B	
HEXP(2,2)	V99U7157C	FT	F	S	M	C	4.260	00	HUD	92938B	
HUD_NEP_PFNAL_MIN_ALT	V99U9644C	FT	F	S	D	C	4.260	00	HUD	92938B	
RH(1,1)	V99U7162C	FT	F	S	M	C	4.260	03	HUD	92938B	
RH(1,2)	V99U7163C	FT	F	S	M	C	4.260	03	HUD	92938B	
RH(2,1)	V99U7164C	FT	F	S	M	C	4.260	00	HUD	92938B	
RH(2,2)	V99U7165C	FT	F	S	M	C	4.260	00	HUD	92938B	
SIGMA(1)	V97U0402C	FT	F	S	M	C	4.260	03	GL3	92938B	
SIGMA(2)	V97U0403C	FT	F	S	M	C	4.260	00	GL3	92938B	
SIGMAH(1)	V99U7166C	FT	F	S	M	C	4.260	00	HUD	92938B	
SIGMAH(2)	V99U7167C	FT	F	S	M	C	4.260	00	HUD	92938B	
TAU_TD	V97U0411C	SEC	F	S	D	C	4.260	00	ZFH	92938B	
TAU_TD2F	V99U7144C	SEC	F	S	M	C	4.260	00	HUD	92938B	
V_REF(1)	V97U0418C	FT/SEC	F	S	M	C	4.260	03	GL3	92938B	
V_REF(2)	V97U0419C	FT/SEC	F	S	M	C	4.260	00	GL3	92938B	
X_EXP(1,1)	V97U0446C	FT	F	S	M	C	4.260	03	GL3	92938B	
X_EXP(1,2)	V97U0447C	FT	F	S	M	C	4.260	03	GL3	92938B	
X_EXP(2,1)	V97U0448C	FT	F	S	M	C	4.260	00	GL3	92938B	
X_EXP(2,2)	V97U0449C	FT	F	S	M	C	4.260	00	GL3	92938B	
X_WP2	V97U0445C	FT	F	S	M	C	4.260	03	GL3	93090E	
X_ZERO(1)	V97U0454C	FT	F	S	M	C	4.260	00	GLC	92938B	
X_ZERO(2)	V97U0455C	FT	F	S	M	C	4.260	00	GLC	92938B	
XDECAY(1,1)	V99U7158C	FT	F	S	M	C	4.260	03	HUD	92938B	
XDECAY(1,2)	V99U7159C	FT	F	S	M	C	4.260	03	HUD	92938B	
XDECAY(2,1)	V99U7160C	FT	F	S	M	C	4.260	00	HUD	92938B	

TABLE F.4.260-7. BFS HEAD UP DISPLAY PROCESSING (4.260) I-LOADS

BFS NAME	MSID	ENG UNITS	DT	PR	D	S	PARA	MC	CAT	LAST CR	R E V
XDECAY(2,2)	V99U7161C	FT	F	S	M	C	4.260	00	HUD	92938B	

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**

TABLE F.4.260-8. BFS HEAD UP DISPLAY PROCESSING (4.260) K-LOADS

BFS NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PARA	LAST CR	R E V
GEAR_DOWN_ALT ALTITUDE THRESHOLD FOR GEAR LIGHT	V97U6792C	00	+3.0	E+02 FT	F	S	C	4.260	92938B	
GLOAD_FLASH G-LOAD LIMIT TO TRIGGER HUD NZ SYMBOL FLASHING	V97U7024C	00	+6.48	E+01 FT/SEC**2	F	S	C	4.260	93194A	*
BF_UL BODY FLAP UPPER LIMIT -CONF LT	V97U9087C	00	+5.0	E-01 DEG	F	S	C	4.260	93194A	*
BF_LL BODY FLAP LOWER LIMIT - CONF LT	V97U9092C	00	-5.0	E-01 DEG	F	S	C	4.260	93194A	*
RW_REM_STP_BFS	V98U9975C	00	+1000	FT	I	S	B	4.260	93194A	*
CONF_ALT_BF MAX ALTITUDE LIMIT FOR HUD B/F WARNING MESSAGE	V99U7140C	00	+5.0	E+03 FT	F	S	C	4.260	93194A	*
GEAR_EAS	V99U7141C	00	+5.063	E+02 FT/SEC	F	S	C	4.260	92938B	
DECEL_CMD_MAX	V99U7145C	00	+16	FT/SEC**2	I	S	C	4.260	92938B	
RW_TGO_MIN	V99U7168C	00	+10	FT	I	S	C	4.260	92938B	
PITCH_ADJ	V99U7590C	00	+32119	ND	I	S	C	4.260	92938B	
VV_FILT_FREQ	V99U7592C	00	+22861	ND	I	S	C	4.260	92938B	

NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.

TABLE F.4.260-9. BFS HEAD UP DISPLAY PROCESSING (4.260) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
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NO REQUIREMENTS

**NOTE: REFERENCE TABLE 1.3-1 FOR EXPLANATION OF DATA ELEMENTS.**



**APPENDIX R CHANGE AUTHORIZATION REFERENCES**

**R.1 CR REFERENCE SUMMARY**

Table R.1-1. list the paragraphs, tables (T), and figures (F) that have been changed as a result of approved change requests commencing with OI-26 up to the current OI. Changes incorporated prior to OI-26 are listed in the Historical Change Request Summary.

<b>Table R.1-1. CR Reference Summary - Volume 1</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
N/A	92157	28	IDD Clarification to Remove Blanks from FSSR Names
	92230F	29	Display FSSR Documentation Cleanup
	92307	29	FSSR Format Change - Documentation Only
	92973	32	Reassign Effectivity of SCRs 92542D & 92743D to OI-32
	92983	32	Reassign Effectivity of SCRs 92834C & 92931A to OI-32
	92991	32	Reassign Effectivity of SCR 92870A to OI-32
	93009	32	Reassign Effectivity of SCR 92843B to OI-32
	93050	32	Expand Effectivity of SCR 92789C to Include OI-32
2.0	92031C	26	Displays and Controls FSSR-20 Documentation Update/Cleanup
	92150C	27	MEDS Documentation for Mixed - Fleet
2.4	92938B	32	BFS HUD Processor
2.5	92439A	29	BFS Scratch Pad Line Requirements
	93090E	33	Bearing Displays
3.0	92150C	27	MEDS Documentation for Mixed - Fleet
3.2	93047B	32	Simultaneous Keyboard Entries/Uplink Documentation
3.2.1	93047B	32	Simultaneous Keyboard Entries/Uplink Documentation
3.2.2	93047B	32	Simultaneous Keyboard Entries/Uplink Documentation
3.4	92031C	26	Displays and Controls FSSR-20 Documentation Update/Cleanup
	91051K	26B	Streamlined Shuttle GPS Capability
	92097B	27	Three String GPS for the BFS
	92145B	27	D&C Doc Cleanup for BFS Three String GPS
	92150C	27	MEDS Documentation for Mixed - Fleet
	91062D	28	Multiple TDRS State Vector Capability for PASS and BFS
	92100B	28	BFS Communications Reconfiguration Capability
3.4.3	93090E	33	Bearing Displays

<b>Table R.1-1. CR Reference Summary - Volume 1</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
3.4.3-4.(T)	93090E	33	Bearing Displays
3.4.5	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
3.4.6	93090E	33	Bearing Displays
3.4.7-2.(T)	93037A	32	OI-32 FSSR-20 Clean-up
	93090E	33	Bearing Displays
3.4.7-3.(T)	92318E	29	GPC Payload Command Filter
3.4.7-5.(T)	93037A	32	OI-32 FSSR-20 Clean-up
3.4.8-1.(T)	92320D	29	Software Changes for Forward RCS Interconnect System (FICS)
3.5	92163	26	Display Update Clarification
3.6	90843A	26	Deletion of SPEC 110 - BUS/BTU Status Display (G9/P9)
	91051K	26B	Streamlined Shuttle GPS Capability
	92144C	27	Three String GPS Documentation Cleanup
3.6.4-1.(T)	92318E	29	GPC Payload Command Filter
	92603A	30	Payload Control Supervisor (PCS) Deletion
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
3.7	93099B	33	Removal of BFS Extended Duration Orbiter (EDO) Support
	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
3.7.(T)	93090E	33	Bearing Displays
	93012D	32	PASS 6X TRAJ Display Enhancement
3.8	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
	93090E	33	Bearing Displays
3.8.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
3.9	92439A	29	BFS Scratch Pad Line Requirements
3.9.1	92439A	29	BFS Scratch Pad Line Requirements
3.9.2	92439A	29	BFS Scratch Pad Line Requirements
3.9.3	92439A	29	BFS Scratch Pad Line Requirements
3.9.4	92439A	29	BFS Scratch Pad Line Requirements
3.9.5	92439A	29	BFS Scratch Pad Line Requirements
3.9.6	92439A	29	BFS Scratch Pad Line Requirements
3.10	92067D	27	Three String GPS Capability
	93069A	32	PASS 6X TRAJ Display Correction
3.10-1.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
	93069A	32	PASS 6X TRAJ Display Correction

<b>Table R.1-1. CR Reference Summary - Volume 1</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
	93090E	33	Bearing Displays
3.12	92150C	27	MEDS Documentation for Mixed - Fleet
3.12.1	93098A	33	Reverse Direction of ADI Rate Pointer Travel
3.12.2-2.(F)	92396B	29	Display Correct Units/Text on HSI Digital Range Readout on MEDS
	92399C	29	MEDS HSI Enhancements
3.12.3-2.(F)	92416B	27	Incorporate Alpha Limits on MEDS Displays
	92395F	28	Incorporate G on MEDS Displays
	92407B	29	Make MEDS Flight Instrument Tapes Consistent
3.12.4-2.(F)	92398B	29	Rearrange H, H-dot & H-double dot on ADI/AVVI & Composite MEDS Displays
	92407B	29	Make MEDS Flight Instrument Tapes Consistent
3.16.3	93012D	32	PASS 6X TRAJ Display Enhancement
	93068B	32	PASS 6X TRAJ Display Documentation Clean-p
3.16.3-1.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
	93069A	32	PASS 6X TRAJ Display Correction
3.16.3-2.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
3.17.1	93012D	32	PASS 6X TRAJ Display Enhancement
3.17.1-1.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
	93069A	32	PASS 6X TRAJ Display Correction
4.0	92157	28	IDD Clarification to Remove Blanks from FSSR Names
	92230F	28	Display FSSR Documentation Cleanup
4.0.1-1(T)	92603A	30	Payload Control Supervisor (PCS) Deletion
	92938B	32	BFS HUD Processor
	93012D	32	PASS 6X TRAJ Display Enhancement
	93099B	33	Removal of BFS Extended Duration Orbiter (EDO) Support
	93156A	33	OI-33 FSSR-20 Clean-Up
4.1.2	92031C	26	Displays and Controls FSSR-20 Documentation Updates/ Cleanup
4.1.2-2.(T)	92695A	30	Clarification of CRT Timer Capabilities
4.1.2.1	92507	29	Clarification of PASS Fault Down to GPC Time Requirements
	92695A	30	Clarification of CRT Timer Capabilities
4.1.2.3	92695A	30	Clarification of CRT Timer Capabilities
4.1.3	91081A	26	Clearing the GPC Soft Error Counter

<b>Table R.1-1. CR Reference Summary - Volume 1</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
4.1.3-1.(F)	92344C	29	Single Item Entry GPC Memory Dump Capability
4.1.3-1.(T)	92344C	29	Single Item Entry GPC Memory Dump Capability
4.1.3-2.(T)	92344C	29	Single Item Entry GPC Memory Dump Capability
4.1.3.1	92344C	29	Single Item Entry GPC Memory Dump Capability
4.1.3.3	92344C	29	Single Item Entry GPC Memory Dump Capability
4.1.4-2.(T)	93084B	33	Spec 60 Checkpoint Capability Enhancement
4.1.4.1	93084B	33	Spec 60 Checkpoint Capability Enhancement
4.1.7-2(1).(T)	92436	26	Doc Correction of IPL Display Processing Page
4.1.7-2(2).(T)	92436	26	Doc Correction of IPL Display Processing Page
4.1.8-1.(F)	92344C	29	Single Item Entry GPC Memory Dump Capability
4.1.8-1.(T)	92344C	29	Single Item Entry GPC Memory Dump Capability
4.1.8-1.(T)	93037A	32	OI-32 FSSR-20 Clean-up
4.1.8-2.(T)	93037A	32	OI-32 FSSR-20 Clean-up
4.1.8.1	92344C	29	Single Item Entry GPC Memory Dump Capability
4.1.8.3	92344C	29	Single Item Entry GPC Memory Dump Capability
4.2.1	91051K	26B	Streamlined Shuttle GPS Capability
	90914C	28	Delay MOV MPS Dump/FRCS Dump at MM602
4.2.1-1.(T)	93090E	33	Bearing Displays
4.2.1-1.(F)	93090E	33	Bearing Displays
4.2.1-2.(T)	93090E	33	Bearing Displays
4.2.1-5.(T)	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	92619A	30	Correction CR for CR 92522D
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
4.2.1-6.(T)	93090E	33	Bearing Displays
4.2.1.1	93090E	33	Bearing Displays
4.2.1.2	93090E	33	Bearing Displays
4.2.1.3	93090E	33	Bearing Displays
4.2.1.4	93090E	33	Bearing Displays
4.2.2	91051K	26B	Streamlined Shuttle GPS Capability
	90914C	28	Delay MOV MPS Dump/FRCS Dump at MM602
4.2.2-1.(F)	93090E	33	Bearing Displays
4.2.2-5.(T)	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92542D	32	Deletion of LO2 Step Pressurization CMDS

<b>Table R.1-1. CR Reference Summary - Volume 1</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
	92619A	30	Correction CR for CR 92522D
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
4.2.2-6.(T)	93090E	33	Bearing Displays
4.2.3	91051K	26B	Streamlined Shuttle GPS Capability
	90914C	28	Delay MOV MPS Dump/FRCS Dump at MM602
4.2.3-1.(F)	93090E	33	Bearing Displays
4.2.3-5.(T)	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	92619A	30	Correction CR for CR 92522D
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
4.2.3-6.(T)	93090E	33	Bearing Displays
4.2.4	91051K	26B	Streamlined Shuttle GPS Capability
	90914C	28	Delay MOV MPS Dump/FRCS Dump at MM602
4.2.4-1.(T)	93090E	33	Bearing Displays
4.2.4-5.(T)	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	92619A	30	Correction CR for CR 92522D
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
4.2.4-6.(T)	93090E	33	Bearing Displays
4.2.5	91051K	26B	Streamlined Shuttle GPS Capability
	90914C	28	Delay MOV MPS Dump/FRCS Dump at MM602
4.2.5-1.(F)	93090E	33	Bearing Displays
4.2.5-5.(T)	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	92619A	30	Correction CR for CR 92522D
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
4.2.5-6.(T)	93090E	33	Bearing Displays
4.2.6	91051K	26B	Streamlined Shuttle GPS Capability
	90724D	28	OPS 6 Entry ECAI Automation
	90914C	28	Delay MOV MPS Dump/FRCS Dump at MM602
4.2.6-5.(T)	92355B	29	GPC Major Mode to MEDS

<b>Table R.1-1. CR Reference Summary - Volume 1</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
	92389C	29	Spiral HAC in TAEM Area Navigation
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93023D	32	OI_32 Remote Control Orbiter Capability
	93090E	33	Bearing Displays
4.2.6-6.(T)	93090E	33	Bearing Displays
4.2.7	91051K	26B	Streamlined Shuttle GPS Capability
4.2.7-5.(T)	92355B	29	GPC Major Mode to MEDS
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
	93100C	33	OI-33 Remote Control Orbiter Capability Enhancement
4.2.8	91051K	26B	Streamlined Shuttle GPS Capability
4.2.8-5.(T)	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
4.2.9	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup
	91051K	26B	Streamlined Shuttle GPS Capability
	92069B	26B	Single - String GPS Documentation Cleanup
	92102B	26B	GPS I-Load Category Update
	92139	26B	GPS I-Load Categorization Updates
	92067D	27	Three String GPS Capability
	92132C	27	Three String GPS GN&C Corrections
	92144C	27	Three String GPS Documentation Cleanup
	92178C	27	Altitude Threshold and Floor for GPS to Nav Updates
	92214A	27	Post-CI Three-String GPS Documentation Cleanup
	92289A	27	Post STS-91 OI-27 GPS Redesign
	92208C	28	GPS Issues for Correction on OI-28
	92292B	28	GPS Related Category Modification for OI-28
4.2.9-1.(T)	92517C	30	Expand Landing Site Table
	92551B	30	Short Field Landing Speedbrake Upgrade

Table R.1-1. CR Reference Summary - Volume 1			
Paragraph	CR	OI	Title
4.2.9-2.(T)	92571B	30	Drive HSD MLS, TAC, DRAG and ADTA A/I/F Asterisks at Item Entry
	92817C	32	GPS FSW Compensation for GPC Clock Drift
	92571B	39	Drive HSD MLS, TAC, DRAG and ADTA A/I/F Asterisks at Item Entry
4.2.9-2A.(T)	93090E	33	Bearing Displays
	92369B	29	PASS GPS Operational Enhancements
	92551B	30	Short Field Landing Speedbrake Upgrade
4.2.9-2B.(T)	92571B	30	Drive HSD MLS, TAC, DRAG and ADTA A/I/F Asterisks at Item Entry
	92281D	28	Post FACI OI-28 GPS Documentation Cleanup
	92369B	29	PASS GPS Operational Enhancements
	92551B	30	Short Field Landing Speedbrake Upgrade
4.2.9-5.(T)	92571B	30	Drive HSD MLS, TAC, DRAG and ADTA A/I/F Asterisks at Item Entry
	92297B	27	Delete Erroneous TLM Destinations for NAV
	92354	27	Delete Erroneous TLM Destinations
	92281D	28	Post FACI OI-28 GPS Documentation Cleanup
	92369B	29	PASS GPS Operational Enhancements
	92332D	30	Add Theta Limits Bracket to MEDS ADI Displays
	92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	92551B	30	Short Field Landing Speedbrake Upgrade
	92571B	30	Drive HSD MLS, TAC, DRAG and ADTA A/I/F Asterisks at Item Entry
	92619A	30	Correction CR for CR 92522D
	92779A	30	Specify Separate Annunciations for TACAN Bearing and Range Fail
	4.2.9-6.(T)	92817C	32
93012D		32	PASS 6X TRAJ Display Enhancement
93090E		33	Bearing Displays
92354		27	Delete Erroneous TLM Destinations
92551B		30	Short Field Landing Speedbrake Upgrade
92571B		30	Drive HSD MLS, TAC, DRAG and ADTA A/I/F Asterisks at Item Entry

<b>Table R.1-1. CR Reference Summary - Volume 1</b>				
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>	
4.2.9.1	92817C	32	GPS FSW Compensation for GPC Clock Drift	
	93090E	33	Bearing Displays	
	92281D	28	Post FACI OI-28 GPS Documentation Cleanup	
	92369B	29	PASS GPS Operational Enhancements	
	92392C	29	Doc-Only Corrections for OI-29 CRs 92329E, 92364D, and 92369B	
	92430B	29	Protect Against GPS Receiver Non-Homogenous Data, DRs 109743/109744	
	92450C	29	Documentation Clean-up for CR 92389	
	92517C	30	Expand Landing Site Table	
	92551B	30	Short Field Landing Speedbrake Upgrade	
4.2.9.2	93156A	33	OI-33 FSSR-20 Clean-Up	
	92281D	28	Post FACI OI-28 GPS Documentation Cleanup	
	92551B	30	Short Field Landing Speedbrake Upgrade	
4.2.9.3	93090E	33	Bearing Displays	
	92281D	28	Post FACI OI-28 GPS Documentation Cleanup	
	92369B	29	PASS GPS Operational Enhancements	
	92450C	29	Documentation Clean-up for CR 92389	
4.2.9.1	92551B	30	Short Field Landing Speedbrake Upgrade	
4.2.9.1	93037A	32	OI-32 FSSR-20 Clean-up	
4.2.9.2	92571B	30	Drive HSD MLS, TAC, DRAG and ADTA A/I/F Asterisks at Item Entry	
4.2.9.3	92571B	30	Drive HSD MLS, TAC, DRAG and ADTA A/I/F Asterisks at Item Entry	
4.2.10	92031C	26	Display and Controls FSSR-20 Documentation Updates/Cleanup	
	91051K	26B	Streamlined Shuttle GPS Capability	
4.2.10-1.(F)	92510E	30	Modification to Maneuver Execute Display	
4.2.10-2.(T)	92510E	30	Modification to Maneuver Execute Display	
4.2.10-5.(T)	92354	27	Delete Erroneous TLM Destinations	
	90763E	29	Fix PASS & BFS Maneuver Display Burn Attitude	
	92510E	30	Modification to Maneuver Execute Display	
	92522D	30	Overhaul MEDS Composite Flight Instrument Display	
	92859C	30	Preburn Maneuver Time To Go Clean-up	
	93090E	33	Bearing Displays	
	4.2.10.1	90763E	29	Fix PASS & BFS Maneuver Display Burn Attitude



<b>Table R.1-1. CR Reference Summary - Volume 1</b>				
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>	
4.2.10.1-1.(T)	92548B	29	Maneuver Display Burn Attitude Clarification	
	92579	29	PASS/BFS Maneuver Disp Burn Att Implementation Correction CR	
	92510E	30	Modification to Maneuver Execute Display	
	92843B	32	Lambert Guidance Improvement	
	92859C	30	Preburn Maneuver Time To Go Clean-up	
	93023D	32	OI-32 Remote Control Orbiter Capability	
	93037A	32	OI-32 FSSR-20 Clean-up	
4.2.10.2	92590	30	Doc Clean Up for BFS ADI Error Needles - DR 109755	
4.2.10.2-1.(T)	93037A	32	OI-32 FSSR-20 Clean-up	
4.2.10.3	92579	29	PASS/BFS Maneuver Disp Burn Att Implementation Correction CR	
4.2.10.4	93023D	32	OI-32 Remote Control Orbiter Capability	
	90763E	29	Fix PASS & BFS Maneuver Display Burn Attitude	
	92548B	29	Maneuver Display Burn Attitude Clarification	
	92579	29	PASS/BFS Maneuver Disp Burn Att Implementation Correction CR	
	92510E	30	Modification to Maneuver Execute Display	
4.2.11	92859C	30	Preburn Maneuver Time To Go Clean-up	
	93023D	32	OI-32 Remote Control Orbiter Capability	
	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup	
	92002B	26B	GPS Flight Critical BUS Capability - BFS	
	92097B	27	Three String GPS for the BFS	
	92145B	27	D&C Doc Cleanup for BFS Three String GPS	
	92267	28	Add Illegal Entry Reqmts for HSD Items 10-15	
	92292B	28	GPS Related Category Modifications for OI-28	
	4.2.11-1.(T)	92517C	30	Expand Landing Site Table
	4.2.11-1A.(T)	92517C	30	Expand Landing Site Table
4.2.11-2.(F)	92370C	29	BFS GPS Operational Enhancements	
4.2.11-2A.(T)	92370C	29	BFS GPS Operational Enhancements	
4.2.11.1	92370C	29	BFS GPS Operational Enhancements	
	92430B	29	Protect Against GPS Receiver Non-Homogenous Data, DRs 109743/109744	
	92450C	29	Documentation Clean-up for CR 92389	
	92517C	30	Expand Landing Site Table	

<b>Table R.1-1. CR Reference Summary - Volume 1</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
	92742A	30	Documentation Clean-up for Horizontal Situation Display - BFS
	92817C	32	GPS FSW Compensation for GPC Clock Drift
	93037A	32	OI-32 FSSR-20 Clean-up
4.2.11.2.1	93090E	33	Bearing Displays
4.2.11.2.2	93090E	33	Bearing Displays
4.2.11.3.1	92450C	29	Documentation Clean-up for CR 92389
4.2.11.3.2	92370C	29	BFS GPS Operational Enhancements
4.2.13	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup
	91051K	26B	Streamlined Shuttle GPS Capability
4.2.13-1.(F)	92320D	29	Software Changes for Forward RCS Interconnect System (FICS)
	92887A	30/3 2	RCS Auto Manifold Close Enable/Disable via SPEC 23
	92900A	30/3 2	SPEC 23 Display Change for Auto-Manifold Close
4.2.13-1a.(F)	92900A	30/3 2	SPEC 23 Display Change for Auto-Manifold Close
4.2.13-1b.(F)	92900A	30/3 2	SPEC 23 Display Change for Auto-Manifold Close
4.2.13-1.(T)	92320D	29	Software Changes for Forward RCS Interconnect System (FICS)
	92509C	29	Correction CR for Forward RCS Interconnect System (FICS)
	92887A	30/3 2	RCS Auto Manifold Close Enable/Disable via SPEC 23
4.2.13-1b.(T)	92900A	30/3 2	SPEC 23 Display Change for Auto-Manifold Close
4.2.13-2.(T)	92320D	29	Software Changes for Forward RCS Interconnect System (FICS)
	92509C	29	Correction CR for Forward RCS Interconnect System (FICS)
4.2.13-2.(T)	92887A	30/3 2	RCS Auto Manifold Close Enable/Disable via SPEC 23
	92900A	30/3 2	SPEC 23 Display Change for Auto-Manifold Close
4.2.13-2b.(T)	92870A	32	Correct Update Capability for OMS/RCS Quantity Gauging
	92900A	30/3 2	SPEC 23 Display Change for Auto-Manifold Close

<b>Table R.1-1. CR Reference Summary - Volume 1</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
4.2.13–5.(T)	92320D	29	Software Changes for Forward RCS Interconnect System (FICS)
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	92887A	30/3 2	RCS Auto Manifold Close Enable/Disable via SPEC 23
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
4.2.13–6.(T)	92320D	29	Software Changes for Forward RCS Interconnect System (FICS)
	92870A	32	Correct Update Capability for OMS/RCS Quantity Gauging
	92887A	30/3 2	RCS Auto Manifold Close Enable/Disable via SPEC 23
4.2.13–7.(T)	92320D	29	Software Changes for Forward RCS Interconnect System (FICS)
4.2.13.1	92320D	29	Software Changes for Forward RCS Interconnect System (FICS)
	92509C	29	Correction CR for Forward RCS Interconnect System (FICS)
	92887A	30/3 2	RCS Auto Manifold Close Enable/Disable via SPEC 23
	92900A	30/3 2	SPEC 23 Display Change for Auto-Manifold Close
4.2.13.2	92320D	29	Software Changes for Forward RCS Interconnect System (FICS)
	92509C	29	Correction CR for Forward RCS Interconnect System (FICS)
	92887A	30/3 2	RCS Auto Manifold Close Enable/Disable via SPEC 23
4.2.13.3	92320D	29	Software Changes for Forward RCS Interconnect System (FICS)
	92870A	32	Correct Update Capability for OMS/RCS Quantity Gauging
	92900A	30/3 2	SPEC 23 Display Change for Auto-Manifold Close
4.2.13.4	92900A	30/3 2	SPEC 23 Display Change for Auto-Manifold Close
4.2.14	91051K	26B	Streamlined Shuttle GPS Capability
4.2.14–5.(T)	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays

<b>Table R.1-1. CR Reference Summary - Volume 1</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
4.2.15	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup
	91051K	26B	Streamlined Shuttle GPS Capability
	92067D	27	Three String GPS Capability
	92292B	28	GPS Related Category Modifications for OI-28
4.2.15-5.(T)	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
4.2.18	91051K	26B	Streamlined Shuttle GPS Capability
4.2.18-5.(T)	92354	27	Delete Erroneous TLM Destinations
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
4.2.20	91051K	26B	Streamlined Shuttle GPS Capability
4.2.20-5.(T)	92354	27	Delete Erroneous TLM Destinations
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
4.2.21	91051K	26B	Streamlined Shuttle GPS Capability
4.2.21-1.(F)	92665C	32	Upgrade IMU/IMU Alignment
4.2.21-1.(T)	92707	30	Modify IMU Alignment Illegal Entry Requirements
	92665C	32	Upgrade IMU/IMU Alignment
4.2.21-2.(T)	92665C	32	Upgrade IMU/IMU Alignment
4.2.21-5.(T)	92354	27	Delete Erroneous TLM Destinations
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
4.2.21.1	92665C	32	Upgrade IMU/IMU Alignment
	92707	30	Modify IMU Alignment Illegal Entry Requirements
4.2.21.2	92665C	32	Upgrade IMU/IMU Alignment
	92707	30	Modify IMU Alignment Illegal Entry Requirements
4.2.21.3	92665C	32	Upgrade IMU/IMU Alignment
4.2.22	91003D	26	Addition of ± X Jets for Rotational Control
	91051K	26B	Streamlined Shuttle GPS Capability
	92187F	28	Automatic Reboost

<b>Table R.1-1. CR Reference Summary - Volume 1</b>				
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>	
4.2.22-1.(F)	92324A	29	Update Orbit DAP CONFIG Display Keyboard Limit	
4.2.22-1.(T)	92324A	29	Update Orbit DAP CONFIG Display Keyboard Limit	
4.2.22-2.(T)	92324A	29	Update Orbit DAP CONFIG Display Keyboard Limit	
4.2.22-5.(T)	92542D	32	Deletion of LO2 Step Pressurization CMDS	
	92789C	32	STS 83-0009 Errata Cleanup	
	93012D	32	PASS 6X TRAJ Display Enhancement	
	93090E	33	Bearing Displays	
4.2.22-6.(T)	92789C	32	STS 83-0009 Errata Cleanup	
4.2.23	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup	
	91051K	26B	Streamlined Shuttle GPS Capability	
	92067D	27	Three String GPS Capability	
	92132C	27	Three String GPS GN&C Corrections	
	92144C	27	Three String GPS Documentation Cleanup	
	92214A	27	Post-CI Three-String GPS Documentation Cleanup	
	92292B	28	GPS Related Category Modifications for OI-28	
	4.2.23-1.(T)	92817C	32	GPS FSW Compensation for GPC Clock Drift
		92834C	32	Rendezvous Nav Item Entry Corrections
	4.2.23-2.(T)	92369B	29	PASS GPS Operational Enhancements
4.2.23-5.(T)	92297B	27	Delete Erroneous TLM Destinations for NAV	
	92369B	29	PASS GPS Operational Enhancements	
	92542D	32	Deletion of LO2 Step Pressurization CMDS	
	92817C	32	GPS FSW Compensation for GPC Clock Drift	
	92834C	32	Rendezvous Nav Item Entry Corrections	
	93012D	32	PASS 6X TRAJ Display Enhancement	
	93090E	33	Bearing Displays	
	4.2.23-6.(T)	92817C	32	GPS FSW Compensation for GPC Clock Drift
		92834C	32	Rendezvous Nav Item Entry Corrections
	4.2.23-8.(T)	92834C	32	Rendezvous Nav Item Entry Corrections
4.2.23.1	92281D	28	Post FACI OI-28 GPS Documentation Cleanup	
	92369B	29	PASS GPS Operational Enhancements	
	92392C	29	Doc-Only Corrections for OI-29 CRs 92329E, 92364D, and 92369B	
	92834C	32	Rendezvous Nav Item Entry Corrections	
	92931A	32	Correction to SCR92834C to use DOING_REND_NAV	

<b>Table R.1-1. CR Reference Summary - Volume 1</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
4.2.23.2	92834C	32	Rendezvous Nav Item Entry Corrections
	92931A	32	Correction to SCR92834C to use DOING_REND_NAV
4.2.23.3	92281D	28	Post FACI OI-28 GPS Documentation Cleanup
	92369B	29	PASS GPS Operational Enhancements
4.2.25	91051K	26B	Streamlined Shuttle GPS Capability
4.2.25-1.(F)	92335A	29	Spec 34 10 Day Limit
4.2.25-1.(T)	92335A	29	Spec 34 10 Day Limit
4.2.25-2.(T)	92335A	29	Spec 34 10 Day Limit
4.2.25-5.(T)	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
4.2.25.3	92335A	29	Spec 34 10 Day Limit
4.2.26	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup
	91051K	26B	Streamlined Shuttle GPS Capability
	92187F	28	Automatic Reboost
4.2.26-1.(T)	92749B	30	Universal Pointing Processor Degrees to Radians Documentation Clean-up
	93078B	33	Universal Pointing Attitude Errors Clean-Up
4.2.26-2.(T)	92749B	30	Universal Pointing Processor Degrees to Radians Documentation Clean-up
4.2.26-5.(T)	92542D	32	Deletion of LO2 Step Pressurization CMDS
	92739D	30	STS 83-0003 Errata Cleanup
	92749B	30	Universal Pointing Processor Degrees to Radians Documentation Clean-up
	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.26-6.(T)	93090E	33	Bearing Displays
	92749B	30	Universal Pointing Processor Degrees to Radians Documentation Clean-up
4.2.26-8.(T)	93078B	33	Universal Pointing Attitude Errors Clean-Up
	92749B	30	Universal Pointing Processor Degrees to Radians Documentation Clean-up
4.2.26.1	92475A	28	Doc-Only Correction for OI-28 CR 92187 to fix DR 109226
	93037A	32	OI-32 FSSR-20 Clean-up
	93078B	33	Universal Pointing Attitude Errors Clean-Up

<b>Table R.1-1. CR Reference Summary - Volume 1</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
4.2.26.2	92749B	30	Universal Pointing Processor Degrees to Radians Documentation Clean-up
	93037A	32	OI-32 FSSR-20 Clean-up
	93078B	33	Universal Pointing Attitude Errors Clean-Up
4.2.26.3	92749B	30	Universal Pointing Processor Degrees to Radians Documentation Clean-up
	92535B	30	Display Second SSME Failure Velocity
4.2.29	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup
	91051K	26B	Streamlined Shuttle GPS Capability
	90704F	28	DAP Hotstick Downmode Alert and Message
	92198A	28	SERC OMS/RCS Interconnect Delay
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93025B	32	Single Engine Throttle Back for NPSP Protection
	92668C	30	Prevent Erroneous Droop Guidance Engagement
4.2.29-1.(T)	92668C	30	Prevent Erroneous Droop Guidance Engagement
4.2.29-1.(F)	92535B	30	Display Second SSME Failure Velocity
	92668C	30	Prevent Erroneous Droop Guidance Engagement
4.2.29-2.(T)	92535B	30	Display Second SSME Failure Velocity
	92668C	30	Prevent Erroneous Droop Guidance Engagement
4.2.29-5.(T)	92355B	29	GPC Major Mode to MEDS
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104
	92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92535B	30	Display Second SSME Failure Velocity
	92565A	30	SE RTLS Increased Pitch Authority Using Forward RCS Jets
	92668C	30	Prevent Erroneous Droop Guidance Engagement
	92490B	29	Correct Behavior of OMS Dump Arm/Start/Stop Asterisks
4.2.29-6.(T)	92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions
	92535B	30	Display Second SSME Failure Velocity
	92668C	30	Prevent Erroneous Droop Guidance Engagement
	92668C	30	Prevent Erroneous Droop Guidance Engagement
4.2.29.1	92668C	30	Prevent Erroneous Droop Guidance Engagement
4.2.29.2	92668C	30	Prevent Erroneous Droop Guidance Engagement

<b>Table R.1-1. CR Reference Summary - Volume 1</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
4.2.29.3	92668C	30	Prevent Erroneous Droop Guidance Engagement
4.2.31	91014E	26	OMS Assist Performance Enhancement Burn
	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup
	91051K	26B	Streamlined Shuttle GPS Capability
	92142C	27	Override Display Documentation Update
	90704F	28	DAP Hotstick Downmode Alert and Message
	90724D	28	OPS 6 Entry ECAL Automation
	90914C	28	Delay MOV MPS Dump/FRCS Dump at MM602
	92175D	28	Uplink Second Stage I-Loads
	92208C	28	GPS Issues for Correction on OI-28
	92232B	28	Variable Intact Abort Throttle Limits
4.2.31–2.(T)	92490B	29	Correct Behavior of OMS Dump Arm/Start/Stop Asterisks
4.2.31–5.(T)	92354	27	Delete Erroneous TLM Destinations
	92225A	29	ET SEP Switch Default to Auto on a TAL Abort
	92316B	29	Automating 2nd MPS Vacuum Inert
	92350A	29	Fails OPS/Fail Safe SSME Repositioning for Drag Chute
	92355B	29	GPC Major Mode to MEDS
	92364D	29	Just-In-Time Flight Design (JITFD) I-Load Uplink Expansion
	92392C	29	Doc-Only Corrections for OI-29 CRs 92329E, 92364D, and 92369B
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104
	92463C	29	Correction of JITFD CRs (CR92364D and CR92392C)
	92490B	29	Correct Behavior of OMS Dump Arm/Start/Stop Asterisks
92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions	
92522D	30	Overhaul MEDS Composite Flight Instrument Display	
92542D	32	Deletion of LO2 Step Pressurization CMDS	
92565A	30	SE RTLS Increased Pitch Authority Using Forward RCS Jets	
93012D	32	PASS 6X TRAJ Display Enhancement	
93023D	32	OI-32 Remote Control Orbiter Capability	
93064D	32	Errata Issue Clean-Up Part II	
93090E	33	Bearing Displays	



<b>Table R.1-1. CR Reference Summary - Volume 1</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
4.2.31-6.(T)	92392C	29	Doc-Only Corrections for OI-29 CRs 92329E, 92364D, and 92369B
	93064D	32	Errata Issue Clean-Up Part II
4.2.31-7.(T)	92364D	29	Just-In-Time Flight Design (JITFD) I-Load Uplink Expansion
	92463C	29	Correction of JITFD CRs (CR92364D and CR92392C)
4.2.31.1	92364D	29	Just-In-Time Flight Design (JITFD) I-Load Uplink Expansion
	92490B	29	Correct Behavior of OMS Dump Arm/Start/Stop Asterisks
	92780A	30	Clarify OMS Dump Initialization and Carryover Requirements
	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.31.2	92490B	29	Correct Behavior of OMS Dump Arm/Start/Stop Asterisks
	93064D	32	Errata Issue Clean-Up Part II
4.2.31.3	92364D	29	Just-In-Time Flight Design (JITFD) I-Load Uplink Expansion
	92463C	29	Correction of JITFD CRs (CR92364D and CR92392C)
	92490B	29	Correct Behavior of OMS Dump Arm/Start/Stop Asterisks
	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.34	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup
4.2.35	91014E	26	OMS Assist Performance Enhancement Burn
	92100B	28	BFS Communications Reconfiguration Capability
	92232B	28	Variable Intact Abort Throttle Limits
4.2.35.1	92364D	29	Just-In-Time Flight Design (JITFD) I-Load Uplink Expansion
	92392C	29	Doc-Only Corrections for OI-29 CRs 92329E, 92364D, and 92369B
	92401	29	Make BFS Override Disp. RCS Dump Enable/Inhibits Legal in OPS 1
	92434	29	Doc Clarification of CR 92401
4.2.35.3	92364D	29	Just-In-Time Flight Design (JITFD) I-Load Uplink Expansion
	92392C	29	Doc-Only Corrections for OI-29 CRs 92329E, 92364D, and 92369B
4.2.36	91051K	26B	Streamlined Shuttle GPS Capability
	92035D	26B	GPS SOP Processing Relief

<b>Table R.1-1. CR Reference Summary - Volume 1</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
	92049C	26B	Corrections to CR 91051K, Streamlined Shuttle GPS Capability
	92056D	26B	Remove Unnecessary GPS SOP Processing in G9
	92069B	26B	Single - String GPS Documentation Cleanup
	92098D	26B	Single - String GPS RCVR STATE PROC Status Display Corrections
	92102B	26B	GPS I-Load Category Update
	92067D	27	Three String GPS Capability
	92132C	27	Three String GPS GN&C Corrections
	92144C	27	Three String GPS Documentation Cleanup
	92178C	27	Altitude Threshold and Floor for GPS to NAV Updates
	92214A	27	Post-CI Three-String GPS Documentation Cleanup
	92274	27	Prevent Statle GPS Data from Auto Updating Baseline Navigation in OPS 3
	92277	27	GPS SOP Self-Test Bit Swap
	92289A	27	Post STS-91 OI-27 GPS Redesign
	92208C	28	GPS Issues for Correction on OI-28
	92292B	28	GPS Related Category Modifications for OI-28
4.2.36-1.(T)	92369B	29	PASS GPS Operational Enhancements
	92529B	30	GPS Capability Enhancements For OI-30
	92817C	32	GPS FSW Compensation for GPC Clock Drift
4.2.36-1.(F)	92369B	29	PASS GPS Operational Enhancements
	92817C	32	GPS FSW Compensation for GPC Clock Drift
4.2.36-2.(T)	92281D	28	Post FACI OI-28 GPS Documentation Cleanup
	92369B	29	PASS GPS Operational Enhancements
	92529B	30	GPS Capability Enhancements For OI-30
	92817C	32	GPS FSW Compensation for GPC Clock Drift
4.2.36-5.(T)	92281D	28	Post FACI OI-28 GPS Documentation Cleanup
	92369B	29	PASS GPS Operational Enhancements
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	92817C	32	GPS FSW Compensation for GPC Clock Drift
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
4.2.36-6.(T)	92369B	29	PASS GPS Operational Enhancements
	92817C	32	GPS FSW Compensation for GPC Clock Drift

<b>Table R.1-1. CR Reference Summary - Volume 1</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
4.2.36.1	92281D	28	Post FACI OI-28 GPS Documentation Cleanup
	92369B	29	PASS GPS Operational Enhancements
	92430B	29	Protect Against GPS Receiver Non-Homogenous Data, DRs 109743/109744
	92630A	30	I-Load Controls for GPS Residual Edit Logic
	92817C	32	GPS FSW Compensation for GPC Clock Drift
4.2.36.2	92369B	29	PASS GPS Operational Enhancements
	92817C	32	GPS FSW Compensation for GPC Clock Drift
	93058B	32	OI32 VU Documentation Clean-up
4.2.36.3	92281D	28	Post FACI OI-28 GPS Documentation Cleanup
	92369B	29	PASS GPS Operational Enhancements
4.2.37	92002B	26B	GPS Flight Critical BUS Capability - BFS
	92097B	27	Three String GPS for the BFS
	92117	27	Reduce BFS GPS CPU Utilization
	92145B	27	D&C Doc Cleanup for BFS Three String GPS
	92292B	28	GPS Related Category Modifications for OI-28
4.2.37-1.(F)	92370C	29	BFS GPS Operational Enhancements
	92529B	30	GPS Capability Enhancements For OI-30
	92817C	32	GPS FSW Compensation for GPC Clock Drift
4.2.37-1.(T)	92370C	29	BFS GPS Operational Enhancements
	92529B	30	GPS Capability Enhancements For OI-30
	92817C	32	GPS FSW Compensation for GPC Clock Drift
	93000A	32	BFS GPS Aiding Enhancement for OI-32
4.2.37-2.(T)	92370C	29	BFS GPS Operational Enhancements
	92441	29	Doc Correction to CRT Table in CR 92370C
	92506A	29	Provide Homogeneity for BFS Parameters
4.2.37-2.(T)	92817C	32	GPS FSW Compensation for GPC Clock Drift
4.2.37.1	92370C	29	BFS GPS Operational Enhancements
	92430B	29	Protect Against GPS Receiver Non-Homogenous Data, DRs 109743/109744
	92506A	29	Provide Homogeneity for BFS Parameters
	92529B	30	GPS Capability Enhancements For OI-30
	92817C	32	GPS FSW Compensation for GPC Clock Drift
	93000A	32	BFS GPS Aiding Enhancement for OI-32
	92370C	29	BFS GPS Operational Enhancements
4.2.37.2	92370C	29	BFS GPS Operational Enhancements

<b>Table R.1-1. CR Reference Summary - Volume 1</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
4.2.37.3	92529B	30	GPS Capability Enhancements For OI-30
	92370C	29	BFS GPS Operational Enhancements
	92506A	29	Provide Homogeneity for BFS Parameters
4.2.38	92529B	30	GPS Capability Enhancements For OI-30
	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.38-1.(F)	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.38-1.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.38-2.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
4.2.38-5.(T)	93069A	32	PASS 6X TRAJ Display Correction
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.38-6.(T)	93025B	32	Single Engine Throttle Back for NPS Protection
	93090E	33	Bearing Displays
	93025B	32	Single Engine Throttle Back for NPS Protection
4.2.38-7.(T)	93090E	33	Bearing Displays
	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.38-8.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.38-9.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.38.1	93012D	32	PASS 6X TRAJ Display Enhancement
	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
4.2.38.2	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.38.3	93012D	32	PASS 6X TRAJ Display Enhancement
	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
4.2.38.4	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.39	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.39-1.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.39-1.(F)	93012D	32	PASS 6X TRAJ Display Enhancement
	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
	93069A	32	PASS 6X TRAJ Display Correction
4.2.39-2.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
4.2.39-3.(T)	93069A	32	PASS 6X TRAJ Display Correction
	93069A	32	PASS 6X TRAJ Display Correction
4.2.39-5.(T)	92542D	32	Deletion of LO2 Step Pressurization CMDS

<b>Table R.1-1. CR Reference Summary - Volume 1</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
	93012D	32	PASS 6X TRAJ Display Enhancement
	93025B	32	Single Engine Throttle Back for NPSP Protection
	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
	93087E	33	RTLS ET Separation Improvements
	93090E	33	Bearing Displays
4.2.39-6.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
4.2.39-7.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.39-8.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.39-9.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.39.1	93012D	32	PASS 6X TRAJ Display Enhancement
	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
	93069A	32	PASS 6X TRAJ Display Correction
4.2.39.2	93012D	32	PASS 6X TRAJ Display Enhancement
	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
4.2.39.3	93012D	32	PASS 6X TRAJ Display Enhancement
	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
4.2.39.4	93012D	32	PASS 6X TRAJ Display Enhancement
	93069A	32	PASS 6X TRAJ Display Correction
4.2.40	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.40-1.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.40-1.(F)	93012D	32	PASS 6X TRAJ Display Enhancement
	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
	93069A	32	PASS 6X TRAJ Display Correction
4.2.40-2.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
	93069A	32	PASS 6X TRAJ Display Correction
4.2.40-3.(T)	93069A	32	PASS 6X TRAJ Display Correction
4.2.40-5.(T)	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93025B	32	Single Engine Throttle Back for NPSP Protection
	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
	93090E	33	Bearing Displays
4.2.40-6.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays

<b>Table R.1-1. CR Reference Summary - Volume 1</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
4.2.40-7.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.40-8.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.40-9.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.40.1	93012D	32	PASS 6X TRAJ Display Enhancement
	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
	93069A	32	PASS 6X TRAJ Display Correction
4.2.40.2	93012D	32	PASS 6X TRAJ Display Enhancement
4.2.40.3	93012D	32	PASS 6X TRAJ Display Enhancement
	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
4.2.40.4	93012D	32	PASS 6X TRAJ Display Enhancement
	93069A	32	PASS 6X TRAJ Display Correction
4.2.41	93090E	33	Bearing Displays
4.2.41-1.(T)	93090E	33	Bearing Displays
4.2.41-1.(F)	93090E	33	Bearing Displays
4.2.41-2.(T)	93090E	33	Bearing Displays
4.2.41-2.(F)	93090E	33	Bearing Displays
4.2.41-3.(T)	93090E	33	Bearing Displays
4.2.41-3.(F)	93090E	33	Bearing Displays
4.2.41-4.(F)	93090E	33	Bearing Displays
4.2.41-5.(T)	93090E	33	Bearing Displays
4.2.41-6.(T)	93090E	33	Bearing Displays
4.2.41-7.(T)	93090E	33	Bearing Displays
4.2.41-8.(T)	93090E	33	Bearing Displays
4.2.41-9.(T)	93090E	33	Bearing Displays
4.2.41.1	93090E	33	Bearing Displays
4.2.41.2	93090E	33	Bearing Displays
4.2.41.3	93090E	33	Bearing Displays
4.2.41.4	93090E	33	Bearing Displays
4.2.42	93090E	33	Bearing Displays
4.2.42-1.(T)	93090E	33	Bearing Displays
4.2.42-1.(F)	93090E	33	Bearing Displays
	93168A	33	Bearing Displays Corrections II
4.2.42-2.(T)	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
4.2.42-2.(F)	93090E	33	Bearing Displays

<b>Table R.1-1. CR Reference Summary - Volume 1</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
4.2.42-3.(T)	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
	93168A	33	Bearing Displays Corrections II
4.2.42-5.(T)	93090E	33	Bearing Displays
4.2.42-6.(T)	93090E	33	Bearing Displays
4.2.42-7.(T)	93090E	33	Bearing Displays
4.2.42-8.(T)	93090E	33	Bearing Displays
4.2.42-9.(T)	93090E	33	Bearing Displays
4.2.42.1	93090E	33	Bearing Displays
4.2.42.2	93090E	33	Bearing Displays
4.2.42.3	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
4.2.42.4	93090E	33	Bearing Displays

<b>Table R.1-2. CR Reference Summary - Volume 2</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
N/A	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup
	92230F	28	Display FSSR Documentation Cleanup
	92307	29	FSSR Format Change - Documentation Only
	92973	32	Reassign Effectivity of SCRs 92542D & 92743D to OI-32
	92993	32	Reassign Effectivity of SCR 92908B to OI-32
	93054	32	Expand Effectivity to Include OI-32 for SCR 92897A
	4.3.1-1.(F)	92349	29
92586A		30	OI-30 Long Life Alkaline Fuel Cell SM Implementation
92731A		30	Descope of OI-30 Long Life Alkaline Fuel Cell
4.3.1-2.(T)	92349	29	Addition of CNTL BUS RPC Indicators to BFS SM SYS SUMM 1
	92586A	30	OI-30 Long Life Alkaline Fuel Cell SM Implementation
	92731A	30	Descope of OI-30 Long Life Alkaline Fuel Cell
	93037A	32	OI-32 FSSR - 20 Clean-up

<b>Table R.1-2. CR Reference Summary - Volume 2</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
4.3.1.1	92349	29	Addition of CNTL BUS RPC Indicators to BFS SM SYS SUMM 1
	92586A	30	OI-30 Long Life Alkaline Fuel Cell SM Implementation
	92731A	30	Descope of OI-30 Long Life Alkaline Fuel Cell
4.3.1.3	93037A	32	OI-32 FSSR - 20 Clean-up
4.3.2-1.(T)	93084B	33	Spec 60 Checkpoint Capability Enhancement
4.3.2-1.(F)	93084B	33	Spec 60 Checkpoint Capability Enhancement
4.3.2-2.(T)	93084B	33	Spec 60 Checkpoint Capability Enhancement
4.3.2.1	92698A	30	RMS SPEC 94 (PDRS CONTROL) Display Updates
	92797B	30	OI30 SM Doc Cleanup
	93084B	33	Spec 60 Checkpoint Capability Enhancement
4.3.4	91062D	28	Multiple TDRS State Vector Capability for PASS and BFS
	92238B	28	FSW CR 91062D - Multi TDRS Cleanup
4.3.4-1.(T)	92326C	29	Addition to Multiple TDRS State Vector Capability for PASS
4.3.4-1.(F)	92326C	29	Addition to Multiple TDRS State Vector Capability for PASS
4.3.4-2.(T)	92326C	29	Addition to Multiple TDRS State Vector Capability for PASS
4.3.4-3.(T)	92326C	29	Addition to Multiple TDRS State Vector Capability for PASS
4.3.4.1	92330A	28	Cleanup Multi TDRS Requirements (91062D)
	92326C	29	Addition to Multiple TDRS State Vector Capability for PASS
4.3.4.2	92326C	29	Addition to Multiple TDRS State Vector Capability for PASS
4.3.4.3	92330A	28	Cleanup Multi TDRS Requirements (91062D)
	92326C	29	Addition to Multiple TDRS State Vector Capability for PASS
4.3.5	92295D	28	PSP Port Mode Reject Added to SPEC 62
4.3.5.1	92318E	29	GPC Payload Command Filter
	92603A	30	Payload Control Supervisor (PCS) Deletion
	92999B	32	Annunciation of Shuttle Alarms on ISS for OI-32
	93044A	32	Shuttle Alarms to ISS Correction to SCR 92999B
4.3.5-1.(T)	92999B	32	Annunciation of Shuttle Alarms on ISS for OI-32
4.3.5-1.(F)	92999B	32	Annunciation of Shuttle Alarms on ISS for OI-32
4.3.5-2.(T)	92999B	32	Annunciation of Shuttle Alarms on ISS for OI-32
4.3.5.3	92318E	29	GPC Payload Command Filter
	92603A	30	Payload Control Supervisor (PCS) Deletion
	92999B	32	Annunciation of Shuttle Alarms on ISS for OI-32
4.3.5.4	92999B	32	Annunciation of Shuttle Alarms on ISS for OI-32
4.3.12.1	92380A	28	RMS Calibration
	92343E	29	Dial An Arm



**Table R.1-2. CR Reference Summary - Volume 2**

Paragraph	CR	OI	Title
4.3.12.2	92698A	30	RMS SPEC 94 (PDRS CONTROL) Display Updates
	92380A	28	RMS Calibration
	92343E	29	Dial An Arm
4.3.12.3	92698A	30	RMS SPEC 94 (PDRS CONTROL) Display Updates
	92343E	29	Dial An Arm
	92698A	30	RMS SPEC 94 (PDRS CONTROL) Display Updates
4.3.12.4.(T)	92877A	30/32	RMS SPEC 94 Changes to Support Starboard Boom
	92897A	30/32	RMS SPEC 94 MRL/MPM Bit Location Data - Doc Only
	92897A	30/32	RMS SPEC 94 MRL/MPM Bit Location Data - Doc Only
4.3.12-1	92877A	30/32	RMS SPEC 94 Changes to Support Starboard Boom
4.3.12-1.(T)	92380A	28	RMS Calibration
	92343E	29	Dial An Arm
	92698A	30	RMS SPEC 94 (PDRS CONTROL) Display Updates
4.3.12-1.(F)	92380A	28	RMS Calibration
	92343E	29	Dial An Arm
	92877A	30/32	RMS SPEC 94 Changes to Support Starboard Boom
4.3.12-2.(T)	92380A	28	RMS Calibration
	92343E	29	Dial An Arm
	92698A	30	RMS SPEC 94 (PDRS CONTROL) Display Updates
4.3.17-1.(F)	92877A	30/32	RMS SPEC 94 Changes to Support Starboard Boom
	93056	32	OI32 RMS Documentation Clean-up
	92334A	29	SM OMS High Point Bleed Line Deletion
4.3.17-2.(T)	92334A	29	SM OMS High Point Bleed Line Deletion
4.3.23	92603A	30	Payload Control Supervisor (PCS) Deletion
4.3.23-1.(T)	92603A	30	Payload Control Supervisor (PCS) Deletion
4.3.23-1.(F)	92603A	30	Payload Control Supervisor (PCS) Deletion
4.3.23-2.(T)	92603A	30	Payload Control Supervisor (PCS) Deletion
4.3.23.4	92603A	30	Payload Control Supervisor (PCS) Deletion
4.3.24.1	92343E	29	Dial An Arm
4.3.24-1.(T)	92343E	29	Dial An Arm
4.3.24-1.(F)	92343E	29	Dial An Arm
4.3.24.2	92343E	29	Dial An Arm
4.3.24.3	92343E	29	Dial An Arm
4.3.24-2.(T)	92343E	29	Dial An Arm
4.3.26	92559C	30	SM MPLM OI-30 Implementation
	93099B	33	Removal of BFS Extended Duration Orbiter (EDO) Support

<b>Table R.1-2. CR Reference Summary - Volume 2</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
4.3.26-1.(F)	92559C	30	SM MPLM OI-30 Implementation
	93008A	32	Addition of Cargo Cooling Loop Line Pressure Parameter to the BFS
	93099B	33	Removal of BFS Extended Duration Orbiter (EDO) Support
4.3.26-2.(T)	92559C	30	SM MPLM OI-30 Implementation
	93008A	32	Addition of Cargo Cooling Loop Line Pressure Parameter to the BFS
	93099B	33	Removal of BFS Extended Duration Orbiter (EDO) Support
4.3.26.1	93099B	33	Removal of BFS Extended Duration Orbiter (EDO) Support
4.3.26.2	92559C	30	SM MPLM OI-30 Implementation
	93099B	33	Removal of BFS Extended Duration Orbiter (EDO) Support
4.3.26.3	92559C	30	SM MPLM OI-30 Implementation
	93099B	33	Removal of BFS Extended Duration Orbiter (EDO) Support
4.3.26.4	92559C	30	SM MPLM OI-30 Implementation
	93099B	33	Removal of BFS Extended Duration Orbiter (EDO) Support
4.3.27	93116A	33	OI-33 RMS Updates
4.3.28	92318E	29	GPC Payload Command Filter
	92674A	29	GPCF OI-29 Doc Cleanup
4.3.28-1.(T)	92318E	29	GPC Payload Command Filter
	92674A	29	GPCF OI-29 Doc Cleanup
4.3.28-1.(F)	92318E	29	GPC Payload Command Filter
	92674A	29	GPCF OI-29 Doc Cleanup
4.3.28-2.(T)	92318E	29	GPC Payload Command Filter
	92674A	29	GPCF OI-29 Doc Cleanup
	92797B	30	OI30 SM Doc Cleanup
4.3.28.1	92318E	29	GPC Payload Command Filter
	92540A	29	GPCF Correction CR
	92601C	30	GPCF OI30 Enhancements
	92674A	29	GPCF OI-29 Doc Cleanup
4.3.28.2	92318E	29	GPC Payload Command Filter
	92674A	29	GPCF OI-29 Doc Cleanup
4.3.28.3	92318E	29	GPC Payload Command Filter
	92674A	29	GPCF OI-29 Doc Cleanup
	92797B	30	OI30 SM Doc Cleanup
4.3.28.4	92318E	29	GPC Payload Command Filter
	92674A	29	GPCF OI-29 Doc Cleanup

**Table R.1-2. CR Reference Summary - Volume 2**

Paragraph	CR	OI	Title
4.3.29	92318E	29	GPC Payload Command Filter
4.3.29-1.(T)	92318E	29	GPC Payload Command Filter
4.3.29-1.(F)	92318E	29	GPC Payload Command Filter
4.3.29-2.(T)	92318E	29	GPC Payload Command Filter
	92540A	29	GPCF Correction CR
	92674A	29	GPCF OI-29 Doc Cleanup
4.3.29.1	92318E	29	GPC Payload Command Filter
	92674A	29	GPCF OI-29 Doc Cleanup
4.3.29.2	92318E	29	GPC Payload Command Filter
	92674A	29	GPCF OI-29 Doc Cleanup
4.3.29.3	92318E	29	GPC Payload Command Filter
	92797B	30	OI30 SM Doc Cleanup
4.3.29.4	92318E	29	GPC Payload Command Filter
4.3.30	92318E	29	GPC Payload Command Filter
	92674A	29	GPCF OI-29 Doc Cleanup
4.3.30-1.(T)	92318E	29	GPC Payload Command Filter
	92674A	29	GPCF OI-29 Doc Cleanup
4.3.30-1.(F)	92318E	29	GPC Payload Command Filter
	92540A	29	GPCF Correction CR
4.3.30-2.(T)	92318E	29	GPC Payload Command Filter
	92674A	29	GPCF OI-29 Doc Cleanup
4.3.30.1	92318E	29	GPC Payload Command Filter
	92674A	29	GPCF OI-29 Doc Cleanup
4.3.30.2	92318E	29	GPC Payload Command Filter
4.3.30.3	92318E	29	GPC Payload Command Filter
	92674A	29	GPCF OI-29 Doc Cleanup
	92797B	30	OI30 SM Doc Cleanup
4.3.30.4	92318E	29	GPC Payload Command Filter
	92674A	29	GPCF OI-29 Doc Cleanup
4.5.1	91051K	26B	Streamlined Shuttle GPS Capability
4.5.1-5.(T)	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
4.5.2	91051K	26B	Streamlined Shuttle GPS Capability
4.5.2-5.(T)	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement

<b>Table R.1-2. CR Reference Summary - Volume 2</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
4.5.3-5.(T)	93090E	33	Bearing Displays
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93023D	32	OI-32 Remote Control Orbiter Capability
4.5.3-6.(T)	93090E	33	Bearing Displays
	93100C	32	OI-32 Remote Control Orbiter Capability Enhancement
	93023D	32	OI-32 Remote Control Orbiter Capability
	93100C	32	OI-32 Remote Control Orbiter Capability Enhancement
4.5.4	91051K	26B	Streamlined Shuttle GPS Capability
	92067D	27	Three String GPS Capability
	92085B	27	Sensor Self-Test Updates (SPECs 40, 41, 101, and 102)
	92205B	27	OI-27 VU/LDB Documentation Cleanup
4.5.4-1.(F)	92292B	28	GPS Related Category Modifications for OI-28
	93058B	32	OI32 VU Documentation Clean-up
4.5.4-2.(T)	92944E	32	Clarification of BITE Indication During Sensor Self Test
4.5.4-5.(T)	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
4.5.4.1	92944E	32	Clarification of BITE Indication During Sensor Self Test
4.5.4.3	92944E	32	Clarification of BITE Indication During Sensor Self Test
4.5.5	92085B	27	Sensor Self-Test Updates (SPECs 40, 41, 101, and 102)
4.5.5.1	92908B	32	Jet May Inaccurately Fail Trickle Current Check
	92944E	32	Clarification of BITE Indication During Sensor Self Test
4.5.5.3	92944E	32	Clarification of BITE Indication During Sensor Self Test
	93058B	32	OI32 VU Documentation Clean-up
4.5.6	92205B	27	OI-27 VU/LDB Documentation Cleanup
	92189B	28	Deletion of MM SSME Controller Load Capability
	92284A	28	Add Explicit Rejection of MM SSME Controller Load Requests
4.5.7-1.(T)	93023D	32	OI-32 Remote Control Orbiter Capability
4.5.7-1.(F)	93023D	32	OI-32 Remote Control Orbiter Capability
4.5.7-2.(T)	93023D	32	OI-32 Remote Control Orbiter Capability
4.5.7.1	93023D	32	OI-32 Remote Control Orbiter Capability
4.5.7.2	93023D	32	OI-32 Remote Control Orbiter Capability
4.5.7.4	93023D	32	OI-32 Remote Control Orbiter Capability
4.5.9	91051K	26B	Streamlined Shuttle GPS Capability

**Table R.1-2. CR Reference Summary - Volume 2**

Paragraph	CR	OI	Title
4.5.9.1-5.(T)	92354	27	Delete Erroneous TLM Destinations
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
4.5.9.1-6.(T)	92354	27	Delete Erroneous TLM Destinations
4.5.9.2-7.(T)	92354	27	Delete Erroneous TLM Destinations
4.5.9.2-8.(T)	92354	27	Delete Erroneous TLM Destinations
4.6.1	92205B	27	OI-27 VU/LDB Documentation Cleanup
4.6.1-1.(F)	93058B	32	OI32 VU Documentation Clean-up
4.6.2	92067D	27	Three String GPS Capability
	92085B	27	Sensor Self-Test Updates (SPECs 40, 41, 101, and 102)
4.6.2.1	92944E	32	Clarification of BITE Indication During Sensor Self Test
	93058B	32	OI32 VU Documentation Clean-up
4.6.2.3	92944E	32	Clarification of BITE Indication During Sensor Self Test
	93058B	32	OI32 VU Documentation Clean-up
4.6.3	92085B	27	Sensor Self-Test Updates (SPECs 40, 41, 101, and 102)
4.6.3-1.(F)	93058B	32	OI32 VU Documentation Clean-up
4.6.3.1	92944E	32	Clarification of BITE Indication During Sensor Self Test
	93058B	32	OI32 VU Documentation Clean-up
4.6.3.3	92944E	32	Clarification of BITE Indication During Sensor Self Test
	93058B	32	OI32 VU Documentation Clean-up
4.6.4.1	93058B	32	OI32 VU Documentation Clean-up
4.6.5-1.(T)	92342C	29	Reduced Bandwidth G9 Downlist Format Addition
4.6.5.1	92607A	30	SPEC 100 DL Format Initialization
4.6.5.2	92342C	29	Reduced Bandwidth G9 Downlist Format Addition
4.6.6	90870	26	Flight Critical and Payload MDM Single Port Device ID Protection
	92009	26	OI26 Correction to Single Port Device ID Protection (CR 90870)
	91051K	26B	Streamlined Shuttle GPS Capability
	92069B	26B	Single-String GPS Documentation Cleanup
	92067D	27	Three String GPS Capability
	92141A	27	IMU Software Documentation Update
	92214A	27	Post-CI Three-String GPS Documentation Cleanup
4.6.6-1.(T)	92068A	29	Spare IMU Tape Requirements Deletion
4.6.6-1.(F)	92068A	29	Spare IMU Tape Requirements Deletion

<b>Table R.1-2. CR Reference Summary - Volume 2</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
4.6.6-2.(T)	92068A	29	Spare IMU Tape Requirements Deletion
4.6.6-5.(T)	90662F	29	Automatic Reanchoring of an Upmoded IMU
	92297B	27	Delete Erroneous TLM Destinations for NAV
	92354	27	Delete Erroneous TLM Destinations
	92068A	29	Spare IMU Tape Requirements Deletion
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
4.6.6-6.(T)	92068A	29	Spare IMU Tape Requirements Deletion
	92354	27	Delete Erroneous TLM Destinations
	93090E	33	Bearing Displays
4.6.6-9.(T)	93090E	33	Bearing Displays
4.6.6.1	92068A	29	Spare IMU Tape Requirements Deletion
	92483A	29	Correction to CR92068A Spare IMU Tape Deletion
4.6.6.3 (T)	92068A	29	Spare IMU Tape Requirements Deletion
4.6.6.3-1.(T)	92068A	29	Spare IMU Tape Requirements Deletion
4.6.9	90843A	26	Deletion of SPEC 110 - BUS/BTU Status Display (G9/P9)
4.6.11-1.(F)	93058B	32	OI32 VU Documentation Clean-up
4.6.11-2.(T)	93058B	32	OI32 VU Documentation Clean-up
4.7.7	91051K	26B	Streamlined Shuttle GPS Capability

<b>Table R.1-3. CR Reference Summary - Volume 3</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
N/A	92230F	28	Display FSSR Documentation Cleanup
	92957A	32	Expand Effectivity of BFS RTF SCR to Include OI-32
	92973	32	Reassign Effectivity of SCRs 92542D & 92943D to OI-32
	92995	32	Reassign Effectivity of SCR 92926C to OI-32
	93053	32	Expand Effectivity of SCR 92885B to Include OI-32
Appendix A	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup
	91051K	26B	Streamlined Shuttle GPS Capability
	92002B	26B	GPS Flight Critical Bus Capability - BFS
	92097B	27	Three String GPS for the BFS

**Table R.1-3. CR Reference Summary - Volume 3**

Paragraph	CR	OI	Title	
A.1.1	90704F	28	DAP Hotstick Downmode Alert and Message	
	90724D	28	OPS 6 Entry ECAL Automation	
	92208C	28	GPS Issues for Correction on OI-28	
	92318E	29	GPC Payload Command Filter	
	92486	28	Correct SM Minor Field Fault Message ID Range Discrepancy	
A.3-1.(T)	92559C	30	SM MPLM OI-30 Implementation	
	93073A	33	PASS Non-Universal Enhancement	
	93099B	33	Removal of BFS Extended Duration Orbiter (EDO) Support	
A.4.2.(T)	93012D	32	PASS 6X TRAJ Display Enhancement	
	93068B	32	PASS 6X TRAJ Display Documentation Clean-up	
A.5-1.(T)	92349	29	Addition of CNTL BUS RPC Indicators to BFS SM SYS SUMM 1	
	92559C	30	SM MPLM OI-30 Implementation	
	92586A	30	OI-30 Long Life Alkaline Fuel Cell SM Implementation	
	92731A	30	Descope of OI-30 Long Life Alkaline Fuel Cell	
	93008A	32	Addition of Cargo Cooling Loop Line Pressure Parameter to the BFS	
	93099B	33	Removal of BFS Extended Duration Orbiter (EDO) Support	
	93037A	32	OI-32 FSSR-20 Clean-up	
	A.6-1.(T)	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup
		91051K	26B	Streamlined Shuttle GPS Capability
		92069B	26B	Single-String GPS Documentation Cleanup
92103A		26B	FSSR Parameter Table Upgrade	
92067D		27	Three String GPS Capability	
90704F		28	DAP Hotstick Downmode Alert and Message	
90914C		28	Delay MOV MPS Dump/FRCS Dump at MM602	
91050C		28	Improved Fault Tolerance to Executing Beep Trim Derotation	
92157		28	IDD Clarification to Remove Blanks from FSSR Names	
B.4.110-5.(T)		92208C	28	GPS Issues for Correction on OI-28
	92297B	27	Delete Erroneous TLM Destinations for NAV	
	92354	27	Delete Erroneous TLM Destinations	
	92340A	28	GAX Annunciation Correction for CR 92260B	
	89464G	29	RCS PVT Sensor Change	

**Table R.1-3. CR Reference Summary - Volume 3**

Paragraph	CR	OI	Title
	90662F	29	Automatic Reanchoring of an Upmoded IMU
	92355B	29	GPC Major Mode to MEDS
	92369B	29	PASS GPS Operational Enhancements
	92332D	30	Add Theta Limits Bracket to MEDS ADI Displays
	92458A	30	ET Separation Channelization Clean-Up
	92779A	30	Specify Separate Annunciations for TACAN Bearing and Range Fail
	92817C	32	GPS FSW Compensation for GPC Clock Drift
	92950	32	G/C Steer Roll Bias Ramp at PPD or MECO
	93012D	32	PASS 6X TRAJ Display Enhancement
	93100C	33	OI-33 Remote Control Orbiter Capability Enhancement
B.4.110.1.2	92519	29	Addition of Crew Class 3 CRT Message to SCR 92225A
	93013	32	Annunciate ME SHDN SW Message in OPS 6
B.4.110.3-1.(7).(T)	89464G	29	RCS PVT Sensor Change
B.4.110.4-1 (T)	92340A	28	GAX Annunciation Correction for CR 92260B
	89464G	29	RCS PVT Sensor Change
	92369B	29	PASS GPS Operational Enhancements
	92519	29	Addition of Crew Class 3 CRT Message to SCR 92225A
	92779A	30	Specify Separate Annunciations for TACAN Bearing and Range Fail
	93013	32	Annunciate ME SHDN SW Message in OPS 6
B.4.112	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup
	92002B	26B	GPS Flight Critical Bus Capability - BFS
	92061A	26B	Calibrations for Helium Regulator Pressure Transducers
	92073	26B	CR 92061A Additional K-Loads
	92103A	26B	FSSR Parameter Table Upgrade
	92097B	27	Three String GPS for the BFS
	92212	27	GH2 Ullage Pressure Increase
	92234	28	Calibration of MPS Helium Bottle Pressure Transducers
	92275C	28	Preclude BFS NAV Nuisance Alarms - DR 109712
B.4.112.1.3	92349	29	Addition of CNTL BUS RPC Indicators to BFS SM SYS SUMM 1
	92559C	30	SM MPLM OI-30 Implementation
	92586A	30	OI-30 Long Life Alkaline Fuel Cell SM Implementation



**Table R.1-3. CR Reference Summary - Volume 3**

<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
	92731A	30	Descope of OI-30 Long Life Alkaline Fuel Cell
	93008A	32	Addition of Cargo Cooling Loop Line Pressure Parameter to the BFS
B.4.112.1.4	93099B	33	Removal of BFS Extended Duration Orbiter (EDO) Support
	93037A	32	OI-32 FSSR-20 Clean-up
B.4.112.3-1.(T)	92334A	29	SM OMS High Point Bleed Line Deletion
	92349	29	Addition of CNTL BUS RPC Indicators to BFS SM SYS SUMM 1
	92559C	30	SM MPLM OI-30 Implementation
	92586A	30	OI-30 Long Life Alkaline Fuel Cell SM Implementation
	92731A	30	Descope of OI-30 Long Life Alkaline Fuel Cell
	93008A	32	Addition of Cargo Cooling Loop Line Pressure Parameter to the BFS
	93099B	33	Removal of BFS Extended Duration Orbiter (EDO) Support
B.4.150	91051K	26B	Streamlined Shuttle GPS Capability
	92103A	26B	FSSR Parameter Table Upgrade
B.4.150-5.(T)	92354	27	Delete Erroneous TLM Destinations
	92353D	29	Automated Alpha-Beta Management During Mated Coast & MM104
	92355B	29	GPC Major Mode to MEDS
	92389C	29	Spiral HAC in TAEM Area Navigation
	93090E	33	Bearing Displays
B.4.150-6.(T)	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	93090E	33	Bearing Displays
B.4.150-7.(T)	93090E	33	Bearing Displays
B.4.150.1	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92679B	30	Correction CR for MEDS Data Collector Inputs
	92687	30	OI-30 Documentation CR for BFS Entry Display Processing
	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
B.4.154	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup
	91051K	26B	Streamlined Shuttle GPS Capability
	92103A	26B	FSSR Parameter Table Upgrade
	90704F	28	DAP Hotstick Downmode Alert and Message
	90724D	28	OPS 6 Entry ECAL Automation

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<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
B.4.154-5.(T)	93037A	32	OI-32 FSSR-20 Clean-up
	92355B	29	GPC Major Mode to MEDS
	92389C	29	Spiral HAC in TAEM Area Navigation
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104
	92450C	29	Documentation Clean-up for CR 92389
	92332D	30	Add Theta Limits Bracket to MEDS ADI Displays
	92619A	30	Correction CR for CR 92522D
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
	93100C	33	OI-33 Remote Control Orbiter Capability Enhancement
B.4.154-6.(T)	92332D	30	Add Theta Limits Bracket to MEDS ADI Displays
	93090E	33	Bearing Displays
B.4.154-7.(T)	92938B	32	BFS HUD Processor
	93090E	33	Bearing Displays
B.4.160	91051K	26B	Streamlined Shuttle GPS Capability
	92103A	26B	FSSR Parameter Table Upgrade
	92099B	27	Flight Path Angle RTLS Downlist Units Correction
	92208C	28	GPS Issues for Correction on OI-28
	93012D	32	PASS 6X TRAJ Display Enhancement
B.4.160-5.(T)	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
	92225A	29	ET SEP Switch Default to Auto on a TAL Abort
	92355B	29	GPC Major Mode to MEDS
	92389C	29	Spiral HAC in TAEM Area Navigation
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104
	92578B	29	Correction for ET SEP Switch Default
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
B.4.160-6.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
B.4.160-7.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
	93069A	32	PASS 6X TRAJ Display Correction
B.4.160-8.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
B.4.160.1	93012D	32	PASS 6X TRAJ Display Enhancement
	93068B	32	PASS 6X TRAJ Display Documentation Clean-up

**Table R.1-3. CR Reference Summary - Volume 3**

<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
B.4.160.1-1.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
B.4.160.1-2.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
B.4.160.2	93012D	32	PASS 6X TRAJ Display Enhancement
	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
B.4.160.3	93012D	32	PASS 6X TRAJ Display Enhancement
B.4.160.4	93012D	32	PASS 6X TRAJ Display Enhancement
	93068B	32	PASS 6X TRAJ Display Documentation Clean-up
B.4.160.4-1.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
	93069A	32	PASS 6X TRAJ Display Correction
B.4.160.4-2.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
B.4.160.5	93012D	32	PASS 6X TRAJ Display Enhancement
B.4.206	92103A	26B	FSSR Parameter Table Upgrade
B.4.206-7.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
	93069A	32	PASS 6X TRAJ Display Correction
B.4.206.3	93012D	32	PASS 6X TRAJ Display Enhancement
B.4.206.3-1.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
	93069A	32	PASS 6X TRAJ Display Correction
B.4.218	92103A	26B	FSSR Parameter Table Upgrade
	92453	29	Doc Correction of BFS G_Load Flash Parameter
B.5.3	92067D	27	Three String GPS Capability
	92214A	27	Post-CI Three-String GPS Documentation Cleanup
	92208C	28	GPS Issues for Correction on OI-28
B.5.7	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup
	91051K	26B	Streamlined Shuttle GPS Capability
	92103A	26B	FSSR Parameter Table Upgrade
	92067D	27	Three String GPS Capability
	90724D	28	OPS 6 Entry ECAL Automation
	90914C	28	Delay MOV MPS Dump/FRCS Dump at MM602
	92208C	28	GPS Issues for Correction on OI-28
	92450C	29	Documentation Clean-up for CR 92389
B.5.7-5.(T)	93156A	33	OI-33 FSSR-20 Clean-Up
	92306A	28	Orbiter Window Protection
	92353D	29	Automated Alpha-Beta Management During Mated Coast & MM104

**Table R.1-3. CR Reference Summary - Volume 3**

<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
	92355B	29	GPC Major Mode to MEDS
	92389C	29	Spiral HAC in TAEM Area Navigation
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104
	92450C	29	Documentation Clean-up for CR 92389
	92504G	30	Alleviate ET Recontact for RTLS 2EO Yellow and Orange Regions
	92619A	30	Correction CR for CR 92522D
	92676B	30	CR 92522D / CR 92619A Correction CR
	93012D	32	PASS 6X TRAJ Display Enhancement
	93087E	33	RTLS ET Separation Improvements
	93090E	33	Bearing Displays
	93100C	33	OI-33 Remote Control Orbiter Capability Enhancement
B.5.7-7.(T)	92389C	29	Spiral HAC in TAEM Area Navigation
	92517C	30	Expand Landing Site Table
	92938B	32	BFS HUD Processor
	93090E	33	Bearing Displays
B.5.16	92103A	26B	FSSR Parameter Table Upgrade
	92157	28	IDD Clarification to Remove Blanks from FSSR Names
	92320D	29	Software Changes for Forward RCS Interconnect System (FICS)
B.5.16-5.(T)	92354	27	Delete Erroneous TLM Destinations
	92306A	28	Orbiter Window Protection
	92340A	28	GAX Annunciation Correction for CR 92260B
	89464G	29	RCS PVT Sensor Change
	92320D	29	Software Changes for Forward RCS Interconnect System (FICS)
	92509C	29	Correction CR for Forward RCS Interconnect System (FICS)
	92504G	30	Alleviate ET Recontact for RTLS 2EO Yellow and Orange Regions
	92565A	30	SE RTLS Increased Pitch Authority Using Forward RCS Jets
B.5.16-6.(T)	92320D	29	Software Changes for Forward RCS Interconnect System (FICS)
B.5.16.3	92320D	29	Software Changes for Forward RCS Interconnect System (FICS)
B.5.19	92103A	26B	FSSR Parameter Table Upgrade
B.5.21	92103A	26B	FSSR Parameter Table Upgrade

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Paragraph	CR	OI	Title
B.5.21-5.(T)	92142C	27	Override Display Documentation Update
	92235B	27	Fix AOA Propellant Wasting Calculation
	92175D	28	Uplink Second Stage I-loads
	92364D	29	Just-In-Time Flight Design (JITFD) I-Load Uplink Expansion
	92392C	29	Doc-Only Corrections for OI-29 CRs 92329E, 92364D, and 92369B
	92490B	29	Correct Behavior of OMS Dump Arm/Start/Stop Asterisks
	92950	32	G/C Steer Roll Bias Ramp at PPD or MECO
B.5.21-6.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
	92392C	29	Doc-Only Corrections for OI-29 CRs 92329E, 92364D, and 92369B
B.5.21-7.(T)	92463C	29	Correction of JITFD CRs (CR92364D and CR92392C)
	92364D	29	Just-In-Time Flight Design (JITFD) I-Load Uplink Expansion
B.5.21.2.1	92463C	29	Correction of JITFD CRs (CR92364D and CR92392C)
	92780A	30	Clarify OMS Dump Initialization and Carryover Requirements
B.5.21.2.2	92490B	29	Correct Behavior of OMS Dump Arm/Start/Stop Asterisks
	93012D	32	PASS 6X TRAJ Display Enhancement
B.5.25	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup
	92103A	26B	FSSR Parameter Table Upgrade
B.5.26	93090E	33	Bearing Displays
B.5.26-1.(T)	93090E	33	Bearing Displays
B.5.26-1.(1)(F)	93090E	33	Bearing Displays
B.5.26-1.(2)(F)	93090E	33	Bearing Displays
B.5.26-2.(T)	93090E	33	Bearing Displays
B.5.26-3.(T)	93090E	33	Bearing Displays
B.5.26-4.(T)	93090E	33	Bearing Displays
B.5.26-5.(T)	93090E	33	Bearing Displays
B.5.26-5.(F)	93090E	33	Bearing Displays
B.5.26-6.(T)	93090E	33	Bearing Displays
B.5.26-6.(F)	93090E	33	Bearing Displays
B.5.26-7.(T)	93090E	33	Bearing Displays
B.5.26-7.(1)(F)	93168A	33	Bearing Displays Correction II
	93090E	33	Bearing Displays

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<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
B.5.26-7.(2)(F)	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
B.5.26-8.(T)	93090E	33	Bearing Displays
B.5.26-9.(T)	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
B.5.26-9.(F)	93090E	33	Bearing Displays
B.5.26-10.(F)	93090E	33	Bearing Displays
B.5.26-11.(F)	93090E	33	Bearing Displays
B.5.26-12.(F)	93090E	33	Bearing Displays
B.5.26-13.(F)	93090E	33	Bearing Displays
B.5.26-14.(1)(F)	93090E	33	Bearing Displays
	93168A	33	Bearing Displays Correction II
B.5.26-14.(2)(F)	93090E	33	Bearing Displays
	93168A	33	Bearing Displays Correction II
B.5.26-14.(3)(F)	93090E	33	Bearing Displays
	93168A	33	Bearing Displays Correction II
B.5.26-15.(F)	93090E	33	Bearing Displays
	93168A	33	Bearing Displays Correction II
B.5.26-16.(F)	93090E	33	Bearing Displays
	93168A	33	Bearing Displays Correction II
B.5.26-17.(F)	93090E	33	Bearing Displays
B.5.26-18.(F)	93090E	33	Bearing Displays
B.5.26-19.(F)	93090E	33	Bearing Displays
	93168A	33	Bearing Displays Correction II
B.5.26-20.(F)	93090E	33	Bearing Displays
B.5.26-21.(F)	93090E	33	Bearing Displays
B.5.26-22.(F)	93090E	33	Bearing Displays
B.5.26-23.(F)	93090E	33	Bearing Displays
B.5.26-24.(F)	93090E	33	Bearing Displays
B.5.26-25.(F)	93090E	33	Bearing Displays
B.5.26-26.(F)	93090E	33	Bearing Displays
B.5.26-27.(F)	93090E	33	Bearing Displays
B.5.26.1	93090E	33	Bearing Displays
B.5.26.1.1	93090E	33	Bearing Displays
B.5.26.1.2	93090E	33	Bearing Displays

**Table R.1-3. CR Reference Summary - Volume 3**

<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
B.5.26.2	93090E	33	Bearing Displays
B.5.26.3	93090E	33	Bearing Displays
B.5.26.4	93090E	33	Bearing Displays
B.5.26.5	93090E	33	Bearing Displays
B.5.26.6	93090E	33	Bearing Displays
B.5.26.7	93090E	33	Bearing Displays
B.5.26.8	93090E	33	Bearing Displays
B.5.26.8.1	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
B.5.26.8.2	93090E	33	Bearing Displays
B.5.26.9	93090E	33	Bearing Displays
B.5.26.9.1	93090E	33	Bearing Displays
B.5.26.9.2	93090E	33	Bearing Displays
B.5.26.9.3	93090E	33	Bearing Displays
B.5.26.9.4	93090E	33	Bearing Displays
B.5.26.9.5	93090E	33	Bearing Displays
B.5.26.9.6	93090E	33	Bearing Displays
	93168A	33	Bearing Displays Correction II
B.5.26.9.6.1	93090E	33	Bearing Displays
	93168A	33	Bearing Displays Correction II
B.5.26.9.6.2	93090E	33	Bearing Displays
B.5.26.9.7	93090E	33	Bearing Displays
	93168A	33	Bearing Displays Correction II
B.5.26.9.8	93090E	33	Bearing Displays
B.5.26.9.8.1	93090E	33	Bearing Displays
	93168A	33	Bearing Displays Correction II
B.5.26.9.8.2	93090E	33	Bearing Displays
B.5.26.9.8.3	93090E	33	Bearing Displays
B.5.26.9.8.4	93090E	33	Bearing Displays
	93168A	33	Bearing Displays Correction II
B.5.26.10	93090E	33	Bearing Displays
B.5.26.11	93090E	33	Bearing Displays
B.5.26.12	93090E	33	Bearing Displays
B.5.26.13	93090E	33	Bearing Displays
B.5.26.14	93090E	33	Bearing Displays

**Table R.1-3. CR Reference Summary - Volume 3**

<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
B.5.26.14.1	93090E	33	Bearing Displays
B.5.26.14.2	93090E	33	Bearing Displays
B.5.26.14.3	93090E	33	Bearing Displays
B.5.26.15	93090E	33	Bearing Displays
B.5.26.16	93090E	33	Bearing Displays
B.5.26.17	93090E	33	Bearing Displays
B.5.26.18	93090E	33	Bearing Displays
B.5.27	93090E	33	Bearing Displays
B.5.27-1.(F)	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
B.5.27-2.(F)	93090E	33	Bearing Displays
B.5.27-3.(F)	93090E	33	Bearing Displays
B.5.27-4.(F)	93090E	33	Bearing Displays
B.5.27-5.(F)	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
B.5.27-5.(1)(F)	93090E	33	Bearing Displays
B.5.27-5.(2)(F)	93090E	33	Bearing Displays
B.5.27-6.(T)	93090E	33	Bearing Displays
B.5.27-6.(1)(F)	93090E	33	Bearing Displays
B.5.27-6.(2)(F)	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
B.5.27-7.(T)	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
	93168A	33	Bearing Displays Correction II
B.5.27-7.(F)	93090E	33	Bearing Displays
B.5.27-8.(T)	93090E	33	Bearing Displays
B.5.27-8.(F)	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
B.5.27-9.(T)	93090E	33	Bearing Displays
B.5.27-9.(F)	93090E	33	Bearing Displays
B.5.27-10.(F)	93090E	33	Bearing Displays
B.5.27-11.(F)	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
	93168A	33	Bearing Displays Correction II
B.5.27-12.(1)(F)	93090E	33	Bearing Displays



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<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
B.5.27-12.(2)(F)	93090E	33	Bearing Displays
B.5.27.1	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
B.5.27.2	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
B.5.27.3	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
B.5.27.4	93090E	33	Bearing Displays
B.5.27.4.1	93090E	33	Bearing Displays
B.5.27.4.2	93090E	33	Bearing Displays
B.5.27.4.3	93090E	33	Bearing Displays
B.5.27.4.4	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
B.5.27.5	93090E	33	Bearing Displays
B.5.27.6	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
B.5.27.7	93090E	33	Bearing Displays
B.5.27.8	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
	93168A	33	Bearing Displays Correction II
B.5.27.9	93090E	33	Bearing Displays
B.5.27.10	93090E	33	Bearing Displays
B.5.27.11	93090E	33	Bearing Displays
B.5.27.12	93090E	33	Bearing Displays
F.4.103	90996G	26	ADI & HUD Error Display Integrator Mods for HAC & A/L
	92043	26	ADI PROC Correction & Cleanup for CR 90996G
	91051K	26B	Streamlined Shuttle GPS Capability
	92103A	26B	FSSR Parameter Table Upgrade
	90704F	28	DAP Hotstick Downmode Alert and Message
	90724D	28	OPS 6 Entry ECAL Automation
	90914C	28	Delay MOV MPS Dump/FRCS Dump at MM602
	91050C	28	Improved Fault Tolerance to Executing Beep Trim Derotation
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92676B	30	CR 92522D / CR 92619A Correction CR
	93098A	33	Reverse Direction of ADI Rate Pointer Travel

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<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>	
F.4.103–5.(T)	92353D	29	Automated Alpha-Beta Management During Mated Coast & MM104	
	92354	27	Delete Erroneous TLM Destinations	
	92355B	29	GPC Major Mode to MEDS	
	92389C	29	Spiral HAC in TAEM Area Navigation	
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104	
	92450C	29	Documentation Clean-up for CR 92389	
	92504G	30	Alleviate ET Recontact for RTLS 2EO Yellow and Orange Regions	
	92522D	30	Overhaul MEDS Composite Flight Instrument Display	
	92565A	30	SE RTLS Increased Pitch Authority Using Forward RCS Jets	
	92619A	30	Correction CR for CR 92522D	
	92740D	30	STS 83-0002 and STS 83-0008V1 Errata Cleanup	
	93012D	32	PASS 6X TRAJ Display Enhancement	
	93023D	32	OI-32 Remote Control Orbiter Capability	
	93064D	32	Errata Issue Clean-Up Part II	
	93090E	33	Bearing Displays	
	93100C	33	OI-33 Remote Control Orbiter Capability Enhancement	
	F.4.103–6.(T)	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.103.0–2.(T)	92522D	30	Overhaul MEDS Composite Flight Instrument Display	
	93064D	32	Errata Issue Clean-Up Part II	
F.4.103.0–3.(T)	92522D	30	Overhaul MEDS Composite Flight Instrument Display	
F.4.104	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup	
	92103A	26B	FSSR Parameter Table Upgrade	
	90704F	28	DAP Hotstick Downmode Alert and Message	
	90724D	28	OPS 6 Entry ECAL Automation	
	90914C	28	Delay MOV MPS Dump/FRCS Dump at MM602	
	92522D	30	Overhaul MEDS Composite Flight Instrument Display	
	92676B	30	CR 92522D / CR 92619A Correction CR	
	92765	30	Clarify HSI Requirements	
	92885B	32	Errata Issue Clean-Up Part 1	
	F.4.104–5.(T)	92297B	27	Delete Erroneous TLM Destinations for NAV
		92355B	29	GPC Major Mode to MEDS
		92389C	29	Spiral HAC in TAEM Area Navigation

**Table R.1-3. CR Reference Summary - Volume 3**

Paragraph	CR	OI	Title
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104
	92450C	29	Documentation Clean-up for CR 92389
	92504G	30	Alleviate ET Recontact for RTLS 2EO Yellow and Orange Regions
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92565A	30	SE RTLS Increased Pitch Authority Using Forward RCS Jets
	92676B	30	CR 92522D / CR 92619A Correction CR
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
F.4.104-6.(T)	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.104-7.(T)	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.105	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup
	92103A	26B	FSSR Parameter Table Upgrade
	90724D	28	OPS 6 Entry ECAL Automation
	90914C	28	Delay MOV MPS Dump/FRCS Dump at MM602
	92395F	28	Incorporate G on MEDS Displays
	92451	28	Change PFS MM304 Accel Data to Nz
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92619A	30	Correction CR for CR 92522D
F.4.105-5.(T)	92355B	29	GPC Major Mode to MEDS
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104
	92504G	30	Alleviate ET Recontact for RTLS 2EO Yellow and Orange Regions
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92565A	30	SE RTLS Increased Pitch Authority Using Forward RCS Jets
	92619A	30	Correction CR for CR 92522D
	93012D	32	PASS 6X TRAJ Display Enhancement
	93064D	32	Errata Issue Clean-Up Part II
	93090E	33	Bearing Displays
F.4.105-6.(T)	92395F	28	Incorporate G on MEDS Displays
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104
	92956A	30	Correct the range values for the LH/RH AMI ALPHA

**Table R.1-3. CR Reference Summary - Volume 3**

Paragraph	CR	OI	Title
F.4.105-9.(T)	92926C	32	Correction to AMI MSIDs in SCR 92522D
	92395F	28	Incorporate G on MEDS Displays
	92389C	29	Spiral HAC in TAEM Area Navigation
F.4.105.0-1.(T)	93090E	33	Bearing Displays
	92395F	28	Incorporate G on MEDS Displays
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.106	91051K	26B	Streamlined Shuttle GPS Capability
	92103A	26B	FSSR Parameter Table Upgrade
	92067D	27	Three String GPS Capability
	92144C	27	Three-String GPS Documentation Cleanup
	90724D	28	OPS 6 Entry ECAL Automation
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104
	92885B	32	Errata Issue Clean-Up Part 1
F.4.106-5.(T)	92355B	29	GPC Major Mode to MEDS
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104
	92504G	30	Alleviate ET Recontact for RTLS 2EO Yellow and Orange Regions
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92565A	30	SE RTLS Increased Pitch Authority Using Forward RCS Jets
	93012D	32	PASS 6X TRAJ Display Enhancement
	93064D	32	Errata Issue Clean-Up Part II
	93090E	33	Bearing Displays
	93155B	33	Bearing Displays Correction
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104
F.4.106-6.(T)	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104
F.4.107	92103A	26B	FSSR Parameter Table Upgrade
	90704F	28	DAP Hotstick Downmode Alert and Message
	90724D	28	OPS 6 Entry ECAL Automation
	90914C	28	Delay MOV MPS Dump/FRCS Dump at MM602
F.4.107-5.(T)	92354	27	Delete Erroneous TLM Destinations
	92355B	29	GPC Major Mode to MEDS
	92389C	29	Spiral HAC in TAEM Area Navigation
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104
	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
	92578B	29	Correction for ET SEP Switch Default

**Table R.1-3. CR Reference Summary - Volume 3**

Paragraph	CR	OI	Title	
F.4.108	92504G	30	Alleviate ET Recontact for RTLS 2EO Yellow and Orange Regions	
	92565A	30	SE RTLS Increased Pitch Authority Using Forward RCS Jets	
	93064D	32	Errata Issue Clean-Up Part II	
	93087E	33	RTSL ET Separation Improvements	
	93090E	33	Bearing Displays	
	93100C	33	OI-33 Remote Control Orbiter Capability Enhancement	
	90996G	26	ADI & HUD Error Display Integrator Mods for HAC & A/L	
	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup	
	91051K	26B	Streamlined Shuttle GPS Capability	
	92103A	26B	FSSR Parameter Table Upgrade	
	92067D	27	Three String GPS Capability	
	90704F	28	DAP Hotstick Downmode Alert and Message	
	90724D	28	OPS 6 Entry ECAL Automation	
	90914C	28	Delay MOV MPS Dump/FRCS Dump at MM602	
F.4.108-5.(T)	91050C	28	Improved Fault Tolerance to Executing Beep Trim Derotation	
	92354	27	Delete Erroneous TLM Destinations	
	92355B	29	GPC Major Mode to MEDS	
	92389C	29	Spiral HAC in TAEM Area Navigation	
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104	
	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS	
	92332D	30	Add Theta Limits Bracket to MEDS ADI Displays	
	92522D	30	Overhaul MEDS Composite Flight Instrument Display	
	92676B	30	CR 92522D / CR 92619A Correction CR	
	93087E	33	RTSL ET Separation Improvements	
	93090E	33	Bearing Displays	
	93100C	33	OI-33 Remote Control Orbiter Capability Enhancement	
	F.4.108-8.(T)	92938B	32	BFS HUD Processor
	F.4.128	92358B	29	GPC to MEDS IDP Data Transfer Capability
F.4.128-5.(T)	92354	27	Delete Erroneous TLM Destinations	
	92225A	29	ET SEP Switch Default to Auto on a TAL Abort	
	92316B	29	Automating 2nd MPS Vacuum Inert	
	92355B	29	GPC Major Mode to MEDS	

**Table R.1-3. CR Reference Summary - Volume 3**

Paragraph	CR	OI	Title
	92389C	29	Spiral HAC in TAEM Area Navigation
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104
	92578B	29	Correction for ET SEP Switch Default
	92332D	30	Add Theta Limits Bracket to MEDS ADI Displays
	92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions
	92510E	30	Modification to Maneuver Execute Display
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92565A	30	SE RTLS Increased Pitch Authority Using Forward RCS Jets
	92571B	30	Drive HSD MLS, TAC, DRAG and ADTA A/I/F Asterisks at Item Entry
	92619A	30	Correction CR for CR 92522D
	92670D	30	Abort Improvements to Improve TAL Performance
	92676B	30	CR 92522D / CR 92619A Correction CR
	92542D	32	Deletion of LO2 Step Pressurization CMDS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93018B	32	Blank HAC Turn Angle on PFD at Heading Alignment Phase
	93064D	32	Errata Issue Clean-Up Part II
	93090E	33	Bearing Displays
	93100C	33	OI-33 Remote Control Orbiter Capability Enhancement
F.4.128-6.(T)	92355B	29	GPC Major Mode to MEDS
	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92332D	30	Add Theta Limits Bracket to MEDS ADI Displays
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92619A	30	Correction CR for CR 92522D
F.4.128-7.(T)	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92619A	30	Correction CR for CR 92522D
F.4.128-9.(T)	92332D	30	Add Theta Limits Bracket to MEDS ADI Displays
	93090E	33	Bearing Displays
F.4.128.1	92355B	29	GPC Major Mode to MEDS
	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92489C	29	MEDS Data Transfer Requirements Clarification
	92679B	30	Correction CR for MEDS Data Collector Inputs
F.4.128.1-1.(T)	92355B	29	GPC Major Mode to MEDS

**Table R.1-3. CR Reference Summary - Volume 3**

Paragraph	CR	OI	Title
F.4.128.1-2.(T)	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92332D	30	Add Theta Limits Bracket to MEDS ADI Displays
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92619A	30	Correction CR for CR 92522D
	92670D	30	Abort Improvements to Improve TAL Performance
	92679B	30	Correction CR for MEDS Data Collector Inputs
	92885B	32	Errata Issue Clean-Up Part 1
	92355B	29	GPC Major Mode to MEDS
	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92332D	30	Add Theta Limits Bracket to MEDS ADI Displays
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92619A	30	Correction CR for CR 92522D
	92670D	30	Abort Improvements to Improve TAL Performance
	92679B	30	Correction CR for MEDS Data Collector Inputs
	92953B	32	Drive Tapes During BFS Powered Ascent
	93018B	32	Blank HAC Turn Angle on PFD at Heading Alignment Phase
	F.4.128.1.1	92358B	29
F.4.128.1.2	92355B	29	GPC Major Mode to MEDS
	92358B	29	GPC to MEDS IDP Data Transfer Capability
F.4.128.1.2.1	92442A	29	Clarification to CR 92355B and CR 92358B
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.1.1	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.1.2	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92619A	30	Correction CR for CR 92522D
F.4.128.1.2.1.3	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.1.4	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.1.5	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.1.6	92332D	30	Add Theta Limits Bracket to MEDS ADI Displays
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.1.7	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.1.8	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.1.9	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92676B	30	CR 92522D / CR 92619A Correction CR
	93018B	32	Blank HAC Turn Angle on PFD at Heading Alignment Phase
F.4.128.1.2.1.10	92522D	30	Overhaul MEDS Composite Flight Instrument Display

**Table R.1-3. CR Reference Summary - Volume 3**

<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
F.4.128.1.2.1.11	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.1.12	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.1.13	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.1.14	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.1.15	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.1.16	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92619A	30	Correction CR for CR 92522D
	92676B	30	CR 92522D / CR 92619A Correction CR
F.4.128.1.2.1.17	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92619A	30	Correction CR for CR 92522D
	92676B	30	CR 92522D / CR 92619A Correction CR
F.4.128.1.2.2	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.2.1	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.2.2	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92619A	30	Correction CR for CR 92522D
	92676B	30	CR 92522D / CR 92619A Correction CR
F.4.128.1.2.2.3	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.2.4	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.2.5	92489C	29	MEDS Data Transfer Requirements Clarification
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.2.6	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.2.7	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92679B	30	Correction CR for MEDS Data Collector Inputs
F.4.128.1.2.2.8	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.2.9	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	93018B	32	Blank HAC Turn Angle on PFD at Heading Alignment Phase
F.4.128.1.2.2.10	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.2.11	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.2.12	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92804A	30	Provide BFS Target Nz for Composite Display
F.4.128.1.2.2.13	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.2.14	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.2.15	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.2.16	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.2.2.17	92522D	30	Overhaul MEDS Composite Flight Instrument Display



**Table R.1-3. CR Reference Summary - Volume 3**

Paragraph	CR	OI	Title
F.4.128.1.3	92619A	30	Correction CR for CR 92522D
	92355B	29	GPC Major Mode to MEDS
	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92442A	29	Clarification to CR 92355B and CR 92358B
F.4.128.1.3.1	92442A	29	Clarification to CR 92355B and CR 92358B
F.4.128.1.3.1	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.1.1	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.1.2	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92670D	30	Abort Improvements to Improve TAL Performance
	92676B	30	CR 92522D / CR 92619A Correction CR
F.4.128.1.3.1.3	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.1.4	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.1.5	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.1.6	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92619A	30	Correction CR for CR 92522D
F.4.128.1.3.1.7	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92619A	30	Correction CR for CR 92522D
	92676B	30	CR 92522D / CR 92619A Correction CR
F.4.128.1.3.1.8	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.1.9	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92619A	30	Correction CR for CR 92522D
	93018B	32	Blank HAC Turn Angle on PFD at Heading Alignment Phase
F.4.128.1.3.1.10	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.1.11	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.1.12	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.1.13	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.1.14	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.1.15	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.1.16	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.1.17	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.2	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.2.1	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.2.2	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92670D	30	Abort Improvements to Improve TAL Performance
	92953B	32	Drive Tapes During BFS Powered Ascent

**Table R.1-3. CR Reference Summary - Volume 3**

Paragraph	CR	OI	Title
F.4.128.1.3.2.3	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.2.4	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92670D	30	Abort Improvements to Improve TAL Performance
F.4.128.1.3.2.5	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92670D	30	Abort Improvements to Improve TAL Performance
F.4.128.1.3.2.6	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92670D	30	Abort Improvements to Improve TAL Performance
F.4.128.1.3.2.7	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92619A	30	Correction CR for CR 92522D
	92670D	30	Abort Improvements to Improve TAL Performance
F.4.128.1.3.2.8	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.2.9	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92619A	30	Correction CR for CR 92522D
	92679B	30	Correction CR for MEDS Data Collector Inputs
	93018B	32	Blank HAC Turn Angle on PFD at Heading Alignment Phase
F.4.128.1.3.2.10	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.2.11	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.2.12	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92679B	30	Correction CR for MEDS Data Collector Inputs
	92804A	30	Provide BFS Target Nz for Composite Display
F.4.128.1.3.2.13	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.2.14	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.3.2.15	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92679B	30	Correction CR for MEDS Data Collector Inputs
F.4.128.1.3.2.16	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92679B	30	Correction CR for MEDS Data Collector Inputs
F.4.128.1.3.2.17	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92679B	30	Correction CR for MEDS Data Collector Inputs
	93156A	33	OI-33 FSSR 20 Clean-Up
F.4.128.1.3.3	92332D	30	Add Theta Limits Bracket to MEDS ADI Displays
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.128.1.4	92355B	29	GPC Major Mode to MEDS
	92442A	29	Clarification to CR 92355B and CR 92358B
	92676B	30	CR 92522D / CR 92619A Correction CR
	92767A	30	Clarify MEDS Transfer Time Consistency Requirements

**Table R.1-3. CR Reference Summary - Volume 3**

<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
F.4.128.1.4.1	92355B	29	GPC Major Mode to MEDS
	92442A	29	Clarification to CR 92355B and CR 92358B
	92332D	30	Add Theta Limits Bracket to MEDS ADI Displays
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92670D	30	Abort Improvements to Improve TAL Performance
	92767A	30	Clarify MEDS Transfer Time Consistency Requirements
	F.4.128.1.4.2	92522D	30
92670D		30	Abort Improvements to Improve TAL Performance
92767A		30	Clarify MEDS Transfer Time Consistency Requirements
F.4.128.2	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.129	92358B	29	GPC to MEDS IDP Data Transfer Capability
F.4.129-5.(T)	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB
F.4.129-6.(T)	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB
	92358B	29	GPC to MEDS IDP Data Transfer Capability
F.4.129-7.(T)	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92619A	30	Correction CR for CR 92522D
F.4.129.1	92358B	29	GPC to MEDS IDP Data Transfer Capability
F.4.129.1.1	92358B	29	GPC to MEDS IDP Data Transfer Capability
F.4.129.1.2	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB
	92358B	29	GPC to MEDS IDP Data Transfer Capability
F.4.129.1.3	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB
	92358B	29	GPC to MEDS IDP Data Transfer Capability
F.4.129.1-1.(T)	92358B	29	GPC to MEDS IDP Data Transfer Capability
F.4.129.1-2.(T)	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB
	92358B	29	GPC to MEDS IDP Data Transfer Capability
F.4.129.2	92358B	29	GPC to MEDS IDP Data Transfer Capability
F.4.130	92358B	29	GPC to MEDS IDP Data Transfer Capability
F.4.130.1	92358B	29	GPC to MEDS IDP Data Transfer Capability
F.4.130.1-1.(T)	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB
	92358B	29	GPC to MEDS IDP Data Transfer Capability
F.4.130.1-2.(T)	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB
	92358B	29	GPC to MEDS IDP Data Transfer Capability
F.4.130.1-3.(T)	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB

**Table R.1-3. CR Reference Summary - Volume 3**

Paragraph	CR	OI	Title
F.4.130.1-4.(T)	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB
F.4.130.1.1	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB
F.4.130.1.2	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB
F.4.130.1.3	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB
F.4.131	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92358B	29	GPC to MEDS IDP Data Transfer Capability
F.4.131.1	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB
F.4.131.1-1.(T)	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB
F.4.131.1-2.(T)	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB
F.4.131.1-3.(T)	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB
F.4.131.1-4.(T)	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB
F.4.131.1.1	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB
F.4.131.1.2	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB
F.4.131.1.3	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92356B	29	Provide Capability for MEDS Edgekey Entries Via the LDB
F.4.168	92358B	29	GPC to MEDS IDP Data Transfer Capability
	92031C	26	Displays and Controls FSSR-20 Documentation Updates/Cleanup
	92103A	26B	FSSR Parameter Table Upgrade
	90704F	28	DAP Hotstick Downmode Alert and Message
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	92676B	30	CR 92522D / CR 92619A Correction CR
	93098A	33	Reverse Direction of ADI Rate Pointer Travel
	92355B	29	GPC Major Mode to MEDS
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104
	92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions
92565A	30	SE RTLS Increased Pitch Authority Using Forward RCS Jets	

**Table R.1-3. CR Reference Summary - Volume 3**

Paragraph	CR	OI	Title
	92740D	30	STS 83-0002 and STS 83-0008V1 Errata Cleanup
	92950	32	G/C Steer Roll Bias Ramp at PPD or MECO
	93012D	32	PASS 6X TRAJ Display Enhancement
	92023D	32	OI-32 Remote Control Orbiter Capability
	93090E	33	Bearing Displays
F.4.168-6.(T)	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.168.0-1.(T)	92522D	30	Overhaul MEDS Composite Flight Instrument Display
F.4.169	92103A	26B	FSSR Parameter Table Upgrade
	93007B	32	OPS-2 ADI Rate Switch Scaling Change for OI32
	93098A	33	Reverse Direction of ADI Rate Pointer Travel
F.4.169.0-1.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
F.4.169-5.(T)	93007B	32	OPS-2 ADI Rate Switch Scaling Change for OI32
F.4.218-7.(T)	93012D	32	PASS 6X TRAJ Display Enhancement
F.4.230	92103A	26B	FSSR Parameter Table Upgrade
	90914C	28	Delay MOV MPS Dump/FRCS Dump at MM602
F.4.252	91051K	26B	Streamlined Shuttle GPS Capability
	92103A	26B	FSSR Parameter Table Upgrade
	91050C	28	Improved Fault Tolerance to Executing Beep Trim Derotation
	92157	28	IDD Clarification to Remove Blanks from FSSR Names
	92938B	32	BFS HUD Processor
F.4.252-5.(T)	92297B	27	Delete Erroneous TLM Destinations for NAV
	92355B	29	GPC Major Mode to MEDS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93090E	33	Bearing Displays
	93100C	33	OI-33 Remote Control Orbiter Capability Enhancement
F.4.252-7.(T)	92938B	32	BFS HUD Processor
	93090E	33	Bearing Displays
F.4.252-8.(T)	92938B	32	BFS HUD Processor
F.4.252.1	92938B	32	BFS HUD Processor
F.4.252.1-1.(T)	92938B	32	BFS HUD Processor
F.4.252.1-2.(T)	92938B	32	BFS HUD Processor
F.4.260	92938B	32	BFS HUD Processor
F.4.260-5(T)	92938B	32	BFS HUD Processor
F.4.260-7.(T)	92938B	32	BFS HUD Processor
	93090E	33	Bearing Displays

<b>Table R.1-3. CR Reference Summary - Volume 3</b>			
<b>Paragraph</b>	<b>CR</b>	<b>OI</b>	<b>Title</b>
F.4.260–8.(T)	92938B	32	BFS HUD Processor
F.4.260.1	92938B	32	BFS HUD Processor
	93041	32	Correction to SCR 92938 BFS HUD
	93110	33	BFS HUD Documentation Clean-up
	93156A	33	OI-33 FSSR-20 Clean-Up
F.4.260.1–1.(T)	92938B	32	BFS HUD Processor
	93110	33	BFS HUD Documentation Clean-up
F.4.260.1–2.(T)	92938B	32	BFS HUD Processor
	93110	33	BFS HUD Documentation Clean-up
F.4.260.2	92938B	32	BFS HUD Processor
	93110	33	BFS HUD Documentation Clean-up
F.4.260.3	92938B	32	BFS HUD Processor
	93110	33	BFS HUD Documentation Clean-up

## R.2 HISTORICAL CHANGE REQUEST SUMMARY

The following tabulation, Table R.2-1., is an historical record of approved change requests incorporated since the initial baseline up to OI–25. Change requests commencing with OI–26 are reformatted and listed in the CR Reference Summary.

<b>Table R.2-1. Historical Change Request Summary</b>		
<b>CR No.</b>	<b>OI</b>	<b>CR Title</b>
1990		FSSR Update No. 5
2267B		Addition of TM Block Update
2293B		IPL STL Changes
2386A		RM CONT/SW FB Spec Functions Update
2390A		OFT SYS SUM Displays Update
2417B		Rev of Entry Displays
2454A		Changes to SM Section of D&C FSSR
2477A		Update MS/ID's to SYS Parameters
2510		Energy Tape Scale – Vertical Situation Displays
2546		Update TIME Management
2549B		Addition of Payload Data Interleaver Software Requirements to SM

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
2566B		Add Rendezvous Controls
2578		Miscellaneous SM Changes
2582		SRB/ET SEP Auto Inhibit Note: 2582 was withdrawn as an applicable CR to PFS due to 12658; this CR, however applies to BFS displays.
2592		Update OFT CKPT/DATA Handling Req'mts
12001		Addition of Pitch Attitude Tape Scale To Vertical Situation Displays 1 and 2
12015C		Entry and Ascent System Summary Display Changes
12020B		GRTLS DAP Lash-up
12050B		COMM/RCDR & Antenna Display
12054B		Horiz Sit Display Changes
12061A		Updates to Level A and Level C TIME Display Operation
12071A		Mnv Execute Display Changes
12079		Level C GAX – Display: Split, Update and Cleanup
12080A		“GND” IMU CNTL/MON Operate Control
12096		Updates to LEVEL A and LEVEL C GPC READ/WRITE
12109		On-Orbit #1 I/O Update
12112		GAX–Annunciation Rewrite
12121		Manipulator Controllers Interface Unit (MCIU) Changes
12124A		RM/Switches Feedback Display
12125A		RM Controllers
12127		Editorial Corrections to LVL C D&C FSSR
12131A		Deselect IMU CAL When Comm Fault Causes Removal From Read Chain
12148		MSBLS SOP Changes
12153A		P/L Bay Door
12177B		Dedicated Display Rate Reductions
12186A		Star Track/COAS Control Display
12187A		Addition of S–Band Site
12197A		Orbit Sensor Self Test Item Entry Designations
12201		AOA OMS–2 Data Transfer to OPS–3
12203		Miscellaneous SM changes
12204		Delete All Option
12210A		Several RM Changes
12212A		Vertical Situation Display Update
12214A		Star Tracker SOP Interface Table Update

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
12229		Add S/W Capability in Deorbit
12236A		PRPLT THERM Update
12254		SM Electric Display
12255		SM CRYO/Fuel Cell
12263A		SM APU/HYD Display
12264A		MPS ET Ullage Pressures
12266A		TACAN SOP and RM
12268		SM SYS SUMM DISP
12269		MSID Corrections to IDD Tables
12277C		Programmed Test Input Module
12299		Preflight RCS/RGA/ADTA Self Test Display Changes
12300		Manual Controls Display
12301		TCS Control Display Changes
12302		GTS Display
12303		Pre Flight Sensor
12304A		GPC/BTU Interface Display Change
12328A		Event Light Modification
12332		ADI Scale Changes
12333		Star Table Clear Command
12353B		Entry Displays Simulation Update
12355A		RCS Activity Lights (Roll & Pitch)
12360A		Changes to GN&C Systems Summary Displays
12361A		Vertical Situation 1 and 2 Display Change
12369D		RCS RM
12377		BTU Cycle BITE Req't
12379		SM Display Changes
12382		TIME Management Corrections
12389		RCS Display Changes
12390A		RM Sensor Sel
12398		BUS/BTU Display Blanking
12409		ADT Error Message Change
12411B		OMS Engine FDI Simplification
12412A		Update to Level C Systems Management Environment Display and APU/ENVIRON THERM Display
12415A		Default RM for Single Contact Switches



Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
12416A		ADTA SOP & ADTA RM
12427B		Addition of RMS CRT Messages
12429		Correction to CR 12177B
12431		GN&C OPS 8 Interface Requirements
12432A		Modifications to the Area Nav Principal Function per Crew Assessment Working Group
12440A		DPS, GPC Read/Write and BUS/BTU Status Display Changes
12441A		Vert Sit DIP
12444A		Level C CRT Message Change
12446A		MISC SM LVL Changes
12499E		Manual Landing SOP
12501A		Addition of Level C System Management "ENVIRONMENT" Display (S5.2.3)
12517		Horiz Sit Display Changes
12526		Signal Interface Definition Change in Appendix B of D&C FSSR
12527B		System Software CRT Message Update
12528A		System Software Displays Update
12531		I/O Table Corrections to VU Displays
12532A		RM/Controller Display Update
12533A		RM Orbit Display Update
12546		Systems Management CRT Message Update
12547A		Update System Software MSID's for Downlist
12550		Deletion of SM Check Point Area Initial Value Requirements
12561A		GAX & SYS SUMM Display Scrub
12569		SM Electric Display – Deletion of 4 Payload Current
12586		Integ Sig Interface for 6.35, 6.46 & DIPS
12589A		Dedicated Display Requirement for Ascent, RTLS (MM 601)
12591A		RMS Display Initialization
12595		Add One-Shot Xfer & GSE Poll Enable Controls to GTS Spec
12606		IMU RM Mode Team FSSR Redline
12617B		Expansion of MM Patch Capability
12620		SM System Summary Display Update
12623		FCS Dedicated Display Changes for STS-2
12625B		OMS Gimble Actuator
12629		Delete Main Memory Dump Via DL in MC 1
12635B		Adaptive PRL

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
12636B		FO/FS Hydraulic SOP
12638		Update of RMS Display
12641		Modify ADT Checkout of the Body Flap Pilot Valves
12643		Add GPC Fail Vote Matrix
12645B		ATT PROC, ADI and HSI Mods for Ascent Powered Flight
12651		TIME Management Spec Scrub Items
12653		Updates to Level C System Management Hydraulic Thermal Display
12657		Horiz Sit Display Changes
12658B		Ascent Displays Update
12659B		RM Switches and Switches Display Changes
12671		RMS Coordinate System Changes
12678		ADI Attitude Freeze Change
12685		ADTA SOP Clean-up
12686		Y Coord Sign Chg
12692		Entry Displays Update – Phugoid
12705		ADI Roll Error Needle E/L
12714		ADTA Probe Deploy Correction
12716A		MNVR EXEC Display Reformat
12718C		GN&C Switch RM Modifications
12722		Manual Open Vent Doors During Entry and Pulse Commands
12723A		SSW Error Annunciation Cleanup
12729		Misc. SM Level B and C Changes
12731		SM Display Update
12737B		Addition of Controls to Override the Automatic Shut-Off of KU-Band Antenna Servo Motors & Other Documentations Changes
12742		Hydraulic Switching Valve Change
12745		Deletion of OMS/OMS Interconnect Software
12770A		BF CMD RM
12798		GRTLS Flight Control Down Moding
12807A		VU I/O Table Updates
12809A		Mod of UNIV PTG (6.27) to be the MM201 Display
12810		DAP Config Display Chg (OFT 3)
12811		Orbit Target Display
12812A		Relative Navigation Display
12814		SM Display Updates (APU/HYD)(OFT1 & SUBS)

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
12825B		Delete Occult Test fm ST SOP & Update Star Track/COAS
12826A		Vent Door Control Update
12842		Reestablish TV Roll Mnv Exec Display
12848H		Optional TAEM Targeting
12850		Angle of Attack Modulation in Entry Guidance
12853		Computation of Commanded Alpha Symbol Position
12865		Ascent Displays Update to Basic Provide Delta Range Computation`
12885		System Software Changes
12895A		Range to Landing Site–Task in MM303
12900		RCS Display Revisions
12909		Documentation Changes to Correct Miscellaneous Errors in CR 12737B
12920B		GRTLS DAP Lash–up
12921		EXEC Flash on MNVR Display Update
12922		Revise SPI OFF Flag
12930		Rel Nav. Display Intl Req
12947		GNC SYS SUM 2 Display Processing Signal Source Corrections
12948		Add of Auto Mnv Cap. To TRANS DAP
12958		VU Level B/C Requirements Merge
12964		SM APU/HYD Display Update (OFT1 & SUBS)
12968		Fault Annunciation and CRT Message Cleanup
12969A		Orbit Targeting Display
12971E		Orbit Targeting (PROX OPS)
12974		Time–Tag Adjust to Correct Nav Error
12978		SM SYS SUMM 1 Display Update
12981D		On–Orbit Flight Control
12985A		Crew Override of Abort Select Switch Failure
12987A		Entry Roll Mode Control Switch Processing Mods
12996		Star Track/COAS Disp
19001		Antenna Management Cleanup
19006A		Rst Shtr Ovrld Cmd Astrsk in Star Trk Sif–Tst
19011A		Communication Displays Miscellaneous Corrections & Parameter additions to reduce display ambiguity for NSP parameters
19023A		SM System Summary 2 CRT Display Processing BFS Supplement (STS–1 and Subsequent)
19025A		Uplink Data Control

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
19031C		Correction of Interface Discrepancies
19035		Update ILLEGAL ENTRY CRT MSG Output Sources for GN&C Displays
19039C		Ascent/Entry Structural PTI's
19046		Vert. Sit. Display Processor I-load Value Update
19058A		HORIZ SIT Display Changes
19062B		Dedicated Display Dynamic Drive Test
19068A		Main Engine Shutdown Switch RM
19070		Correction to Entry Displays Altitude Rate Reference
19072		Comm Fault Add to OMS TVS FBSOP
19074A		Orbit DAP Config Display Item Entry Limit Update For STS-2
19080		P/L Bay Doors. Use of Starboard/Port Designations
19082B		Horizontal Situation Display Changes (Cycle 1)
19085		Addition of Comm Fault Logic to HYD SOP Uplock Processing
19089		Delete Multiple MSID's from I-load Data Base
19093A		CRT Message Annunciation During Hydraulic Thermal Conditioning
19094B		Display and Control I-Load Update (Cycle 1)
19099A		Comm/RCDR Display GCIL Control Clarification
19100		FSSR Update
19104B		Cycle 2 Display I-Loads
19106		Enable AMI Acceleration during landing/rollout
19115A		PRPLT Thermal Revision for OMS TCS Changes
19118A		Add Freeze Dry Capability
19119B		BFS Memory Dump Controls
19130A		MNVR EXEC Make Work Changes
19131B		Univ Pointing Display Cleanup
19132A		IMU Level C Requirements Do Not Agree with Level B
19133		Changes on Ascent Trajectory Display Interface Processor and its I-Load
19142A		Backup to MECO Confirmed
19152		SM Table Maintenance Cleanup
19153A		XXXXX TRAJ MECO CUE (I-Load only)
19154A		Add BFS Memory Display and Change GPC Memory Display
19161A		Estimated Beta
19163A		R/S Launch Seq Cleanup
19164A		I-Load Value Updates for Cyc 2 S/W Build
19167B		REL NAV Display Interface Corrections

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
19181		Addition of Crew Alert for CCTV–Cameras Out Of Temperature Condition
19185A		XXXXXX TRAJ Display Additions
19187B		Delete Keyboard Lockout in OPS 1,2,3
19188		I–Load MSID Reassignment
19189A		Cycle 2 Display I–Loads
19191A		Add AA and RGA Parameters to OPS 8 Downlist
19194A		TM Error Processing
19216A		Programmed Test Input (PTI) Module PF 4.248 Auto Index Advance
19222		ET SEP SW Default and Override Processing
19226A		BFS Thermal FDA Requirements
19227B		Addition of FC Trim Data to Entry Traj 1–5 and Vert Sit 1 and 2
19228A		Vert. Sit. DIP Corrections
19233A		IMU Deselection in the BFS
19242		HORIZ SIT Display Changes
19246B		Correction to Runway Name MSID’s & Associated CRT Display Chgs
19250		IMU Data Blanked for COMM Fault
19252A		GNC Display Functional Requirements
19254		Sep FSP Clear and Error Log Reset Functions
19255A		GPC Reconfiguration Restrictions
19256A		TAEM HAC Selection (E–41 TAEM LEFT Hand Turn)
19263B		RMS MT6 CR1
19264B		PDRS Control Display: PL and RMS Latch Monitor Capability
19275A		Horizontal Situation Display Initialization
19293		Changes on RTLS TRAJ 2 Display Format Initial Issue of DIP Text and I–Load Data (BFS) (Cycle 2)
19297A		BFS Ascent Traj 1 Display Cycle 2 Update and EAS Scale Change
19298A		BFS Ascent Traj 2 I–Load Update (Cycle 2)
19300		FSSR Update No. 2
19301		ASC Display Format I–Load
19319C		Add APU Valve Positions to FDA (STS–2)
19336A		Conflicting Level B IMU REQ’TS Did Not Get On CR List
19344		Star Tracker Display Data Update Rate
19347A		Zero STRK REQ’D ID at Off Set Mode Completion
19349		Update to Display Cycle 2 I–Loads
19350		Creation of BFS Unique I–Loads for VERT SIT DIP and HORIZ SIT DIP

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
19353B		OMS FDA Limit Change
19359A		Entry Display I-Load Changes
19361A		Rewrite of the Nov. 1977 Navigation Level C FSSR (IDD Only)
19376A		Correct Conflict in Principal Function Identification Number
19378		CRT Message Associated with CR 19255A
19381A		Level B Change to RM Sensor Select (6.47)
19382A		Illegal Entries on RM Sensor Select Display
19398		Shutter Manual Open Commands for -Y and -Z Star Trackers
19402		GN&C SYS SUM 1 Display Change
19417		Make RCS Jet Off Failures Available to GAX in OPS 1
19421B		Vert Situation Display Changes as a Result of GRTLS Guidance Changes (STS-1)
19422A		Requirement Clarification to XXXXXX TRAJ and RTLS TRAJ 2 DIPs (STS-1)
19433A		Initialization Requirements for GPC Memory and BFS Memory Displays
19435A		FCS Dedicated Display C/O
19438A		XXXXXX Traj DIP Change
19445A		Capability to Change IMU Acceleration Navigation Threshold Level in On Orbit Operations (Post STS-1)
19448		ADI Error Needles During Ascent
19454		4.150 Entry DIP Update Phugoid
19471B		Orbit Targeting Cleanup (STS-2)
19472A		Addition of IMU Navigation Threshold Test in the On-Orbit User Parameter Processor (Post STS-1)
19478		Entry TRAJ I-Load Correction (STS-1)
19479A		ASC TRAJ and ASC TRAJ DIP and RTLS TRAJ 2 I-Load corrections (STS-1)
19484A		I-Load Data Tape Corrections From Community Review
19489A		Update OMS Engine Valve POSN Conversion in GAX
19491A		Universal Pointing Documentation Cleanup (STS-2)
19494		Update to Cycle 2 Ascent Display I-Loads
19500		FSSR Update No. 3
19502		Mass Memory Element Location Redundancy Support
19503		RA Parking Value
19518		RMS Fault Messages
19527A		Consistency Check Inhibit
19538		Fault Summary GPC Field Change
19539A		Reinstate GAX Support Interface Table into the D&C FSSR

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
19543A		ET SEP INH CRT Message BFS
19550		Doc Change to Refl. 19220A
19552		Cycle Update of Vehicle WT & PRPLT on MNVR Exec Disp. (STS-2)
19553C		Crew Override of OMS Targets Via Item Entry (STS-2)
19556A		I-load Correction for Version 2-3
19571A		OPS-2 State Vector Propagation Scrub
19575		Correct Runway Name Parameters for UNIV PTG Display (STS-2)
19582		BFS Usage of GAX I-Loads
19586A		CR 12369D Cleanup – RCS RM
19587A		Alert On High Helium Regulator Pressure (BFS)
19593		Horiz Sit Display Changes
19627B		CRT Message Annunciation After Weight on Main Wheels (STS-2 & Subs)
19630A		Orbit DAP Config Display Inertia Item Entry Limits U/D
19641		VERT SIT DIP I-Load Corrections
19647A		SM Table Maint Display
19650D		TACAN Deselection in BFS
19655A		Predictor Cycle Overrun CR
19683A		MPS Fault Annunciation/CRT Messages
19684A		GN&C System Summary 1 Display
19685		HORIZ SIT. Display Doc Update
19688A		PCMMU/PL Comm Display: Incorporation of PSP & PDI Functions (STS-2)
19692B		Vert. Sit. Display Changes
19695A		BFS Ascent Traj 2 DIP I-Loads
19698A		RCS Quantity Monitor
19669A		I-Loads for RCS SPEC
19700		FSSR Update No. 4
19733B		Initial Release of BFS CRT Msgs
19741		Backup I-Load Data Base Cleanup
19747		Event Light I-Load Correction
19750D		PDRS Status Display: Documentation Cleanup
19751		SM Table Maint Display Corrections Double Precision Update
19752A		Documentation of the BFS GN&C SYS SUMM 1 and 2 GAX Interface Requirements
19782A		Phugoid Bank Symbol Update Change to Entry Trajectory 1-5 Displays (STS-1 & Sub)
19783A		RMS MSID Assignments – CR Incorporation

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
19785B		REL NAV Spec and Disp Requirements and Interface Corr (STS-2)
19787		Measurement Number Change for CCTV-Camera Overtemp
19793		Payloads Annunciation
19801		Update Antenna Management Display STDN SITE 15 (NFS)
19806		Modification of PTI Feedback
19807		ADI Error Needle Scale Changes
19831A		Optional TAEM Targeting I-Loads
19833B		Payload Bay Doors Disp Changes
19834A		MDM Return Word Check
19839B		Simultaneous Star Tracking and Target Tracking For STS-2
19840A		Updates to Computer Annunciation Matrix Logic
19845A		TACAN Commfault Addition
19860A		Switches Display Changes (STS-2)
19872A		TVR-Roll I-Load and Form Chngs (STS-2)
19874A		Universal Pointing Changes (STS-2)
19881B		Add Roll Ref Status Msg to BFS
19885A		General Clean-up of SSW Level A#2
19886		Change D&C FSSR to Reflect Codes Which Provided Continuous Memory Dump Status for the BFS Memory Display
19887		Change D&C FSSR to Reflect BFS Codes Which Displayed "BFS" as Double Overbright
19895A		HORIZ SIT Update Display Changes
19898		Entry Trajectory Display Documentation Change (STS-1)
19900		FSSR Update No. 5
19901B		Vert. Sit. I-Load Changes (STS-1)
19912		Corrections to CR 19783 (MSID Duplications)
19916D		Limit Sense OMS FU INJ TEMP During OMS Burns
19930C		TM Changes For Antenna Mgt.
19934C		Resched of the HYD SOP
19936		Correction to CR 19684A
19942A		OMS TK Press I-Load Change
19943C		MPS HE REG Pressures Display and Annunciation Changes
19963D		IMU Alignment Display Changes (STS-2 & SUBS)
19975B		New Position Encoder Check-2
19999B		APU Injector/Pump Cooling



Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
29003A		Alpha – Mach Ind Rate Change
29004B		AMI Dedicated Display Changes
29008		Correction of Body Flap Position Conversion Processing Basic
29009B		AMI Dedicated Display Changes (STS–2)
29017A		(GN&C Orbit D/C) Universal Pointing Downlist Parameters (STS–2) (IDD only)
29024B		Vernier to Primary Default Capability
29031A		System Software Clean–up
29038		Conversion of EAS From Ft/Sec to Knots
29046B		FCS Switch Nomenclature Change in Compliance with MCR 5949
29062		MPS REG P & ET ULL P I–Load Chgs
29063		MPS ET Ullage Pressures Display and Annunciation Changes
29068		Config. of BFS (I–Loads) and GRTLS Cleanup
29073		MET Reset Control
29078A		GSE Port Failure Annunciation and Display Indicator Change
29080		Doc. Cleanup on the BFS Override Display
29100A		APU Cooling: Thermal Display (BFS, STS–2)
29114		Delete CR 19448
29130D		Deletion of KB Lockout of MM Trans While an OMS Burn is Enabled or in Prog
29131B		Modification of CR19553C Crew Override of OMS Targets via Item Entry to Reduce No. of Targets Sets
29139A		D&C FSSR Documentation Correction
29143A		Incorrect Default on IMU Align Display
29144		Doc. Corr. on VERT SIT 1 & 2 Displays
29151A		Defaults for User Errors
29153A		Mod to CR 19916D
29157		VU Documentation Cleanup (STS–1)
29158A		Ascent Trajectory DIP I–Load Update
29164C		BFS I–Load Cleanup
29165A		BFS GAX I–Load Update
29169		IMU Message Simplification
29176B		Cycle 3 I–Loads for Entry
29177A		Cycle 3 I–Loads for PRI Ascent Display
29178		Cycle 3 I–Loads for BFS Ascent Traj 1 & 2
29179A		Cycle 3 I–Loads for BFS RTLS Traj 2
29181A		GNC SYS SUMM 2 I–Load Data Eqns

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
29188C		Time Sync of On-Orbit Nav Input & Output Parameters (Post STS-1)
29190		Entry ADI Error Needle Correction (STS-1)
29191		Activation of RDS JET ACT, Lights During OPS 2, 3 and MM301-303
29194		Override Display Requirements Correction
29196		Doc. Correction On GNC SYS SUMM 1
29208A		OMS Both Engine Selection on the MANEUVER Display
29223A		OMS Altr RM Fail Counter
29230		Units Conversion for Phugoid Equations
29231		Event Light Proc. Reqt's Update
29238B		PFS Payload Status Display and PDRS Control Display Changes (STS-3)
29239E		GPC Redundancy Logic Checkout
29252B		Blanking TACAN Data and Status Symbols on HSD
29268		PDRS Control Display RMS Latch Parameter Update (PFS - STS2)
29273F		Hand Cont Crit 1 Fail
29274		Correction to RMS OP Function
29289		Modify CR19647A-TM Double Precision
29291B		ECP Error Code for TCS Display
29300A		FSSR Update No. 6
29306A		No Noise Filtering for IMU Bits/T Messages
29321D		HORIZ SIT DISP Reformat
29326B		Delete MTU Bite "STAT" Ind
29332		I-Load Changes Resulting from BFS Audit
29335		Resolve ADI Roll Error Scaling Requirement Discrepancy
29345G		Ground IMU CNTL/Monitor Display & IMU Checkpoint MM Area Format
29358B		RCS Tank Pres I-Loads
29359		Clarification of SPTI Act Criteria
29364		Page Number Requirements Definition of Payload CRT Displays for "STS Operations Software."
29373A		Change CRT Message Minor Field ID from Decimal to Hexadecimal Number System
29378A		OMS Valve Miscompare Message Cleanup
29381B		Add ET SEP UMB DRS & Abort Controls
29383		Limit Sense OMS FU INJ Temp
29387A		Update SPI Speedbrake Display Requirement
29399C		Streamline Vert. Sit. DIP
29407C		MNVR EXEC DISP PFS 18/BFS 12

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
29409		VU Requirements Update
29426A		REL NAV Update
29430		VU Doc Change (STS-1)
29444C		Entry Controls Display
29445		Launch Date (I-Loads)
29468A		D&C Cleanup to COAS Angles
29471B		HFE Overrun Definition
29476C		OMS Actuator Lock-up Fix
29477A		Remove Req'm't to Disp "LOAD"
29490C		RCS Vernier Leak Detection
29491B		COMM/RCDR Disp Logic Corrections
29493		"Fly-To" Delta H-DOT Display
29495		RMS Auto Seq. Update Rate
29499		Predictor Algorithms - RTLS
29500		FSSR Update No. 7
29520F		KU-Band Comm/Radar Control Interface, Channel 1 (PL MDM)
29531B		Spacelab Computer Memory Dump
29536B		XFER Data Tests
29569		MPS LH2 MANF P LO Limit
29571A		MPS Data - GNC SYS SUMM 1
29573A		ET ULL P Limit Sense
29577B		Req Clarification - ST SOP Disp
29580B		BFS NAV Usage of Guid. I/L
29596B		BFS Power Transient Annun
29614		Univ. Ptg Earth Relative TGT (OI-5)
29615C		ATT MNVR Inputs
29631C		Support TFL & DFL in GN&C OPS 9
29648B		RMS TM Spec Deletions
29660		Curr. Veh. Mass Update (IDD only)
29670		GNC SYS SUMM 1 Doc Cleanup
29671B		AMI and AVVI Proc. Changes
29672A		Rescale HSI $\beta$ Display
29682C		PL Checkout Support-S 9 and GNC 9
29685A		Redef of Entry Guidance I/L
29688C		Entry Controls Cleanup

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
29689C		Horiz Sit Disp/Spec – OTT
29692B		A/E & ORB ATT PROC Cold Start
29699A		D&C Usage of Guid. (I-Load)
29709F		PCMMU TFL Load and Status
29713A		Update Remote Text Table
29716		Cabin dP/dT Computation
29721B		Char. String – Asc. Traj.
29728A		Data Corr on Univ Point Disp
29730C		Delta AZ Digital Disp
29738B		SM OPS Dependent I/O
29739		RMS Softstop Update Rate–R18
29744A		D&C Asc. Disp. (Cycle 3 I/L)
29745A		D&C Ent. Disp. (Cycle 3 I/L)
29759E		Auto Braking for Consistency Check
29766		HSD Sign Change
29768B		AMI, AVVI Initialization Change (OI–3)
29774B		Horiz Sit Spec – Use Guid XHAC
29779		PCS Requirements Update
29781A		HSD DISP/SPEC Doc. Corrections
29782		RTLS TRAJ 2 ALPHA Indicator
29785		Alert Tone Duration Change
29800B		FSSR Update No. 8
29802		Delete Load Status for PDI
29806B		I-Load Changes – D&C
29821A		YAW Error Correction for Entry/RTLS
29830		BFS Memory Documentation Cleanup
29831A		RCS Non–failed Jet Reset
29852C		Clarify KYBD Functions – D&C
29863D		Add 4 Flash Evap Temp Meas
29865E		Univ. Ptg Display Update (OI–5)
29875A		HORIZ SIT Entry/Graphics Output
29876B		IPL & BFS SYS Loader CRT MSG
29882A		MPS HE REG Press Document Update
29886C		MNVR EXEC DISP/PIPS Update (OI–6)
29888C		New VU Requirements Sync (Partial)

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
29907		RCS Quantity Monitor Display
29910A		Delete CR19762A – IPL FMT 50
29925A		ORB IMU Align Protection (OI-4)
29926C		ORB DAP Vernier Downmode
29943A		CRT Time-to-go to SRB IGN (Supersedes CR 29421B)
29945		HYD SYS Boiler/Vent Temp Disp
29948		ST/COAS Display Changes (STS-7)
29958		GMBL CK Illegal Pre-Engage
29998A		IMU Alignment in OPS 3 (OI-5)
29999A		Optional TAEM Targeting Rewrite
39000		FSSR Update No. 9
39018A		Mass Mem. Display Doc Update
39038B		PDI Decom Sync Status Support
39039B		PSP REJ/Incomplete Cmd Status
39050		On-Orb Nav Rel 18/19 REQ's (B/L) RD1523
39051		On-Orbit Guidance Rel 18/Rel 19 Baseline
39052		Star Tracker Rel 18/Rel 19 Baseline (IDD only)
39059B		SM/PL I/O Error Processing
39061A		Display Change Cabin dP/dT STS-2
39072		User Feedback Ind/GPC Memory Dump
39073B		Vert Sit DIP Changes-TAEM
39087A		Head Up Display (HUD)
39088		GNC SYS SUMM I/L SF CORR
39089		I-Load SF Correction for V96U9050C
39095A		HSD Scale Factor Change
39116B		Non-Prime OPS 0 D/L Enable
39132C		Create Secondary Throttle Set
39137D		SSME Fail Messages
39143B		RMS STS OPS Update for OFT
39144A		Payload Annunciation
39147		GPCIPL D&C FSSR Update
39155D		RCS Jet Priority Control
39159		IMU Selection/Deselection in BFS
39162A		PCMMU/PL COMM in S9 & G9
39164B		OTT OPS 6 CRT MSG

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
39177B		SSME Secondary Throttle Set
39187B		Elevon Test Limit Selection
39200B		VU Support for RJD Toggler CMD
39202A		BFS RCS Manifold Status
39206B		Increase PP02 Display Fields
39227		D&C ASC DISP Cycle 3.3.3 I/L
39250B		Flight Control for IUS P/L
39257A		STS-2 Cycle 1 D&C ENT I-Loads
39263E		Delete Cont. Abort Spec
39264E		HUD Autoland Monitor Format
39266A		SM OPS 9 Deletion
39270B		VU Requirements/Design Sync
39285C		Star Tracker Doc Update
39289A		Clarify HSI Requirement
39307C		OTT Changes-RTLS UPP and HSD
39339B		STS-2 Cycle 1 D&C ASC I-Loads
39350		FSSR Update No. 6
39365F		HUD PROC I/O Cleanup
39395		Correct HM-SF Derived Equation
39400		FSSR Update No. 10
39401A		Trans-Atlantic Abort Landing
39412F		RCS Activity Light Processing
39416C		ADTA Failure Status Message
39421A		PASS/BFS MEM DISP Errors
39450B		CR Implement B/L May/81
39451		OMS ULL Press C&W Limit
39464F		Star Catalog Increase (OI-4)
39467A		DR Closeout-Doc Cleanup
39484		VERT SIT DIP ES C12 I/L
39487E		Spacelab Error Processing
39494B		S-Band Switch Beam Antenna
39499		CR 39073 Correction
39509B		ADI Errors MM 202
39510B		OTT Energy Symbol Display
39511B		HSD Changes-OTT

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
39518A		PSP Command Reject Annunciate
39520		Delete HE VLV CK-OMS Fire Seq
39524B		PMW and PLBUS Bypass and Commfault
39527		KU-Band Obscuration Contour
39544A		CRT Timer Documentation
39549B		STS-5/STS-6 OFI B/L
39551A		Elevon Sat Light Processing
39558E		Improved ASC Guid Onboard Cues
39562A		CR39200B Corr "VU TOG CMD"
39566A		PPCO2 Display & FDA
39580		SM source for PL Fault MSGS
39582B		Memory Purge (GPCIPL)
39603		STS-3 Cycle 2 ASC & ENT DISP
39609A		Vel & Accel Drag - HUD DISP
39611A		UNIV PTG CUR and FUT indicators
39625		Add Cryo Tank Set 4
39631		PI-Data PCMMU/PL COMM In G9
39634		VERT SIT SPBK CMD TAEM End
39639		HUD_Gamma_ref 2 Initialize
39640		FSSR Update No. 11
39641A		STS-3 Cycle 2 I-Load Update-D&C
39642E		FWD RCS MANF Pressure Display
39646		ASC Traj 2 Inert Veloc. Indicator
39648B		PL Bay Door Out-of-Seq Safe
39649A		Heads Up Display Formats (STS-6)
39650		FSSR Update No. 11
39669		HUD_X_Zero only in MM 305 & 603
39670C		Bypass PDI Switch Matrix Read
39675B		VU Documentation Cleanup R18
39680A		BFS TFL/IMU Landing
39692		Illegal Entry Minor Field
39696B		Limit TAL Delta V to Disp Fmt
39700D		ENT/GRTLS FCS Gain & Aero Mode (STS-7)
39707B		Univ PTG Termination Cues
39708B		NAV Update CMD Reset (Not used)

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
39717		DPS Utility Display Cleanup
39723A		ADI Error Needles During RTLS
39740		Orbit DAP Config Display Inertia (OI-4)
39746C		STS-4 Cycle 1 ASC/ENT D&C D/L
39755		Display of ECP Errors
39766G		Rendezvous State Vector Mgmt
39770		STS-4 D&C I-Load Change
39773I		Delete FCS Downmoding (STS-6)
39776		Correct I/L Value for "BLANK"
39789A		Low Range Fan Delta Pressure
39791		MPS LH2 MANIF Press Low Limit
39797B		Add OMS AFT Qty/Status Disp
39815A		Automated PTI
39818		Change HSD RTURN name
39824A		Chg. to Amt. Mgmt. Site Table
39825B		APU ISO VLV FDA
39828		Delete Star Tracker Bite MSG
39832D		Orbit Targeting Update
39861A		Change HSD Initialization
39866D		System SW Sumword Logic (OI-5)
39879B		STS-5 Micro Mod SM Baseline.
39880		STS-5 Payload
39884A		Horiz Sit Negative TACAN ID
39896D		Add PCMMU TLM & PDI Uplink
39910C		Inhibit FCS Sat Msg.
39917D		On-Orbit CG Offset Correction (OI-3)
39936		SM Checkpoint Status Display
39945		ADT/SEC ACT Test Interaction (OI-3)
39946A		AA Downlist Scaling
39950		FSSR Update No. 12
39985		SM2 Checkout Status/CRT MSG
39987A		Requirement MODS to CR 39766G
39988F		STS-5 Cycle 3 Desc/Ent I-Loads
39992		Inboard Elevon Posn in GAX
39993C		DISP/MSG Update - APU FU TK VLV



Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
39994A		Parameter for PMU I/O Reset
59007A		Delete RCS LSD FU Temp
59008A		Add RCS LSD FU Temp
59010		Univ. Ptg Upgrade (OI-6)
59033A		AIL/RUD Blank ET & VS Disp
59046A		HUD Clean-up
59050		FSSR Update No. 13
59061B		STS-5 Cycle 3 ASC/ENT D&C I-Loads
59076		OMS VLV POSN I-Load SF Corr
59085A		STS-4 CY5 D&C I-Load Update
59104A		PMU Bypass Feedback
59111A		Correct STS-5 Cycle 3 I/L
59117C		ASC Guid Onboard Cues
59126H		RCS XFeed MCA Optimization
59134A		HUD REQTS DOC Cleanup
59135		SPI Processing Speedbrake CMD
59137B		STS-6 CY2 ASC/ENT D&C I-Loads
59141		Update RMS CRT Message Reqmt's (STS-11)
59158		Current Spec 112 Item Entry
59164B		HUD Velocity Vector Cage
59173		BSL MSG Correction
59178C		Speedbrake Annunciation (PFS 21)
59188C		Doc Cleanup - CR39510B
59190		ADI Error Source in MM 202
59197C		IMU Test Site Text I-Loads (OI-5)
59202		Payload Retention CRT Display
59203B		MM Purge Option Display
59207B		HUD ALT Monitor Make Work
59208A		FDA Inhibit for Discretes
59225B		Delete RCS Valve Miscomp Msg
59228		Change X NEP I-Load for Traceability
59232A		Blank OTT Energy Symbol
59235		Cage HUD VEL Vector_ADI PBI
59239		OVAD/STAT & TOGHAC in MM 101
59250A		STS-5 & Subs SM Update-PI Cal/Site 9 EN

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
59251		S/B MACH Low Limit I/L
59255B		Delete RCS Valve Miscomp MSG
59257		ALT Elevon Sched CMD INIT
59265		STS-5 Cycle 5 D&C I-Load Update
59272		Vert Sit DIP I-Loads Update
59273C		ABT CNTL SEQ-Select Interconnect
59277A		STS-6 I-Load Update for PRTLs
59313		I/L Update to D&C STS-5 CY 5
59314C		OTT Corrections
59324A		HUD A/L Monitor Cleanup
59328A		Correct HSD I-Loads - Heavy Veh
59346C		TPF Ghost Alarm Clean-up (STS-12)
59348A		STS-7 CY1 ASC/ENT D&C I-Loads
59350		FSSR Update No. 6
59352		Correct MSID CR 39832/ORB TGT
59363		Select FCS Filter &/or Trim
59364A		RMS Auto Brake Circuit Check (OI-6)
59380A		Orbit Targeting Cleanup
59382		GPCIPL FAIL/ADVISORY MSG
59390		HVY VEH I-Loads Update STS-6
59393F		HUD Guid Gains & VV I-Loads
59403		Sensor Self-Test Clarification
59405A		Correction of CR 29926C
59426F		Landing Site Table Mod
59429A		BFS/IPL Compatibility
59430A		HUD Range/Units Change (IDD Only)
59437		BFS Payload Enhancement Baseline
59450		FSSR Update No. 7
59462E		BFS/PASS RTLS Turnaround
59468E		ORB TGT Alarms
59472C		CRYO Tank Set #5 DIS & FDA
59473A		Three Substack Fuel Cells
59477		Scaling Error in CR59235
59479		Correct CR 59178C - SB Annun (PFS 21)
59486		Fan Delta Press - OV102

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
59487A		APU Fuel Drain Temp –OV102 (STS–9)
59495A		Correction of CR59346C (STS–12)
59507		APU 3 Fuel Drain Temp –OV102 (STS–9)
59509		HUD Autoland VU Table Change
59527		Supplement – CR 29774B
59532B		Payload Bay Door Seq to SM 4 (REL. 21)
59540B		Speedbrake Alarm Inh. (I–Load Only)
59544B		Correct CR 59472C – CRYO Set 5
59557A		Add Identifier – MMU CRT MSG (OI–5)
59579B		FCP End Cell Htr Monitor
59584E		BTU Test/IMU Interference (OI–5) (IDD only)
59624A		Correct CR 59426F – Land Site
59625A		APU Fuel Line Temp Pri FDA (STS–11)
59628B		APU Fuel Test Line Temp
59639		FCS Channel Status Processor
59670A		APU Line Temp – Redundant
59671C		APU Line Temp FDA–OV102
59676B		Ascent/Entry D&C I–Loads, STS–9 Cy 1
59679B		Add LDB ENA/DIS – DPS UTIL SPEC
59680C		Add BTU Test For CMD & SRB (OI–5)
59693C		Manned Maneuvering Unit
59703		APU Fuel Drain Temp MSID
59708B		Advanced Autopilot – Update 1
59713C		FC End Cell HTR Display
59744D		GN&C SW Output Clarification
59747		OV–102 Fan Delta Pressure Revisited
59750		FSSR Update No. 8 (Rel 19), No. 2 (Rel 20)
59757A		CRYO Config. – 4 Tank Set
59765		Latch RCS Qty Down Arrow
59785		HUD Doc Clean–up
59811C		BFS D&C K–Loads
59819		HUD PROC Use Of Integer Funct
59827		ET ULL P Limit Sense – OPS 6
59831		OMS FDA MSID Correction
59833		OMS TEMP Delete–OV–099

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
59839A		STS-8 Cycle 3 D&C I-Load Update
59848		Univ. Ptg Mnvr Time/Stop Option (OI-4)
59866		MOD RCS ACT LT Proc
59869		Correct CR59579B/FCP FAIL
59919		HUD GRTLS I-Load Correction
59920A		HUD A/L Monitor GRTLS I-Loads
59921A		HUD I-Load Ownership
59934		PRSD MSID Change
59949A		Delete MET Reset From GN&C Reg
59989		I-Load Baseline, D&C (STS-11)
69014B		Entry Controls Cleanup
69025E		Actuator Control Disp (Superceded by CR 79036B)
69030		STS-9 Cycle 2 D&C I-Load Update
69064C		Interpret RM Switches Display
69065C		FES MSID Nomenclature Change
69070		FSSR Update No. 3
69071A		D&C I-Load Database Update
69096A		TFL/DFL Uplink
69108		I-Load Baseline, D&C, Cycle 2
69132C		PCS Hold Requirements Update
69142		D&C I-Loads/STS-13, Cycle 1
69144		HUD FSSR Format Change
69170		D&C I-Loads/STS-13, Ascent/Abort
69180		ADD FES HI Load FDLN Temps (OI-5)
69182		Mark accept to three digits (OI-2)
69192C		Approach & Landing Guidance Update
69204B		Change 2 SL MSG - PM TO SM (OI-4)
69205G		SM Ground Checkout (OI-6)
69209C		Univ. Ptg CR 59010D Cleanup (OI-6) (Supercedes 59010)
69220F		Centaur Abort Dumps
69227		D&C I-Loads B/L, STS-14, Cycle 1
69241A		Correct CR 39797B
69249		I-Load Baseline Update - D&C
69340		Update D&C I-Loads/STS-14/1.1
69345D		Cancel Unbaselined CRs (Cancel CR 59135)

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
69349		HUD FMT Switching MM 603,305
69384		ADT Requirements Clean-up
69391		D&C I-Load Update, STS-16, Cycle 1
69392		STS-13.2 D&C Ascent I-Load Update
69438B		GNC Checkout Configuration (OI-10)
69442		Define Integer in ADI Proc.
69457		D&C I-Loads STS-17.1, Cat VE10
69458		D&C I-Loads STS-17.1, Cat VE20
69459		D&C I-Loads STS-17.1, Cat VR10
69460		D&C I-Loads STS-17.1, Cat VR20
69461		D&C I-Loads STS-17.1, Cat VSA0
69465		Correct Fuel Cell Disp Rqmts
69474		Ascent/Entry D&C I-Loads, STS-17.1
69490C		Mutually Exclusive RMS Items
69517		D&C I-Loads, CAT VE10 Occurrence Change
69518		D&C I-Loads, CAT VE20 Occurrence Change
69520		CR 69474 Corrections, STS-17.1
69524A		OMS TEMP Restore-OV-099 (STS-21)
69553		STS-14.2 D&C I-Loads
69555A		TAL/RTLS Weather Alternate
69569		Modify CR 39263E
69587		Horiz Sit L or R HAC Init
69588		Cleanup of CR 69192D
69598A		TAL Weather Alternate Corrections
69611		Doc CR 59624A HSD CRT Table
69635B		Correct CR 59273C
69642		Restrict Star & Matrix Align
69661		Standard Vert Sit 2 Display Mod (Light Weight-EOM) Cat VE20
69662		Standard Vert Sit 1 Display Mods (Light Weight-EOM) Cat VE10
69669		Update D&C I-Loads/STS-19.1
69670		Entry Traj 1 I/L Lt Wt/28.5 Inc
69671		Entry Traj 2 I/L 210K LB + 2 Elev
69672		Entry Traj 3 I/L Light Weight
69673		Entry Traj 5 I/L Light Weight
69687		KU-BD Contour Discontinuity

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
69699		Delete PCS Error MSGS
69700		FSSR Update No. 4
69708		Delete Parm Status Indicator
69748A		Correct CR 59380A
69773D		Document Cleanup CR 29886C
69877I		TAL/RTLS Weather Alternate Cleanup
69899A		RGA/AA Deselect Disp Correction
69913		REL NAV Requirements Inconsistent
69961B		CRYO System Display Change
69995D		Dump LOX/LH2 Residuals
69997B		TAL Entry +X Aft RCS Dump
79005A		BTU Test Corrections
79026B		Aft RCS Dump Upgrade
79036B		Clarify Actuator Control Display
79043A		DOC. Update to CR 69555A for HSD
79056		Dump Stop Fix
79074B		Drag Altitude Atmosphere Model Update
79145A		Incorrect Update Rate for TGO and Delta VTOT In CRT Display Processing
79152B		Forward RCS PTI Logic
79168A		Correction to CR 79036B
79185A		FC H2O Relief HTR Switch FDA
79190D		Override Display Update
79191		BTU Display Corrections
79195		Fleetwide OMS XFD TEMP MEAS
79199		Corrections to 69997B
79211A		Ascent Traj 2 CO Tic Scaling
79222B		Delta H Dot Code Change
79237		Rate Chg: Port Assignment Indicators
79248B		Clarification of SPEC 62 Requirements
79294A		Offload DEU Critical Formats
79304B		OPS 3 Dump Cleanup
79334C		IMU SITE I-Loads WTR and 39B
79340C		OMS XFD Press Disp & D/L Req
79349B		Actuator Control Cleanup
79352		Correction to FWD PTI Logic

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
79406A		Override Display Cleanup
79408		RCS ACT LT Doc Change
79499		FSSR Update No. 5
79533C		SM Level B Class 1 Additions
79556D	20	Add Controls Display to OPS 1/6
79566A		Remove SM Disps from D&C FSSR
79582		Cleanup of SCR 69961B
79594A		Documentation Cleanup for Override Display
79670A		Cleanup for CR 39449
79710A		DK Listen Items on Override Display
79770		Add RW Bearing to HSI for TAL ABT
79801G	20	On-ORB/RNDZ NAV D/L Cleanup
79844G	20	Body Flap Update
79856		Elevon Processing of BFS Override Display (OI-8A Only)
79857E		GPC IPL Modifications (Version 8.01)
79860H		RMS Joint Bias Data
79862F	23	Universal Pointing Future MNVR – DAP Part
79863		FSSR Update STS 83-0020C
79866A		TAL Traj Display Cubic Target Line
79885D	20	Air Data Calc W/O Spec 51
79901D		OPS D/L Cleanup
79906C		FCSM Downlist Scrub
79916D		Cabin P and BU dP/dT Limit Changes
79957		Add HUD to A/L Guidance H_K I-Load
79964F		RCS Reg Fail Protect Seq
79967G		ZF32, ZF42 I-Loads to K-Loads
79985A		APU Fuel TK ISO Valve Instru
79986D		SM Tire Pressure Monitor
89127A		Add FDA of Smoke Detectors
89137C		Delete HUD 2 (Autoland) FMT
89138B		SM Brake Pressure Monitor
89140E		Centaur Requirements Deletion
89148F	20	Downlist Nomenclature Cleanup
89149B		OI-8A Version of CR79596C
89154B		Dump Item Display Cleanup

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
89161A		I-Load Cleanup for CR 79340C
89192B		IPL Source Switch Mask
89193D		ABT CNTL SEQ/Override Lashup
89214C		FSSR STS 83-0020C Errata
89220C		EQ Cabin Press Monitor Comp
89245D		Post MECO TAL Declaration
89250B		Bailout Control System
89272B		GRTLS Guidance Activation
89281B		Downlist Cleanup of Deselect Commands
89299		Update Requirements for SPEC 62 and 2011
89302B		Checkout Software Cleanup
89329A	20	RMS Item Processing Clarification
89339E		OMS TVC Fail Flag Reset
89385		Memory Dump Requirements Cleanup
89387D		Time-Homogeneous State Vector Disp
89397C		MPS PNEU SYS FDA & Display – BFS
89411C		Delete FMT 2 (Autoland Monitor) from Dedicated Display Checkout
89417		OI-8C Implementation of CR 79207B (RMS Checkout Tools)
89419		OI-8C Implementation of CR 79355 (OMS Power Inhibit in G9)
89430		OI-8C Implementation of CR 89113B (MM305/603 Vent Door Update)
89447B		FSSR STS 83-0020D Errata/Baseline
89448		FSSR STS 83-0020D Errata/Baseline
89449		FSSR STS 83-0020D Errata/Baseline
89455A		SM Brake Press Monitor Update
89468B	20	PSP I/O Update
89474B		Auto NZ for Contingency Abort
89476		MSBLS Cleanup of CR 89281B
89508		OI-8C Implementation of CR 79003B (SSW Toolbox Patch Implementation on DPS Utility SPEC)
89575		Replace IMU Fan Speeds W/WP
89592A		G1 to G3 NBAT Carry Over
89595A		STS 83-0020D PCND-1 Errata
89605		Update Missing BFS CRT MSG ID
89639E	21	Scrolling of Fault MSG Line
89652E	22	ACTS BFS Measurements



Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
89663B		S-Band TDRS Mode Override
89665B		HUD Velocity Vector
89663B	20	S-Band TDRS Mode Override
89666C	22	Auto Deselect Commfaulted IMU
89674E	22	Entry FCS I-Load to K-Load Conversion
89677B	20	RTLS Powered Pitcharound Crew Display Parameter
89684C	20	Add RM in OPS 1/6: GNC LRUs
89690B		ALT MM Area/GPC Memory DISP
89692B	20	Orbit Targeting Protection & Alarms
89693B		OPS 3 Uplink/GPC Memory DISP
89695C	20	Enforce Type Range Checking for TM Constants
89701D	20	Upgrade WSB Controller "B"
89712C	20	Elevon Limits for Orbiter Weather Protection System (O.W.P.S)
89721C	20	Actuator Display Enhancements
89722A		MIA Parity Test (GPC IPL 9.0)
89748		ET SEP & ATMOS – Selected Interface Doc. Cleanup – BFS Override DISP.
89755A		BFS AP-101S IOP Bite Enhancements
89766B		Errata STS 83-0020D, PCND-2
89772A		IPL Base for IPL 9.0
89804B		Correct GPC IPL/BSL Error Messages
89805		Errata CHG – CR89665B PG. 3 & IDD
89813B	20	IMU BITE Mask Via Spec 21
89815A		Cleanup to CR 89245D
89829B	20	KSC PCMMU TFL Dump In G9 RS
89849		HSD – KBD Lockout – DOC Cleanup – DR 101199
89851A		Mass Memory Patch Error Code Classification DRs 101642 – 101852
89870B		Clarify Leading Zero Suppression/Update Rates DRs 55245 – 63988 – 63989 – 63991
89881		WDS/Frame Blanking REQMT – DR101896
89882		Burn ATT Update Rate – DOC Cleanup DR101920
89883B		RCS PRESS IND – BFS Requirement Clarification – DR101941
89884A		Entry TRAJ REF. Drag Correction – DR101944
89889H	20	Improved Nose Wheel Steering Software
89890E	20	Improved Nose Wheel Steering VU Checkout Software
89894C	22	Add CRYO MANF P/SM SYS SUMM 2
89907A		Errata STS 83-0020D OI-8D Update PCND-3

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
89912A		Allow Specification of MAX/MIN Limits for TM SPEC/TMBU
89914B	20	High Memory G3 Store/Retrieve (G3 Archive)
89920C	22	MPS GH2, GO2 FDA & Display – BFS
89921C	20	Closed Loop PRCS Pulse Mode
89927	20	Change SPEC 60 Items 19/20 Update Rate
89931	20	Add RCS Display (Spec 23) To OPS 1
89944H	24	PFS/BFS Vent Doors Sequence Enhancements
89971	21	EQ/BU Cabin Press Limit Cleanup (DRs 101952 & 103153)
89972C	23	Selected IMU Display – BFS
89974B	21	RMS WR Range Illegal Entry Definition
89977C	20	SM Parametric Display ID Expansion
89978	20	SM CRT Message Major Field ID Reallocation
89985C	20	RMS PDRS Override Spec
89986H	22	OPS–1 IMU Alignment
89990E	21	Single Engine Auto Contingency Abort
89991E	21	Entry SSME Repositioning for Drag Chute
89998A	20	BFS Flight Control Signal Selection
90000E	20	Abort Landing Area Upgrade
90007G	23	MPS Dump Enhancements
90016	21	Delete Redundant Brake Press Measurements
90018B	20	PCS Capabilities Deletion
90023A	20	GNC Checkout Configuration (OI–20)
90025A	20	Mass Memory Read/Write Downlist Requirements Deletion
90051	20	Add System Software Displays (Spec 001, DISP 006) in G1/G6 and G3
90052	20	Cleanup to CR 79844G Body Flap Update
90064		Cleanup for 79003B Alternate PL Toggle Buffer Requirements
90075	20	Correct BSL Error Messages – DR103212
90078	20	Doc Cleanup of VERT SIT 2 Display – DR 105431
90085		Doc Cleanup of IPL MENU (1) Display – DR105433
90091	21	APU INJ Cooling – DR 103173
90093	20	DOC Cleanup of MPS HE Press Rate Units – DR103197
90102D	21	LDG Gear Extension Isolation Valve
90109D	21	I–Load/K–Load Conversion: CAT STC, ZF0, ZF5, ZF6, ZS6
90111	22	Fix Traj Delta Velocity Bug Transient for TAL
90112E	21	EDO WOW Orbiter Sensing Upgrades

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
90114B	21	Abort Sequencing Redesign
90118D	21	EDO SM Modifications
90122E	22	TAL Droop Control
90142A		Add Annunciation Limits to the Level A CPDS
90152D	22	Contingency Abort TAL Low-Energy Logic
90153B	21	PRSD Tank Set 5 for OV-105
90159B	20	PCS Requirement Clean-up
90160A	21	RMS End Effector Status Display
90161B	21	Fault Message ICC Enhancements
90163B	21	PCS IPV Elimination
90166B	21	Capture Initial GPC Error and DEU IPL Errors
90167D	23	HDA I/O Enhancements
90182	21	SCM Scrub Completion
90209B	20	DL Enable Flag Initialized Disabled
90210A	20	SM Static Analysis Requirements Clarification and Cleanup
90229C	20	OI-20 D&C FSSR Errata/Cleanup/DR Closure
90233	22	BFS Deorbit AOA Correction – DR 106022
90234A	22	Delete HX T OUT Alarm – DR 106027
90238D	23	Deletion of APU GGVM FDA Limits
90243C	22	Second Stage Auto Recognition of Second Engine Out
90245C	22	Pitch Error Display in Gs – DR 103238
90249A	22	End Cell Heater Monitor Deletion
90256D	23	Mission Independent First Stage I-Loads
90257B	22	FMT 26 Available via Spec Entry–RMS OPS
90264	20	Delete Unnecessary Illegal Entry Check for SPEC 113
90283	20	XXXX IPL MENU Display Data Doc Cleanup–DR 103245
90288A	21	Make QBAR 2 and QBAR 10 I-Loads
90302B	22	Entry Downlist Additions
90314H	23	State Estimator Upgrades
90326	20	Spec 1 and Disp 6 Available In MC3
90332	20	Correct GPC Memory Display (Spec 0) Documentation
90342C	22	G9 PDI I/O Support
90347B	22	RMS SM Preprocessor Defaults Redefined
90357	21	Sequencing Redesign Refinements
90361B	22	BFS Maneuver Display/Guidance Corrections

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
90363A	22	GPC IPL Checksum Error Message Fix – DR 106053
90366C	22	Single Engine Control Improvements in MM 103
90376A	20	Documentation Change for CR 90000E
90417	21	Update of Desired Vehicle Burn Attitude on Maneuver Display
90424	22	Failed BFS Transmitter Causes Erroneous Data on Bus – DR 105708
90431	22	TFF and REI Update – BFS Documentation Cleanup
90450D	25	RCS Tank Temp Hi Limit Change
90464B	23	Abort OMS/RCS Interconnect Monitor Sequence – DR106078
90472C	23	MPS HE Regulator Out Pressure FDA Change
90475	23	BFS Roll Attitude Error Sign Enhancement
90476F	25	Wraparound Yaw Jet System W/PTI Effector
90477E	22	Addition of Orbiter RGA SMRD RM
90487E	23	RMS Conversion to New MCIU
90493	21	Entry Traj Doc.–Only Attitude Error Correction – DR 106091
90495A	22	BFS Override Display – RCS Dump Requirements Cleanup
90496	22	MPS GH2 & GO2 Message Correction
90498	21	Update Brn Att MNVR DISP–90417 Correction
90510B	23	Compress Spec 95 & Loaded Rate Change
90511	22	Update Brn ATT MNVR DISP/90361 Cleanup
90526	21	Update Requirements to Include PASS DEU Message Line “Anomalies”
90549	22	Doc. Only Display Clarification for CR 90361
90552A	23	PL Data Bus Fault Display – DR 106209
90555	21	Correct Data Type for CR 89990E
90562A	22	CR 90342C COMMFAULT Indicator Correction
90563	22	BFS Maneuver Display Abort Target Data Autoload
90568	22	Units Correction for GAX I–loads
90576A	21	Cleanup of CR 89990E, Single Engine Auto Contingency Abort
90582A	22	RMS OI–22 CR Documentation Cleanup
90591B	22	Entry Downlist Correction
90593A	22	DTC I-Load to K-Load Conversions
90596A	22	Clarify Concurrent FDA Limit Sensing Requirements
90602B	23	RMS Spec 95 Items Illegal While RMS Software Inactive
90603	21	Clarification of Predicted Altitude/Velocity Indicator Computation Rate
90608D	24	Level C Guidance Ascent/RTLS FSSR Documentation Clarification
90620	22	TM Processing of Analog Limit Values – Doc. Update

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
90627	22	Doc-only Launch Recycle FDA – DR 102139
90629C	23	RMS Position Orientation Hold Select
90639B	23	CR 79862F “Universal Pointing Future Maneuver – DAP Par” Corrections
90657A	24	RMS Joint Bias Update
90660B	23	TDRSS Antenna Management – Modify PASS/SM Control System
90667	22	Change Update Rate for OMS PRESS ENA Fields on RCS RM Display
90677	23	Modify the Level A and Level C RTC Requirements
90690A	24	Deletion of EQTN MSID Column From K-Load FSSR Tables
90698B	24	BFS GMT/MET Update Capability
90703D	24	Load Block Transfer From One Area of a Mass Memory to Any Area of Another Mass Memory
90705H	25	3 Engines Out Auto Contingency
90708C	24	Orbit DAP On-board I-Load Calculation and Notch Filter Uplink
90715C	24	RMS Servo Power Amplifier Upgrade Support
90717A	25	VU SSW Changes for GN&C SM Parallel Reconfiguration
90718	23	State Estimator Upgrades Correction II
90730G	25	RMS Fly-to vs. Fly-from Handcontroller Select
90733	23	CR 90167D Clarification for OI-23
90741B	23	Clarify Requirements for Brightness on XXXXXX TRAJ Display
90754	24	BFS VGO BUG Initialization Correction - DR 106243
90785A	22	BFS Horizontal Sit. Display Initialization Problems – DR 108544
90790	24	Add Memory Configuration to the FSSR I-Load Tables
90792C	23	SM Documentation Cleanup (OI23)
90798A	24	BFS HSD TACAN Source Selection – DR 106444
90799	24	FSSR-20 Documentation Corrections – DR 106279
90800A	23	Clarify Post MECO Attitude Error Data Source in MM 102
90802	24	Remove Item From BFS Memory Display Message Line
90803C	24	PASS and BFS Fault Message Line Format
90815B	24	FSSR Book 1 & 20 Documentation Changes
90816	24	Target Solution Delay on Maneuver Display – DR 106177
90848E	25	RMS Downlist Modification
90867B	25	Increase PCS Execution Rate
90881A	25	FSSR STS 83-0001 Documentation Changes
90890	25	More FSSR-20 Display Documentation Cleanup
90895A	24	FSSR-20 Volume 1 Documentation Cleanup

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
90897D	24	FSSR STS 83-0020 Vol.3 Documentation Changes
90900D	25	FSSR-9 Orbit Flight Control Documentation Changes
90920A	25	Update to GPC / BUS Status Display (SPEC 6)
90937A	24	RMS-Acquire Spec 169 and Rename Spec 96
90952B	24	CR 90837G Requirements Clean-up/Corrections
90956A	24	D&C FSSR Doc. Update for Spec 106 & Spec 113
90960E	25	HAC Initiation Predictor and Position Error Displays
92964	25	Interface Clarification for 3 Engine Out - CR 90705H
90966A	24	Deletion of the Qualifier from the FSSR I-Load Tables
90982A	25	OI-25 Cleanup to the D&C FSSR - BFS Only
91028C	25	RMS OI-25 FSSR Editorial Changes
91036B	25	Corrections and Cleanup to CR 90705H: 3 Engines Out Auto Contingency
91047C	25	Early GPS Capability for Orbiter - FCP RI0041
91055	25	Orbit Targeting Display Correction
91065A	25	Clarification of PASS Update Rates for Display Header Information
91068B	25	CR 91047C Documentation Cleanup
91069A	25	SPEC 112 PCMMU Selection
91079A	25	HAC Predictor Tickmark Location Adjustment
91082	25	Remove RCS Jet Display Vertical Vectors
91087	25	GAX 1.04 Hz, .52 Hz Message Annunciation Documentation Change
91088	25	GH2 Ullage Pressure Reduction
92006	25	RMS SPEC 94 Display Update Correction
92008	25	Correct WRAP_MODE Initiation for TAL - DR 109642
92027A	25	TDMS-2 Required FSSR Changes