

Space Program Operations Contract

SPACE SHUTTLE ORBITER OPERATIONAL LEVEL C FUNCTIONAL SUBSYSTEM SOFTWARE REQUIREMENTS GUIDANCE, NAVIGATION AND CONTROL PART C

FLIGHT CONTROL ENTRY — GRTLS

**Prepared by The Boeing Company
Space Exploration**

Under Subcontract 6000132079, PDRD P1433q

December 14, 2007

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G4.36	AERO-JET DAP
G4.227	GRTLS AERO-JET DAP
G4.248	PTI MODULE

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FOREWORD

The primary avionics software system (PASS) requirements for the computer programs that execute in the Shuttle general-purpose computers (GPC's) are specified in the Computer Program Development Specifications (CPDS's) and the Functional Subsystem Software Requirements (FSSR) documents. The requirements are specified at three levels:

Level A CPDS – System-level constraints and capabilities

Level B CPDS – Functional requirements

Level C FSSR – Detailed-level requirements

The Level A CPDS specifies system-level constraints and capabilities that are not oriented toward any particular program end item. The Level B CPDS specifies system-level requirements for guidance, navigation, and control (GN&C) and detailed requirements for systems management (SM) and vehicle utility (VU). The Level C FSSR's specify the detailed requirements for GN&C and display/controls. The Level C reconfigurable requirements are specified in the systems management and payload documents. The Level A, Level B, and Level C requirements documents are listed in Section 2, Applicable Documents.

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DOCUMENT CHANGE RECORD

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

DOCUMENT CHANGE RECORD			
Issue and Date	Change Summary/Effectivity		
OI-34 Release December 14, 2007	This baseline release for effectivity OI-34 and subs includes: <u>SCR</u> <u>OI</u> <u>Title</u> 93017G 33 Baseline RSS99D0100 with Expanded Downlist 93183A 33 Correction of FAST_SEP_FLAG for OI-33		

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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.

CHANGE REQUEST SUMMARY			
Paragraph	SCR No.	OI	SCR Title
1.3-1.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
4.2-1.(F)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
4.2-2.(7)(F)	93183A	33	Correction of FAST_SEP_FLAG for OI-33
4.4-3.(T)	93183A	33	Correction of FAST_SEP_FLAG for OI-33
4.5.1	93183A	33	Correction of FAST_SEP_FLAG for OI-33
4.10.1-1.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
4.10.1-2.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
4.10.2-1.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
4.10.2-2.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
4.10.3-1.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist
4.10.3-2.(T)	93017G	33	Baseline RSS99D0100 with Expanded Downlist

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1.0 INTRODUCTION

1.1 PURPOSE

The Flight Control (FC) Level C document presents the requirement details and formulations of the FC Level B functional requirements for the integrated vehicle GN&C flight software

1.2 SCOPE

This document contains the requirement details and formulations for the FC functions operative during the entry phase of orbital operational flight. The FC functions are those specified in the GN&C Level B functional requirements document.

1.3 ORGANIZATION

This document is organized into the following sections:

1. Introduction
2. Applicable Documents
3. Overview
4. Flight Control Requirements

Section 1 defines the purpose, scope, and organization of this document. Section 2 lists the applicable documents. Section 3 provides an overview of the OFP software function and discusses the contents of Section 4. Section 4 specifies the requirement details. It also contains applicable tables (Interface Definition Document (IDD) inputs/outputs, I-Loads, K-Loads, and Constants) located at the end of each Principal Function.

Also included as part of the Aerojet DAP are various modules and switches that are used only for Transatlantic Abort (TAL)

The automated IDD tables provided herein define signal (parameter) interface requirements either between hardware (LRU) and software elements or between software elements and other software elements. A GN&C software element is either a sequenced principal function (PF), crew generated specialist/display function, or an OPS display function. In the event of a conflict between the IDD tables and other internal text input/output tables, the SASCB data base-controlled IDD tables take precedence.

The data types identified in the subfunction tables within Section 4 are described in Table 1.3-2.

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The following table defines the data elements found in the IDD input/output, I–Load, K–Load, and Constant tables for each principal function.

Table 1.3-1. Parameter Element Description												
Title	Definition	Valid Entries										
CAT	Category of the I–Load (**Note)	Three alphanumeric characters: the first character must be alphabetic.										
D	Dependency of the I–Load	D = Design M = Mission L = LRU										
DESCRIPTION	Parameter description of the K–Load or Constant.	A string of ≤ 64 characters.										
DESTINATION	Destination of the output parameter	Abbreviated functional titles. (**Note)										
DT or DATA TYPE	Data Type	<ul style="list-style-type: none"> * See reference (1) for valid I–Load, K–Load and Constant data types. * See reference (2) for valid IDD data types for parameters with destination TLM. * See reference (3) for valid IDD data types for all other parameters. 										
ENG UNITS or UNITS	Engineering Units	<ul style="list-style-type: none"> * See reference (1) for valid I–Load, K–Load and Constant units. * See reference (2) for valid IDD units for parameters with destination TLM. * See reference (3) for valid IDD units for all other parameters. 										
FSSR NAME	Requirements parameter name	A string (with no embedded blanks) of ≤ 32 characters consisting of alphanumerics, underscores, parenthesis, commas and slashes. Parenthesis are used for array elements. Commas separate the different indices of multidimensional arrays. Slashes are used to separate multiple names used for a single MSID.										
LAST CR	The last CR affecting the parameter	5 digit number with an alphabetic revision letter.										
MC	Memory Configuration	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">00=Generic</td> <td style="width: 50%;">05 = SM4 Orbit P/L</td> </tr> <tr> <td>01=GN1 Ascent/GN6 RTLS</td> <td>06 = P/L9 MMU</td> </tr> <tr> <td>02=GN2 Orbit</td> <td>07 = Not Assigned</td> </tr> <tr> <td>03=GN3 Entry</td> <td>08 = GN8 On–Orbit C/O</td> </tr> <tr> <td>04=SM2 On–Orbit</td> <td>09 = GN9 Preflight</td> </tr> </table>	00=Generic	05 = SM4 Orbit P/L	01=GN1 Ascent/GN6 RTLS	06 = P/L9 MMU	02=GN2 Orbit	07 = Not Assigned	03=GN3 Entry	08 = GN8 On–Orbit C/O	04=SM2 On–Orbit	09 = GN9 Preflight
00=Generic	05 = SM4 Orbit P/L											
01=GN1 Ascent/GN6 RTLS	06 = P/L9 MMU											
02=GN2 Orbit	07 = Not Assigned											
03=GN3 Entry	08 = GN8 On–Orbit C/O											
04=SM2 On–Orbit	09 = GN9 Preflight											
MSID or M/S ID	Measurement/Stimulus Identification	Maximum of 10 alphanumeric characters. * See reference (3) for specifications										
NOMENCLATURE	Parameter description of the IDD parameter.	String of ≤ 34 characters (including underscores and blank spaces).										
PR or PREC	Precision	D, DP =Double S, SP =Single										
SOURCE	Origin of the input parameter	Abbreviated functional titles.										

Table 1.3-1. Parameter Element Description		
Title	Definition	Valid Entries
S	Software Utilization	C = Common B = BFS Unique P = Primary X = BFS Derived A = BFS Converted
PR FCTN	Cross reference of the principal function identifiers that are applicable to this parameter.	See Level B GN&C CPDS SS-P-0002-510
VALUE	The value of the K-Load or Constant	* See reference (1) for valid value formats.
REV	Revision indicator	An Asterisk (*) indicates changes for the current OI version.
<p>* References: (1) JSC 19350 I-Load Requirements Document Volume I (2) SS-P-0002-140 Level A SS Downlist/Uplink CPDS (3) JSC 18206 Shuttle Data Integration Plan Volume III MAST II/STAR Deliverable Products.</p> <p>** Note For additional information on any I-Load, contact the I-Load owner defined in CR 98032, JSC, USA, and Boeing I-Load Owner Assignments</p> <p>*** Note IDD output (source) tables which reflect parameters going to input (destination) "TLM" shall not be interpreted as a signal actually being downlisted. The parameter is only available for downlist in COMPOOL and does not appear in a downlist format. Parameters actually on the downlist will be designated with a destination denoting the downlist Format with a Rate Code. The Rate Code legend appears at the end of each FSSR data table. To complete the downlist information, Parent MSIDs (indicated by a 'P' in the 9th character of the MSID) are now included in the software function output data tables in which a Child MSID already appears. A Parent MSID will have the same downlist destinations as its Child(ren) MSID(s).</p>		

Table 1.3-2. Data Types Used in Internal Subfunction Tables	
Symbol	Description
K	K-Loaded Parameter
I	Decimal Fixed Point Integer parameter
F	Decimal Floating Point Scaler parameter
D	Discrete parameter

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2.0 APPLICABLE DOCUMENTS

2.1 LEVEL A DOCUMENTS

- SS-P-0002-140 Shuttle Downlist/Uplink Software Requirements
- SS-P-0002-150 Shuttle Launch Data Bus Software Interface Requirements
- SS-P-0002-170 Shuttle Systems Level Requirements, Software

2.2 LEVEL B DOCUMENTS

- SS-P-0002-510 Shuttle Functional Level Requirements, GN&C
- SS-P-0002-550 Shuttle Functional Level Requirements, Vehicle Utility
- SS-P-0002-580 Shuttle Functional Level Requirements, Systems Management

2.3 LEVEL C DOCUMENTS

- STS 83-0001 Operational Flight Level C, Functional Subsystem Software Requirements; Guidance, Navigation, and Control, Part A, Entry Through Landing Guidance
- STS 83-0002 Operational Flight Level C, Functional Subsystem Software Requirements; Guidance, Navigation, and Control, Part A, Guidance Ascent/RTLS
- STS 83-0003 Operational Flight Level C, Functional Subsystem Software Requirements; Guidance, Navigation, and Control, Part A, Guidance On-Orbit/Deorbit
- STS 83-0004 Operational Flight Level C, Functional Subsystem Software Requirements; Guidance, Navigation, and Control, Part B, Entry Through Landing Navigation
- STS 83-0005 Operational Flight Level C, Functional Subsystem Software Requirements; Guidance, Navigation, and Control, Part B, Navigation Ascent/RTLS
- STS 83-0006 Operational Flight Level C, Functional Subsystem Software Requirements; Guidance, Navigation, and Control, Part B, On-Orbit Navigation
- STS 83-0007 Operational Flight Level C, Functional Subsystem Software Requirements; Guidance, Navigation, and Control, Part C, Flight Control Entry – GRTLS
- STS 83-0008 Operational Flight Level C, Functional Subsystem Software Requirements; Guidance, Navigation, and Control, Part C, Flight Control Volume 1, Ascent Flight Phase, Volume 2, Ascent
- STS 83-0009 Operational Flight Level C, Functional Subsystem Software Requirements; Guidance, Navigation, and Control, Part C, Flight Control Orbit DAP
- STS 83-0010 Operational Flight Level C, Functional Subsystem Software Requirements; Guidance, Navigation, and Control, Part D, Redundancy Management

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STS 83-0013	Operational Flight Level C, Functional Subsystem Software Requirements; Guidance, Navigation, and Control, Part E, Inertial Measurement Unit Subsystem Operating Program
STS 83-0014	Operational Flight Level C, Functional Subsystem Software Requirements; Guidance, Navigation, and Control, Part E, Volume 1, Navigation Aids Subsystem Operating Program, Volume 2, Star Tracker Subsystem Operating Program
STS 83-0015	Operational Flight Level C, Functional Subsystem Software Requirements; Guidance, Navigation, and Control, Part E, Subsystem Operating Programs, FC Sensor/Controller
STS 83-0016	Operational Flight Level C, Functional Subsystem Software Requirements; Guidance, Navigation, and Control, Part E, Subsystem Operating Programs, FC Effector
STS 87-0017	Operational Flight Level C, Functional Subsystem Software Requirements; Remote Manipulator System
STS 83-0020	Operational Flight Level C, Functional Subsystem Software Requirements; Displays and Controls
STS 83-0026	Operational Flight Level C, Functional Subsystem Software Requirements; Guidance, Navigation, and Control, Sequencing
JSC-19350	Shuttle Flight Software Initialization Load <ul style="list-style-type: none">• Volume I General Requirements• Volume II Mission I-Load Requirements
JSC-19478	Payload Management, Level C Flight Software Requirements
JSC-19590	Systems Management, Level C Flight Software Requirements

2.4 INTERFACE CONTROL DOCUMENTS

ICD 3-1011-02	GPC/DEU ICD
ICD 2-1S001	Orbiter Primary Flight Software System and Backup Flight System Software Interface

In the event of a conflict between the documents referenced herein and the contents of this specification, the precedence shall be determined as defined in paragraph 1.3 of CPDS SS-P-0002-170, Volume 1, System Level Requirements, Software.

3.0 OVERVIEW

The operational flight programs (OFP) are executed by the avionics general-purpose computers (GPC). For the orbiter test flight series, the OFP consisted of two general versions: one version used was for approach and landing tests (ALT), and a second version was for the Space Transportation System (STS) orbital flight tests (OFT). Uniqueness of the operational system is designated by change bars.

The STS orbiter computer program development specifications (CPDS) establish the requirements and constraints the software system (program) must satisfy. The OFP requirements are specified at three levels:

- Level "A" – System requirements
- Level "B" – Functional requirements
- Level "C" – Detail requirements

This document specifies the detailed requirements for the Aerojet DAP, the GRTLS DAP, and the mated coast and ETSEP mini-DAP's; and it is the single-thread flight control portion of the GN&C, Level C, and OFP requirements for the entry flight phase.

The entry flight phase begins upon completion of the deorbit maneuver and shutdown of the OMS engines. With the transition to Major Mode 304, the Aerojet DAP is used to control the vehicle through entry, terminal area energy management (TAEM), and landing, terminating with the completion of rollout on the runway.

In the event of an RTLS abort, the GRTLS DAP is used to control the vehicle beginning as early as the second stage of the launch phase, after the SRB solid propellant rockets have burned out and separated from the orbiter/ET mated configuration.

The MC and ETSEP mini-DAP's are used to complete the mated coast and separation of the external tank (ET). The glide phase of the GRTLS DAP then functions in a manner similar to the Aerojet DAP, while operating over a substantially lower range of Mach numbers. The glide includes a TAEM and landing phase as does the Aerojet DAP, as well as control after touchdown on the runway through completion of rollout.

The Aerojet DAP is used to control the vehicle during TAL after automatically sequencing to MM 304. There are minor differences between the Aerojet DAP for TAL and for nominal end of mission.

3.1 DOCUMENTATION

This document specifies the requirements for two distinct major DAP's and two mini-DAP's. The Aerojet DAP requirements address the single-thread flight control during entry, beginning with reentry into the atmosphere and continuing through TAEM, approach and landing through touchdown, rollout, and stop on the runway.

In the event of a launch abort and a return to launch site (RTLS), the GRTLS DAP is required. The GRTLS DAP includes software modules from the Aerojet DAP, as well as unique modules such as the mated coast and ETSEP mini-DAP's. To support the RTLS flight capability, it is necessary to load the GRTLS DAP into Memory Configuration 1 (OPS 1) to be available in the event an abort does occur. In the normal mission, this DAP is not used at all, while the Aerojet DAP is used in Memory Configuration 3 (OPS 3).

The flow charts or functional schematics depicting the Aerojet and GRTLS DAP control channels are complete showing all the modules common to OPS 1 and OPS 3, as well as modules unique to OPS 1 or OPS 3. In the text, the common modules are presented first, and unique modules are identified as Aerojet unique (OPS 3) or GRTLS unique (OPS 1).

The FSW subroutine designators, a three-letter code, identify the modules on the flow charts as a convenience in the use of this document during software testing. These designators are established and used at the discretion of the FSW contractor and do not constitute a requirement.

3.2 GN&C SOFTWARE MAJOR FUNCTIONS

The orbiter general-purpose computers provide the following GN&C major functions:

1. Guidance
2. Navigation
3. Flight control
4. Redundancy management/moding, sequencing, and control
5. Subsystems operating programs
6. Display interface processor

Additional GN&C major functions provided by the GPC software are the flight computer operating system (FCOS), GN&C system management and performance monitoring (SM/PM), and checkout (C/O).

This document specifies the software functional requirements for the GN&C major function and flight control, for the entry flight phase.

The relationship of the flight control module to other GN&C major functions is illustrated in Figure 3.2-1. The module receives inputs from the subsystems operating programs (SOP); guidance (GUID); navigation (NAV); redundancy management (RM); display interface processor (DIP); and moding, sequencing, and control (MSC) software modules. The flight control module provides outputs to the orbiter control surface actuators and displays via actuator SOP, dedicated display SOP, and DIP. In addition, guidance is provided with the flight control AUTO mode status indicators.

The input/output interface of the flight control module and the functional relationship of the reconfiguration module and control laws within the flight control module are illustrated in Figure 3.2-2.

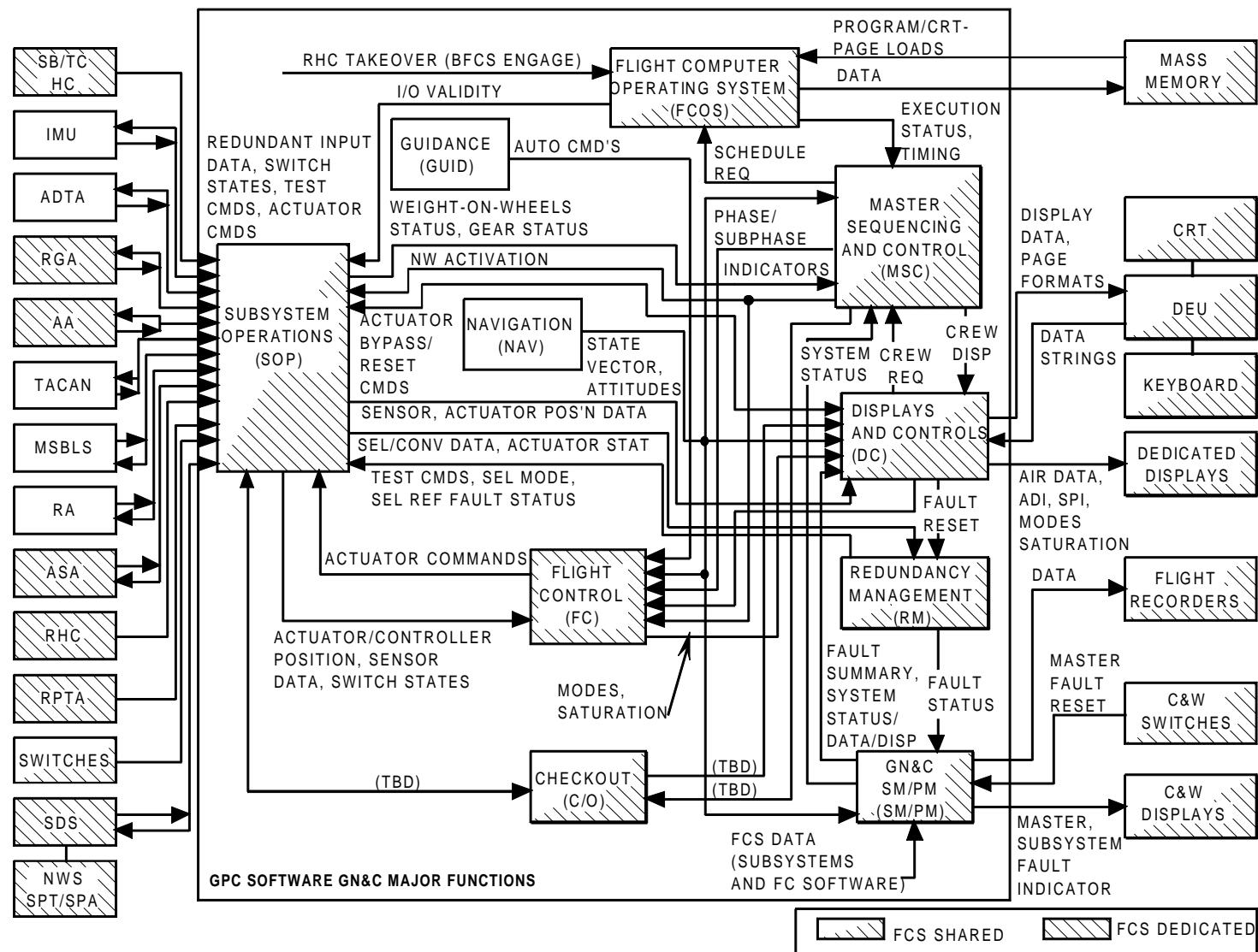


FIGURE 3.2-1. Relationships of Flight Control Module to Other GN&C Major Functions (Atmospheric Flight)

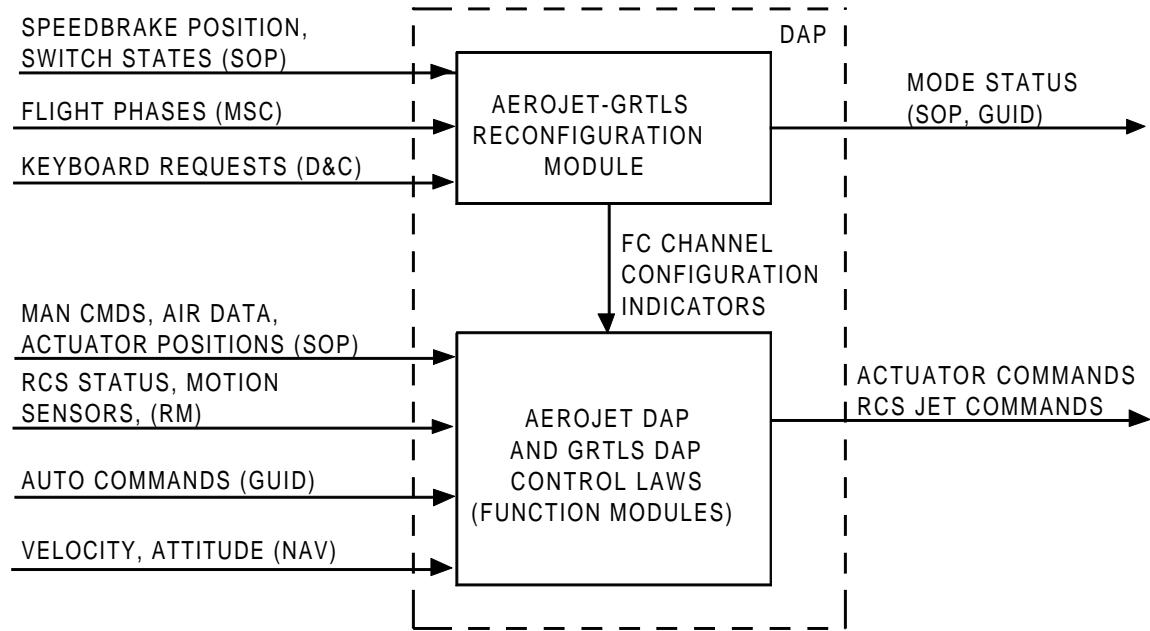


FIGURE 3.2-2. Functional Relationship of Reconfiguration Module and Control Laws for the Flight Control Module

3.3 AEROJET DAP FLIGHT CONTROL SYSTEM

3.3.1 Flight Control System Flight Phases

The basic function of the flight control system (FCS) is to stabilize and control the vehicle in response to manual or automatic commands during all orbiter flight phases. FCS flight phases for OFT entry flight consist of the following major modes:

1. Predeorbit Coast (MM 301).
2. Deorbit Execution (MM 302).
3. Pre-entry Monitor (MM 303).

4. Entry (MM 304).
5. Terminal Area Energy Management (TAEM) (MM 305).

These flight phases correspond to the major modes defined in Level B CPDS, Section 3.3. Indication of flight phase is provided to the flight control module by MSC. Flight control operation in each flight phase is described briefly in Table 3.3.1–1.

Alternate sequences of flight control functions at the subphase level are determined in accordance with the additional indicators listed in Table 3.3.1–2.

Table 3.3.1-1.Flight Control System Flight Phases

Flight Phase	FCS Operation
Predeorbit coast	See STS 83-0008, Volume 2, Transition DAP
Deorbit execute	See STS 83-0008, Volume 2, Transition DAP
Pre-entry monitor	See STS 83-0008, Volume 2, Transition DAP
Entry	Transition to MM 304; control from entry guidance or manual inputs
TAEM	Control from TAEM guidance or manual inputs to Aerojet DAP
AL	Control from AL guidance or manual inputs to Aerojet DAP

Table 3.3.1-2.FCS Subphase Indicators

Indicator	Source	Significance
AL_SUBPHASE	Guidance (TAEM)	Event 22A, transition to AL
ENTRY_SUBPHASE	Aerojet RECON	Manual override of roll channel early/late transition logic
QBAR_REGIME	Aerojet RECON	Initiate commands to aerosurfaces, shut off roll jet command, and increase the number of yaw jets from two to four as QBARFC passes through 2, 10, and 40 lb/ft ² , respectively
ZERO_PITCH_JET	Aerojet RECON	Shuts off pitch jet commands as QBARFC—passes through the I-loaded value of 40 lb/ft ²
RETRACT_BF	Guidance (AL)	Retract the body flap if the body flap channel is configured for automatic operation and the speed brake is contracted sufficiently
FLATTURN	Landing SOP	Initiate (during the AL flight phase) a period wherein lateral acceleration feedback, turn coordination, automatic roll trim, and aileron crossfeed are discontinued, provided the lateral axes are configured for automatic operation
WOWLON	Landing SOP	Main wheels on runway
ROLLOUT	Landing SOP	Nose gear on runway and WOWLON
GSENBL	Landing SOP	Enable nosewheel steering

3.3.2 FCS Modes of Operation

The FCS modes of operation are organized into five main functional groups (pitch, roll/yaw, speed brake, body flap, and nosewheel steering) with two subgroups each as shown in Table 3.3.2-1.

Table 3.3.2-1. Aerojet DAP Mode Characteristics

Channel	Mode	Operation
Pitch	AUTO_PITCH	Control to Alpha CMD Entry Guidance Control to Normal Acceleration CMD from TAEM and AL guidance Control of pitch rate during slapdown; static load relief after slapdown
	CSS_PITCH	Augmented control to RHC pitch rate command
Roll/Yaw	AUTO_BANK	Control to roll angle command from guidance during ENTRY, TAEM, and AL Control to wings level command when FLAT-TURN true
	CSS_BANK	Augmented controls to RHC roll rate command
Speed Brake	AUTO_SB	Control to deflection command from guidance during TAEM and AL; and from FC during ENTRY
	MAN_SB	Control to deflection command from SBTC
Body Flap	AUTO_BF	Control to null elevator trim command
	MAN_BF	Control to discrete rate command from crew
	RETRACT_BF	Retract upon guidance command at transition to AL (subject to speed brake deflection being less than a specified value)
Nosewheel Steering	AUTO_BANK	Control to yaw rate command from AL guidance during rollout when NWS1 or NWS2 true; nosewheel free caster when NWS1 and NWS2 false
	CSS_BANK	Augmented, lateral acceleration, and control to RPTA commands during rollout when NWS1 or NWS2 true Nosewheel free caster when NWS1 and NWS2 false

3.3.3 Flight Control System Mode/Phase Combinations

All combinations of AUTO_PITCH/CSS_PITCH, AUTO_BANK/CSS_BANK, AUTO_BF/MAN_BF, and AUTO_SB/MAN_SB modes are allowed in ENTRY, TAEM, and AL phases. Automatic body flap retraction is inhibited unless the speed brake is sufficiently closed. Nosewheel is inhibited until an enable signal is received from the landing SOP signifying all wheels are on the ground.

3.3.4 Crew-Initiated Mode Changes

Mode switching is accomplished by the crew through the use of the switches and controls shown in Figure 3.3.4-1 and through ITEM entries on the Override Display (SPEC 51). All of the items shown in Figure 3.3.4-1 are provided at both crew stations [commander (LH) and pilot (RH)]. The illuminated pushbuttons shown within the large rectangle are located on the cockpit glare shield. The SPEED BRAKE TAKEOVER switch is used to transfer control between crew stations and to down-mode the speed brake from automatic to manual. Annunciation of the operating mode to the crew is accomplished through utilization of the illumination feature of the pushbuttons. The SPDBK/THROT annunciator is divided into two displays (AUTO, MAN) as is the BODY FLAP (AUTO, MAN). In both cases, the switching function of the push button is used to select the AUTO mode; the manual modes are selected by the SPEED BRAKE TAKEOVER button and the BODY FLAP pushbutton. The ENTRY ROLL MODE switch enables the downmoding logic in the pitch and roll/yaw FCS channels.

The glare shield pushbuttons are momentary contact, nonlatching switches. The SPEED BRAKE TAKEOVER pushbutton is also a momentary switch. The BODY FLAP manual control is a three-position lever-lock toggle switch: momentary down (DOWN), maintain center (AUTO/OFF), momentary up (UP). The rotation hand controls (RHC) PITCH and ROLL produce analog signals proportional to deflection (these signals are associated with “hot-stick” moding).

An indication of the state of each switch is provided by the SOP software. This includes determination of the best state estimate from a sampling of the redundant inputs based upon continuous failure assessment and the “ORing” of corresponding switches at the pilot’s (RH) and commander’s (LH) crew stations. The SOP software also processes the RHC deflections in a similar manner; and based upon the position in each axis from both crew stations, an indication of CSS takeover request is provided. Table 3.3.4-1 identifies the relationship of switches and controls to mode request states for appropriate crew action. The requests TAKEOVER_P and TAKEOVER_R/Y correspond to “hot-stick” activation in either RHC axis when that axis is currently configured in the AUTO mode.

Since the switches and controls utilized by the crew for mode change requests are mechanically and electrically independent functions, it is required that the reconfiguration logic establish a legality check to determine appropriate action in the event multiple requests are sensed during any given sampling period.

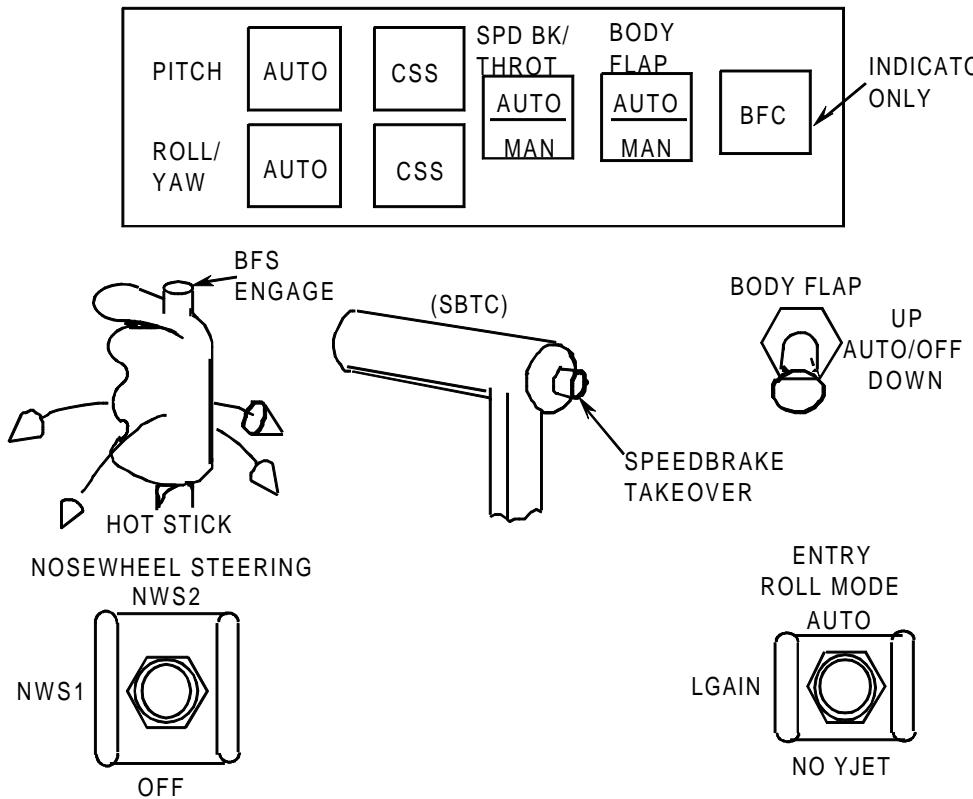


FIGURE 3.3.4-1. FCS Switches and Controls

The rules, which are to be applied in the sequence indicated, are as follows:

- *A. If both pitch requests (AUTOP and CSSP) are active, then AUTOP is processed as inactive.
- *B. If a TAKEOVER_P request is active simultaneously with an AUTOP request, then AUTOP is processed as inactive; if a TAKEOVER_P request is active simultaneously with a CSSP request, then the CSSP request is processed as inactive.
- C. If an active request corresponds to the presently active mode, then it is processed as inactive.
- D. Rules A, B, and C are applied in similar fashion to the roll/yaw request.
- E. The speed brake will be initialized to the AUTO mode on first pass. The top half (AUTO) of the commander's and pilot's speed brake annunciators will light up.
- F. The speed brake can be switched to its manual mode at either station via the SBTC takeover switch. The bottom half of the speed brake annunciator (MAN) will light up at the station where the switching request occurred. The speed brake annunciator at the other station will be off, both top and bottom.
- G. Manual speed brake control can be transferred from one station to the other by actuating the SBTC takeover switch at the station desiring control. The bottom half of the speed brake annunciator (MAN) will be in a steady-on state at the station having control. If the LH and RH SBTC takeover switches are depressed simultaneously, the SBTC SOP station select will give the LH switch precedence.
- H. To return the speed brake to automatic control, the speed brake pushbutton on the glare shield must be depressed. The top half of the speed brake annunciator (AUTO) will then illuminate at both stations.

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I. The automatic body flap mode is engaged (with any pitch-roll/yaw mode combination) by actuating the lighted pushbutton BODY FLAP mounted on the glare shield. The top half of the pushbutton (AUTO) will illuminate at each station.

J. The manual body flap mode is engaged by actuating the BODY FLAP push-button. The bottom half (MAN) of the BODY FLAP pushbutton switch on the glare shield will illuminate at each station.

<u>First Switch</u>	<u>Second Switch</u>	<u>FCS Command</u>
AUTO/Off	AUTO/Off	AUTO/Off
AUTO/Off	Up	Up
AUTO/Off	Down	Down
Up	AUTO/Off	Up
Up	Up	Up
Up	Down	Up
Down	AUTO/Off	Down
Down	Up	Up
Down	Down	Down

Two logic statements come out of the table:

1. Manual (i.e., Up or Down) takes precedence over OFF.
2. Up takes precedence over Down.

This logic will be implemented in the body flap slew SOP.

K. The WRAP MODE (ITEM 45) on the Override Display (SPEC 51) allows the crew to select the wraparound flight control system mode. This mode modifies gains in the roll/yaw channel and widens the yaw RCS jet deadbands. The NO YJET mode selected through the ENTRY ROLL MODE switch takes priority over the wraparound flight control system mode.

L. The ENTRY ROLL MODE switch permits the CDR to select alternate control modes. Selection of LGAIN results in modification of aileron, rudder, and elevator forward loop gains. Selection of NO YJET will ground the yaw jet commands, modify gains in the roll/yaw channel, and force CSS roll/yaw.

*When the LOAD_RELIEF discrete transitions to the enabled state, the pitch channel is initialized to AUTO_PITCH and takes precedence over all current crew-initiated mode requests (AUTOP, CSSP, and TAKEOVER_P). After this one time initialization of the pitch channel due to the LOAD_RELIEF discrete occurs, normal pitch channel mode resumes.

3.3.4.1 System requests

In addition to crew-initiated mode change requests, there is one system-initiated command. The body flap will be retracted automatically to an angle of DBFRET degrees upon receipt of the RETRACT_BF

command from AL guidance provided the crew had previously selected AUTO_BF and the speed brake angle is less than DBFRE degrees.

3.3.4.2 Annunciation

Crew display of operating modes is accomplished by providing to the Dedicated Display SOP the required state of each of the lighted pushbutton annunciators shown in Figure 3.3.4-1. Table 3.3.4-2 identifies the operating mode corresponding to a given annunciator state. Unless otherwise stated, annunciator states are identical at both crew stations.

3.3.4.3 Mode Activation

The reconfiguration logic is required to process mode requests and to initiate and latch a corresponding mode combination.

3.3.5 Flight Control Module

The GN&C function flight control, identified in Section 3.2, is a GPC software module identified herein as the flight control module. The relationship of the flight control module to other GN&C major functions is illustrated in Figure 3.2-1. The FC module receives inputs from the subsystem operating programs (SOP); guidance (GUID); navigation (NAV); redundancy management (RM); display interface processor (DIP); and moding, sequencing, and control (MSC) software modules. The flight control module provides outputs to the orbiter control surface actuators and displays via actuator SOP, dedicated display SOP, and DIP. In addition, guidance is provided with the flight control AUTO mode status indicators.

The input/output interface of the flight control module and the functional relationship of the reconfiguration module and control laws within the flight control module are illustrated in Figure 3.2-2.

During entry, the flight control module processes flight control laws and provides RCS and actuator commands in response to guidance/navigation (automatic) commands, manual commands, and feedback sensor signals that indicate the dynamic state of the orbiter so as to accomplish the following general functions:

1. Acceleration, rate, and attitude response to commands
2. Trim control
3. Stability augmentation
4. Aerodynamic load relief and load limiting
5. Manual command augmentation
6. Turn coordination control
7. Slapdown and ground rollout control

The flight control module accomplishes these general functions during entry by utilizing the following force effectors under software control:

1. Z-axis and Y-axis jets in the aft left and aft right RCS pods for roll, pitch, and yaw effectors

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2. Elevons for vehicle control about the body pitch and roll axes
3. Flared rudder for vehicle control about the body yaw axis and for vehicle airspeed control
4. Body flap vehicle trim control about the body pitch axis
5. Nosewheel for control about the body yaw axis when the vehicle is on the ground

Table 3.3.4-1.Crew Mode Request Definitions (Aerojet DAP)

Switch/Control	Corresponding Software Request	Crew Action to Issue Request	
AUTO (Pitch)	AUTOP	Depression of panel switch	
AUTO (Roll/Yaw)	AUTORY	Depression of panel switch	
BODY FLAP (pushbutton)	AUTOBF	Depression of switch	
BODY FLAP (pushbutton)	MANBF	Depression of switch	
CSS (Pitch)	CSSP	Depression of panel switch	
CSS (Roll/Yaw)	CSSRY	Depression of panel switch	
ENTRY	AUTO	None (normal switch position)	
NOSEWHEEL	NWS2	Select switch to NWS2	
STEERING	NWS1	Select switch to NWS1	
(Switch)	OFF	Select switch to OFF	
Override Display (ITEM 45)	WRAP_MODE	ITEM entry on Override Display	
RHC (Pitch)	CSSRHC	Longitudinal RHC deflection greater than 6.0 degrees on either LH or RH controller*	
RHC (Roll)	CSSRHCY	Lateral RHC deflection greater than 6.0 degrees on either LH or RH controller	
ROLL MODE (Switch)	LGAIN NO YJET	GEPFWD=GPFWDLO GERYFWD=GRYFWDLO GALR=GALRD GRCSA TO GROUND (DRJET=0) SET CSSRY	Select switch to LGAIN Select switch to NOYJET
SPEED BRAKE	AUTOSB	Depression of panel switch	
SPEED BRAKE TAKEOVER	SBEV_LH, SBEV_RH	Depression of SBTC switch	

*Except when load relief is active; then the value is 21.7 degrees

		Table 3.3.4-2.Mode Annunciation (Aerojet DAP)							
Active Mode Annunciator		Pitch		Roll/Yaw		Speed Brake		Body Flap	
		AUTO_PITCH	CSS_PITCH	AUTO_BANK	CSS_BANK	AUTO_SB	MAN_SB	AUTO_BF	MAN_BF
Pitch	AUTO	ON	OFF						
	CSS	OFF	ON						
Roll/ Yaw	AUTO			ON	OFF				
	CSS			OFF	ON				
Speed Brake	AUTO					ON	OFF		
	MAN					OFF	ON		
Body Flap	AUTO							ON	OFF
	MAN							OFF	ON

3.4 GRTLS FLIGHT CONTROL SYSTEM

Flight control of the orbiter during the unpowered portion of a return-to-launch-site (RTLS) abort is provided through the GRTLS DAP.

GRTLS DAP is first called at Event A35, MECO COMMAND, and provides attitude stabilization during the brief mated coast (MC) phase prior to separation from the external tank. Body-mounted rate gyros provide rate feedback on all axes. Attitude error signals are provided by the GC_STEER module. The reference attitude is defined by an axis along the earth relative velocity vector, a horizontal axis normal to the velocity vector, and a third axis normal to the other two. Thus, the yaw error signal may be identified with sideslip and the pitch error signal with angle-of-attack deviations. The crew can modify the reference attitude by employing a three-axis rotational hand controller (RHC) during MC. Effectors used during MC consist of $\pm Z$ and $\pm Y$ aft RCS jets and $-Z$ and $+Y$ forward RCS jets.

Event A37, RTLS ET SEPARATION COMMAND, causes the GRTLS DAP to change from the MC to the ETSEP configuration and initiates the $-Z$ translational burn. All $-Z$ jets (four forward and six aft) are used. After a delay (I-load), selected $-Z$ jets may be turned off as needed and aft $+Z$ jets may be used as required for roll/pitch control, and the forward and aft Y jets may be used for yaw control. Angular rate feedback is provided on all axes, and roll and yaw error and rate command signals are supplied by GC_STEER. However, the pitch error signal is not used during ETSEP. The crew can modify the orientation of the orbiter with three-axis RHC inputs during ETSEP. In addition, the translational hand controller (THC) can be used to override the roll/pitch loops and turn on all the $-Z$ RCS jets.

The DAP issues a discrete for separation completion based on an I-loaded delta time from ET structure release and minimum angle of attack being achieved. This discrete, or an input from the crew, triggers Event A39, which initiates GRTLS GUID and causes the GRTLS DAP to mode from the ETSEP configuration to a slightly modified AEROJET DAP configuration. If the crew has selected AUTO, GRTLS GUID provides inputs directly to the DAP and modes through a succession of phases (IPHASE = 6, 5, 4, 0, 1, 2, and 3) with corresponding configuration changes in the DAP. At the end of IPHASE = 3,

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GRTLS GUID terminates, and the normal Autoland (AL) sequence is initiated. If the crew selects the CSS mode, manual control is provided via the two-axis RHC configuration and the rudder pedals. Mixed control modes are permitted. Aft RCS jets and aerosurfaces are used as combined effectors and transitions to aerosurfaces control only. Nosewheel steering is used during roll-out.

3.4.1 GRTLS Flight Phases

GRTLS flight phases for OFT entry flight consist of the following:

1. Mated coast (MM 601 and MC)
2. ET separation (MM 601 and ET SEP)
3. Alpha recovery (MM 602 and IPHASE = 6)
4. NZ hold (MM 602 and IPHASE = 5)
5. Alpha transition (MM 602 and IPHASE = 4)
6. TAEM (MM 603 and IPHASE = 0, 1, 2, 3)
7. AL (MM 603 and AL)

The major modes are defined in Level B CPDS, Section 3.3. The IPHASE parameter is defined in Level C FSSR STS 83-0001. Indication of flight phase is provided to the flight control module by GRTLS TAEM GUID and MSC. Flight control operation in each flight phase is described briefly in Table 3.4.1-1.

Other sequences of flight control function at the subphase level are determined in accordance with the additional indicators listed in Table 3.4.1-2.

Table 3.4.1-1.Flight Control System

Flight Phase	FCS Operation
Mated Coast	Manual and AUTO control via GC_STEER
ET separation	Manual and AUTO control via GC_STEER
Alpha recovery	Transition to MM 602; control from GRTLS guidance or manual inputs to GRTLS Aerojet DAP
Nz hold	Control from GRTLS guidance or manual inputs to GRTLS Aerojet DAP
Alpha transition	Control from GRTLS guidance or manual inputs to GRTLS Aerojet DAP
TAEM	Transition to MM 603; control from TAEM guidance or manual inputs to GRTLS Aerojet DAP
AL	Control from AL guidance or manual inputs to GRTLS Aerojet DAP

Table 3.4.1-2.Flight Control Function Indicators

Indicator	Source	Significance
QBAR_REGIME	Aerojet RECON	Initiate commands to aerosurfaces, shut off roll jet command, and increase the number of yaw jets from two to four as QBARFC passes through 2, 10, and 40 lb/ft ² , respectively
RETRACT_BF	AL Guid	Retract the body flap if the body flap channel is configured for automatic operation and the speed brake is contracted sufficiently
FLATTURN	Landing SOP	Initiate (during the AL flight phase) a period wherein lateral acceleration feedback, turn coordination, automatic aileron and rudder trim are discontinued provided the lateral axes are configured for automatic operation
WOWLON	Landing SOP	Initiate AUTO slapdown control
ROLLOUT	Landing SOP	Initiate touchdown rudder and speed brake configuration
LOAD_RELIEF	RECON	Initiate main gear load relief
GSENBL	Landing SOP	Enable nosewheel steering
ENTRY_SUBPHASE	RECON	Enables low forward loop gains or NO YAW JET aerodynamic options
MRB_RRXF	RECON	Mach dependent discrete to reconfigure roll rate crossfeed
ALT_ZERO_YAWJET	RECON	Mach dependent discrete to terminate yaw RCS control
MACH_REGIME_RUDDER	RECON	Mach dependent discrete to initiate rudder control
ZERO_PITCH_JET	Aerojet RECON	Shuts off Pitch Jet Command as QBARFC passes through I-loaded value of 40 lb/ft ²
MACH_REGIME_AILERON	RECON	Mach dependent discrete to reconfigure aileron trim
ETSEP_P_ENABLE	RECON, JSL	Initiate closed loop pitch control during ETSEP
ETSEP_R_ENABLE	RECON	Initiate closed loop roll control during ETSEP using pitch jets
ETSEP_Y_ENABLE	RECON	Initiate closed loop roll/yaw control during ETSEP using yaw jets
ETSEP_PR_ENABLE	RECON	Initiate closed loop pitch/roll control during Contingency ETSEP
YAW_RCS_DISCRETE	RECON	Altitude dependent discrete to increase yaw RCS on time
YAW_HYSTeresis_DISCRETE	RECON	Mach dependent discrete to reconfigure yaw hysteresis

3.4.2 Flight Control System Modes of Operation

The FCS modes of operation are organized into five main functional groups (pitch, roll/yaw, speed brake, body flap, and nosewheel steering) as shown in Table 3.4.2-1.

Table 3.4.2-1.GRTLS DAP Modes of Operation		
Channel	Mode	Operation
Pitch	AUTO_PITCH	<p>Control to attitude error and rate commands from GC_STEER (free drift during portion of ETSEP) in MM 601.</p> <p>Control to Alpha and Nz commands from GRTLS guidance in MM 602 and 603.</p> <p>Control pitch rate during slapdown and provide main gear loads relief after slapdown from within FCS.</p>
	CSS_PITCH	Augmented control to RHC pitch rate command
Roll/Yaw	AUTO_BANK	<p>Control to attitude error and rate commands from GC_STEER (free drift during portion of ETSEP) in MM 601.</p> <p>Control to roll angle command from GRTLS guidance in MM 602 and 603.</p>
	CSS_BANK	Augmented controls to RHC roll rate command
Speed Brake	AUTO_SB	Control to deflection command from GRTLS guidance in MM 602 and 603 (closed in MM 601).
	MAN_SB	Control to deflection command from SBTC.
Body Flap	AUTO_BF	Control to null elevator trim command
	MAN_BF	Control to discrete rate command from crew
	RETRACT_BF	Retract upon guidance command at transition to AL (subject to speed brake deflection being less than a specified value).
Nosewheel Steering	AUTO_BANK	<p>Control to yaw rate command from GRTLS guidance during roll-out when NWS1 or NWS2 true.</p> <p>Nosewheel free caster when NWS1 and NWS2 false.</p>
	CSS_BANK	<p>Augmented, lateral acceleration, control to RPTA commands during roll-out when NWS1 or NWS2 true.</p> <p>Nosewheel free caster when NWS1 and NWS2 false.</p>

3.4.3 Flight Control System Mode/Phase Combinations

All combinations of AUTO_PITCH/CSS_PITCH, AUTO_BANK/CSS_BANK, AUTO_BF/MAN_BF, and AUTO_SB/MAN_SB modes are allowed in all flight phases. The reconfiguration logic is required to process mode requests and to initiate and latch a corresponding mode combination.

3.4.3.1 Crew-Initiated FCS Mode/Configuration Changes.

Crew-initiated FCS mode switching or configuration change is accomplished through the use of the switches and controls shown in Figure 3.3.4-1. All of the items shown are provided at both crew stations

(commander [LH] and pilot [RH]). The illuminated pushbuttons shown within the large rectangle are located on the cockpit glare shield. These pushbuttons are momentary contact, nonlatching switches. The SPEED BRAKE TAKEOVER pushbutton is also a momentary switch. The BODY FLAP up/down switch is a spring-loaded, three-position toggle switch: momentary down (DOWN), maintain center (OFF), and momentary up (UP). The rotation hand controls (RHC) PITCH and ROLL produce analog signals proportional to deflection (these signals are associated with “hot-stick”moding). The ENTRY ROLL MODE switch is a three-position lever-lock switch.

An indication of the state of each switch is provided by the subsystem operating program (SOP) software. This includes determination of the best state estimate from a sampling of the redundant inputs based upon continuous failure assessment and the “ORing” of corresponding switches at the pilot’s (RH) and commander’s (LH) crew stations. The SOP software also processes the RHC deflections in a similar manner, and based upon the position in each axis from both crew stations, an indication of CSS takeover request is provided. Table 3.4.3-1 summarizes the crew actions required to initiate a particular FCS mode or configuration change. The request CSSRHCP and CSSRHCY correspond to “hot stick” activation in either RHC axis when that axis is currently configured in the AUTO mode.

Table 3.4.3-1.Crew Action Required to Initiate FCS Mode/Configuration Change

Software Request	Model Configuration	Crew Action Required
AUTOP	AUTO_PITCH	Depression of panel PITCH AUTO switch
CSSP	CSS_PITCH	Depression of panel PITCH CSS switch
CSSRHCP (RHC_STATE(2))	CSS_PITCH	Longitudinal RHC deflection greater than 6.0 degrees on either LH or RH controller*
AUTORY	AUTO_BANK	Depression of panel ROLL/YAW AUTO switch
CSSRY	CSS_BANK	Depression of panel ROLL/YAW CSS switch
CSSRHCY (RHC_STATE(1))	CSS_BANK	Lateral RHC deflection greater than 6.0 degrees on either LH or RH controller
AUTOSB	AUTO_SB	Depression of panel SPEED BRAKE switch
SBEV_LH or SBEV_RH	MAN_SB	Depression of either LH or RH SBTC SPEED BRAKE TAKEOVER switch
AUTOMANBF	AUTO_BF, MAN_BF	Depression of panel BODY FLAP switch
SEL_ENTRY_ROLL_ MODE_LGAIN (LGAIN)	EARLY	Select LGAIN with the ENTRY ROLL MODE switch
SEL_ENTRY_ROLL_ MODE_NO_YJET (NO YJET)	LATE	Select No YJET with the ENTRY ROLL MODE switch

*Except when load relief is active; then the value is 12.0 degrees

3.4.3.2 Crew Interface Functional Description.

Since the switches and controls utilized by the crew for mode change requests are mechanically and electrically independent functions, it is required that the reconfiguration logic establish a legality check to determine appropriate action in the event multiple requests are sensed during any given sampling period.

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The rules, which are to be applied in the sequence indicated, are as follows:

- *A. If both pitch requests (AUTOP and CSSP) are active, then AUTOP is processed as inactive.
- *B. If a CSSRHCP request is active simultaneously with an AUTOP request, then AUTOP is processed as inactive; if a CSSRHCP request is active simultaneously with a CSSP request, then the CSSP request is processed as inactive.
- C. If an active request corresponds to the presently active mode, then it is processed as inactive.
- D. Rules A, B, and C are applied in similar fashion to the roll/yaw request.
- E. The speed brake will be initialized to the AUTO mode on first pass. The top half (AUTO) of the commander's and pilot's speed brake annunciators will light up.
- F. The speed brake can be switched to its manual mode at either station via the SBTC takeover switch. The bottom half of the speed brake annunciator (MAN) will light up at the station where the switching request occurred. The speed brake annunciator at the other station will be off, both top and bottom.
- G. Manual speed brake control can be transferred from one station to the other by actuating the SBTC takeover switch at the station desiring control. The bottom half of the speed brake annunciator (MAN) will be in a steady-on state at the station having control. If the LH and RH SBTC takeover switches are depressed simultaneously, the SBTC SOP station select will give the LH switch precedence.
- H. To return the speed brake to automatic control, the speed brake pushbutton on the glare shield must be depressed. The top half of the speed brake annunciator (AUTO) will illuminate at both stations.
- I. The automatic body flap mode is engaged (with any pitch-roll/yaw mode combination) by actuating the lighted pushbutton BODY FLAP mounted on the glare shield. The top half of the pushbutton (AUTO) will illuminate at each station.
- J. The manual body flap mode is engaged by actuating the BODY FLAP pushbutton. The bottom half (MAN) of the BODY FLAP pushbutton switch on the glare shield will illuminate at each station.

<u>First Switch</u>	<u>Second Switch</u>	<u>FCS Command</u>
AUTO/Off	AUTO/Off	AUTO/Off
AUTO/Off	Up	Up
AUTO/Off	Down	Down
Up	AUTO/Off	Up
Up	Up	Up
Up	Down	Up
Down	AUTO/Off	Down
Down	Up	Up
Down	Down	Down

Two logic statements come out of the table:

1. Manual (i.e., Up or Down) takes precedence over Off.
2. Up takes precedence over Down.

This logic will be implemented in the Body Flap Slew SOP.

K. The ENTRY ROLL MODE switch permits the CDR to select alternate control modes. Selection of LGAIN results in modification of aileron, rudder, and elevator forward loop gains. Selection of NO YJET will ground the yaw jet commands, modify gains in the roll/yaw channel, and force CSS roll/yaw.

*When the LOAD_RELIEF discrete transitions to the enabled state, the pitch channel is initialized to AUTO_PITCH and takes precedence over all current crew-initiated mode requests (AUTOP, CSSP, and TAKEOVER_P). After this one time initialization of the pitch channel due to the LOAD_RELIEF discrete occurs, normal pitch channel mode resumes.

3.4.3.3 Annunciation.

Crew display of operating mode is accomplished by providing to the dedicated display SOP the required state of each of the lighted pushbutton annunciators shown in Figure 3.3.4-1. Table 3.3.4-1 identifies the operating mode corresponding to a given annunciator state. Unless otherwise stated, annunciator states are identical at both crew stations.

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4.0 FLIGHT CONTROL REQUIREMENTS

The digital autopilot, a single-thread flight control module, controls the vehicle in response to automatic and manual commands during entry, terminal area energy management (TAEM), and approach and landing (AL). The Transition and Aerojet DAP's control the vehicle during deorbit and the early phases of entry. Software modules of the Aerojet DAP control the vehicle also during TAEM and AL.

In the event of a launch abort and return to launch site (RTLS), the mated coast (MC) and ET separation (ETSEP) mini-DAP's phase into GRTLS DAP control of entry/TAEM and AL. The control effectors used include RCS jets, elevons, rudder, speed brake, body flap, and nose wheel.

The input/output (I/O) tables for the Aerojet and GRTLS DAP's are presented in this section. The MC and ETSEP I/O tables are incorporated also into the GRTLS tables as part of the Memory Configuration 1 flight software (FSW) load. The Aerojet DAP is in the Memory Configuration 3 FSW load. In addition to the I/O tables, constants and I-load parameters are presented in an alphabetically arranged index (Table 4-1).

Requirements precedence in this document shall be as follows:

1. If there is a conflict between the data in the function subtables and the standard principal function tables, the principal function tables (Appendix A) shall have precedence.
2. If there is a conflict between the data in the flow diagrams and the written requirements, the written requirements shall have precedence.

Tables 4.10.1-1, 4.10.1-2, 4.10.2-1, 4.10.2-2, 4.10.3-1 and 4.10.3-2 provide interface data found in the GN&C Interface Definition Database (IDD). For each principal function, input and output tables are included. Although the data shown in these tables duplicates much of the data provided in the principal function section, these tables are provided for traceability to the IDD, and for completeness. For any discrepancies, the Shuttle MML will have highest priority, followed by these tables, and finally the principal function internal tables.

Table 4.10.1-3, 4.10.2-3 and 4.10.3-3 provide I-load data. No values are provided in this document. Official values may be obtained from the I-loads requirement document (ILRD), JSC-19350.

Tables 4.10.1-4, 4.10.2-4 and 4.10.3-4 provide K-Load data with values associated with this flight software Operational Increment.

Tables 4.10.1-5, 4.10.2-5 and 4.10.3-5 provide Constants data compatible with hard coded flight software products and computer program design specifications.

An explanation of the data elements found in these four sets of parameter tables is given in section 1.3.

Table 4-1. Index of I-Loads, K-Loads, and Constants

Module	Name
PITCH CONTROL MODULES	
ALFCMD	TEG TG TS
ALFERRLIM	ALFERR_LIM
DEC_LIM	DECCMAX DECCMIN DECCSLP Q_PK_LOAD Q_STRUCT THETA_PK_LOAD THETA_STRUCT
ELERROR	GGD Q_PK_LOAD Q_STRUCT THETA_PK_LOAD THETA_STRUCT
ELSHAPE	GELError
ELFBK	GELFBK
ESHAPE	DEMAX KDEMLIN
GDQ_COMP	TKPIT QBAR_OFFSET GDQ_MAX GDQ_MIN
GDSB_COMP	TGDSB
GEAR_FILTER	GF
GPC_COMP	KGPC GPC_UL GPC_LL
GPPANT_MOD	GPPANT
GPRHC_COMP	TGPRHC
GQAL_COMP	TGAL
GQALR_MOD	GQALR
GSBHI_MOD	GSBHI
GSBLO_MOD	GBLO
GSD_FILT	GSD
GTAS_COMP	VCO GTAS_OFS
LREL_COMP	TLREL
NZCOMP	CPHIMIN
NZC_SM	TG

Table 4-1. Index of I-Loads, K-Loads, and Constants

Module	Name
NZERR_FD	TS GQN NZFDfilt
NZ_FILTER	GQN GNZfilt
PBBF	GEBB GEBC
PIO_FILTER	PSF SFA SFB PSFL XKQ
PRHCT	GPRHCT DETR_LIM TM
QBLIM_MOD	QBLIML
SDCMP	WGT_SD EAS_SD QC_NOM QC_ALT TQCFADE
UYBB_FILTER	UYBB
VPBBF_ELV	GEBA
VPBBF_MGT1	GMGA GMGB GMGC
VPBBF_MLT1	GMLA GMLB GMLC
ROLL CONTROL MODULES	
ABF	GBA
ABFF	GPA GPB
AIL_DBMOD	AIL_DB
ATRIM	TF
AUTO_LOAD_BALANCE	GO DEG_PER_RAD KDAB_AUTO TRWY_FADE TF KDAB_CSS

Table 4-1. Index of I-Loads, K-Loads, and Constants

Module	Name
BANKERR_THRESH	TDAXFD
BANK_SUM	PHI_MOD
BETASINALF	GSBETA
BRCOR	GO
	GRPHI
	R_ETV
	TAN_LIM
COTALF_COMP	COTALF_LIM
DNYP_COMP	GHLBY
DATRIM_LIM_COMP	DATRIM_LIM
	DATRIM_LIM_NYJET
DRR_LIM_COMP	DRR_LIM
	DRR_LIM_NYJET
GALR_CMD	GALR_BIAS
GALR_COMP	TGALRT
GALR_MOD	GALRE
GALRD_COMP	TGALRD
GBAY_COMP	TGBAY
GERYFWD_COMP	GRYFWDLO
GPAY_COMP	TGPAY
GPBANK_COMP	TGPBANK
GRPANT_MOD	GRPANT
GRRHC_COMP	TGRRHC
GTRA_COMP	TGTRA
GTRIMB_COMP	GTRIMB
	GTRIMB_NYJET
PCLIM_COMP	TPCLIM
PCLIM_COMP_NYJET	TPCLIML
QUAD_COMP	TKDAMLIN
	TKDAMPAR
	TDAMAX
ROLLJET_BBF	GPRJA
	GPRJB
ROLL_STICK	GDAMS
	GRRHCT
	DATLIM
	TF
TAEM_BANKC_SMOOTH	TG
	TS

Table 4-1. Index of I-Loads, K-Loads, and Constants

Module	Name
YAW CONTROL MODULES	
BETACOSALF	GBETA
BYCOR	GRPHI
	R_ETV
	SIN_LIM
	GO
DELRF_COMP	KYRUP
	KYRLWR
	KYRML
	KYRMU
DRT_INT	GDRTI
	TS
	DRT_LIM
ESTIMATED_BETA	ALFLIM
	KLIM
	KCON
	KPAR
	KRCMP
	KJCMP
	GDISP
	GBETA
GDRC_COMP	TKDRC
	GDRC_MAX
	GDRC_MIN
	QBARB
GNYDRM_COMP	TGNYDRM
GPFBAY_COMP	TGPFBAY
GRAY_COMP	TGRAY
GRCSA_MOD	GRCSA
	GYJR
GRH_COMP	TGRH
GTRR_COMP	TGTRR
KRMBETA_COMP	KBETAL
	KBETAU
	KBMACHU
	KBMACHL
KYAIL_COMP	KYAUP
	KYALWR
	KYMACHU
	KYMACHL
NYCOMP	GDGA1

Table 4-1. Index of I-Loads, K-Loads, and Constants

Module	Name
PNY_COMP	PTHL
RRCS_FEED	RTHL
RUD_INT	GRRCS DRTRIM_LIM TF
RUDSHAPE	DRMAX KDRMLIN KDRMPAR
YAW_RATE_BBF	RBBF
YAWJET_BBF	GRCYJA GRCYJB
YBB_FILTER	GRCA GRCB
BETA_FILTER	GBDFILT
AEROJET UTILITY FUNCTIONS	
FIRST_ORDER_FILTER	GX
SECOND_ORDER_FILTER	GX
FOURTH_ORDER_FILTER	GA GB
FADER	NFADZ
HYSTER	XADB XBOB
SMOOTHER	NX TMAJOR TMINOR
SPEED-BRAKE CHANNEL	
ENT_SB_SCHED	TDSBCOM
GDSBMAN_MOD	GDSBMAN
SBCMD	DSB_MAX DSB_MIN_L DSB_MIN_U DSB_DEF_L_MC
SB_LIM_BIAS	DSB_MIN_L DSB_MIN_U DSB_MIN_M DSB_BIAS_U MACH_SBH

Table 4-1. Index of I-Loads, K-Loads, and Constants

Module	Name
BODY-FLAP CHANNEL	
BODY_FLAP_CHANNEL	CTBFINT DBFRET DBFD CTBFINT DBFD LLIM TS ULIM DBFADBN DBFADBP DBFBDB BFRADB BFRBDB TDETD TGBFAUTO TGBFMACH GBFMAN TGBFR
BF_DEF_CMD	
BF_HYSTER	
BF_RATE_CMD	
DTED_SCHED	
GBFAUTO_MOD	
GBFMACH_SCHD	
GBFMAN_MOD	
GBFR_SCHED	
NOSEWHEEL CHANNEL	
AUTONW	GDRGB GNWR
DRG_COMP	GRR
NYFB_BBF	GNY GNYR
DR_LIM	DR_LLM
MANNW	DNWMAX KNWMLIN KNWMPAR
NWCMD	TNWFADE DNWC_LIM
NYFB_NWS	GNYNWS
JET_LOGIC	
JET_SEL_LOGIC	IYAW_CYCLE DT_PITCH_ERR_TAB PITCH_ERR_LIM PITCH_ERR_TAB Q_BAR_A_LIM

Table 4-1. Index of I-Loads, K-Loads, and Constants

Module	Name
MINI-DAP MODULES	
CONT_ETSEP_PITCH_CHAN	CONT_KSEPY CONT_QSEP_LIM
CONT_ETSEP_ROLL_CHAN	CONT_KSEPX CONT_PSEP_LIM
CONT_ETSEP_YAW_CHAN	CONT_KSEPZ CONT_RSEP_LIM
CONT_MC_PITCH_CHAN	CONT_KMCY CONT_QMC_LIM
CONT_MC_ROLL_CHAN	CONT_KMCX CONT_PMC_LIM
CONT_MC_YAW_CHAN	CONT_KMCZ CONT_RMC_LIM
CONT_PITCH_QUANT	QE1 QE2 QE3 QE11 QE12 QE13 Q_REG4_FC LOW_PCH_GAIN ALF_REG4_FC P_MC_1 P_MC_2 UY1 UY11 UY12 UY2 PE1 PE2 PE3 PE4 PE5 PE6 PE7 DEL_MC1 UX1 UX13 RE1 RE2
CONT_ROLL_QUANT	
CONT_YAW_QUANT	

Table 4-1. Index of I-Loads, K-Loads, and Constants

Module	Name
ETSEP_ROLL_CHAN	RE3 RE4 RE5 RE6 UZ1 UZ2 LRE KRB_ETSEP P_ERROR_DBAND
ETBB_FILTER	ETBB
ETSEP_YAW_CHAN	GDRJ LRU LYP KDR KYB KYD KYP KYR MCBB KMCY QEBFB_LIM
MCBB_FILTER	KMCX PEBFD_LIM
MC_PITCH_CHAN	KMCZ REBFB_LIM
MC_ROLL_CHAN	QE UY PE UX NP_LOW NP_HIGH RADB RBDB
MC_YAW_CHAN	DRJETTH NR RE1 RE2 RE3 RE4 RE5
PITCH_QUANT	
ROLL_QUANT	
YAW_QUANT	

Table 4-1. Index of I-Loads, K-Loads, and Constants

Module	Name
	UZ1 UZ2 UZ11 YADB_LO YADB_HI YBDB_LO YBDB_HI
	AEROJET UNIQUE MODULES
ALFERR_FILT	GALFERR
ALFERRLIM_TAL	ALFERR_LIM_TAL
ETRIM_INT	DETRIM_MAX DETRIM_MIN TF
GJET_COMP	TGJET
GTRE_COMP	TGTRE
PITCH_HYST	NQLO NQHI DPJET_CUTOFF PADB PBDB
QCOMP	TANPHI GQCOMP
BANKERR_THRESH_NYJET	TDAXFDL
ENT_BANKC_SMOOTH	TEG TS
ROLL_HYST	PE_CUTOFF NP_LOW NP_HIGH RADB RBDB
SDCMP	WGT_SD EAS_SD QC_NOM QC_ALT
WRAP_COMP	WJETD WJETD1 WJETD2 WJETD3 WJETD4 WJETHYST

Table 4-1. Index of I-Loads, K-Loads, and Constants

Module	Name
YAW_HYST	WJNR1_LOWQ WJNR2_LOWQ WJNR3_LOWQ WJNR4_LOWQ WJNR1_HIGHQ WJNR2_HIGHQ WJNR3_HIGHQ WJNR4_HIGHQ YADB_LO YADB_HI YBDB_LO YBDB_HI NR DRJETTH
PTI_DRIVER (PF 4.248)	DBLET_PAMP_N DBLET_PWIDTH_N DBLET_PINT_N DBLET_PDAMP_N DBLET_PFFT_N PTI_START_N PTI_STOP_N MACH_ADTA WINDOW_LE(N) WINDOW_TE(N) QBAR_WINDOWS MACH_WINDOWS MACH_ADTA RATE_LIMIT(N)
PTI_SEQUENCER	
DEPTI_MOD PJPTI_MOD DAPTI_MOD AILCMD YJPTI_MOD DRPTI_MOD RUDCMD GDA_COMP	TF TM TF DAC_LIM TM TF DRC_LIM GDA_MAX GDA_MIN GDAB TKGDA

Table 4-1. Index of I-Loads, K-Loads, and Constants

Module	Name
GRTLS UNIQUE MODULES	
ETRIM_INT	DETRIM_MAX DETRIM_MIN TF
GTRE_COMP	TGTRE GTRE_AUTO_6 GTRE_CSS_6
QCOMP	GQCOMP TANPHI_LIM
ROLL_STICK	GDAMS GRRHCT DATLIM TF
AILCMD	DAC_LIM
RUDCMD	DRC_LIM_FLIGHT DRC_LIM_ROLLOUT
GDA_COMP	GDA_MAX GDA_MIN GDAB TKGDA TXKALP
SDCMP	EAS_SD QC_NOM
CONT_BF_RATE_CMD	BFBIAS CBFRADB CBFRBDB CGBFR
PRIORITY RATE LIMITING	
PRIO_RATE_LIMITING	BRAKE_FLOW DACDOT_LIM1 DACDOT_LIM2 DACDOT_LIM3 DACDOT_LIMW DBFL DECCDOT_LIM1 DECCDOT_LIM2 DECCDOT_LIM3 DECCDOT_LIMW DELVC_MAX DELVC_MIN

Table 4-1. Index of I-Loads, K-Loads, and Constants

Module	Name
	DLIM
	DRDOT_LIM1
	DRDOT_LIM2
	DRDOT_LIM3
	DRDOT_LIM_SLIM1
	DRDOT_LIM_SLIM2
	DRDOT_LIM_SLIM3
	DSB_CLOSED
	DSBDOT_NLIM11
	DSBDOT_NLIM12
	DSBDOT_NLIM13
	DSBDOT_NLIM2
	DSBDOT_NLIM_SLIM1
	DSBDOT_NLIM_SLIM2
	DSBDOT_NLIM_SLIM3
	DSBDOT_PLIM1
	DSBDOT_PLIM2
	DSBDOT_PLIM3
	FLOW_AVAIL
	KEIO
	KEIS
	KEOO
	KEOS
	KQR
	KQSB
	LEAKAGE1
	LEAKAGE2
	LEAKAGE3
	LIMPR_LA
	LIMPR_HA
	LNDG_GR_FLOW
	LNDG_GR_LEAKAGE
	NWS_FLOW
	SB_SOFT_STOP
	SLIMHYS
	SSME_ISOL_VLV_LEAKAGE
	TAS_SW
	TF
	WONG_LEAKAGE

4.2 INITIALIZATION, MODING, AND SEQUENCING REQUIREMENTS

4.2.1 Parameter Initialization

Parameter initialization requirements are specified in this document at the local level. The detailed requirement subsection for each function module specifies initialization requirements for parameters within the module. This does not preclude centralized initialization in the software implementation subject to the stated initialization requirements.

- A. Initialization of a module is understood to mean the process of assigning values to variable quantities referenced by that module whenever a discrete change in external conditions requires it.
- B. Dynamic initialization of a module means that the initialization may use the current value of variable quantities, rather than being restricted to the use of constants. An example of dynamic initialization is the initialization of a filter based upon the current value of its inputs, as opposed to simply setting the filter output and nodes to zero.
- C. Local initialization of a module permits the use of quantities computed in modules executed prior to the one being initialized. Since local dynamic initialization is specified in this document, it is suggested that the initialization functions be implemented within each function module.
- D. In general, filter initialization has been specified to occur when, and only when, the filter goes from an inactive to an active state. Filters are inactive (not executed) when their outputs are not being used. Filters are discussed further in Subsection 4.9.
- E. In general, fader triggering has been specified to occur when, and only when, the source of the immediate input to the fader changes. Fader clearing has been specified to occur when the fader goes from an active to an inactive state. (Clearing means that any fader action that may be in progress is terminated, so that the fader output equals the input.) Faders are discussed further in Subsection 4.9.4.
- F. The first-pass condition, which is specified for some initializations, is defined as the initial activation pass through the flight control module after it has been in an inactive state.
- G. The implications upon initialization concerning function module grouping according to sample rate are discussed in Subsection 4.2.3.

4.2.2 DAP Reconfiguration Module (RECON)

The DAP reconfiguration module (RECON) performs moding, sequencing, and initialization functions unique to the flight control DAP modules:

1. Moding in response to major mode/subphase changes and crew or system initiated mode change requests.
2. Module sequencing control by means of flags or indicators generated for the control law module.
3. Initialization control in response to startup and major mode/subphase transitions.
4. Buffering of mode and subphase indicators so that initialization and sequencing requirements are met prior to execution of a particular module.

5. Annunciation of operating modes – RECON modules interface with other GN&C major functions as follows:
 - a. Master sequencing and control (MSC) software – Provides RECON modules with indicators for first-pass and flight phase, and with mission elapsed time.
 - b. Subsystem operating program (SOP) software – Provides RECON modules with crew-initiated mode change requests and flight parameters; receives mode status discretes from RECON modules to actuate annunciators.
 - c. Flight computer operating system (FCOS) – Provides overall scheduling and timing control.

The context in which the Aerojet and GRTLS DAP are used may be readily related to the software major modes. The major modes are numbered as follows:

- 101 – Terminal count
- 102 – First stage
- 103 – Second stage
- 104 – OMS 1 insertion
- 105 – OMS 2 insertion
- 106 – Insertion coast
- 201 – Orbit coast
- 202 – Maneuver execute
- 301 – Predeorbit coast
- 302 – Deorbit execution
- 303 – Pre–entry monitor
- 304 – Entry
- 305 – TAEM/landing
- 601 – RTLS second stage
- 602 – Glide RTLS 1
- 603 – Glide RTLS 2

If there is a mission abort during launch and a decision to return to the launch site (RTLS), then, and only then, is the GRTLS DAP used. A summary of moding is presented in Table 4.2–1.

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During a nominal mission, the GRTLS DAP is not used, being maintained in reserve during Memory Configuration 1. The Aerojet DAP is used during Memory Configuration 3, beginning with Major Mode 304, Table 4.2-2.

If a reentry is made with IUS payload undeployed, an item entry is made to cause a different set of body bending filters to be used in the AEROJET DAP. This set of filters is also used in the GRTLS DAP. The item entry is ITEM 21* on the OVERRIDE CRT page.

* ALT_ELV is available through Item 18 on the OVERRIDE CRT page (SPEC 051).

The Aerojet DAP (Principal Function 4.36) is brought on-line by the crew (OPS 304 PRO) at the transition from Major Mode 303 to Major Mode 304, Event El6. The two-axes RHC SOP is initialized, and the three-axes RHC SOP is terminated. Any PTI testing would be performed prior to OPS 305, PRO, transition from Major Mode 304 to Major Mode 305. TAEM guidance is brought on-line at this time, Event 21. The transition to Autoland is identified as Event 22A.

AEROJET RECON determines the ENTRY_SUBPHASE, QBAR_REGIME, ZERO_YAWJET, MACH_REGIME_RRKF, MACH_REGIME_RUDDER, TURN_COORD, MACH_REGIME_AILERON, ZERO_PITCH_JET, YAW_RCS_DISCRETE, ALT_ZERO_YAWJET, MACH_PHIERR, and MACH_SB as indicated in Figure 4.2-2.

AEROJET RECON shall monitor flight conditions during TAL to determine if the necessary flight control system constraints on allowing an OMS/RCS interconnected dump have been satisfied. The FCS_ACCEPT_ICNCT flag shall be set true by AEROJET RECON in MM 304 if a TAL abort has been declared and if the following conditions are satisfied for FCS_INTC_COUNT consecutive passes; else the FCS_ACCEPT_ICNCT flag shall be set false.

- 1) The absolute difference between the commanded angle-of-attack and the actual angle of attack is less than the angle-of-attack limit ($|ALPCMD - ALPHA_N| < ALPHA_LIM_INTC$)
- 2) The absolute difference between the commanded bank angle and the actual bank angle is less than the bank angle limit ($|PHIC - PHI| < PHI_LIM_INTC$)
- 3) The magnitude of the body rates are less than their corresponding limits ($|P| < P_LIM_INTC, |Q| < Q_LIM_INTC, |R| < R_LIM_INTC$)

In the event of an RTLS abort, GRTLS DAP RECON is activated by Event A35. At Event A35, the portion of GRTLS DAP RECON required to support the MC and ETSEP moding is initiated. First-pass initialization for this portion of GRTLS DAP RECON is performed. This processing includes the MC and ETSEP mode indicators and the ETSEP_P_ENABLE, ETSEP_R_ENABLE, ETSEP_PR_ENABLE, ETSEP_Y_ENABLE, and SEP_COMPLETE discretes. From Event A35 to Event A39, moding of GRTLS DAP auto/CSS is controlled by ASC DAP RECON.

The ETSEP Mode Indicators are modified extensively to allow more flexibility in the use of the RCS Jets for roll and pitch control. Separate enable mode indicators were assigned to the roll and pitch axes, ETSEP_R_ENABLE and ETSEP_P_ENABLE to allow the pitch axis to be enabled sooner than the prescribed I-Loaded timer if the total pitch error signal, PITCH_ERRT exceeds a predefined I-Loaded redline profile. This feature was incorporated to prevent nose-down loss of control during the open loop -Z burn, should jet failures and dispersions combine to prevent the Orbiter from performing the pitch-up safely. The other significant change to the mode indicators allows the RCS yaw jets to be used for roll

control when the yaw jets are not being used for yaw control, so for this reason, the roll channel and the quantized roll error signal, UXCMD are enabled when ETSEP_Y_ENABLE is TRUE. The ETSEP_R_ENABLE Indicator is only used to activate the pitch jets for roll control when its I-Loaded timer is satisfied.

At Event A39, the portion of GRTLS DAP RECON required to support the GRTLS TAEM and GRTLS AL phases is initiated. First-pass initialization for this portion of GRTLS DAP RECON is performed at Event A39.

GRTLS RECON determines the mode indicators MC, ETSEP, AL, and IPHASEB (Figure 4.2-1). The discretes of SEP_COMPLETE, QBAR_REGIME, PIO_ON, ENTRY_SUBPHASE, MRB_RRXF, ZERO_YAWJET, TURN_COORD, ZERO_PITCH_JET, MACH_REGIME_RUDDER, MACH_REGIME_AILERON, ETSEP_P_ENABLE, ETSEP_R_ENABLE, ETSEP_PR_ENABLE, ETSEP_Y_ENABLE, YAW_RCS_DISCRETE, ALT_ZERO_YAWJET, and MACH_PHIERR are determined as indicated in Figure 4.2-2. Crew mode change requests are processed as shown in Figures 4.2-3, -4, -5, and -6 to determine MODE_PITCH, MODE_BANK, MODE_SB, MODE_BF, and the associated status lamp discretes.

GRTLS RECON shall monitor flight conditions to determine if the necessary flight control system constraints on allowing an OMS/RCS interconnected dump have been satisfied. The FCS_ACCEPT_ICNCT flag shall be set true by GRTLS RECON in MM 602 if the following conditions are satisfied for FCS_INTC_COUNT consecutive passes; else the FCS_ACCEPT_ICNCT flag shall be set false.

- 1) The absolute difference between the commanded angle-of-attack and the actual angle-of-attack is less than the angle-of-attack limit ($|ALPCMD - ALPHA_N| < ALPHA_LIM_INTC$)
- 2) The absolute difference between the commanded bank angle and the actual bank angle is less than the bank angle limit ($|PHIC_AT - PHI| < PHI_LIM_INTC$)
- 3) The magnitude of the body rates are less than their corresponding limits ($|P| < P_LIM_INTC, |Q| < Q_LIM_INTC, |R| < R_LIM_INTC$)

Buffering is performed as needed for other discretes that govern the operating status of the GRTLS DAP channels.

It is assumed that all indicators received from MSC are legal.

It is further assumed that the guidance module is executed before the flight control module at guidance mode transitions.

The flight phase indicators MC, ETSEP, AL, and IPHASEB = 0, 1, 2, 3, 4, 5, or 6 are mutually exclusive.

The GRTLS RECON does not interface with E/L LT PROC until Event A39. ASCENT RECON interfaces with the lamps up to Event A39, to allow manual ETSEP selection.

- A. Processing Requirements – RECON is processed at 6.25 Hz.
- B. Interface Requirements – RECON interface requirements are presented in Table 4.2-3.
- C. I-Loads – The I-loads required by RECON are listed in Table 4.2-4.

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D. Initialization Requirements – On first pass, the RECON indicators are initialized as shown in Table 4.2–5.

Table 4.2-1. Summary of FCS Status During RTLS					
MM_CODE	Major Mode	Major Mode Subphase	QBAR_REGIME*	MACH Regime	Events
601	RTLS second stage	Powered RTLS	LOWQ LOWMIDQ		Event A36A, zero thrust, terminate ASC DAP Event A35, RTLS MECO CMD Event A37, RTLS ET separation command or FAST SEPARATION flag and no Event A35
		Mated coast, MC			Event A39, transition to MM 602 end of separation burn
		ETSEP			
602	Glide RTLS 1	IPHASEB = 6,5,4	HIGHMIDQ		Terminate Roll Jets
			HIGHQ		Terminate Pitch Jets Activate Rudder Reconfigure Aileron Trim
			ZERO_PITCH_JET		Event A41, transition to MM 603
603	Glide RTLS 2	IPHASEB = 0,1,2,3		M < MACH_YAWJET M < MACH_RRXF	Terminate Yaw Jets Reconfigure Roll Rate Crossfeed TG_END, transition from GRTLS TAEM GUID to GRTLS AL GUID
				AL	Initiate Flattail Weight on Main Gear (WOWLON) Rollout NW Steering Enable Load Relief

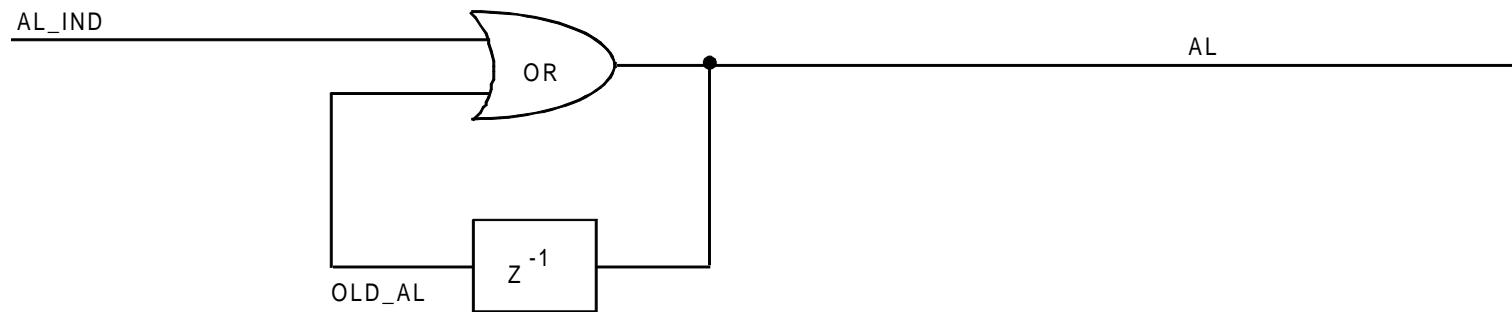
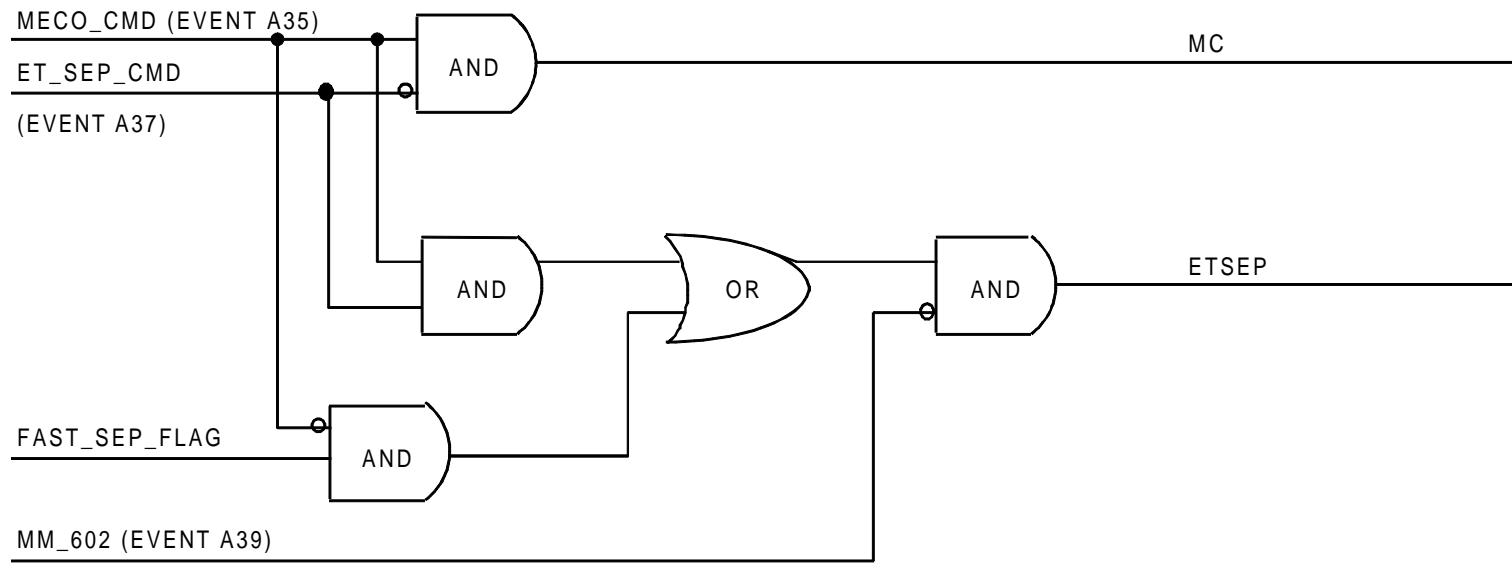
*See Figure 4.2–2

Table 4.2-2. Summary of FCS During Entry

MM_CODE	Major Mode	Major Mode Subphase	QBAR_REGIME	MACH Regime	Events
304	ENTRY		LOWQ LOMIDQ HIGHMIDQ HIGHQ ZERO_PITCH_JET	M < MACH_AILERON M < MACH_RUDDER	Start Aerojet DAP on PRO 304 Initiate aerosurface commands Terminate Roll Jets Reconfigure Aileron Trim Activate Rudder Terminate Pitch Jets
305	TAEM/LANDING	TAEM AL		M < MACH_YAWJET M < MACH_RRXF	Terminate Yaw Jets Reconfigure Roll Rate Crossfeed E22A Transition to AL Initiate FLATTURN Weight on Main Gear (WOWLON) Rollout NW Steering Enable Load relief

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GRTLS_MODING



NOTE: IF NOT MC AND NOT ETSEP AND NOT AL, THEN IPHASEB = IPHASE

FIGURE 4.2-1. Generation of GRTLS DAP Moding Indicators

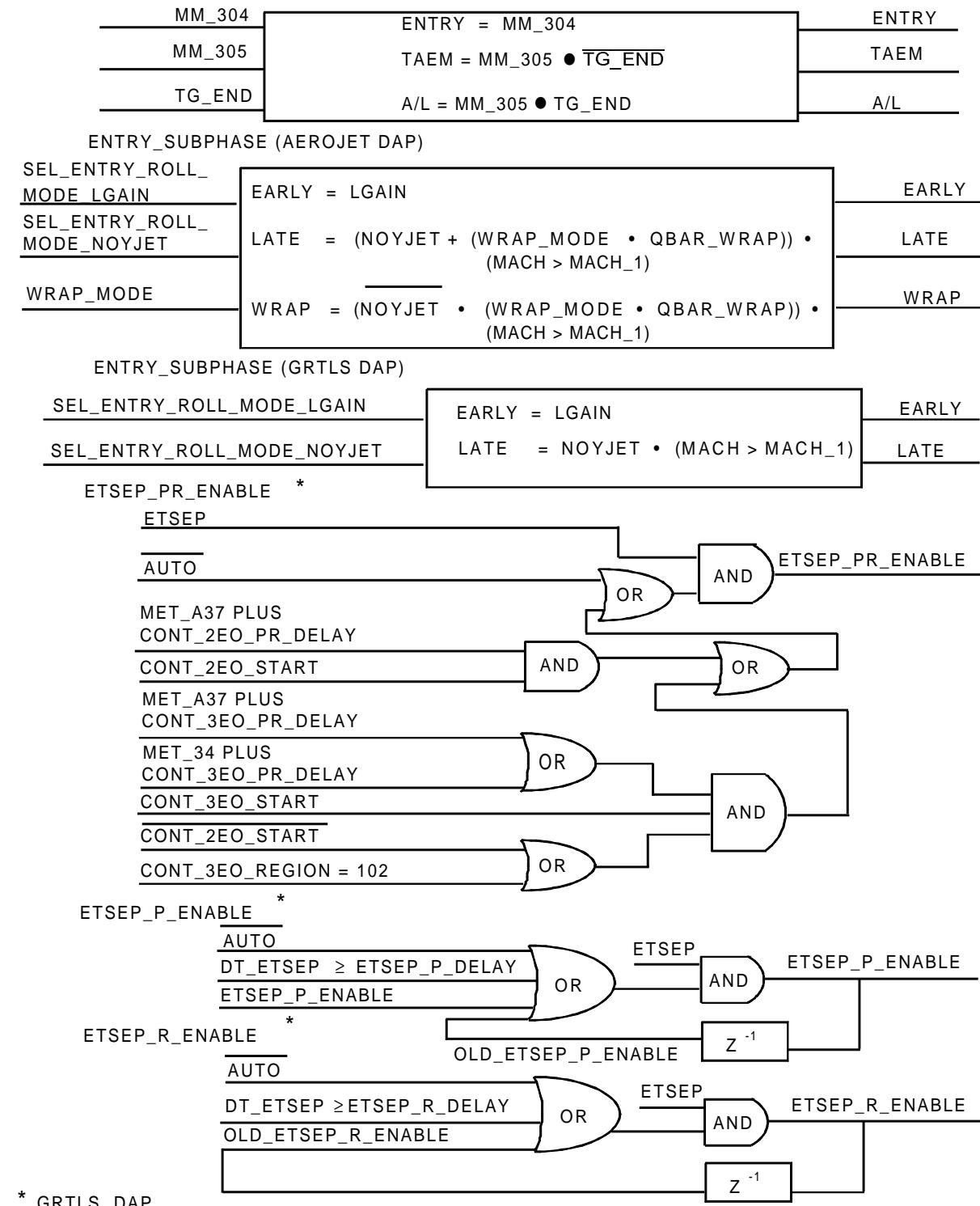


FIGURE 4.2-2.(1) Determination of Subphase Indicators for Moding and Sequencing Control
(Sheet 1 of 7)

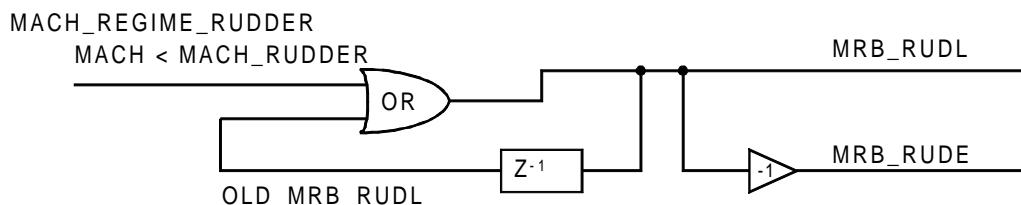
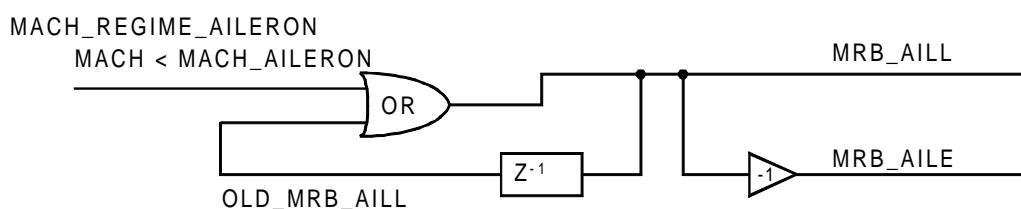
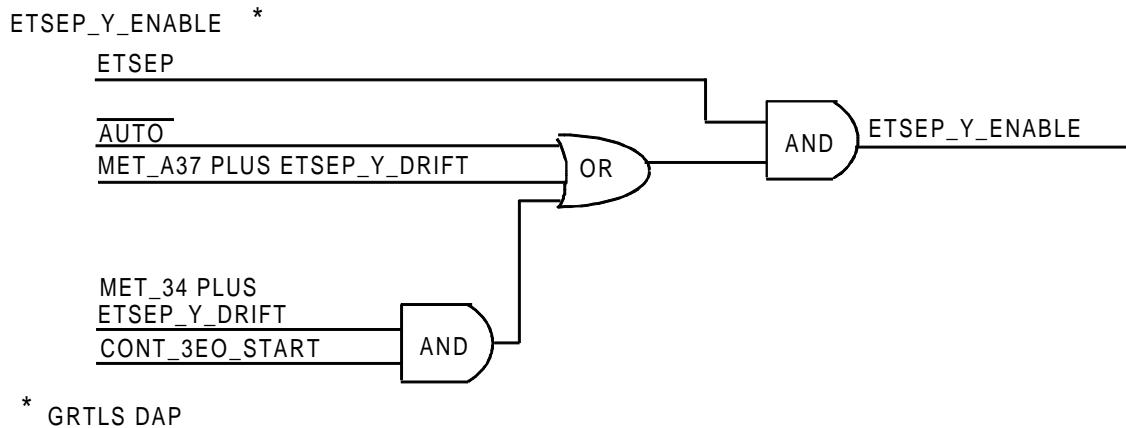
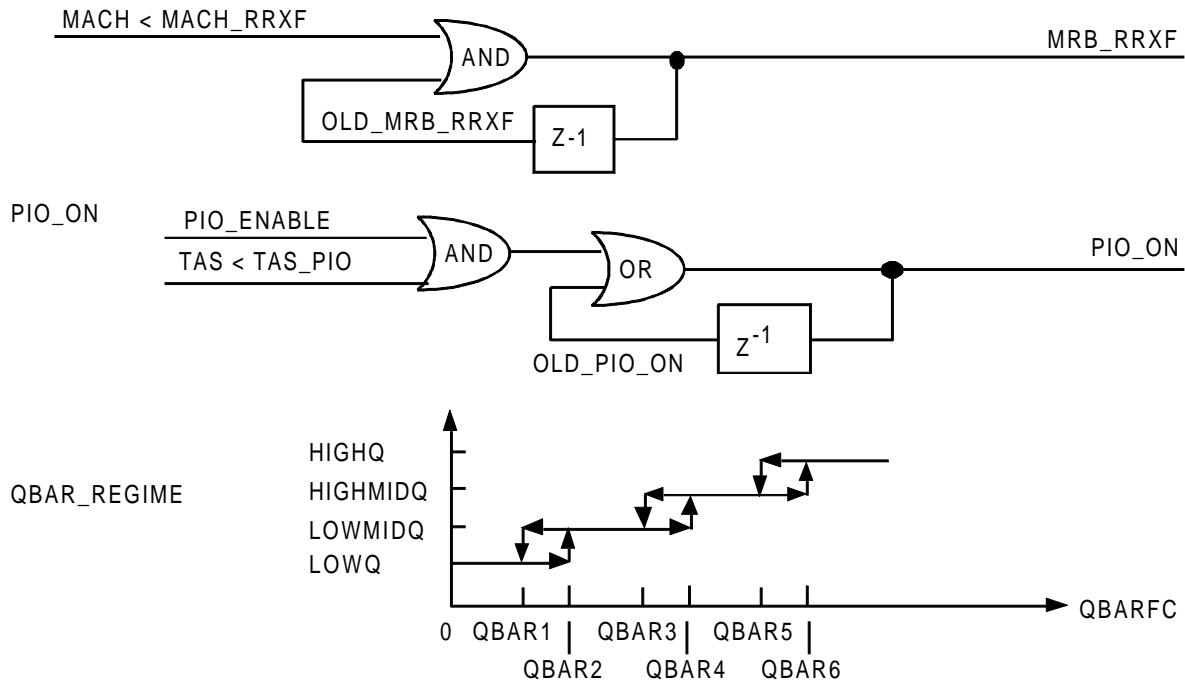


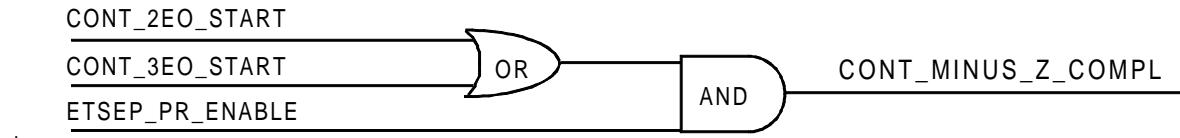
FIGURE 4.2-2.(2) Determination of Subphase Indicators for Moding and Sequencing Control
(Sheet 2 of 7)

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MACH_REGIME_RRXF

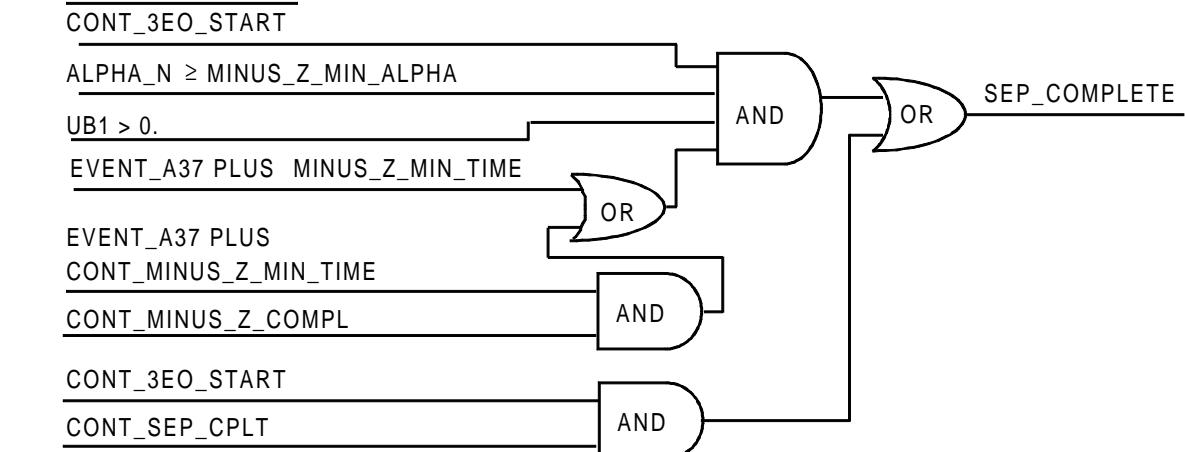


CONT_MINUS_Z_COMPL *



* GRTLS DAP

SEP_COMPLETE *



* GRTLS DAP

FIGURE 4.2-2.(3) Determination of Subphase Indicators for Moding and Sequencing Control
(Sheet 3 of 7)

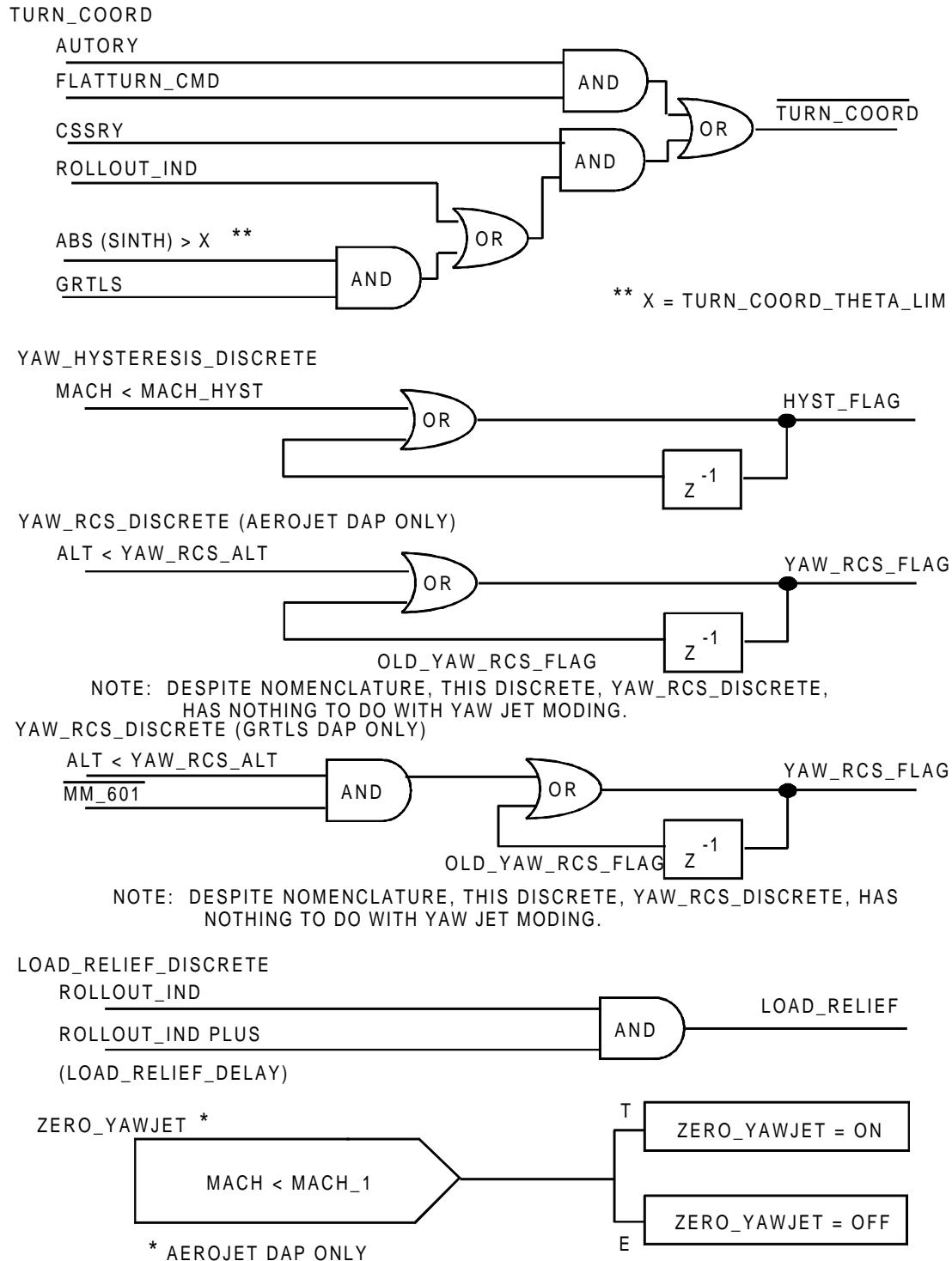


FIGURE 4.2-2.(4) Determination of Subphase Indicators for Moding and Sequencing Control
(Sheet 4 of 7)

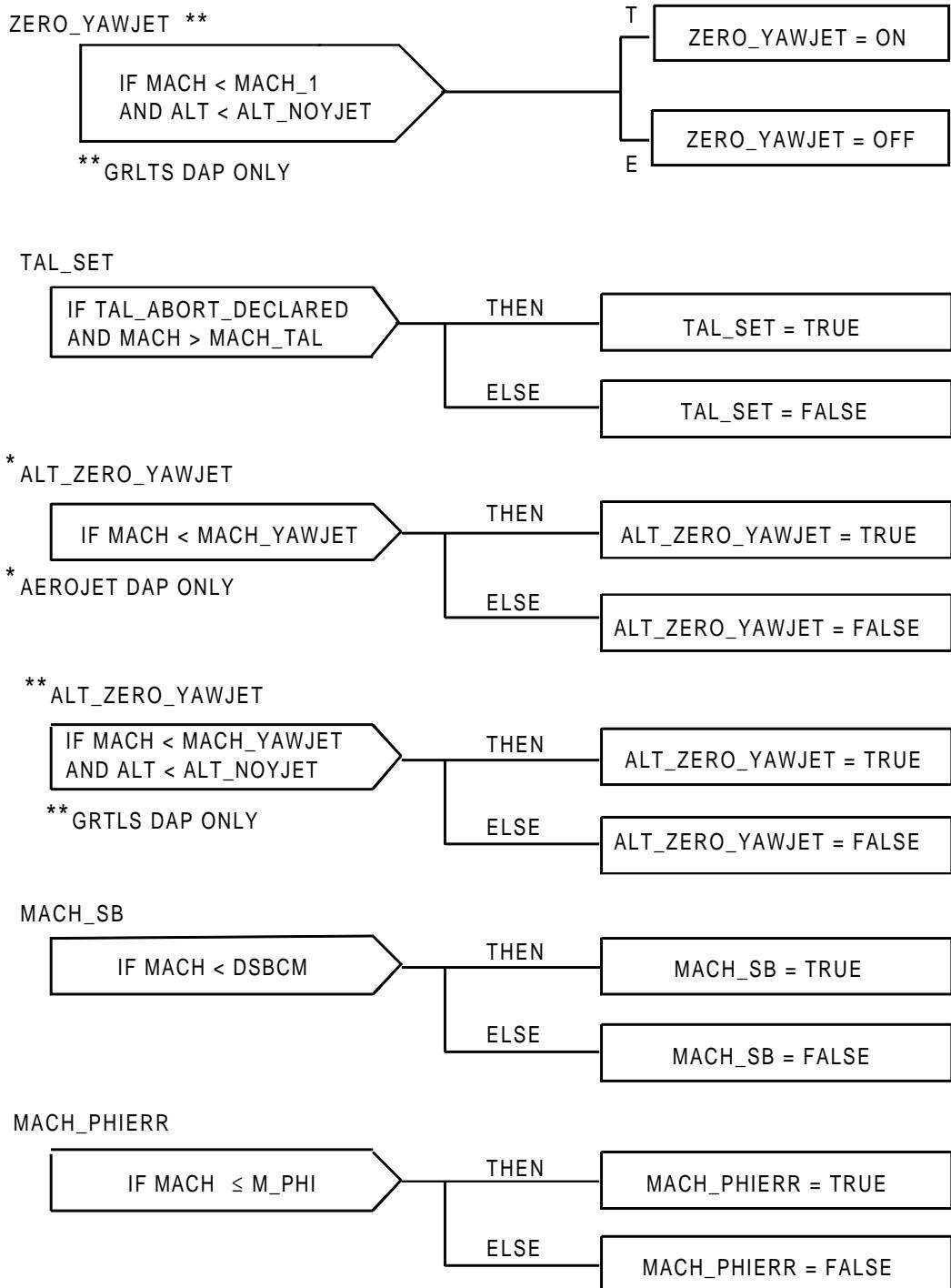


FIGURE 4.2-2.(5) Determination of Subphase Indicators for Moding and Sequencing Control
(Sheet 5 of 7)

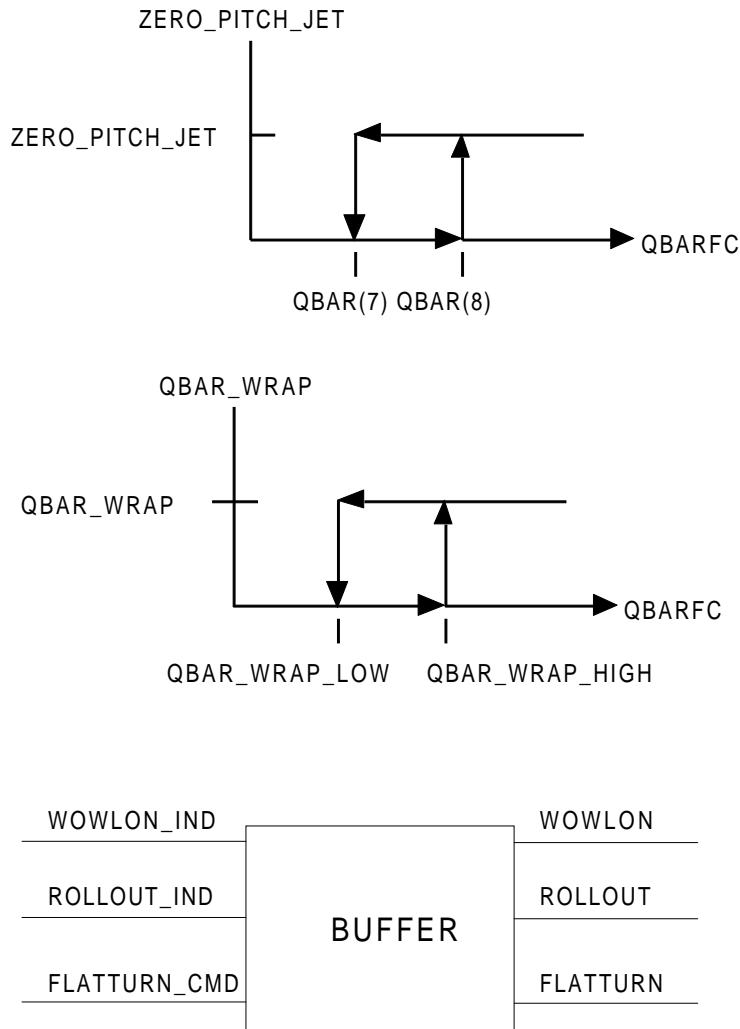


FIGURE 4.2-2.(6) Determination of Subphase Indicators for Moding and Sequencing Control
(Sheet 6 of 7)

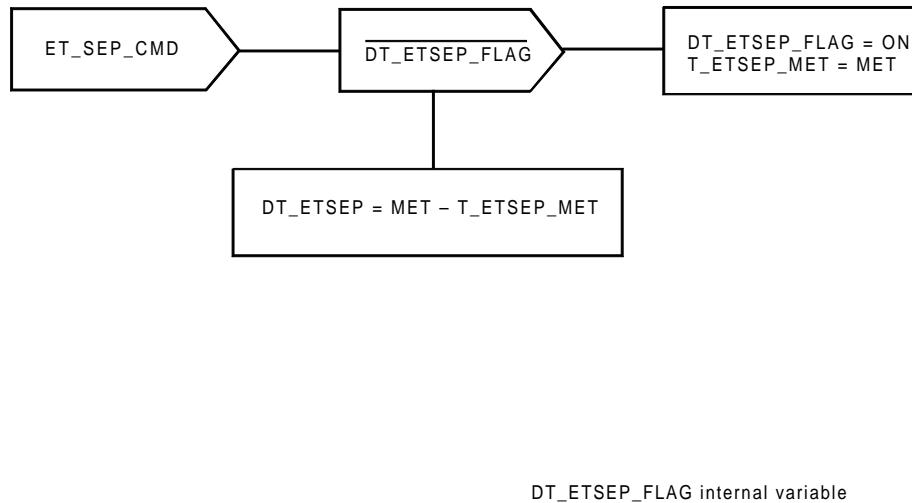
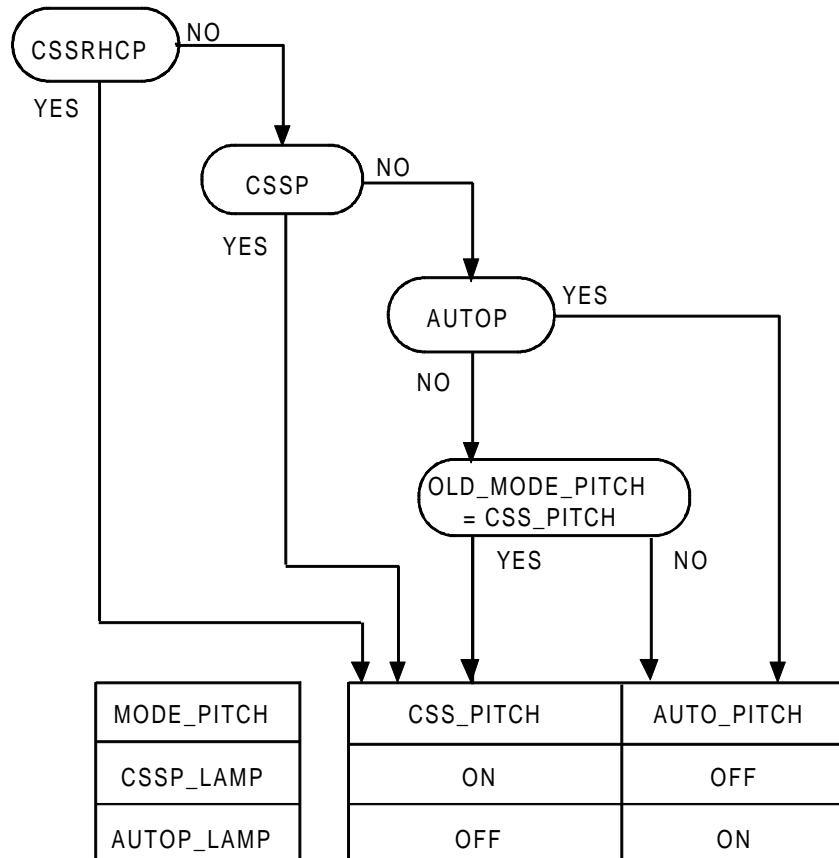
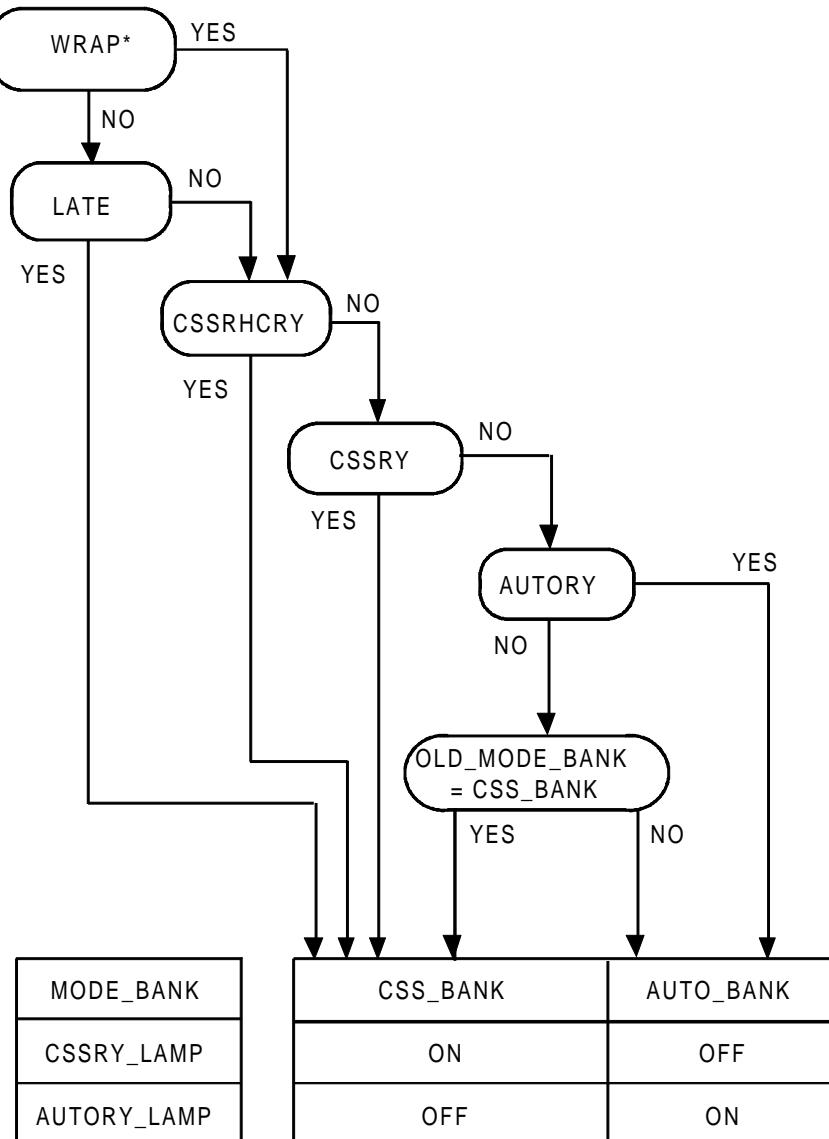


FIGURE 4.2-2.(7) Determination of Subphase Indicators for Moding and Sequencing Control (Sheet 7 of 7)



NOTE: When the LOAD_RELIEF discrete transitions to the enabled state, the pitch channel is initialized to AUTO_PITCH and takes precedence over all current crew-initiated mode requests (AUTOP, CSSP, and TAKEOVER_P). After this onetime initialization of the pitch channel due to the LOAD_RELIEF discrete occurs, normal pitch channel mode resumes.

FIGURE 4.2-3. MODE_PITCH Determination



*AEROJET DAP ONLY

FIGURE 4.2-4. MODE_BANK Determination

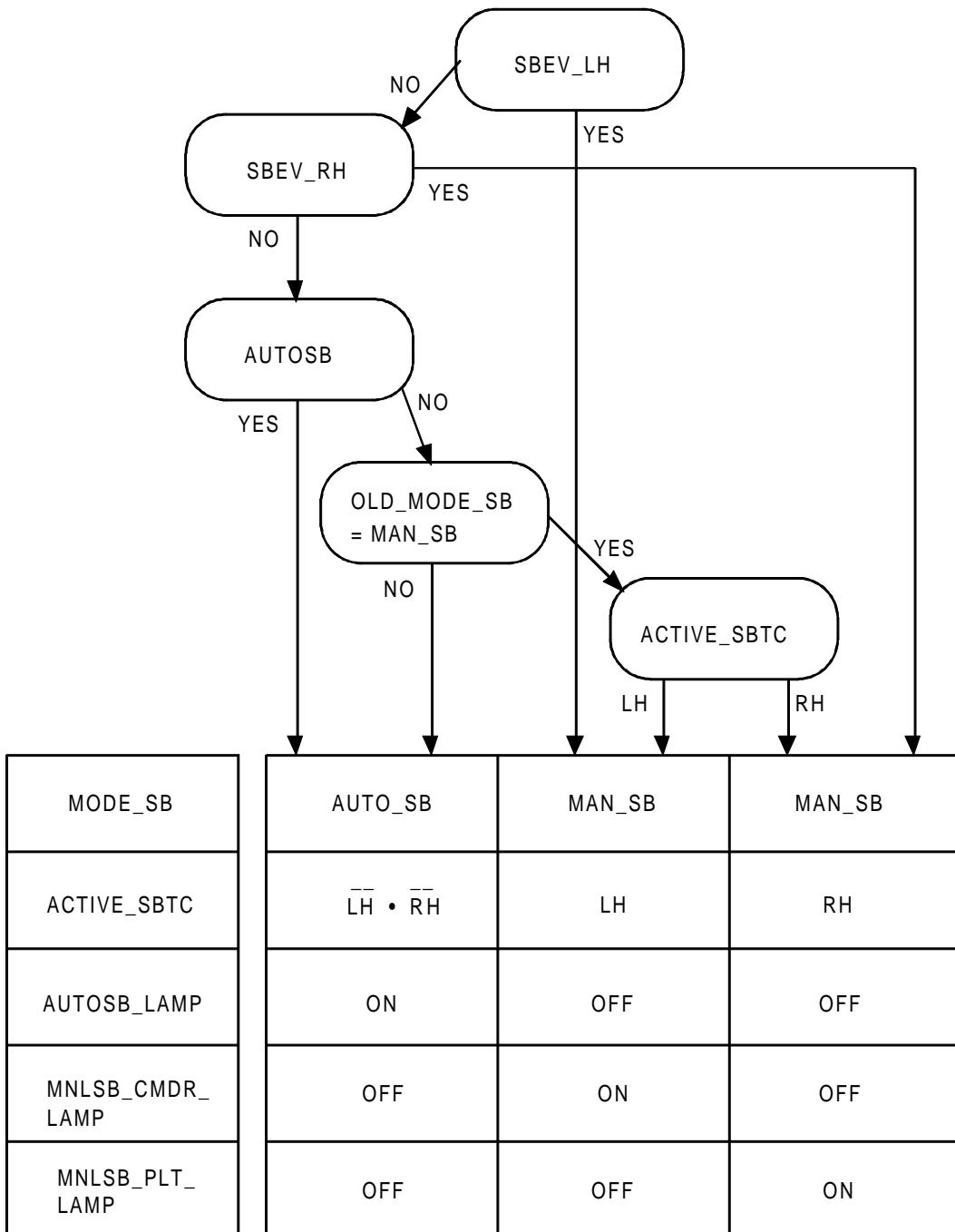


FIGURE 4.2-5. MODE_SB Determination

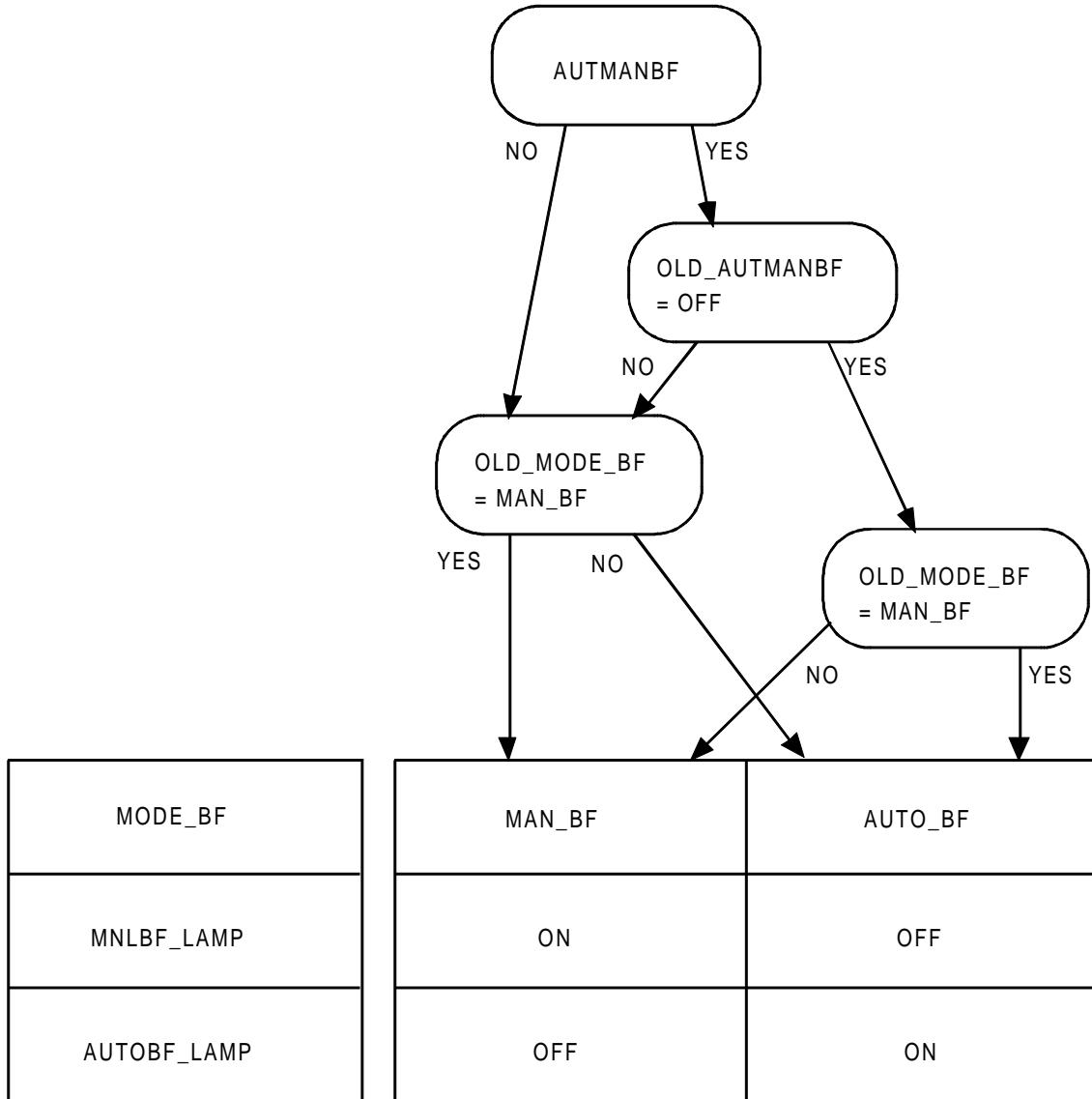


FIGURE 4.2-6. MODE_BF Determination

Table 4.2-3. RECON Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
AL_IND	Autoland indicator	MSC	D	—	6.25
ALPCMD	Angle of attack command	ENT GUID, GRTLS TAEM GUID	F	deg	0.52
ALPHA_N	NAV angle of attack	A/E ATT PROC	F	deg	6.25
ALT	Altitude	RTLS UPP, ENT UPP	F	ft	1.04
AUTMANBF	Station selected AUTO/MAN body flap	GN&C SW RM	D	—	6.25
AUTO	AUTO guidance mode flag	ASC DAP	D	—	12.5
AUTOP	Station selected AUTO pitch	GN&C SW RM	D	—	6.25
AUTORY	Station selected AUTO roll/yaw	GN&C SW RM	D	—	6.25
AUTOSB	Station selected speedbrake/throt AUTO/MAN	GN&C SW RM	D	—	6.25
CONT_2EO_PR_DELAY	Minus Z burn timer for 2 E/O contingency aborts	PW CONT GUID	F	S	0.52
CONT_2EO_START	Discrete indicating powered contingency abort guidance has been activated	PW CONT GUID, XXXXXX TRAJ 1 DISP, XXXXXX TRAJ 2 DISP, RTLS TRAJ 2 DISP	D	—	0.52
CSSP	Station selected CSS pitch	GN&C SW RM	D	—	6.25
CSRHC (RHC_STATE(2))	RHC out of detent, pitch	2-AX RHC SOP	D	—	6.25
CSRHC (RHC_STATE(1))	RHC out of detent, roll	2-AX RHC SOP	D	—	6.25
CSSRY	Station selected CSS roll/yaw	GN&C SW RM	D	—	6.25
ET_SEP_CMD	RTLS ET separation command (EVENT_A37); ET separation command (EVENT_34)	ET SEP SEQ	D	—	6.25
FAST_SEP_FLAG	Fast separation flag	ET SEP SEQ	D	—	6.25
FLATTURN_CMD	Flatturn indicator	LANDING SOP	D	—	6.25
IPHASE	GRTLS guidance subphase	GRTLS TAEM GUID	I	—	1.04
MACH	Mach number	ADTA SOP	F	—	1.04
MECO_CMD	MECO command (EVENT_A35)	SSME OPS	D	—	6.25
ETSEP_P_ENABLE	Flag to enable pitch control during ET SEP	JSL	D	—	6.25
MET	Mission elapsed time	FCOS	F	sec	6.25
CONT_3EO_REGION	Contingency 3 E/O Region Index	CONT 3E/O GUID	I	--	6.25
CONT_3EO_START	Contingency 3 engines out start flag	CONT 3E/O GUID	D	—	6.25

Table 4.2-3. RECON Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
CONT_SEP_CPLT	Contingency ET sep complete flag	CONT 3E/O GUID	D	-	6.25
CONT_3EO_PR_DELAY	Minus Z burn timer for 3 engines out contingency aborts	CONT 3E/O GUID	F	S	6.25
ETSEP_Y_DRIFT	ET sep yaw axis open loop time	CONT 3E/O GUID	F	S	6.25
MM_601	Major mode 601 flag	MSC	D	--	6.25
MM_602	Transition from MM 601 to MM 602 (EVENT_A39)	MSC	D	-	6.25
MM_CODE	Major mode (flight phase) indicator	MSC	I	-	6.25
P	Roll rate	SF	F	deg/s	25
PHI	Roll angle	A/E ATT PROC	F	deg	6.25
PHIC	Roll angle command	ENT GUID	F	deg	0.52
PHIC_AT	Roll angle command. TAEM	GRTLS TAEM GUID	F	deg	1.04
Q	Pitch rate	SF	F	deg/s	25
QBARFC	Dynamic pressure for FCS	Pitch Channel	F	lb/ft ²	1.04
R	Yaw rate	SF	F	deg/s	25
ROLLOUT_IND	Rollout flag	LANDING SOP	D	-	6.25
SBEV_LH	CMDR SBTC takeover flag	SBTC SOP	D	-	6.25
SBEV_RH	PLT SBTC takeover flag	SBTC SOP	D	-	6.25
SEL_ENTRY_ROLL_MODE_NO_YJET	Entry roll mode no yaw jet option	GN&C SW RM	D	-	6.25
SEL_ENTRY_ROLL_MODE_LGAIN	Entry roll mode reduced forward loop gains	GN&C SW RM	D	-	6.25
SINTH	Euler angle pitch sine	A/E ATT PROC	F	-	6.25
TAL_ABORT_DECLARED	TAL abort declared discrete	MSC	D	-	6.25
TAS	True airspeed	ADTA SOP	F	ft/s	1.04
TG_END	TAEM guidance termination flag	TAEM GUID GRTLS TAEM GUID	D	-	1.04
UB1	First component of body frame relative velocity vector	A/E ATT PROC	F	ft/s	6.25
WOWLON_IND	Weight-on-(main) wheels indicator	LANDING SOP	D	-	6.25
WRAP_MODE*	Wraparound FCS mode	OVERRIDE DISPLAY	D	-	1.04
<u>Outputs</u>					
AL	Autoland flag	P,R,Y,SB, NW channels	D	-	6.25

Table 4.2-3. RECON Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
ALT_ZERO_YAWJET	Mach yaw jet termination discrete	Yaw channel	D	–	6.25
AUTOBF_LAMP	AUTO lamp status, body flap	E/L EV AN PROC	D	–	6.25
AUTOP_LAMP	AUTO lamp status, pitch	E/L EV AN PROC, AL GUID, TLM, 2-AX RHC SOP, MEDS FC GNC XFER	D	–	6.25
AUTORY_LAMP	AUTO lamp status, roll/yaw	E/L EV AN PROC, AL GUID, TLM, ENT GUID, 2-AX RHC SOP, MEDS FC GNC XFER	D	–	6.25
AUTOSB_LAMP	AUTO lamp status, speed brake	E/L EV AN PROC, MEDS FC GNC XFER	D	–	6.25
CONT_MINUS_Z_COMPL	Discrete to indicate the contingency minus Z maneuver is complete	PW CONT GUID, CONT 3E/O GUID, JSL	D	–	6.25
CSSP_LAMP	CSS lamp status, pitch	E/L EV AN PROC, E/L ADI PROC	D	–	6.25
CSSRY_LAMP	CSS Lamp status, roll/yaw	E/L EV AN PROC, E/L ADI PROC	D	–	6.25
EARLY	Low gain downmode discrete	R,P,Y channels	D	–	6.25
ENTRY	Entry phase flag	R, P, Y channels	D	–	6.25
ETSEP	External tank separation flag	P,R,Y,BF,JSL,SB channels	D	–	6.25
DT_ETSEP	Elapsed Time from ET_SEP_CMD set True, Event 34 (Nom. ETSEP) or Event A37 (RTLS ETSEP)	JSL	F	sec	6.25
ETSEP_P_ENABLE	Flag to enable pitch control during ET SEP	P Channel, JSL	D	–	6.25
ETSEP_PR_ENABLE	Flag to enable pitch & roll control during Contingency ET SEP	P, R Channels	D	–	6.25
ETSEP_R_ENABLE	Flag to enable roll control during ET SEP using pitch jets	JSL	D	–	6.25
ETSEP_Y_ENABLE	Flag to enable roll and yaw control during ET SEP using yaw jets	R, Y Channels	D	–	6.25
FCS_ACCEPT_ICNCT	Flight control constraint for interconnected dump	Abort control sequence	D	–	6.25
FLATTURN	Buffered FLATTURN_CMD discrete	R,Y channels	D	–	6.25
HYST_FLAG	Yaw hysteresis discrete	Yaw channel	D	–	6.25

Table 4.2-3. RECON Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
IPHASEB	Buffered IPHASE	Pitch, roll, body flap channels	I	–	6.25
LATE	No yaw jet downmode discrete	R,Y channels	D	–	6.25
LOAD_RELIEF	LOAD_RELIEF_DISCRETE	2-axis RHC SOP pitch channel	D	–	6.25
MC	Mated coast flag	P,R,Y,BF,JSL,SB channels	D	–	6.25
MNLBF_LAMP	MNL (manual) lamp status, body flap	E/L EV AN PROC	D	–	6.25
MNLSB_CMDR_LAMP	CMDR's MNL (manual) lamp status, speed brake	E/L EV AN PROC	D	–	6.25
MNLSB_PLT_LAMP	Pilot's MNL (manual) lamp status, speed brake	E/L EV AN PROC	D	–	6.25
MODE_BANK	Bank (roll/yaw) channel configuration	PTI, roll, and yaw channels	D	–	6.25
MODE_BF	Body flap channel configuration	Body flap channel	D	–	6.25
MODE_PITCH	Pitch channel configuration	PTI, pitch channel	D	–	6.25
MODE_SB	Speed brake channel configuration	Speed brake channel	D	–	6.25
MACH_PHIERR	Mach regime for bank error threshold	Roll channel	D	–	6.25
MACH_SB*	Auto speed brake moding discrete	Speed brake channel	D	–	6.25
MRB_AILE	Mach regime for aileron trim	Roll channel	D	–	6.25
MRB_AILL	Mach regime for zero aileron trim	Roll channel	D	–	6.25
MRB_RRXF	Mach regime for roll rate crossfeed	Yaw, roll channels	D	–	6.25
MRB_RUDE	Mach regime for zero rudder trim	Yaw, roll channels	D	–	6.25
MRB_RUDL	Mach regime for rudder trim	Yaw, roll channels	D	–	6.25
PIO_ON	Indicator to use PIO suppression filter	Pitch channel	D	–	6.25
QBAR_REGIME	Range-of-QBAR indicator	Pitch, roll, yaw, body flap channels	I	–	6.25
ROLLOUT	Buffered ROLLOUT_IND discrete	Pitch, roll, yaw channels	D	–	6.25
SEP_COMPLETE	Separation –Z burn complete and $a > -z \text{ min } a$ and $x\text{-axis body relative velocity component} > 0.$	MSC	D	–	6.25
TAEM	TAEM phase flag	P,R,Y Channels	D	–	6.25
TAL_SET	TAL selected flag	Pitch channel	D	–	6.25

Table 4.2-3. RECON Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
TURN_COORD	Turn coordination indicator	Pitch, roll, yaw channels	D	–	6.25
WOWLON	Buffered WOWLON_IND	Pitch, yaw, speed brake channels	D	–	6.25
WRAP*	Wraparound mode discrete	Yaw, roll, Override Display, TLM, pitch	D	–	6.25
YAW_RCS_FLAG	Yaw RCS discrete	JSL and yaw channel	D	–	6.25
ZERO_YAWJET	Channel moding discrete	Yaw channel, MSC, pitch channel, roll channel	D	–	6.25
ZERO_PITCH_JET	Discrete to terminate pitch jets	Pitch channel	D	–	6.25

*Aerojet only

Table 4.2-4. RECON I-Loads

Name	Description	Type	MSID	Units
ALPHA_LIM_INTC	Alpha error limit for interconnected dump	F	V97U1282C	deg
ALT_NOYJET	Altitude below which ALT_ZERO_YAWJET discrete can be set	F	V99U9800C	ft
CONT_MINUS_Z_MIN_TIME	Minimum transition burn time for a contingency abort ET separation	F	V97U8206C	s
DSBCM*	Mach level to initiate speed brake modulation	F	V97U0131C	—
ETSEP_P_DELAY	Time delay from ET structural release to pitch ETSEP FCS channel closure	F	V97U1507C	s
ETSEP_R_DELAY	Time delay from ET structural release to enable of pitch jets for roll control in ETSEP FCS Roll channel	F	V97U1508C	s
ETSEP_Y_DRIFT	Time delay from ET structural release to roll and yaw FCS channel closure	F	V97U1086C	s
FCS_INTC_COUNT	Number of passes required for interconnected dump enable	I	V97U1281C	—
LOAD_RELIEF_DELAY	Load relief time delay	F	V97U0820C	s
M_PHI	Mach level to terminate bank error threshold	F	V96U9668C	—
MACH_1	Mach level for channel moding	F	V96U9658C	—
MACH_AILERON	Mach level to reconfigure aileron trim	F	V98U9703C	—
MACH_HYST	Mach level to reconfigure yaw hysteresis	F	V96U8083C	—
MACH_RRXF	Mach level to reconfigure roll rate crossfeed	F	V98U9704C	—
MACH_RUDDER	Mach level to reconfigure rudder trim	F	V98U9702C	—
MACH_TAL	Mach level to set TAL phase	F	V97U9870C	—
MACH_YAWJET	Mach level below which ALT_ZERO_YAWJET discrete can be set	F	V97U0825C	—
MINUS_Z_MIN_ALPHA	Minimum alpha for moding to 602	F	V98U9959C	deg
MINUS_Z_MIN_TIME	Minimum transition burn time for ET separation	F	V98U9958C	s
P_LIM_INTC	Roll rate limit for interconnected dump	F	V97U1284C	deg/s
PHI_LIM_INTC	Bank error limit for interconnected dump	F	V97U1283C	deg
PIO_ENABLE	PIO suppression filter enable	D	V96U8761C	—
Q_LIM_INTC	Pitch rate limit for interconnected dump	F	V97U1285C	deg/s
QBAR(1)	QBARFC level to reset QBAR_REGIME to LOWQ	F	V97U0866C	lb/ft ²
QBAR(2)	QBARFC level to set QBAR_REGIME to LOWMIDQ	F	V97U0867C	lb/ft ²
QBAR(3)	QBARFC level to reset QBAR_REGIME to LOWMIDQ	F	V97U0868C	lb/ft ²
QBAR(4)	QBARFC level to set QBAR_REGIME to HIGHMIDQ	F	V97U0869C	lb/ft ²

Table 4.2-4. RECON I-Loads

Name	Description	Type	MSID	Units
QBAR(5)	QBARFC level to reset QBAR_REGIME to HIGHMIDQ	F	V97U0870C	lb/ft ²
QBAR(6)	QBARFC level to set QBAR_REGIME to HIGHQ	F	V97U0871C	lb/ft ²
QBAR(7)	QBARFC level to reset ZERO_PITCH_JET	F	V97U9873C	lb/ft ²
QBAR(8)	QBARFC level to set ZERO_PITCH_JET	F	V97U9874C	lb/ft ²
QBAR_WRAP_LOW*	QBARFC level to reset QBAR_WRAP	F	V97U0594C	lb/ft ²
QBAR_WRAP_HIGH*	QBARFC level to set QBAR_WRAP	F	V97U0595C	lb/ft ²
R_LIM_INTC	Yaw rate limit for interconnected dump	F	V97U1286C	deg/s
TAS_PIO	True airspeed level below which the PIO suppression filter will be used	F	V96U8760C	ft/s
TURN_COORD_THETA_LIM	Sine of pitch angle above which TURN_COORD will be inhibited for CSS	F	V99U9801C	-
YAW_RCS_ALT	Altitude to increase yaw RCS on time	F	V97U1150C	ft

*Aerojet only

Table 4.2-5. RECON Initialization Requirements

Component	Initialize on Transition		Variable	Value
	From	To		
ALT_ZERO_YAWJET		First pass	ALT_ZERO_YAWJET	OFF
Auto speed brake moding discrete*		First pass	MACH_SB	OFF
Bank error threshold discrete*		First pass	MACH_PHIERR	OFF
BODYFLAP CONFIGURATION		First pass	MODE_BF, OLD_MODE_BF, OLD_AUTMANBF	AUTO_BF
Body flap configuration		First pass	MODE_BF	AUTO_BF
CONT_MINUS_Z_COMPL		First pass	CONT_MINUS_Z_COMPL	OFF
ENTRY_SUBPHASE		First pass	LATE EARLY	OFF
ETSEP Pitch Enable for intact Pitch channel		First pass	ETSEP_P_ENABLE	OFF
ETSEP Roll Enable for intact Roll channel		First pass	ETSEP_R_ENABLE	OFF
ETSEP Pitch/Roll Enable for Contingency Pitch/Roll Channels		First pass	ETSEP_PR_ENABLE	OFF
Indicator for setting T_ETSEP_MET		First pass	DT_ETSEP_FLAG	OFF

Table 4.2-5. RECON Initialization Requirements

Component	Initialize on Transition		Variable	Value
	From	To		
ETSEP YAW ENABLE for intact/contingency Flattern discrete Indicator to use PIO suppression filter LOAD_RELIEF_DISCRETE MACH_PHIERR MACH_REGIME_AILERON MACH_REGIME_RRXF MACH REGIME_RUDDER Nosewheel enable OMS/RCS INTERCONNECTED DUMP ENABLE Pitch configuration QBAR regime Roll/yaw configuration Separation burn ended Speed brake configuration TAL select flag Turn coordination Weight on gear Weight on nosewheel Aerojet DAP wrap mode* Wraparound mode enable* YAW_HYSTERESIS_DISCRETE YAW_RCS_DISCRETE Zero yaw jet ZERO_PITCH_JET_DISCRETE	<u>LOAD_RELIEF</u>	First pass	ETSEP_Y_ENABLE	OFF
		First pass	FLATTURN	OFF
		First pass	PIO_ON	OFF
		First pass	LOAD_RELIEF	OFF
		First pass	MACH_PHIERR	OFF
		First pass	MRB_AILE, MRB_AILL, OLD_MR_B_AILL	ON OFF OFF
		First pass	MRB_RRXF	OFF
		First pass	MRB_RUDE, MRB_RUDL, OLD_MR_B_RUDL	ON OFF
		First pass	GSENBL	OFF
		First pass	FCS_ACCEPT_ICNCT	OFF
		First pass	MODE_PITCH, OLD_MODE_PITCH	AUTO_PITCH
		First pass	QBAR_REGIME	LOWQ
		First pass	MODE_BANK, OLD_MODE_BANK	AUTO_BANK
		First pass	SEP_COMPLETE	OFF
		First pass	MODE_SB, OLD_MODE_SB	AUTO_SB
		First pass	TAL_SET	OFF
		First pass	TURN_COORD	ON
		First pass	WOWLON	OFF
		First pass	ROLLOUT	OFF
		First pass	WRAP	OFF
		First pass	QBAR_WRAP	OFF
		First pass	HYST_FLAG	OFF
		First pass	YAW_RCS_FLAG	OFF
		First pass	ZERO_YAWJET	OFF
		First pass	ZERO_PITCH_JET	OFF

*Aerojet only

4.2.3 Timing and Sequencing Requirements

4.2.3.1 Timing Requirements.

Timing in this document is related to error-free processing conditions. See Level A CPDS SS-P-0002-170, paragraph 4.4.2A, for timing related to error processing conditions. Timing control is performed by the flight computer operating system (FCOS). Requirements relating to the FCOS timing control pertaining to the flight control module are as follows:

1. A minor cycle rate of 25 Hz. The cycle-to-cycle time period tolerance of the minor cycle is specified in CPDS Level A, Section 4.4.2.
2. The transport delay in any 25-Hz feedback loop must not exceed 18 ms from data input to data output, including delays associated with MDM/IOP operation. Similarly, the transport delay in a 12.5-Hz feedback loop must not exceed 40 ms from data input to data output. The allowable software-incurred delays are specified in CPDS Level A, Section 4.4.2.
3. A requirement for execution rates of 25 Hz and the following submultiples of 25 Hz: 12.5, 6.25, 1.04, and 0.52 Hz.

4.2.3.2 Sequencing Requirements.

The following statements constitute the sequencing requirements for the flight control module:

1. Within a rate group, modules are executed prior to modules to which they supply data.
2. Modules not processed at 25 Hz may be performed in that portion of the minor cycle that does not contribute to 25-Hz transport delay. High-rate computations that do not contribute to the output of the current pass (e.g., filter node equations) may also be executed in the nontransport-delay-critical part of the minor cycle. They are not flagged out in this document.
3. When reconfiguration (including first pass) occurs, modules that supply data to transport-delay-critical modules will be executed before the first pass in the new configuration with the following exception. The 1.04 Hz gain scheduling modules, except for GTRA, GTRE, and GDQ, need not be executed at a reconfiguration if the modules have been executed within 960 ms of the reconfiguration. GTRA, GTRE, and GDQ must be executed when control mode change occurs. (The speed brake and body flap channel modules are subject to this requirement on first pass only.) Note that this requirement, together with the requirement to mechanize reconfiguration within 135 ms of recognition of a valid mode-change request, may necessitate an unscheduled execution of low-rate modules.
4. Sequencing requirements for the high-level modules are presented in Figure 4.2-7. Functions shown in dashed lines are not covered by this document. The modules that do not contribute to transport-delay need not immediately follow the transport-delay-critical modules; i.e., a separate HAL process may be used.

4.2.4 Traceability

Table 4.2-6 shows the traceability of the software paragraphs in this FSSR with respect to the corresponding Sections of the Level B CPDS' documentation. In addition, Table 4.2-7 shows the traceability of the PASS GN&C principal functions located in this FSSR with respect to the applicable BFS paragraphs in the Level C PRD specifications. These tables are provided for information only.

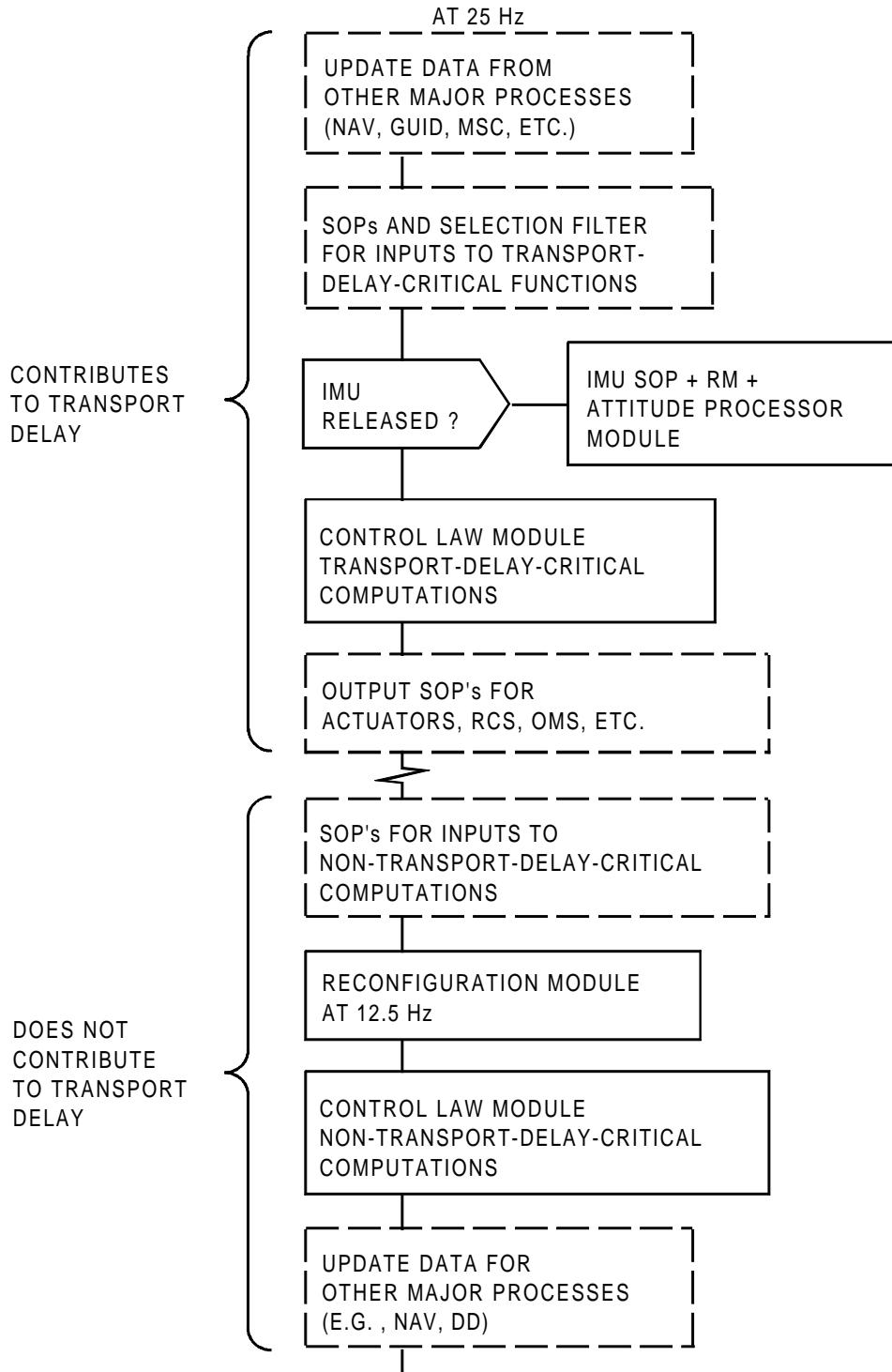


FIGURE 4.2-7. Flight Control Module High-Level Sequencing Requirements

Table 4.2-6. Level B to Level C Traceability		
Level B PF No.	Level B PF Name (Acronym)	Level C FSSR Section No.
4.36	Aerojet Digital Autopilot (AEROJET DAP)	3.3
4.227	Glide Retrun-to-Launch Site Aerojet Digital Autopilot (GRTLS AEROJET DAP)	3.4
4.248	Programmed Test Input Module (PTI MODULE)	4.8.1

Table 4.2-7. Aerojet/GRTLS Digital Autopilot FSSR/PRD Correlation					
Principal Function	FSSR Paragraph	FSSR Title	BFS PRD	PRD Paragraph	BFS Title
G4.36	3.3	Aerojet DAP Flight Control System	MG038105	3.2.4.6	Descent Flight Control (D_DAP)
G4.227	3.4	GRTLS Flight Control System	MG038105	3.2.4.5	RTLS Digital Autopilot (R_DAP)
G4.248	4.8.1	Program Test Input (PTI) Driver Module (AEROJET DAP)	N/A	N/A	N/A

4.3 COMMON MODULES

4.3.1 DAP Control Planes

4.3.1.1 Pitch Channel Control Modules

A. Function Requirements – The pitch channel control laws are presented in block diagram form in Figure 4.3.1.1–1. The pitch channel provides pitch attitude control by means of the pitch RCS jets during mated coast (MC) and external tank separation (ETSEP), and longitudinal control by means of jets and elevons during entry.

B. Function Modules – The function modules that make up the pitch channel control laws are described in this subsection in the order shown in Table 4.3.1.1–1.

C. Sequencing Requirements – The sequencing requirements for the pitch channel function modules may be inferred from Figure 4.3.1.1–1.

D. Interface Requirements – The interface requirements for the pitch channel are presented in Table 4.3.1.1–2.

E. I-Loads – The I-loads for the pitch channel are shown in Table 4.3.1.1–3.

F. Initialization Requirements – The initialization requirements for the pitch channel are shown in Table 4.3.1.1–4.

Table 4.3.1.1-1. Pitch Channel Modules

Module	Subsection
ALFCMD	4.3.1.1.1
ALFERR_FILT	4.3.1.1.2
ALFERR_FILT_NXJET (Aerojet DAP)	4.3.1.1.2a
ALFERRLIM	4.3.1.1.3
ALFERRLIM_TAL (Aerojet DAP)	4.3.1.1.4
ALFLOOP	4.3.1.1.5
AUTO_PJET_CMD	4.3.1.1.6
DEC_LIM	4.3.1.1.7
DEPTI_MOD (Aerojet DAP)	4.3.1.1.8
DETREF_COMP (Aerojet DAP)	4.3.1.1.8a
DETRNG_COMP (Aerojet DAP)	4.3.1.1.8b
ELERROR	4.3.1.1.9
ELFBK	4.3.1.1.10
ELLOOP	4.3.1.1.11
ELSHAPE	4.3.1.1.58
ELSUM	4.3.1.1.59

Table 4.3.1.1-1. Pitch Channel Modules

Module	Subsection
ELVCMRD	4.3.1.1.12
ELV_SUM (Aerojet DAP)	4.3.1.1.13
ESHAPE	4.3.1.1.14
ETRIM (Aerojet DAP)	4.3.1.1.15
ETRIM_INT (Aerojet DAP)	4.3.1.1.16
GDET_COMP (Aerojet DAP)	4.3.1.1.16a
GDQ_COMP	4.3.1.1.17
GDSB_COMP	4.3.1.1.18
GJET_COMP (Aerojet DAP)	4.3.1.1.19
GPC_COMP	4.3.1.1.21
GPPANT_MOD	4.3.1.1.22
GPRHC_COMP	4.3.1.1.23
GPX_MOD	4.3.1.1.24
GQAL_COMP	4.3.1.1.25
GQAL_COMP_NYJET (Aerojet DAP)	4.3.1.1.25a
GQALR_MOD	4.3.1.1.26
GSBHI_MOD	4.3.1.1.27
GSBLO_MOD	4.3.1.1.28
GSD_FILT	4.3.1.1.29
GTAS_COMP	4.3.1.1.30
GTRE_COMP (Aerojet DAP)	4.3.1.1.31
GTRE_COMP (GRTLS DAP)	4.3.1.1.32
JERROR	4.3.1.1.33
LREL_COMP	4.3.1.1.34
NZCOMP	4.3.1.1.35
NZC_SM	4.3.1.1.36
NZERR_FD	4.3.1.1.37
NZ_FILTER	4.3.1.1.38
NZLOOP	4.3.1.1.39
NZTAS	4.3.1.1.40
PBBF	4.3.1.1.41
PIO_FILTER	4.3.1.1.42
PITCH_HYST (Aerojet DAP)	4.3.1.1.43
PIT_SUM (Aerojet DAP)	4.3.1.1.44
PJPTI_MOD (Aerojet DAP)	4.3.1.1.45
PRHC_SUM	4.3.1.1.46

Table 4.3.1.1-1. Pitch Channel Modules

Module	Subsection
PRHCT	4.3.1.1.47
QBLIM_MOD	4.3.1.1.48
QCOMP (Aerojet DAP)	4.3.1.1.49
QCOMP (GRTLS DAP)	4.3.1.1.50
SBXFEED	4.3.1.1.51
SDCMP (Aerojet DAP)	4.3.1.1.52
SDCMP (GRTLS DAP)	4.3.1.1.53
UYBB_FILTER	4.3.1.1.54
VPBBF_ELV	4.3.1.1.55
VPBBF_MGT1	4.3.1.1.56
VPBBF_MLT1	4.3.1.1.57

NOTE: Additional pitch channel functions included in Figure 4.3.1.1-1 and in Table 4.3.1.1-2 are included in section 4.7.

Table 4.3.1.1-2. Pitch Channel Interface Requirements

Name	Description	Source or Destination	Type	Units	Sam- ple Rate (Hz)
<u>Inputs</u>					
AL	Autoland flag	RECON	D	–	6.25
ALPCMD	Angle of attack command	ENT GUID GRTLS TAEM GUID	F	deg	0.52
FLT_PATH_ANG_DOT	Flight path angle rate	RTLS UPP	F	deg/s	1.04
GLIDE_RTLS_INHIBIT	RTLS contingency flag	CONT 3E/O GUID, PW CONT GUID, PW RTLS GUID, MSC, GRTLS TAEM GUID	D	–	6.25
PE_MC	Roll error signal, MC	CONT_MC_ROLL_CHAN (Roll channel)	F	deg/s	12.5
PE_SEP	Roll error signal, ETSEP	CONT_ETSEP_ROLL_CHAN (Roll channel)	F	deg/s	12.5
ENTRY	Entry phase flag	RECON	D	–	6.25

Table 4.3.1.1-2. Pitch Channel Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
TAEM	TAEM phase flag	RECON	D	–	6.25
PE_BIG	Large roll error signal flag	CONT_ROLL_QUANT (Roll channel)	D	–	12.5
PCH_CMD_REG4	Pitch command flag set during contingency Region 4	CONT 3E/O GUID	D	–	6.25
CONT_3EO_REGION	Contingency 3 engines out region index	CONT 3E/O GUID	I	–	6.25
ALPHA_N	NAV derived angle of attack	A/E ATT PROC	F	deg	6.25
CONT_3EO_START	Contingency 3 engines out start flag	CONT 3E/O GUID	D	–	6.25
COSPHI	Cosine of PHI	A/E ATT PROC	F	–	6.25
COSTH	Cosine of THETA	A/E ATT PROC	F	–	6.25
DEFB	Elevator position feedback	ELVN PFB SOP	F	deg	25
DEL_DSBPC	Speed brake increment crossfeed	PRIO_RATE_LIMITING	F	deg	25
DEMAN	RHC pitch command	2-AX RHC SOP	F	deg	25
DETM_PAN	Panel pitch beep trim	2-AX RHC SOP	I	–	6.25
DETM_RHC	RHC pitch beep trim	2-AX RHC SOP	I	–	6.25
DRPHI	Turn coordination yaw rate component	YAW CHANNEL	F	deg/s	6.25
DSBOFB	Speed brake position	SB PFB SOP	F	deg	6.25
EARLY	Low gain downmode discrete	RECON	D	–	6.25
EAS	Equivalent air speed	ADTA SOP	F	ft/s	1.04
EBFB ₂	Pitch attitude error component of attitude error vector (EBFB)	G/C STEER	F	deg	12.5
ETSEP	ET separation flag	RECON	D	–	6.25
ETSEP_P_ENABLE	Flag to enable pitch control during ET SEP	RECON, JSL	D	–	6.25
ETSEP_PR_ENABLE	Flag to enable pitch & roll control during Contingency ET SEP	RECON	D	–	6.25
FILT	Body bending filter schedule command	OVERRIDE DISPLAY	D	–	1.04
IPHASEB	Buffered IPHASE	RECON	I	–	6.25
LOAD_RELIEF	Load relief discrete	RECON	D	–	6.25
MACH	MACH NUMBER	ADTA SOP	F	–	1.04
MASS	Vehicle mass (OPS 3 only)	DEORB GUID	F	slugs	6.25
MC	Mated coast flag	RECON	D	–	6.25

Table 4.3.1.1-2. Pitch Channel Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
MODE_PITCH	Pitch channel mode indicator	RECON	D	-	6.25
NZ	Normal acceleration feedback (absolute)	SF	F	g	25
NZC	Normal acceleration command (increment)	TAEM GUID, A/L GUID, GRTLS TAEM GUID	F F F	g g g	1.04 6.25 1.04
PIO_ON	Indicator to use PIO suppression filter	RECON	D	-	6.25
PTI_ACT	Flag indicating an AEROJET DAP PTI is in progress	PTI_DRIVER	D	-	12.5
PTI_ELV	PTI elevator command	PTI_DRIVER	F	ND	12.5
PTI_PIT	PTI aft pitch jet command	PTI_DRIVER	F	ND	12.5
PTI_WRAP	PTI wraparound mode discrete	PTI_DRIVER	D	-	12.5
Q	Pitch rate feedback	SF	F	deg/s	25
QBAR	Dynamic pressure	ADTA SOP	F	lb/ ft**2	1.04
QBAR_REGIME	Range of QBAR indicator	RECON	I	-	6.25
R	Yaw rate feedback	SF	F	deg/s	25
ROLLOUT	Buffered Weight on nose gear indicator	RECON	D	-	6.25
SINPHI	Sine of PHI	A/E ATT PROC	F	-	6.25
TAN_PHILM	Tangent of limited roll angle	BRCOR (ROLL CHANNEL)	F	-	6.25
TAL_SET	TAL selected flag	RECON	D	-	6.25
TAS	True airspeed	ADTA SOP	F	ft/s	1.04
THETA	Pitch attitude	A/E ATT PROC	F	deg	6.25
TURN_COORD	Turn coordination indicator	RECON	D	-	6.25
WFBI_FB2	Body angular rate command	G/C_STEER	F	deg/s	12.5
WOWLON	Buffered Weight on main gear indicator	RECON	D	-	6.25
WRAP	Wraparound mode discrete	RECON	D	--	6.25
ZERO_YAWJET	Channel moding discrete	RECON	D	-	6.25
ZERO_PITCH_JET	Discrete to terminate pitch jets	RECON	D	-	6.25

Table 4.3.1.1-2. Pitch Channel Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Outputs</u>					
ALFERR_FDC	Unlimited angle of attack error	E/L ADI PROC, TLM	F	deg	6.25
DECC	Elevator command	PRIORATE_LIMITING, TLM (Aerojet only)	F	deg	25
DETRIM	Elevator trim command	BF_RATE_CMD (body flap channel)	F	deg	25
NZERRFD	Modified normal acceleration error	E/L ADI PROC, TLM	F	g	25
QFFDC	Slapdown pitch rate error	E/L ADI PROC, TLM (Aerojet only)	F	deg/s	25
QBARFC	Dynamic pressure for FCS	RECON, roll and yaw channels	F	lb/ft**2	1.04
UYCMD	Number of pitch jets commanded (quantized pitch error signal)	JSL, RCS ACT LT	I	—	12.5
DPJET_MC	Contingency GRTLS DAP pitch error signal	CONT 3E/O GUID, TLM	F	deg/s	12.5
DEMS	Pitch Rate Command	TLM	F	deg/s	25
PITCH_ERRT	Difference between the pitch error signal (DPJET_SEP) and the pitch attitude error (EBFB2).	JSL	F	deg/sec	12.5
PKQ	SQ Term Coefficient in Parabolic Shaping	TLM	F	deg/s	25

Table 4.3.1.1-3. Pitch Channel I-Loads/Constants

Name	Description	Type	MSID/Value	Units
DNZCP_4	Nose up turn compensation	F	V98U9964C	g
GPRHCA_6	Converts RHC command into pitch rate command	F	V98U9963C	(deg/s)/deg
GQAL_TAL	Fixed value of GQAL for TAL	K	V97U9872/+3.3 E-01	(deg/s)/deg
GTAS_5	Fixed value of GTAS	F	V98U9962C	ND
XKQO	Square term coefficient in parabolic shaping	K	V96U9351C/+4.84 E-02	deg/deg**2
GPFWDLO	Low pitch forward loop gain factor	F	V97U1157C	—
GGD	Flight path angle rate gain factor	F	V97U8601C	sec

Table 4.3.1.1-4. Pitch Channel Initialization Requirements

Variable	Initialize on Transition		Initial Value	Description
	From	To		
ALFERR_FDC	—	A	0.0	Angle of attack error
DCSL	—	First-pass	0.0	Limited pitch rate error
DECC	LOWQ	LOWQ		
DETRIM	ROLLOUT	ROLLOUT	0.0	Elevator command
GPRHCX	—	IPHASEB = 6	GPRHC_6	Elevator trim signal
NZERRFD	—	IPHASEB = 4, 6	0.0	Gain to convert shaped RHC pitch command into a pitch rate command
PKQ	—	First pass	XKQO	NZ error for flight director
QFFDC	—	First pass	0.0	Square term coefficient in parabolic shaping
RTANPHI	—	B	0.0	Slapdown pitch rate error
UYCMD	ZERO_PITCH_JET	ZERO_PITCH_JET	0.0	Turn compensation term
QCB	CSS_PITCH	AUTO_PITCH	0.0	Number of pitch jets commanded to fire
QCC	AUTO_PITCH	CSS_PITCH + WOWLON	0.0	CSS_PITCH RATE COMMAND
				AUTO_PITCH RATE COMMAND

A = AL + (IPHASEB = 0, 1, 2, 3, 5)
B = (IPHASEB = 4,5,6) + TURN_COORD

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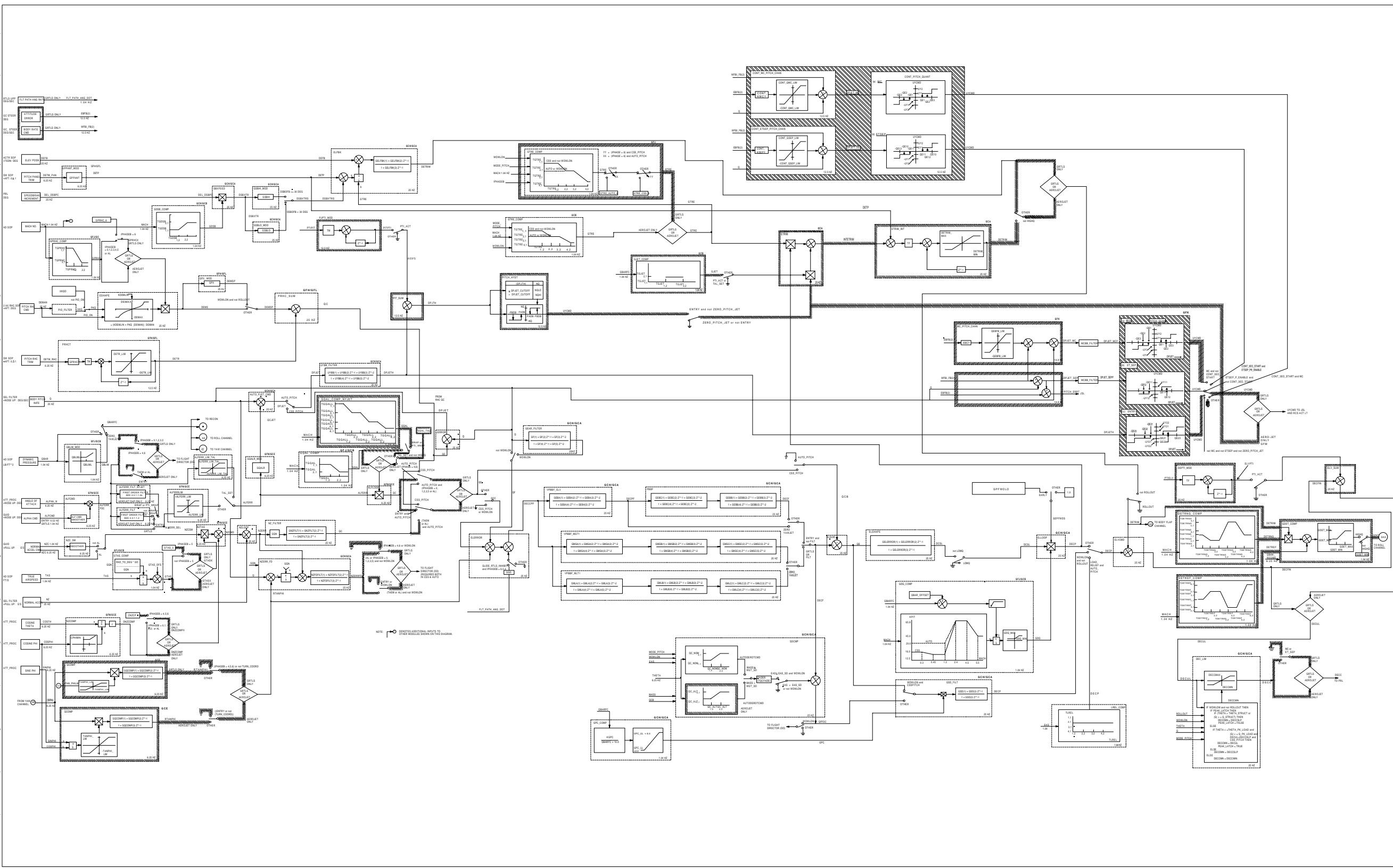


FIGURE 4.3.1.1-1. Pitch Channel

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4.3.1.1.1 ALFCMD

- A. Function – This function module smooths the guidance angle-of-attack command and subtracts this smoothed signal from the angle of attack feedback. The detailed block diagram is presented in Figure 4.3.1.1.1–1.
- B. Processing Requirements – ALFCMD is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for ALFCMD are shown in Table 4.3.1.1.1–1.
- D. Constants – The constants for ALFCMD are shown in Table 4.3.1.1.1–2.
- E. Initialization Requirements – The initialization requirements for ALFCMD are shown in Table 4.3.1.1.1–3.
- F. Software Configuration – Common (input Entry/GRTLS dependent).

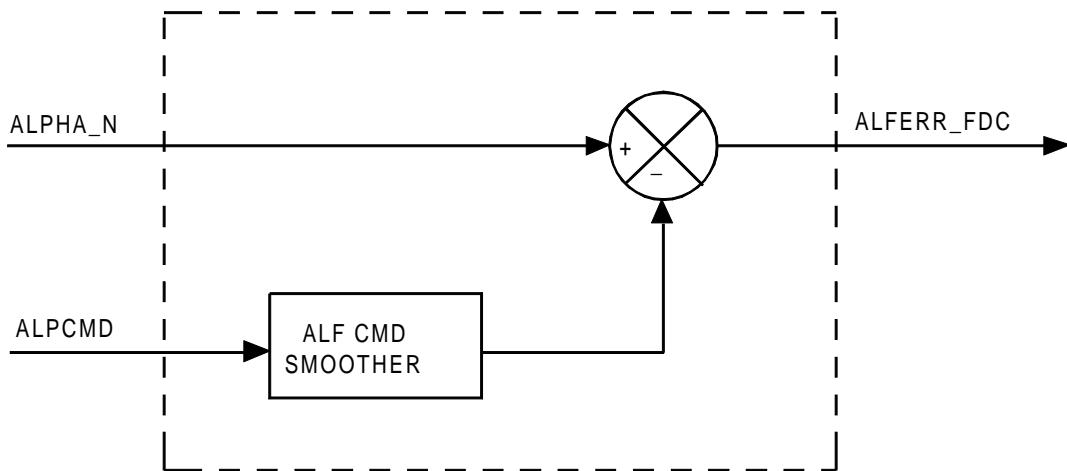


FIGURE 4.3.1.1.1-1. ALFCMD

Table 4.3.1.1.1-1. ALFCMD Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
ALPCMD	Angle of attack command	ENT GUID, GRTLS TAEM GUID	F F	deg deg	0.52 1.04
ALPHA_N	NAV derived angle of attack	A/E ATT PROC	F	deg	6.25
<u>Output</u>					
ALFERR_FDC	Angle of attack error	ALFERR FILT, E/L ADI PROC, ALFERRLIM, ALFERRLIM_ TAL, TLM	F	deg	6.25

Table 4.3.1.1.1-2. ALFCMD Constants

Name	Description	Type	Value	Units
TEG	Time increment between Entry Guidance updates	F	1.920	s
TG	Time increment between TAEM and GRTLS TAEM guidance updates	F	0.960	s
TS	DAP slow cycle time	F	0.160	s

Table 4.3.1.1.1-3. ALFCMD Initialization Requirements

Variable	Initialize on Transition		Variable*	Initial Value
	From	To		
Smoothen	—	First invocation	XOUT	ALPHA_N
	A	B**	XPINV	ALPHA_N
	ETSEP	IPHASEB = 6***	XOUT	ALPHA_N
	IPHASEB = 5	IPHASEB = 4***	XPINV	ALPHA_N
	C	D***	XOUT	ALPHA_N
			XPINV	ALPHA_N
A = CSS_PITCH • ENTRY B = AUTO_PITCH • ENTRY C = CSS_PITCH • (IPHASEB = 4, 6) D = AUTO_PITCH • (IPHASEB = 4, 6)				
* See subsection 4.9.6 ** AEROJET DAP only *** GRTLS DAP only				

4.3.1.1.2 ALFERR_FILT (Aerojet DAP).

- A. Function – This function module applies a first order filter to the angle-of-attack error used to generate the pitch rate command. The detailed block diagram is shown in Figure 4.3.1.1.2-1.
- B. Processing Requirements – ALFERR_FILT is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for ALFERR_FILT are shown in Table 4.3.1.1.2-1.
- D. I-Loads – The I-loads for ALFERR_FILT are shown in Table 4.3.1.1.2-2.
- E. Initialization Requirements – The initialization requirements for ALFERR_FILT are shown in Table 4.3.1.1.2-3.
- F. Software Configuration – Aerojet DAP only.

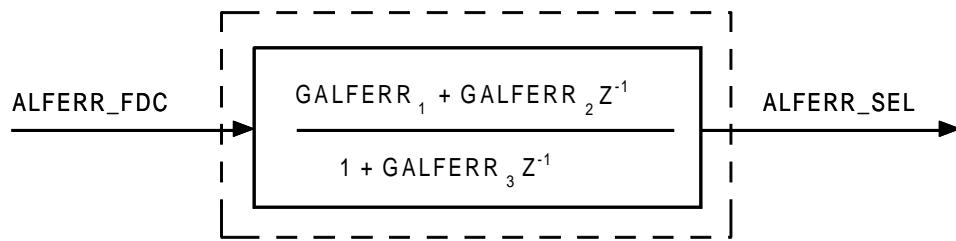


FIGURE 4.3.1.1.2-1. ALFERR_FILT (Aerojet DAP)

Table 4.3.1.1.2-1. ALFER_FILT (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> ALFERR_FDC	Angle-of-attack error	ALFCMD	F	deg	6.25
<u>Output</u> ALFERR_SEL	Filtered angle-of-attack error	ALFERRLIM	F	deg	6.25

Table 4.3.1.1.2-2. ALFERR_FILT (Aerojet DAP) I-loads

Name	Description	Type	MSID	Units
GALFERR(1)	Filter coefficient	F	V96U9669C	—
GALFERR(2)	Filter coefficient	F	V96U9670C	—
GALFERR(3)	Filter coefficient	F	V96U9671C	—

Table 4.3.1.1.2-3. ALFERR_FILT (Aerojet DAP) Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
First-order filter	—	First pass	NODE	*
	CSS_PITCH	AUTO_PITCH	NODE	*
	TAL_SET	TAL_SET	NODE	*
	A	A	NODE	*

A = WRAP + PTI_WRAP
* See subsection 4.9.1

4.3.1.1.2a ALFERR_FILT_NYJET (Aerojet DAP).

A. Function – When in the wraparound mode, this function module applies a first order filter to the angle-of-attack error used to generate the pitch rate command. The detailed block diagram is presented in Figure 4.3.1.1.2a-1.

B. Processing Requirements – ALFERR_FILT_NYJET is processed at 6.25 Hz.

C. Interface Requirements – The interface requirements for ALFERR_FILT_NYJET are shown in Table 4.3.1.1.2a-1.

D. I-Loads – The I-Loads for ALFERR_FILT_NYJET are shown in Table 4.3.1.1.2a-2.

E. Initialization Requirements – The initialization requirements for ALFERR_FILT_NYJET are shown in Table 4.3.1.1.2a-3.

F. Software Configuration – Aerojet DAP Unique.

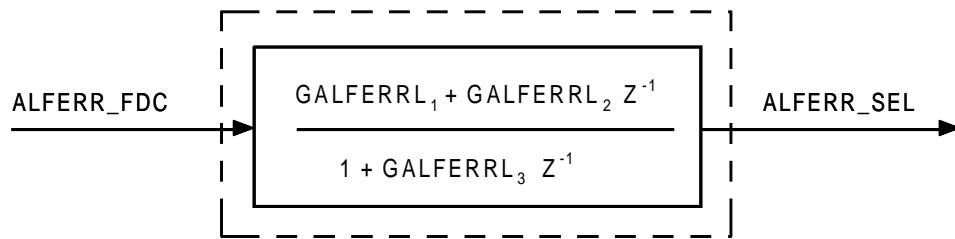


FIGURE 4.3.1.1.2a-1. ALFERR_FILT_NYJET (Aerojet DAP)

Table 4.3.1.1.2a-1. ALFERR_FILT_NYJET (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> ALFERR_FDC	Angle-of-attack error	ALFCMD	F	deg	6.25
<u>Outputs</u> ALFERR_SEL	Filtered angle-of-attack error	ALFERRLIM	F	deg	6.25

Table 4.3.1.1.2a-2. ALFERR_FILT_NYJET (Aerojet DAP) I-loads

Name	Description	Type	MSID	Units
GALFERRL(1)	Filter coefficient	F	V97U0575C	—
GALFERRL(2)	Filter coefficient	F	V97U0576C	—
GALFERRL(3)	Filter coefficient	F	V97U0577C	—

Table 4.3.1.1.2a-3. ALFERR_FILT_NYJET (Aerojet DAP) Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
First-order filter	—	First pass	NODE	*
	CSS_PITCH	AUTO_PITCH	NODE	*
	TAL_SET	TAL_SET	NODE	*
	A	A	NODE	*

A = WRAP + PTI_WRAP
* See subsection 4.9.1

4.3.1.3 ALFERRLIM.

- A. Function – This function module limits the angle-of-attack error signal before it is used to generate effector commands. The detailed block diagram is shown in Figure 4.3.1.3-1.
- B. Processing Requirements – ALFERRLIM is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for ALFERRLIM are shown in Table 4.3.1.3-1.
- D. Constants – The constants for ALFERRLIM are shown in Table 4.3.1.3-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

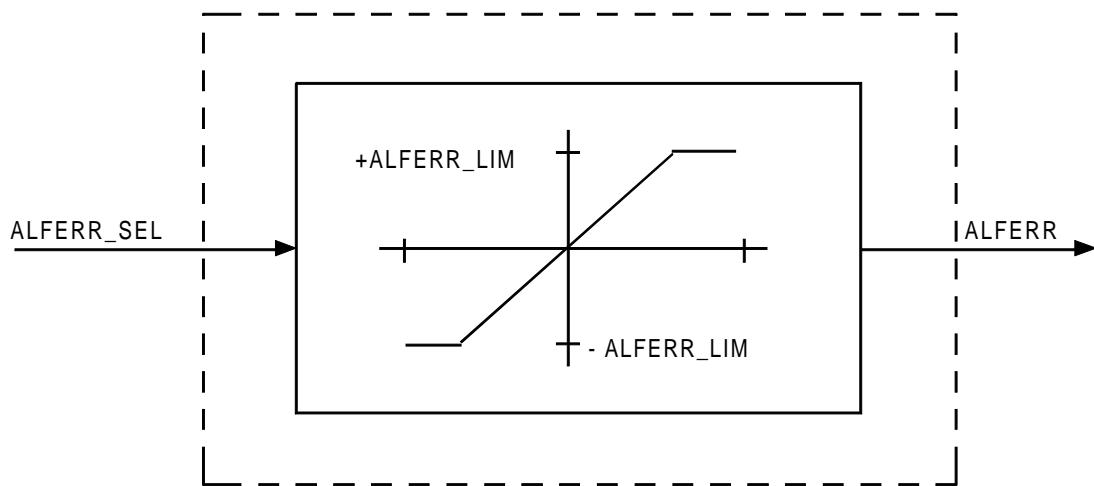


FIGURE 4.3.1.3-1. ALFERRLIM

Table 4.3.1.1.3-1. ALFERRLIM Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> ALFERR_SEL	Filtered angle-of-attack error	ALFERR_FILT, ALFCMD, ALFERR_FILT_NYJET	F	deg	6.25
<u>Output</u> ALFERR	Limited angle-of-attack error	ALFLOOP, GQALR_MOD	F	deg	6.25

Table 4.3.1.1.3-2. ALFERRLIM Constants				
Name	Description	Type	MSID/Value	Units
ALFERR_LIM	Limited on angle-of-attack error	K	V97U0600C/ (1) +5.0 E+00 (2) +2.0 E+00	deg
(1) Memory Configuration 01				
(2) Memory Configuration 03				

4.3.1.1.4 ALFERRLIM_TAL (Aerojet DAP)

- A. Function – This function module limits the angle-of-attack error signal before it is used to generate effector commands. The detailed block diagram is shown in Figure 4.3.1.1.4–1.
- B. Processing Requirements – ALFERRLIM_TAL is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for ALFERRLIM_TAL are shown in Table 4.3.1.1.4–1.
- D. Constants – The constants for ALFERRLIM_TAL are shown in Table 4.3.1.1.4–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Aero jet DAP only.

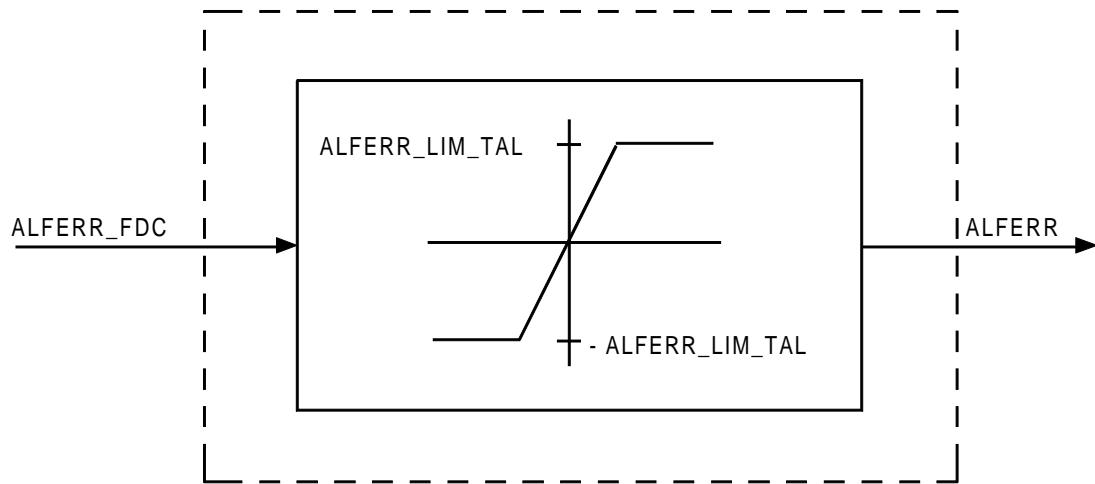


FIGURE 4.3.1.1.4-1. ALFERRLIM_TAL (Aerojet DAP)

Table 4.3.1.1.4-1. ALFERRLIM_TAL (Aerojet DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> ALFERR_FDC	Filtered angle-of-attack error	ALFCMD	F	deg	6.25
<u>Output</u> ALFERR	Limited angle-of-attack error	ALFLOOP, GQALR_MOD	F	deg	6.25

Table 4.3.1.1.4-2. ALFERRLIM_TAL (Aerojet DAP) Constants				
Name	Description	Type	MSID/Value	Units
ALFERR_LIM_TAL	Limited on angle-of-attack error	K	V97U9871C/ +4.0 E+00	deg

4.3.1.5 ALFLOOP.

- A. Function – This function module converts the angle-of-attack error into a pitch rate command. The detailed block diagram is shown in Figure 4.3.1.5-1.
- B. Processing Requirements – ALFLOOP is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for ALFLOOP are shown in Table 4.3.1.1.5-1.
- D. Constants – None.
- E. Initialization Requirements – This is for Aerojet DAP only. On the transition from NOT TAL_SET to TAL_SET, the value for GQAL may come from GQAL_COMP or GQAL_COMP_NYJET on first pass only.
- F. Software Configuration – Common.

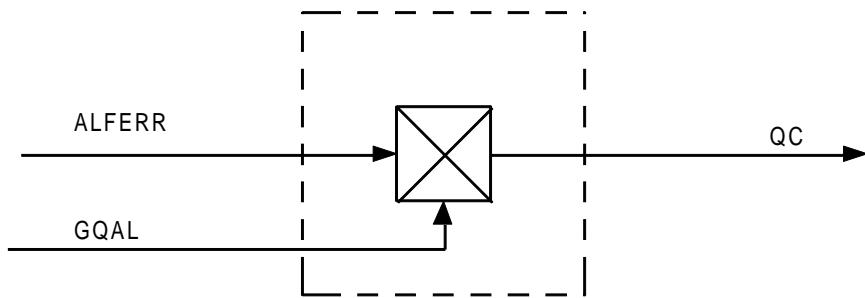


FIGURE 4.3.1.1.5-1. ALFLOOP

Table 4.3.1.1.5-1. ALFLOOP Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
ALFERR	Limited angle-of-attack error	ALFERRRLIM, ALFERRRLIM_TAL	F	deg	6.25
GQAL	Gain to convert angle-of-attack error into a pitch rate command	GQAL_COMP, GQAL_COMP_NYJET	F	(deg/s)/ deg	1.04
<u>Output</u>					
QC	Pitch rate command	ELERROR, GSD_FILT	F	deg/s	6.25

4.3.1.1.6 AUTO_PJET_CMD.

- A. Function – This function module sums the pitch rate command with pitch rate to obtain the pitch error signal. The detailed block diagram is presented in Figure 4.3.1.1.6–1.
- B. Processing Requirements – AUTO_PJET_CMD is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for AUTO_PJET_CMD are shown in Table 4.3.1.1.6–1.
- D. Constants – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

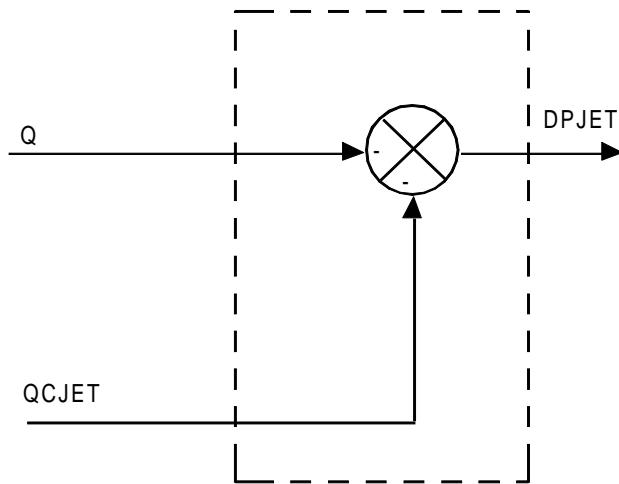


FIGURE 4.3.1.1.6-1. AUTO_PJET_CMD

Table 4.3.1.1.6-1. AUTO_PJET_CMD Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
Q	Pitch rate feedback	SF	F	deg/s	25
QCJET	Pitch rate command for auto pitch RCS	GQALR_MOD	F	deg/s	6.25
<u>Output</u>					
DPJET	Pitch error signal	UYBB_FILTER	F	deg/s	25

4.3.1.1.7 DEC_LIM.

- A. Function – This function module limits the elevator command. During the slapdown flight phase, alternate values are used for the up-elevator limit. A detailed block diagram of this function module is presented in Figure 4.3.1.1.7–1.
- B. Processing Requirements – DEC_LIM is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for DEC_LIM are shown in Table 4.3.1.1.7–1.
- D. I-Loads – The I-loads for DEC_LIM are shown in Table 4.3.1.1.7–2.
- E. Initialization Requirements – The initialization requirements for DEC_LIM are shown in Table 4.3.1.1.7–3.
- F. Software Configuration – Common.

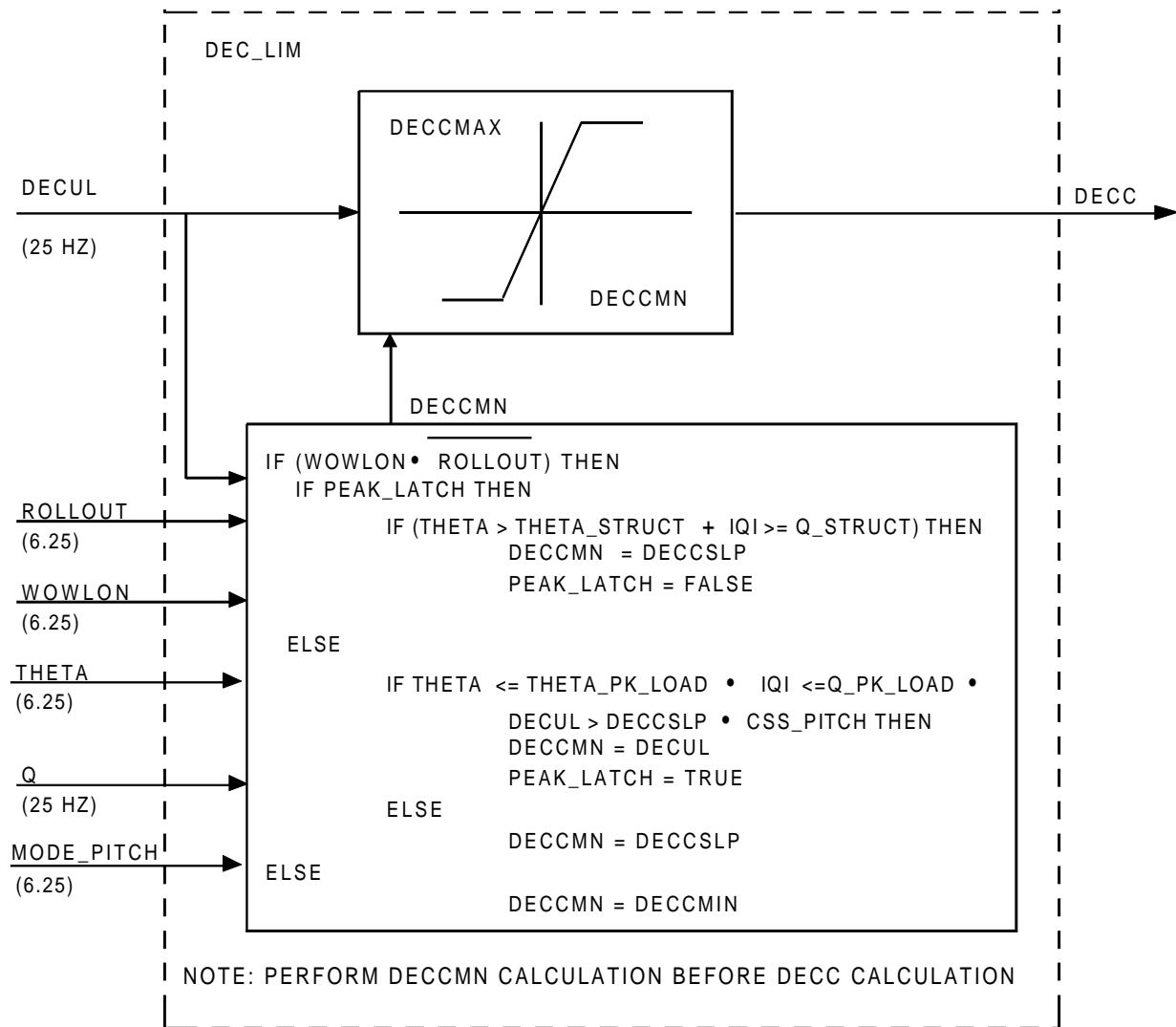


FIGURE 4.3.1.1.7-1. DEC_LIM

Table 4.3.1.1.7-1. DEC_LIM Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
MODE_PITCH	Mode flag indicator	RECON	D	—	6.25
DECUL	Unlimited elevator command	ELV_SUM ELVCMD	F	deg	25
Q	Pitch rate feedback	SF	F	deg/sec	25
ROLLOUT	Buffered weight on nose gear indicator	RECON	D	—	6.25
THETA	Pitch attitude	A/E ATT PROC	F	deg	6.25
WOWLON	Buffered weight on main gear indicator	RECON	D	—	6.25
<u>Output</u>					
DECC	Elevator command	PRIOR_RATE_LIMITING, TLM	F	deg	25

Table 4.3.1.1.7-2. DEC_LIM I-loads

Name	Description	Type	MSID	Units
DECCMAX	Maximum elevator command	F	V97U1104C	deg
DECCMIN	Minimum elevator command other than slapdown	F	V97U1105C	deg
DECCSLP	Minimum elevator command during slapdown	F	V97U1179C	deg
Q_PK_LOAD	Pitch rate limit for setting DECCMN to DECUL	F	V97U2901C	deg/sec
Q_STRUCT	Pitch rate limit for setting DECCMN to DECCSLP	F	V97U2902C	deg/sec
THETA_PK_LOAD	Pitch attitude limit for setting DECCMN to DECUL	F	V97U2903C	deg
THETA_STRUCT	Pitch attitude limit for setting DECCMN to DECCSLP	F	V97U2904C	deg

Table 4.3.1.1.7-3. DEC_LIM Initialization Requirement

Component	Initialization on Transition		Variable	Initial Value
	From	To		
PEAK_LATCH (Flag)	—	FIRST PASS	PEAK_LATCH	False

4.3.1.1.8 DEPTI_MOD (Aerojet DAP).

- A. Function – This function module integrates the elevator PTI signal to obtain the elevator pulse. The detailed block diagram is presented in Figure 4.3.1.1.8–1.
- B. Processing Requirements – DEPTI_MOD is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for DEPTI_MOD are shown in Table 4.3.1.1.8–1.
- D. Constants – The constants for DEPTI_MOD are shown in Table 4.3.1.1.8–2.
- E. Initialization Requirements – The initialization requirements for DEPTI_MOD are shown in Table 4.3.1.1.8–3.
- F. Software Configuration – Aero jet DAP unique.

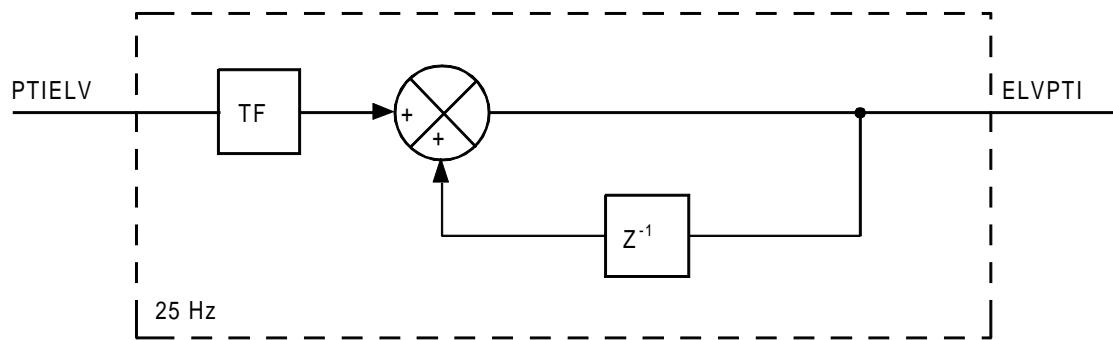


FIGURE 4.3.1.1.8-1. DEPTI_MOD (Aerojet DAP)

Table 4.3.1.1.8-1. DEPTI_MOD (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> PTIELV	Elevator PTI signal	PTI_DRIVER	F	deg/s	12.5
<u>Output</u> ELVPTI	Elevator PTI pulse	ELV_SUM	F	deg	25

Table 4.3.1.1.8-2. DEPTI_MOD (Aerojet DAP) Constants

Name	Description	Type	Value	Units
TF	DAP fast cycle time	F	0.04	S

Table 4.3.1.1.8-3. DEPTI_MOD (Aerojet DAP) Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Integrator	PTI_ACT	PTI_ACT	ELVPTI	0.0

4.3.1.1.8a. DETREF_COMP (Aerojet DAP).

- A. Function – This function module computes an intercept as a function of Mach that is used in calculating an adjustment to the aileron trim gains. The detailed block diagram is presented in Figure 4.3.1.1.8a-1.
- B. Processing Requirements – DETREF_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for DETREF_COMP are shown in Table 4.3.1.1.8a-1.
- D. I-Loads – The I-Loads for DETREF_COMP are shown in Table 4.3.1.1.8a-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Aerojet DAP unique.

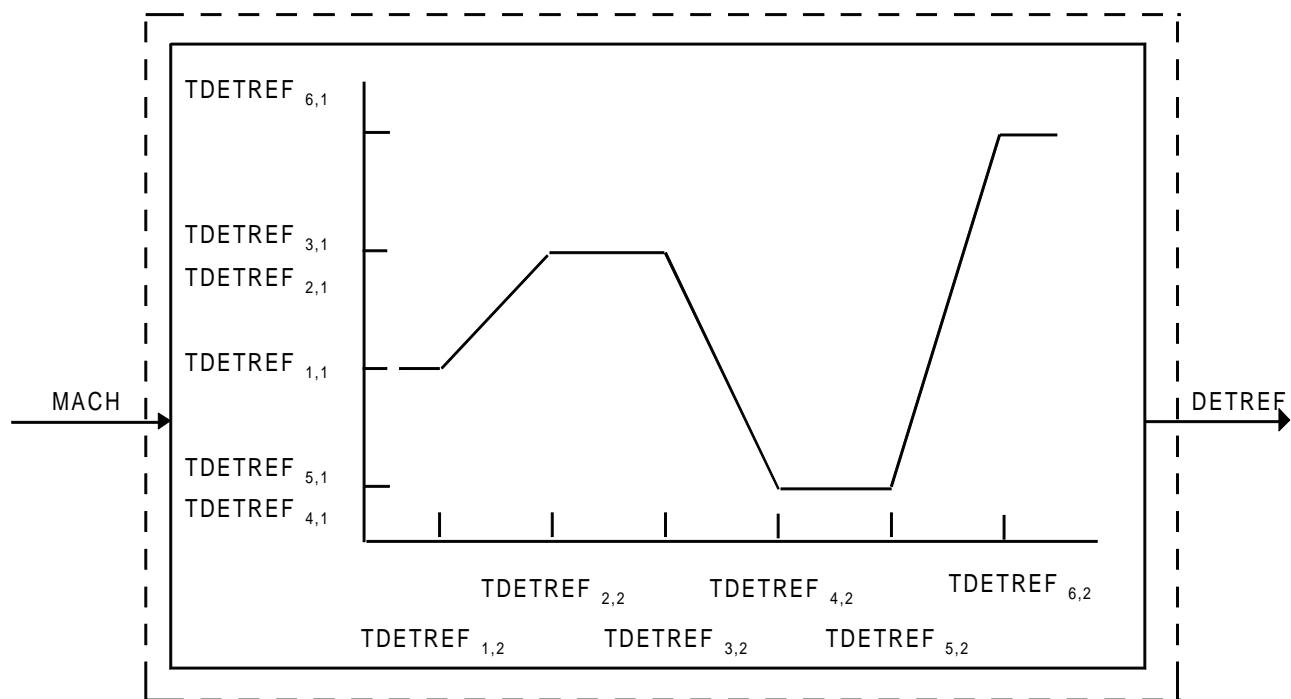


FIGURE 4.3.1.1.8a-1. DETREF_COMP (Aerojet DAP)

Table 4.3.1.1.8a-1. DETREF_COMP (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> MACH	Mach number	ADTA SOP	F	–	1.04
<u>Outputs</u> DETREF	Intercept for calculating aileron trim gain adjustment	GDET_COMP	F	ND	1.04

Table 4.3.1.1.8a-2. DETREF_COMP (Aerojet DAP) I-loads

Name	Description	Type	MSID	Units
TDETREF(1,1)	Tabulated DETREF	F	V97U0541C	ND
TDETREF(1,2)	Tabulated Mach	F	V97U0542C	–
TDETREF(2,1)	Tabulated DETREF	F	V97U0543C	ND
TDETREF(2,2)	Tabulated Mach	F	V97U0544C	–
TDETREF(3,1)	Tabulated DETREF	F	V97U0545C	ND
TDETREF(3,2)	Tabulated Mach	F	V97U0546C	–
TDETREF(4,1)	Tabulated DETREF	F	V97U0547C	ND
TDETREF(4,2)	Tabulated Mach	F	V97U0548C	–
TDETREF(5,1)	Tabulated DETREF	F	V97U0549C	ND
TDETREF(5,2)	Tabulated Mach	F	V97U0550C	–
TDETREF(6,1)	Tabulated DETREF	F	V97U0551C	ND
TDETREF(6,2)	Tabulated Mach	F	V97U0552C	–

4.3.1.1.8b DETRNG_COMP (Aerojet DAP).

A. Function – This function module computes a slope as a function of Mach that is used in calculating an adjustment to the aileron trim gains. The detailed block diagram is presented in Figure 4.3.1.1.8b-1.

B. Processing Requirements – DETRNG_COMP is processed at 1.04 Hz.

C. Interface Requirements – The interface requirements for DETRNG_COMP are shown in Table 4.3.1.1.8b-1.

D. I-Loads – The I-Loads for DETRNG_COMP are shown in Table 4.3.1.1.8b-2.

E. Initialization Requirements – None.

F. Software Configuration – Aerojet DAP unique.

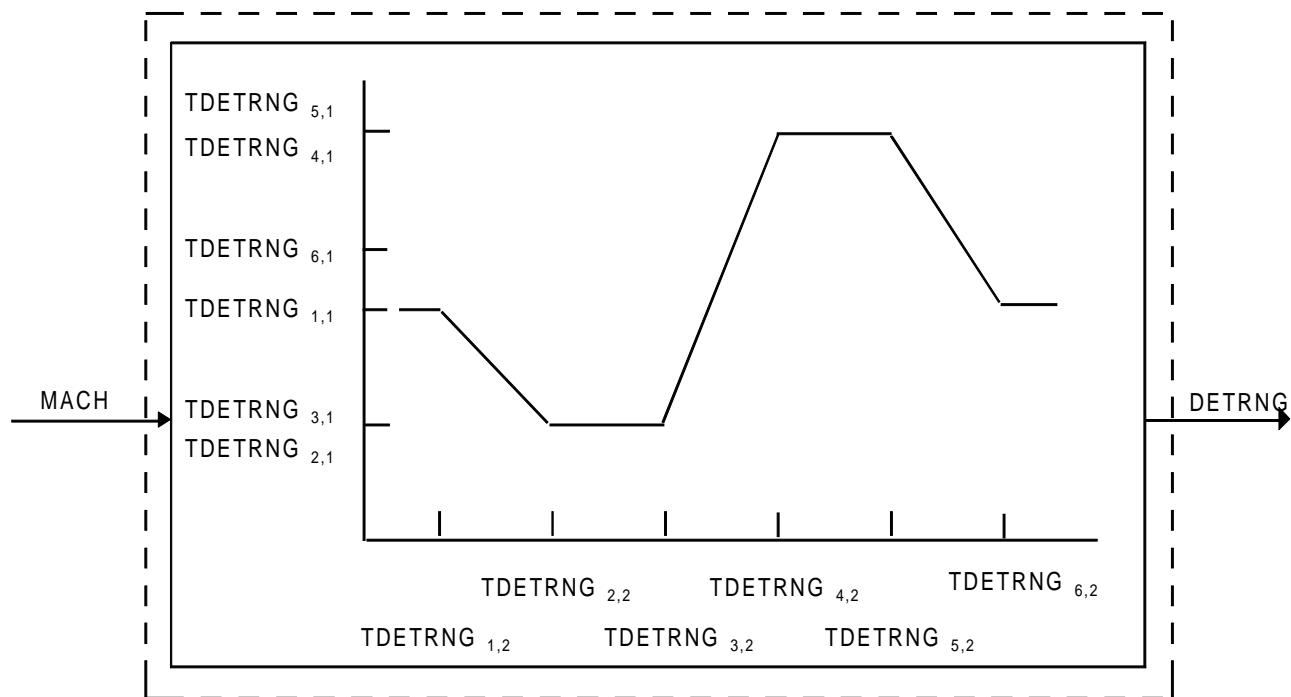


FIGURE 4.3.1.1.8b-1. DETRNG_COMP (Aerojet DAP)

Table 4.3.1.1.8b-1. DETRNG_COMP (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> MACH	Mach number	ADTA SOP	F	–	1.04
<u>Outputs</u> DETRNG	Slope for calculating aileron trim gain adjustment	GDET_COMP	F	1/deg	1.04

Table 4.3.1.1.8b-2. DETRNG_COMP (Aerojet DAP) I-loads

Name	Description	Type	MSID	Units
TDETRNG(1,1)	Tabulated DETRNG	F	V97U0553C	1/deg
TDETRNG(1,2)	Tabulated Mach	F	V97U0554C	–
TDETRNG(2,1)	Tabulated DETRNG	F	V97U0555C	1/deg
TDETRNG(2,2)	Tabulated Mach	F	V97U0556C	–
TDETRNG(3,1)	Tabulated DETRNG	F	V97U0557C	1/deg
TDETRNG(3,2)	Tabulated Mach	F	V97U0558C	–
TDETRNG(4,1)	Tabulated DETRNG	F	V97U0559C	1/deg
TDETRNG(4,2)	Tabulated Mach	F	V97U0560C	–
TDETRNG(5,1)	Tabulated DETRNG	F	V97U0561C	1/deg
TDETRNG(5,2)	Tabulated Mach	F	V97U0562C	–
TDETRNG(6,1)	Tabulated DETRNG	F	V97U0563C	1/deg
TDETRNG(6,2)	Tabulated Mach	F	V97U0564C	–

4.3.1.1.9 ELERROR.

- A. Function – This function module computes the pitch rate error, including the turn and flight path angle compensation term and filters it. The detailed block diagram is presented in Figure 4.3.1.1.9–1.
- B. Processing Requirements – ELERROR is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for ELERROR are shown in Table 4.3.1.1.9–1.
- D. I-Loads – The I-loads for ELERROR are shown in Table 4.3.1.1.9–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

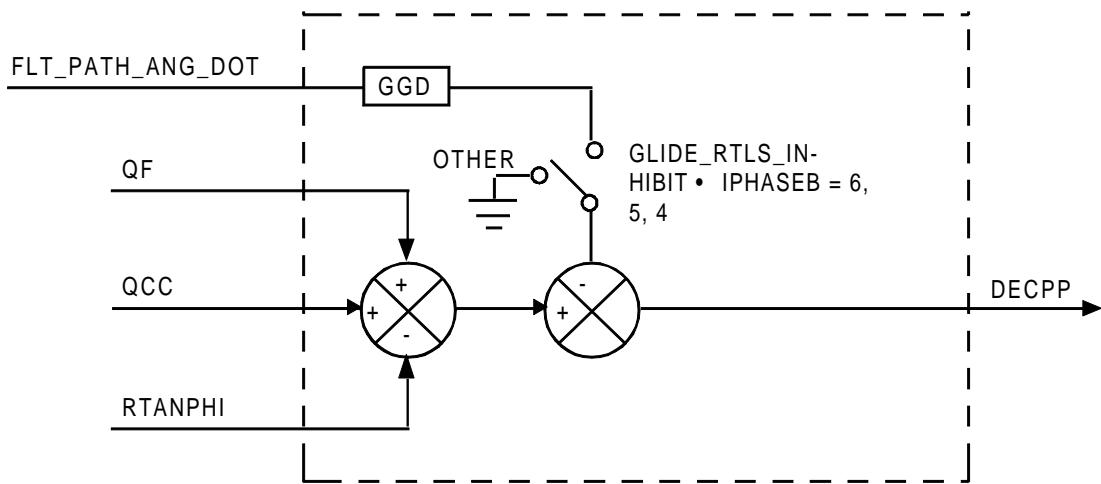


FIGURE 4.3.1.1.9-1. ELERROR

Table 4.3.1.1.9-1. ELERROR Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
QCC	Pitch rate command	ALFFLOOP, NZ_FILTER PRHC_SUM	F	deg/s	6.25 25 25
QF	Filtered pitch rate feedback	GEAR_FILTER	F	deg/s	25
RTANPHI	Pitch rate compensation trim	QCOMP	F	deg/s	6.25
FLT_PATH_ANG_DOT	Flight path angle rate	RTLS UPP	F	deg/s	1.04
GLIDE_RTLS_INHIBIT*	RTLS contingency flag	CONT 3E/O GUID, PW CONT GUID, PW RTLS GUID, MSC, GRTLS TAEM GUID	D	–	6.25
IPHASEB*	Buffered IPHASE	RECON	I	–	6.25
<u>Output</u>					
DECPP	Pitch rate error	VPBBF_ELV, VPBBF_MGT1, VPBBF_MLT1	F	deg	25
* only applicable to GRTLS					

Table 4.3.1.1.9-2. ELERROR I-Loads

Name	Description	Type	MSID	Units
GGD	Flight path angle rate gain	F	V97U8601C	sec

4.3.1.1.10 ELFBK.

A. Function – This function module subtracts panel pitch trim rate from the speed brake trim rate, converts the difference into an elevator trim command and sums it with the elevator position feedback. A first-order lag is then applied to the result. The detailed block diagram is shown in Figure 4.3.1.1.10-1.

- B. Processing Requirements – ELFBK is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for ELFBK are shown in Table 4.3.1.1.10-1.
- D. Internal Variables – The internal variables for ELFBK are shown in Table 4.3.1.1.10-2.
- E. Initialization Requirements – The initialization requirements for ELFBK are shown in Table 4.3.1.1.10-3.
- F. Software Configuration – Common.

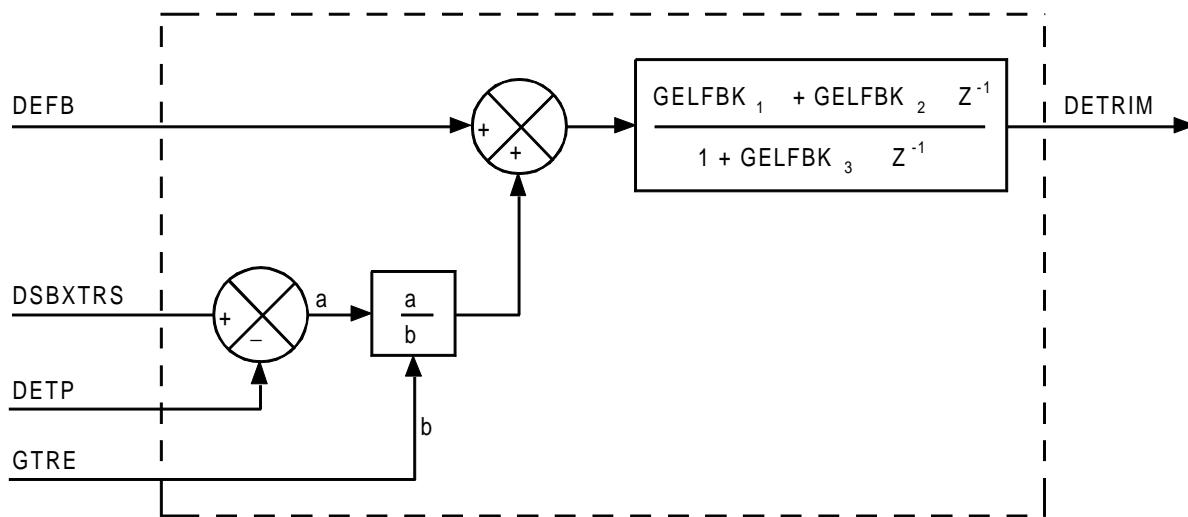


FIGURE 4.3.1.1.10-1. ELFBK

Table 4.3.1.1.10-1. ELFBK Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DEFB	Elevator position feedback	ELVN PFB SOP	F	deg	25
DSBXTRS	Speed brake trim rate	GSBHI_MOD, GSBLO_MOD	F	deg/s	25
GTRE	Gain to control preliminary pitch trim to a pitch trim rate	GTRE_COMP	F	(deg/s)/ deg	1.04
DETP	Panel pitch trim rate	GPPANT_MOD	F	deg/s	6.25
<u>Output</u>					
DETTRIM	Elevator trim command	ELVCMD, BF_RATE_CMD, GDET_COMP	F	deg	25

Table 4.3.1.1.10-2. ELFBK Internal Variables

Name	Description	Type	Value	Units
GELFBK ₁	Filter coefficient	F	1/(50 TAU + 1)	-
GELFBK ₂	Filter coefficient	F	1/(50 TAU + 1)	-
GELFBK ₃	Filter coefficient	F	(-50 TAU + 1) / (50 TAU + 1)	-

Table 4.3.1.1.10-3. ELFBK Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
First-order filter	— HIGHQ	First pass HIGHQ	Node Node	* *

* See Subsection 4.9.1

4.3.1.11 ELLOOP.

- A. Function – This function module converts pitch rate error into a preliminary elevator deflection command. It also applies a downmoding gain factor to the preliminary elevator command. The detailed block diagram is presented in Figure 4.3.1.11-1.
- B. Processing Requirements – ELLOOP is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for ELLOOP are shown in Table 4.3.1.11-1.
- D. Constants – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

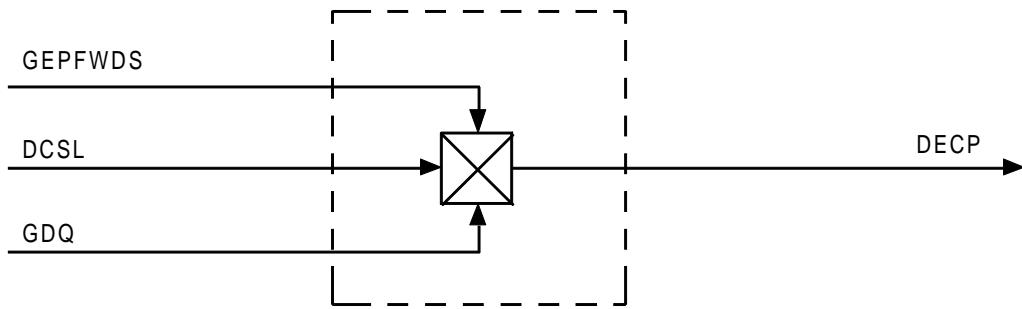


FIGURE 4.3.1.11-1. ELLOOP

Table 4.3.1.11-1. ELLOOP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DCSL	Pitch rate error	ELERROR	F	deg/s	25
GDQ	Gain to convert limited pitch rate error into a preliminary elevator command	GDQ_COMP	F	deg/s (deg/s)	1.04
GEPFWDS	Pitch forward loop downmoding gain factor	Pitch channel	F	—	6.25
<u>Output</u>					
DECP	Preliminary elevator command	ELVCMD, ETRIM*	F	deg	25
*Aerojet only					

4.3.1.1.12 ELVCMD.

- A. Function – This function module sums the preliminary elevator and trim commands. The detailed block diagram is presented in Figure 4.3.1.1.12-1.
- B. Processing Requirements – ELVCMD is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for ELVCMD are shown in Table 4.3.1.1.12-1.
- D. I-Loads – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

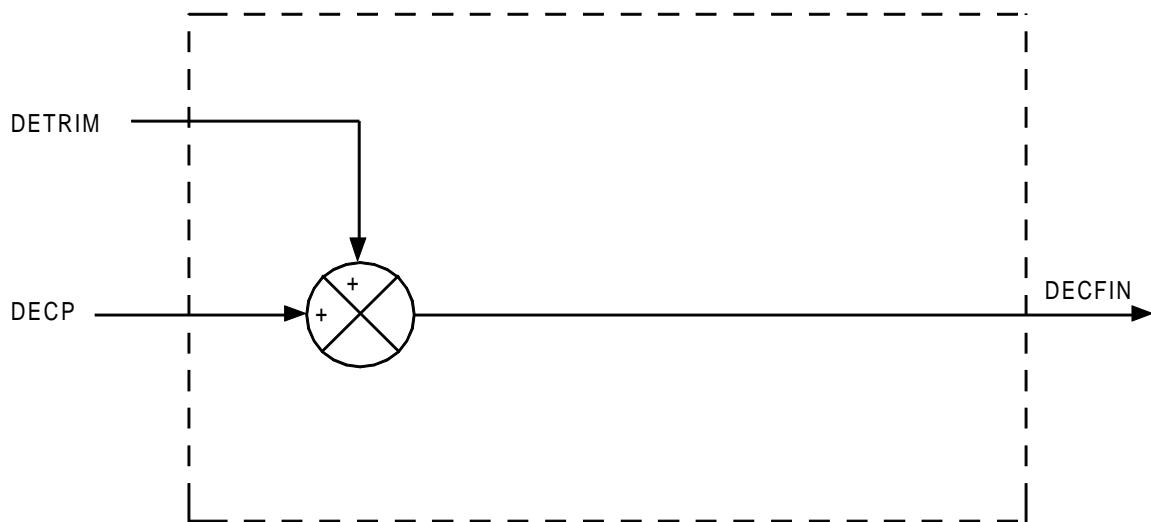


FIGURE 4.3.1.1.12-1. ELVCMD

Table 4.3.1.1.12-1. ELVCMD Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DECP	Preliminary elevator command	ELLOOP, GSD_FILT, LREL_COMP	F	deg/s	25
DETRIM	Pitch trim command	ELFBK, ETRIM_INT	F F	deg deg	1.04 25
<u>Output</u>					
DECFIN	Elevator and trim command	ELV_SUM, DEC_LIM	F	deg	25

4.3.1.1.13 ELV_SUM (Aerojet DAP).

- A. Function – This function module sums the elevator PTI pulse with the standard elevator command. The detailed block diagram is presented in Figure 4.3.1.1.13–1.
- B. Processing Requirements. ELV_SUM is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for ELV_SUM are presented in Table 4.3.1.1.13–1.
- D. Constants – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Aerojet DAP unique.

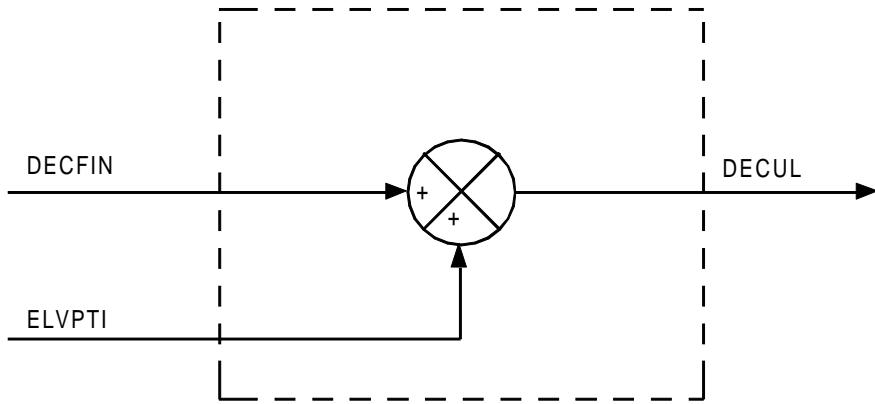


FIGURE 4.3.1.1.13-1. ELV_SUM (Aerojet DAP)

Table 4.3.1.1.13-1. ELV_SUM (Aerojet DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DECFIN	Normal elevator command	ELVCMD	F	deg	25
ELVPTI	PTI elevator pulse	DEPTI_MOD	F	deg	25
<u>Output</u>					
DECUL	Unlimited elevator command	DEC_LIM	F	deg	25

4.3.1.1.14 ESHAPE.

A. Function – This function module converts the RHC pitch command into a pitch rate command. Parabolic shaping and limiting are also applied. The RHC SOP has previously applied a deadband. The detailed block diagram is presented in Figure 4.3.1.14-1.

B. Processing Requirements – ESHAPE is processed at 25 Hz.

C. Interface Requirements – The interface requirements for ESHAPE are shown in Table 4.3.1.14-1.

D. I-Loads – The I-loads for ESHAPE are shown in Table 4.3.1.14-2.

E. Initialization Requirements – None.

F. Software Configuration – Common.

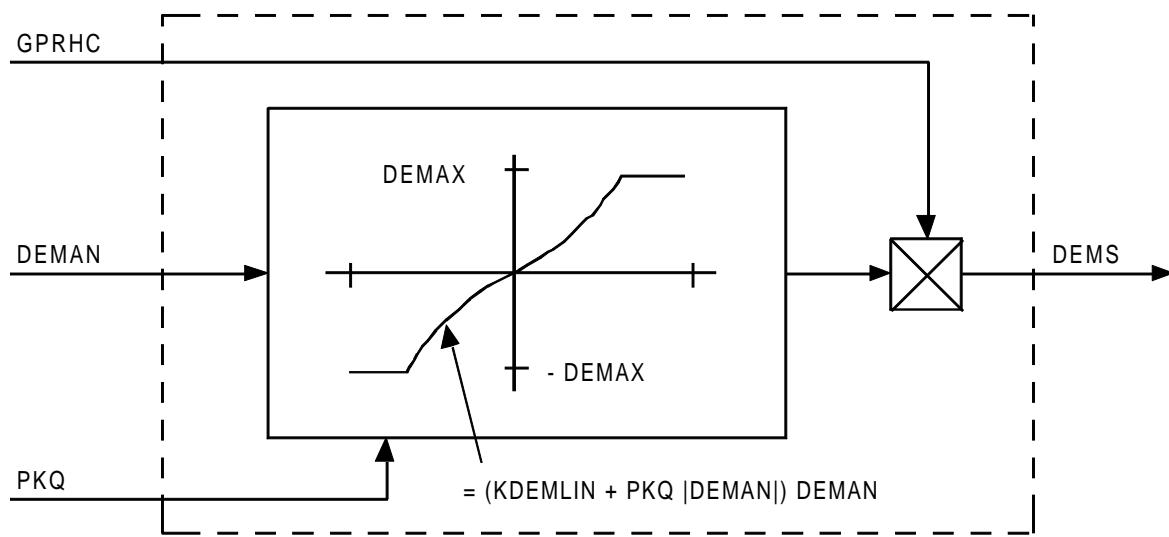


FIGURE 4.3.1.14-1. ESHAPE

Table 4.3.1.14-1. ESHAPE Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
PKQ	Square term coefficient in parabolic shaping	PIO_FILTER	F	deg/deg ²	25
DEMAN	Pitch RHC command	2-AX RHC SOP	F	deg	25
GPRHC	Gain to convert shaped RHC pitch command into a pitch rate command	GPRHC_COMP	F	(deg/s)/deg	1.04
<u>Output</u>					
DEMS	Shaped RHC pitch rate command	GPX_MOD, PRHC_SUM, TLM	F	deg/s	25

Table 4.3.1.14-2. ESHAPE I-Loads				
Name	Description	Type	MSID	Units
DEMAX	Limit on RHC pitch command	F	V97U0642C	deg
KDEMLIN	Linear coefficient in parabolic shaping	F	V97U0798C	deg/deg

4.3.1.1.15 ETRIM (Aerojet DAP).

- A. Function – This function module converts pitch jet and preliminary pitch trim commands into an interim pitch trim command. The detailed block diagram is presented in Figure 4.3.1.1.15–1.
- B. Processing Requirements. ETRIM is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for ETRIM are presented in Table 4.3.1.1.15–1.
- D. Constants – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Aerojet DAP unique.

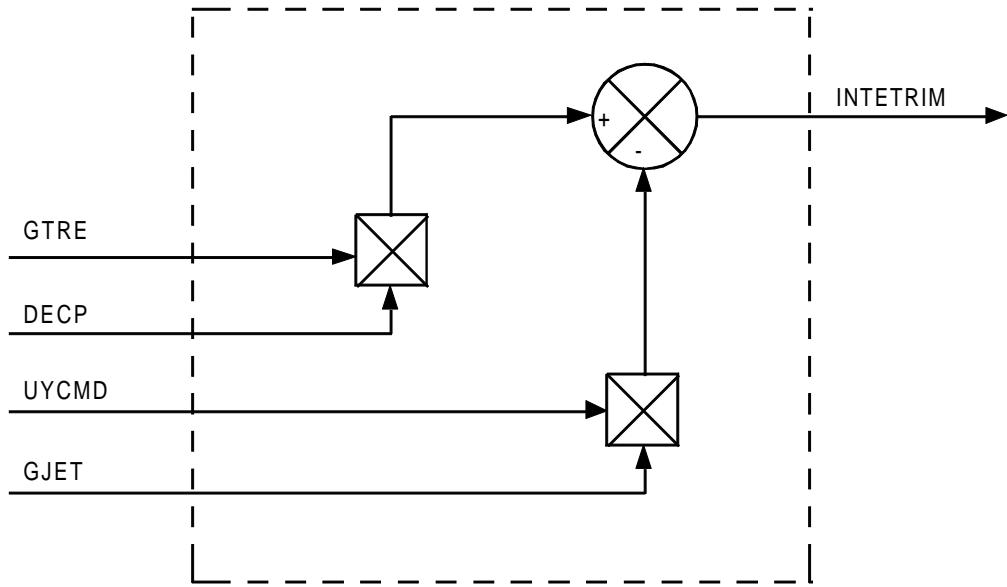


FIGURE 4.3.1.1.15-1. ETRIM (Aerojet DAP)

Table 4.3.1.1.15-1. ETRIM (Aerojet DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DECP	Preliminary pitch trim command	ELLOOP	F	deg	25
GTRE	Gain to convert preliminary pitch trim command into a pitch trim rate	GTRE_COMP	F	(deg/s)/deg	1.04
GJET	Gain to convert pitch jet command into a pitch trim rate	GJET_COMP	F	deg/s	1.04
UYCMD	Pitch jet command	PITCH_HYST	I	—	12.5
<u>Output</u>					
INTETRIM	Interim trim command	ETRIM_INT	F	deg/s	25

4.3.1.1.16 ETRIM_INT (Aerojet DAP).

A. Function – This function module converts the interim pitch trim command into a pitch trim command. The panel pitch trim rate is subtracted from the interim pitch trim rate to obtain an unlimited pitch trim rate. Rectangular integration and limiting are then applied to the trim rate to obtain the pitch trim command. The detailed block diagram is presented in Figure 4.3.1.1.16-1.

B. Processing Requirements – ETRIM_INT is processed at 25 Hz.

C. Interface Requirements – The interface requirements for ETRIM_INT are shown in Table 4.3.1.1.16-1.

D. I-Loads/Constants – The I-loads/constants for ETRIM_INT are shown in Table 4.3.1.1.16-2.

E. Initialization Requirements – The initialization requirements for ETRIM_INT are shown in Table 4.3.1.1.16-3.

F. Software Configuration – Aerojet DAP unique.

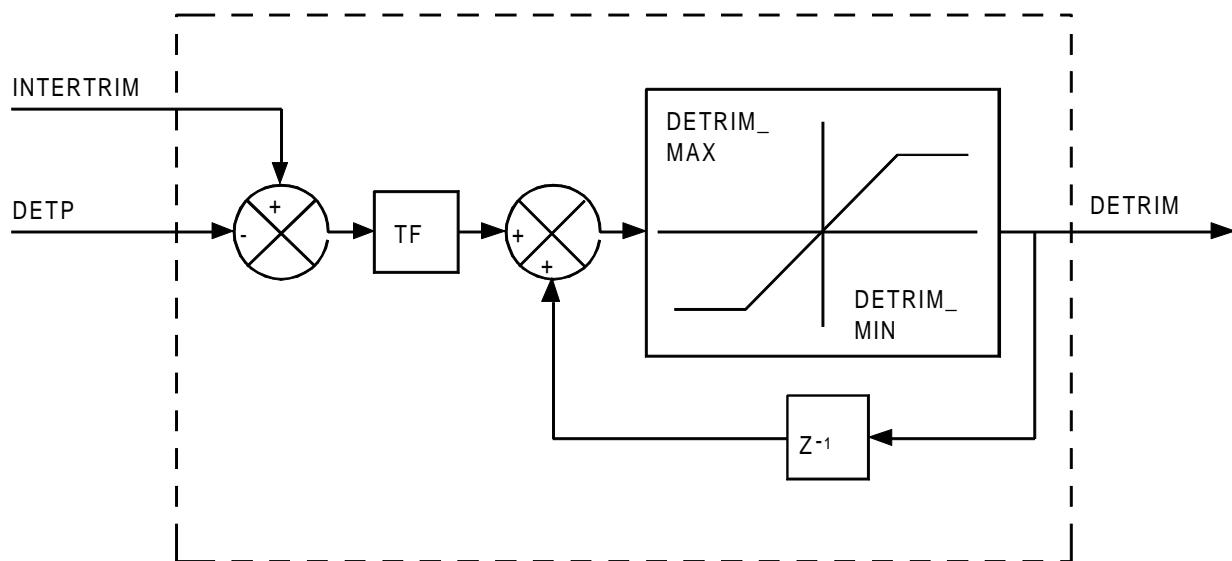


FIGURE 4.3.1.1.16-1. ETRIM_INT (Aerojet DAP)

Table 4.3.1.1.16-1. ETRIM_INT (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DETP	Pitch trim rate due to panel trim switch	GPPANT_MOD	F	deg/s	6.25
INTETRIM	Interim trim command	ETRIM	F	deg/s	25
ALT_ELV	Alternate elevon discrete	OVERRIDE DISPLAY	D	—	1.04
<u>Output</u>					
DETRIM	Pitch trim command	ELVCMD, BF_RATE_CMD	F	deg	25

Table 4.3.1.1.16-2. ETRIM_INT (Aerojet DAP) I-Loads/Constants

Name	Description	Type	MSID/Value	Units
DETRIM_MAX	Maximum pitch trim	F	V97U0644C	deg
DETRIM_MIN	Minimum pitch trim	F	V97U0645C	deg
TF	DAP fast cycle time	F	0.04	s

Table 4.3.1.1.16-3. ETRIM_INT (Aerojet DAP) Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Integrator	—	First pass	Detrim	TDETD (8,1)
	ALT_ELV	ALT_ELV	Detrim	TDETD (8,1)
	ALT_ELV	ALT_ELV	Detrim	TDETDA (8,1) (TDETD and TDETDA from DETD SCHED in body flap channel)

4.3.1.1.16a GDET_COMP (Aerojet DAP).

- A. Function – This function module computes an adjustment for the aileron trim gains based on the elevator trim position. The detailed block diagram is presented in Figure 4.3.1.1.16a-1.
- B. Processing Requirements – GDET_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for GDET_COMP are shown in Table 4.3.1.1.16a-1.
- D. I-Loads – The I-loads for GDET_COMP are shown in Table 4.3.1.1.16a-2.
- E. Initialization Requirements – On the transition from HIGHQ to NOT HIGHQ the value for DETRIM shall come from ELFBK on first pass only. On the transition from NOT HIGHQ to HIGHQ the value for DETRIM shall come from ETRIM_INT on first pass only.
- F. Software Configuration – Aerojet DAP unique.

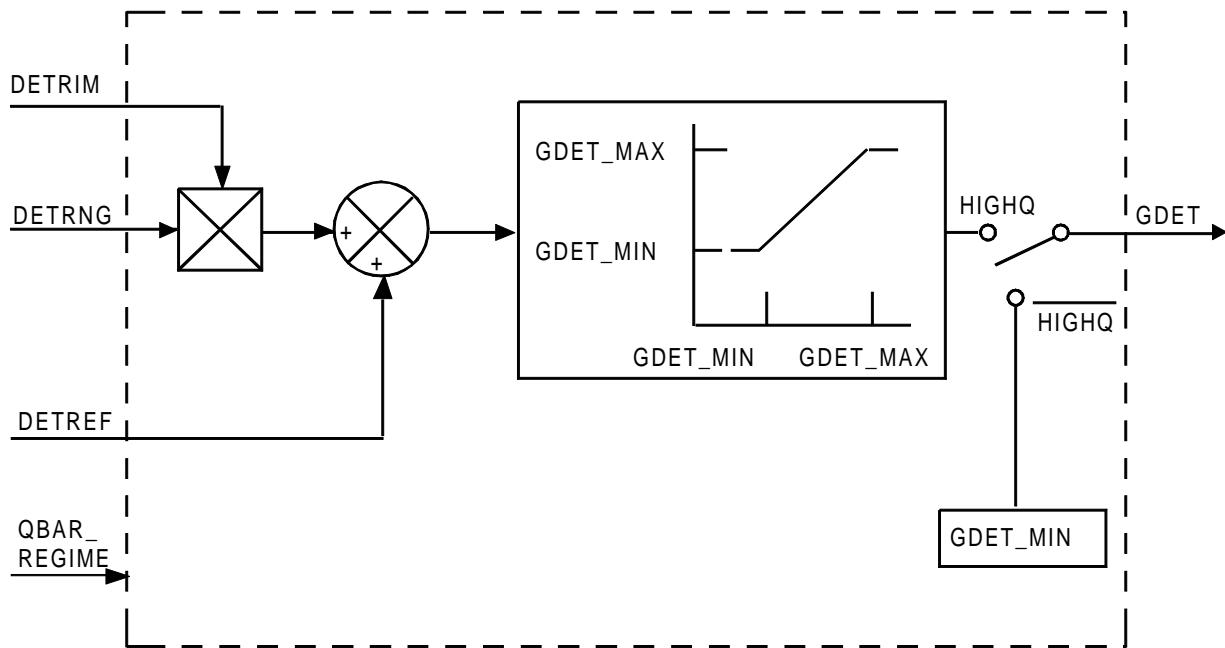


FIGURE 4.3.1.1.16a-1. GDET_COMP (Aerojet DAP)

Table 4.3.1.1.16a-1. GDET_COMP (Aerojet DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DETREF	Intercept for calculating aileron trim gain adjustment	DETREF_COMP	F	ND	1.04
DETRIM	Elevator trim position	ELFBK	F	deg	25
DETRNG	Slope for calculating aileron trim gain adjustment	DETRNG_COMP	F	1/deg	1.04
HIGHQ	High QBAR regime	RECON	D	–	6.25
<u>Outputs</u>					
GDET	Gain adjustment for aileron trim	DRR_LIM_COMP, GTRIMB_COMP (Roll channel)	F	ND	1.04

Table 4.3.1.1.16a-2. GDET_COMP (Aerojet DAP) I-Loads				
Name	Description	Type	MSID	Units
GDET_MIN	Minimum value of GDET	F	V97U0565C	ND
GDET_MAX	Maximum value of GDET	F	V97U0566C	ND

4.3.1.1.17 GDQ_COMP.

A. Function – This function module schedules a gain as a function of Mach number and dynamic pressure. The gain is used to convert the limited pitch rate error into a preliminary elevator command. The detailed block diagram is presented in Figure 4.3.1.1.17-1.

B. Processing Requirements – GDQ_COMP is processed at 1.04 Hz.

C. Interface Requirements – The interface requirements for GDQ_COMP are shown in Table 4.3.1.1.17-1.

D. I-Loads – The I-loads for GDQ_COMP are shown in Table 4.3.1.1.17-2.

E. Initialization Requirements – None.

F. Software Configuration – Common.

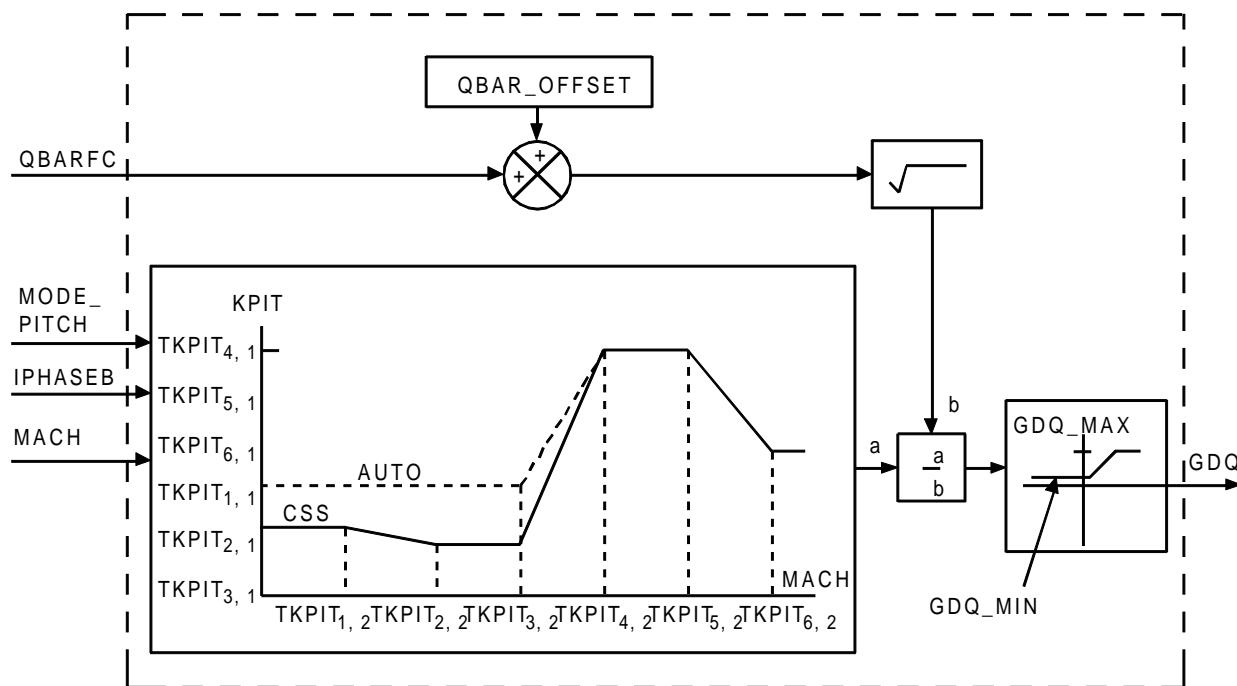


FIGURE 4.3.1.1.17-1. GDQ_COMP

Table 4.3.1.1.17-1. GDQ_COMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
MACH	Mach number	ADTA SOP	F	—	1.04
OBARFC	Dynamic pressure for FCS	ADTA SOP, QBLIM_MOD	F	lb/ft ²	1.04
MODE_PITCH	Pitch channel mode indicator	RECON	D	—	6.25
<u>Output</u>					
GDQ	Gain to convert pitch rate error into a preliminary	ELLOOP	F	deg/ (deg/s)	1.04

Table 4.3.1.17-2. GDQ_COMP I-Loads

Name	Description	Type	MSID	Units
TKPIT_AUTO (1,1)	Tabulated KPIT_AUTO	F	V98U9604C	**
TKPIT_CSS (1,1)	Tabulated KPIT_CSS	F	V97U1018C	**
TKPIT (1,2)	Tabulated MACH	F	V98U9605C	—
TKPIT_AUTO (2,1)	Tabulated KPIT_AUTO_	F	V98U9606C	**
TKPIT_CSS (2,1)	Tabulated KPIT_CSS	F	V97U1020C	**
TKPIT (2,2)	Tabulated MACH	F	V98U9607C	—
TKPIT_AUTO (3,1)	Tabulated KPIT_AUTO_	F	V98U9608C	**
TKPIT_CSS (3,1)	Tabulated KPIT_CSS_	F	V97U1022C	**
TKPIT (3,2)	Tabulated MACH	F	V98U9609C	—
TKPIT_AUTO (4,1)	Tabulated KPIT_AUTO_	F	V98U9610C	**
TKPIT_CSS (4,1)	Tabulated KPIT_CSS_	F	V97U1024C	**
TKPIT_(4,2)	Tabulated MACH	F	V98U9611C	—
TKPIT_AUTO (5,1)	Tabulated KPIT_AUTO_	F	V98U9612C	**
TKPIT_CSS (5,1)	Tabulated KPIT_CSS	F	V97U1026C	**
TKPIT (5,2)	Tabulated MACH	F	V98U9613C	—
TKPIT_AUTO (6,1)	Tabulated KPIT_AUTO_	F	V98U9614C	**
TKPIT_CSS (6,1)	Tabulated KPIT_CSS_	F	V97U1028C	**
TPKIT (6,2)	Tabulated MACH	F	V98U9615C	—
QBAR_OFFSET	Offset of QBAR in the determination of GDQ	F	V97U0872C	lb/ft** ²
GDQ_MAX	Maximum value of GDQ	F	V97U0693C	deg/(deg/s)
GDQ_MIN	Minimum value of GDQ	F	V97U0695C	deg/(deg/s)

$$** \frac{s * lb^{1/2}}{ft}$$

4.3.1.1.18 GDSB_COMP.

A. Function – This function module schedules a gain as a function of Mach number. The gain is used to convert the speed brake increment crossfeed into a pitch trim increment. The detailed block diagram is shown in Figure 4.3.1.1.18-1.

B. Processing Requirements – GDSB_COMP is processed at 1.04 Hz

C. Interface Requirements – The interface requirements for GDSB_COMP are shown in Table 4.3.1.1.18-1.

D. Constants – The constants for GDSB_COMP are shown in Table 4.3.1.1.18-2.

E. Initialization Requirements – None.

F. Software Configuration – Common.

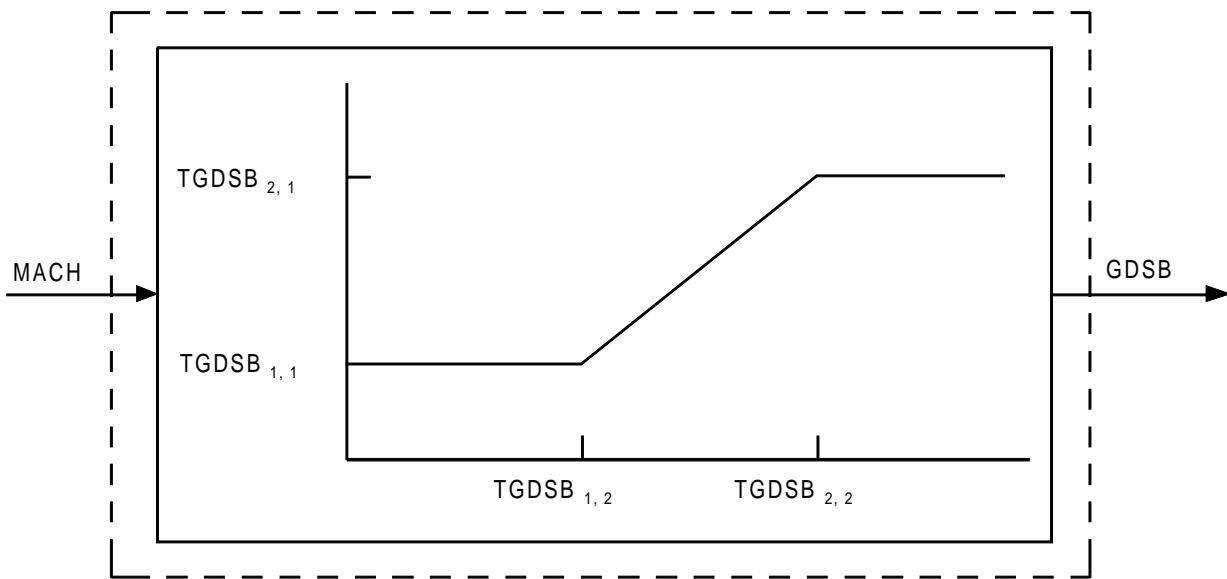


FIGURE 4.3.1.1.18-1. GDSB_COMP

Table 4.3.1.1.18-1. GDSB_COMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> MACH	Mach number	ADTA SOP	F	—	1.04
<u>Output</u> GDSB	Gain to convert speedbrake increment crossfeed into a pitch trim increment	SBXFEED	F	deg/deg	1.04

Table 4.3.1.1.18-2. GDSB_COMP Constants				
Name	Description	Type	MSID/Value	Units
TGDSB(1,1)	Tabulated GDSB	K	V97U0956C/ +6.0 E-02	deg/deg
TGDSB(1,2)	Tabulated MACH	K	V97U0957C/ +4.0 E+00	—
TGDSB(2,1)	Tabulated GDSB	K	V97U0958C/ +0.0 E+00	deg/deg
TGDSB(2,2)	Tabulated MACH	K	V97U0959C/ +4.5 E+00	—

4.3.1.18a GEAR_FILTER

- A. Function – This function module applies a second-order notch filter to the preliminary elevator command to suppress gear oscillations. The detailed block diagram is presented in Figure 4.3.1.18a-1.
- B. Processing Requirements – GEAR_FILTER is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for GEAR_FILTER are shown in Table 4.3.1.18a-1.
- D. I-Loads – The I-loads for GEAR_FILTER are shown in Table 4.3.1.18a-2.
- E. Initialization Requirements – The initialization requirements for GEAR_FILTER are shown in Table 4.3.1.18a-3.
- F. Software Configuration – Common.

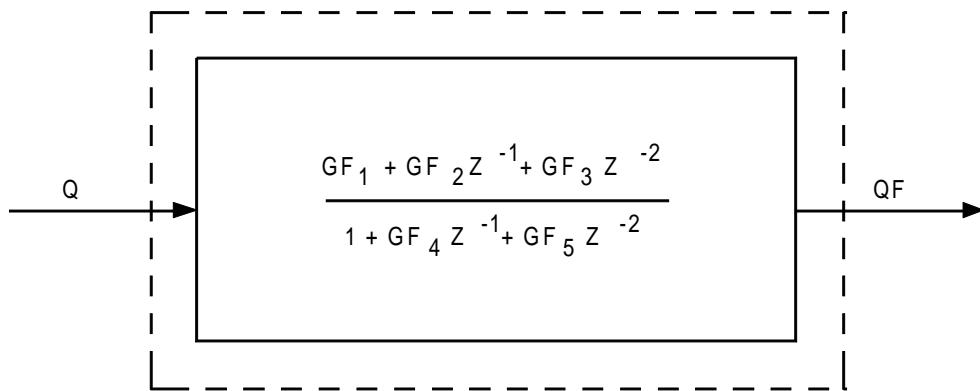


FIGURE 4.3.1.18a-1. GEAR_FILTER

Table 4.3.1.1.18a-1. GEAR_FILTER Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> Q	Pitch rate feedback	SF	F	deg/s	25
<u>Output</u> QF	Filtered pitch rate feedback	ELERROR	F	deg/s	25

Table 4.3.1.1.18a-2. GEAR_FILTER I-Loads

Name	Description	Type	MSID	Units
GF ₁	Filter coefficient	F	V99U9671C	—
GF ₂	Filter coefficient	F	V99U9672C	—
GF ₃	Filter coefficient	F	V99U9673C	—
GF ₄	Filter coefficient	F	V99U9674C	—
GF ₅	Filter coefficient	F	V99U9675C	—

Table 4.3.1.1.18a-3. GEAR_FILTER Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Second-order filter	WOWLON	WOWLON	Node	*
* See Subsection 4.9.2				

4.3.1.1.19 GJET_COMP (Aero jet DAP)

- A. Function – This function module schedules a gain as a function of dynamic pressure. The gain is used to convert pitch jet commands into pitch trim rates. The detailed block diagram is presented in Figure 4.3.1.1.19-1.
- B. Processing Requirements – GJET_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for GJET_COMP are shown in Table 4.3.1.1.19-1.
- D. Constants – The constants for GJET_COMP are shown in Table 4.3.1.1.19-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Aerojet DAP unique.

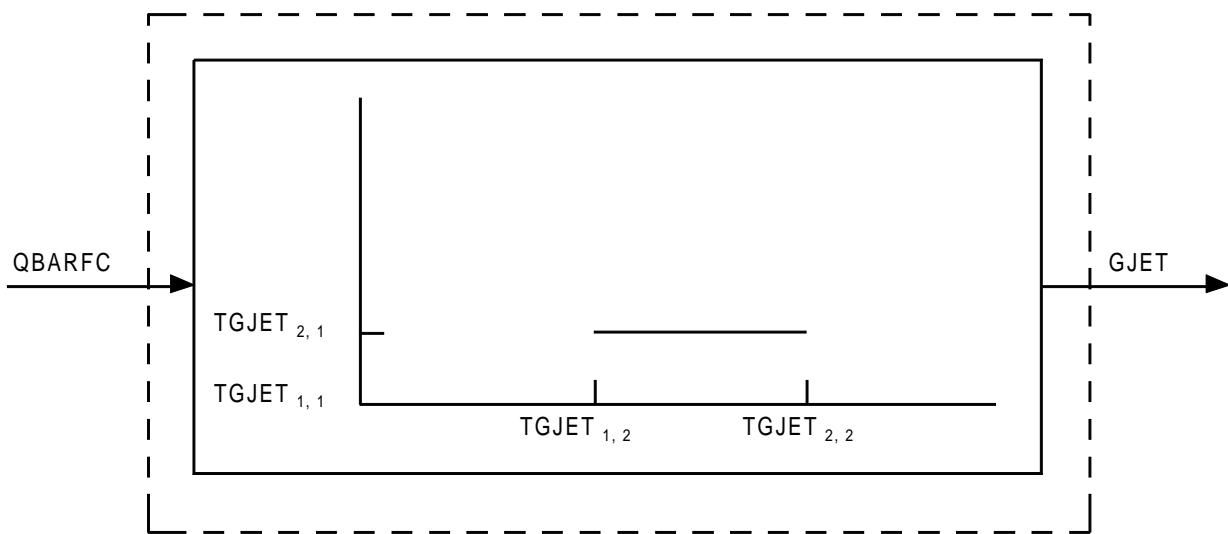


FIGURE 4.3.1.1.19-1. GJET_COMP (Aerojet DAP)

Table 4.3.1.1.19-1. GJET_COMP (Aerojet DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> QBARFC	Dynamic pressure for FCS	ADTA SOP, QBLIM_MOD	F F	lb/ft**2 lb/ft**2	1.04 1.04
<u>Output</u> GJET	Gain to convert a pitch jet command into a pitch trim rate	ETRIM	F	deg/s	1.04

Table 4.3.1.1.19-2. GJET_COMP (Aerojet DAP) Constants				
Name	Description	Type	MSID/ Values	Units
TGJET _{1,1}	Tabulated GJET	K	V97U0960C/ +0.0 E+00	deg/s
TGJET _{1,2}	Tabulated QBARFC	K	V97U0961C/ +1.0 E+03	lb/ft**2
TGJET _{2,1}	Tabulated GJET	K	V97U0962C/ +4.0 E+00	deg/s
TGJET _{2,2}	Tabulated QBARFC	K	V97U0963C/ +2.0 E+03	lb/ft**2

4.3.1.1.21 GPC_COMP.

- A. Function – This function module computes and limits the gain GPC as a function of dynamic pressure. The detailed block diagram is presented in Figure 4.3.1.1.21–1.
- B. Processing Requirements – GPC_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for GPC_COMP are shown in Table 4.3.1.1.21–1.
- D. I-Loads – The I-loads for GPC_COMP are shown in Table 4.3.1.1.21–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common

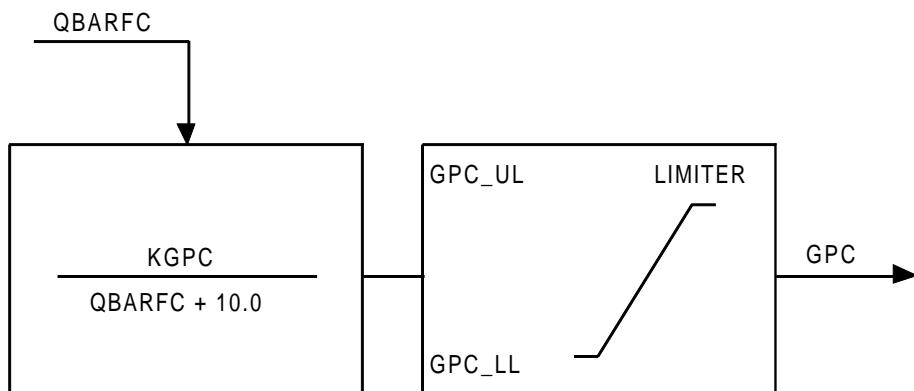


FIGURE 4.3.1.1.21-1. GPC_COMP

Table 4.3.1.1.21-1. GPC_COMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> QBARFC	Limited dynamic pressure	ADTA SOP, QBLIM_MOD	F	lb/ft ²	1.04
<u>Output</u> GPC	Schedule gain	GSD_FILT	F	$\frac{\text{deg}}{\text{deg / s}}$	1.04

Table 4.3.1.1.21-2. GPC_COMP I-Loads					
Name	Description	Type	MSID	Units	
KGPC	Scaled dynamic pressure	F	V96U9366C	$\frac{\text{lb * s}}{\text{ft}^2}$	
GPC_UL	GPC upper limit	F	V96U9367C	$\frac{\text{deg}}{\text{deg / s}}$	
GPC_LL	GPC lower limit	F	V96U9368C	$\frac{\text{deg}}{\text{deg / s}}$	

4.3.1.1.22 GPPANT_MOD.

- A. Function – This function module converts the panel pitch beep trim into a pitch trim rate. The detailed block diagram is presented in Figure 4.3.1.1.22-1.
- B. Processing Requirements – GPPANT_MOD is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for GPPANT_MOD are shown in Table 4.3.1.1.22-1.
- D. I-Loads – The I-loads for GPPANT_MOD are shown in Table 4.3.1.1.22-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

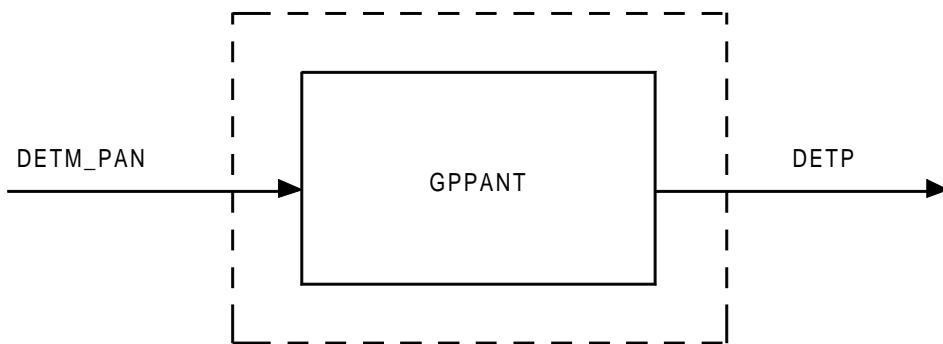


FIGURE 4.3.1.1.22-1. GPPANT_MOD

Table 4.3.1.1.22-1. GPPANT_MOD Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DETM_PAN	Panel pitch beep trim	2-AX RHC SOP	I	—	6.25
<u>Output</u> DETP	Panel pitch trim rate	ELFBK, ETRIM_INT	F	deg/s	6.25

Table 4.3.1.1.22-2. GPPANT_MOD I-Loads				
Name	Description	Type	MSID	Units
GPPANT	Gain to convert panel pitch trim into a pitch trim rate	F	V97U0740C	deg/s

4.3.1.1.23 GPRHC_COMP.

- A. Function – This function module schedules a gain as a function of Mach number. This gain is used to convert the RHC pitch command into a pitch rate command. The detailed block diagram is presented in Figure 4.3.1.1.23-1.
- B. Processing Requirements – GPRHC_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for GPRHC_COMP are shown in Table 4.3.1.1.23-1.
- D. Constants – The constants for GPRHC_COMP are shown in Table 4.3.1.1.23-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

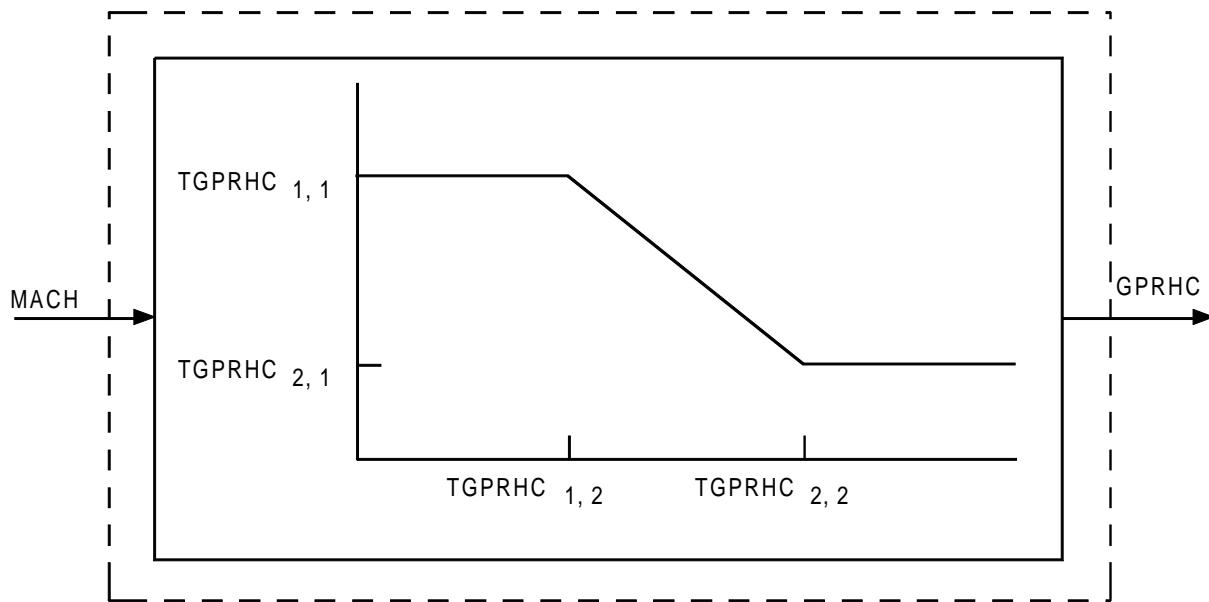


FIGURE 4.3.1.1.23-1. GPRHC_COMP

Table 4.3.1.1.23-1. GPRHC_COMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> MACH	Mach number	ADTA SOP	F	—	1.04
<u>Output</u> GPRHC	Gain to convert shaped RHC pitch command into a pitch rate command	ESHAPE	F	(deg/s)/deg	1.04

Table 4.3.1.1.23-2. GPRHC_COMP Constants				
Name	Description	Type	MSID/Value	Units
TGPRHC(1,1)	Tabulated GPRHC	K	V97U0978C/ +4.0 E-01	(deg/s)/deg
TGPRHC(1,2)	Tabulated MACH	K	V97U0979C/ +1.2 E+00	—
TGPRHC(2,1)	Tabulated GPRHC	K	V97U0980C/ +1.25 E-01	(deg/s)/deg
TGPRHC(2,2)	Tabulated MACH	K	V97U0981C/ +2.0 E+00	—

4.3.1.1.24 GPX_MOD.

- A. Function – This function module scales the pitch rate command during entry when the RHC pitch softstop is exceeded. The detailed block diagram is presented in Figure 4.3.1.1.24–1.
- B. Processing Requirements – GPX_MOD is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for GPX_MOD are shown in Table 4.3.1.1.24–1.
- D. I-Loads – The I-loads for GPX_MOD are shown in Table 4.3.1.1.24–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

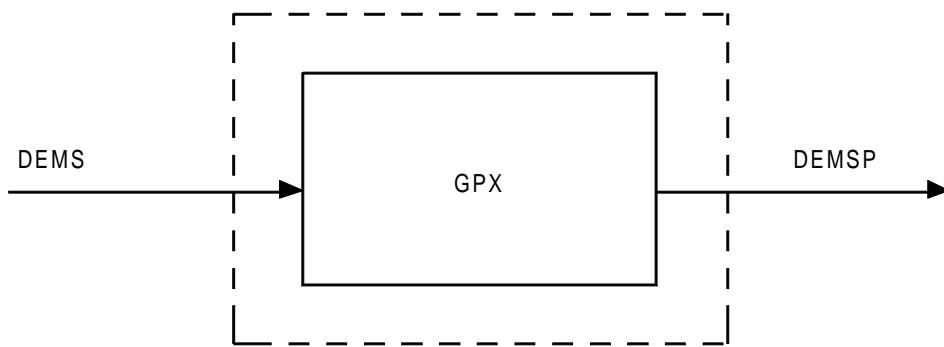


FIGURE 4.3.1.1.24-1. GPX_MOD

Table 4.3.1.1.24-1. GPX_MOD Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DEMS	Shaped RHC pitch rate command	ESHAPE	F	deg/s	25
<u>Output</u> DEMSP	Scaled pitch rate command	PRHC_SUM	F	deg/s	25

Table 4.3.1.1.24-2. GPX_MOD I-Loads				
Name	Description	Type	MSID	Units
GPX	Scale factor	F	V97U0742C	ND

4.3.1.1.25 GQAL_COMP.

- A. Function – This function module schedules a gain as a function of Mach number. The gain is used to convert the angle of attack error into a pitch rate command. The detailed block diagram is presented in Figure 4.3.1.1.25-1.
- B. Processing Requirements – GQAL_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for GQAL_COMP are shown in Table 4.3.1.1.25-1.
- D. Constants – The constants for GQAL_COMP are shown in Table 4.3.1.1.25-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

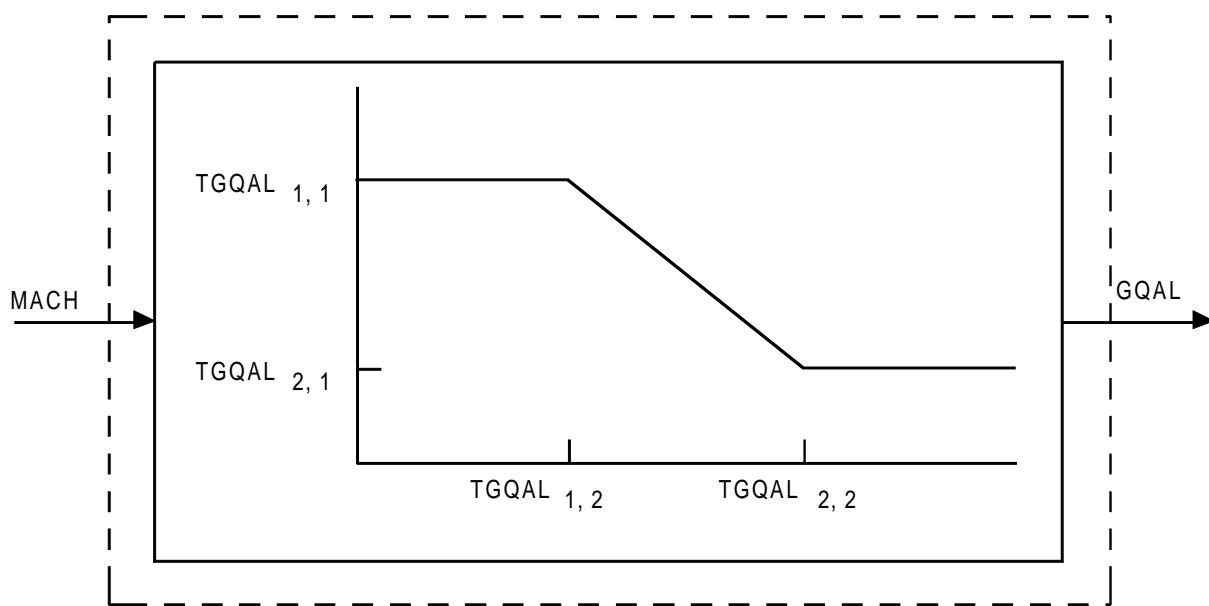


FIGURE 4.3.1.1.25-1. GQAL_COMP

Table 4.3.1.1.25-1. GQAL_COMP Interface Requirements Input					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> MACH	Mach number	ADTA SOP	F	—	1.04
<u>Output</u> GQAL	Gain to convert angle of attack error into a pitch rate command	ALFLOOP	F	(deg/s)/deg	1.04

Table 4.3.1.1.25-2. GQAL_COMP Constants				
Name	Description	Type	MSID/Values	Units
TGQAL(1,1)	Tabulated GQAL	K	V97U0982C/ (1) +5.0 E-01 (2) +7.0 E-01	(deg/s)/deg
TGQAL(1,2)	Tabulated MACH	K	V97U0983C/ (1) +4.8 E+00 (2) +2.2 E+01	—
TGQAL(2,1)	Tabulated GQAL	K	V97U0984C/ (1) +4.0 E-01 (2) +3.3 E-01	(deg/s)/deg
TGQAL(2,2)	Tabulated MACH	K	V97U0985C/ (1) +5.2 E+00 (2) +2.3 E+01	—

(1) Memory Configuration 01
(2) Memory Configuration 03

4.3.1.1.25a GQAL_COMP_NYJET (Aerojet DAP).

- A. Function – When in the wraparound mode, this function module schedules a gain as a function of Mach number. The detailed block diagram is presented in Figure 4.3.1.1.25a-1.
- B. Processing Requirements – GQAL_COMP_NYJET is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for GQAL_COMP_NYJET are shown in Table 4.3.1.1.25a-1.
- D. I-Loads – The I-loads for GQAL_COMP_NYJET are shown in Table 4.3.1.1.25a-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Aerojet DAP unique.

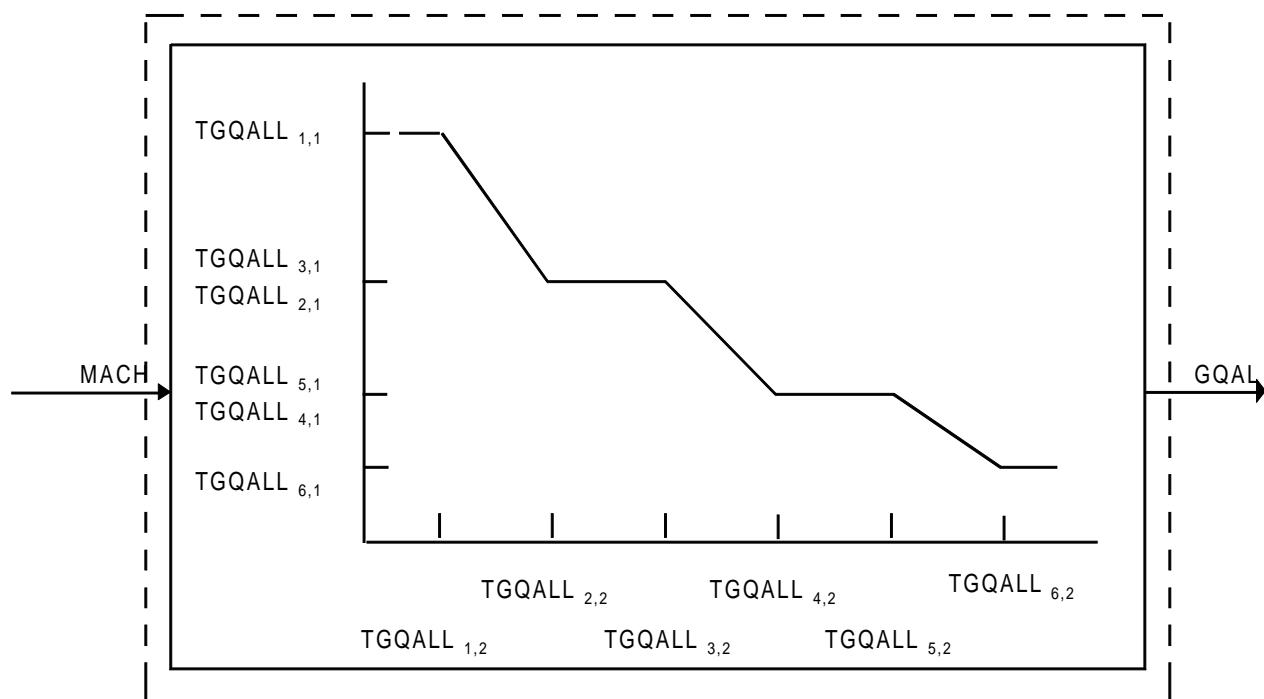


FIGURE 4.3.1.1.25a-1. GQAL_COMP_NYJET (Aerojet DAP)

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Table 4.3.1.1.25a-1. GQAL_COMP_NYJET (Aerojet DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> MACH	Mach number	ADTA SOP	F	—	1.04
<u>Outputs</u> GQAL	Gain to convert angle of attack error into a pitch rate command	ALFLOOP	F	(deg/s)/deg	1.04

Table 4.3.1.1.25a-2. GQAL_COMP_NYJET (Aerojet DAP) I-loads				
Name	Description	Type	MSID/Values	Units
TGQALL(1,1)	Tabulated GQALL	F	V97U0578C	(deg/s)/deg
TGQALL(1,2)	Tabulated Mach	F	V97U0579C	—
TGQALL(2,1)	Tabulated GQALL	F	V97U0580C	(deg/s)/deg
TGQALL(2,2)	Tabulated Mach	F	V97U0581C	—
TGQALL(3,1)	Tabulated GQALL	F	V97U0582C	(deg/s)/deg
TGQALL(3,2)	Tabulated Mach	F	V97U0583C	—
TGQALL(4,1)	Tabulated GQALL	F	V97U0584C	(deg/s)/deg
TGQALL(4,2)	Tabulated Mach	F	V97U0585C	—
TGQALL(5,1)	Tabulated GQALL	F	V97U0586C	(deg/s)/deg
TGQALL(5,2)	Tabulated Mach	F	V97U0587C	—
TGQALL(6,1)	Tabulated GQALL	F	V97U0588C	(deg/s)/deg
TGQALL(6,2)	Tabulated Mach	F	V97U0589C	—

4.3.1.1.26 GQALR_MOD.

- A. Function – This function module converts the angle of attack error into a pitch rate command. The detailed block diagram is presented in Figure 4.3.1.1.26–1.
- B. Processing Requirements – GQALR_MOD is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for GQALR_MOD are shown in Table 4.3.1.1.26–1.
- D. Constatnts – The constants for GQALR_MOD are shown in Table 4.3.1.1.26–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

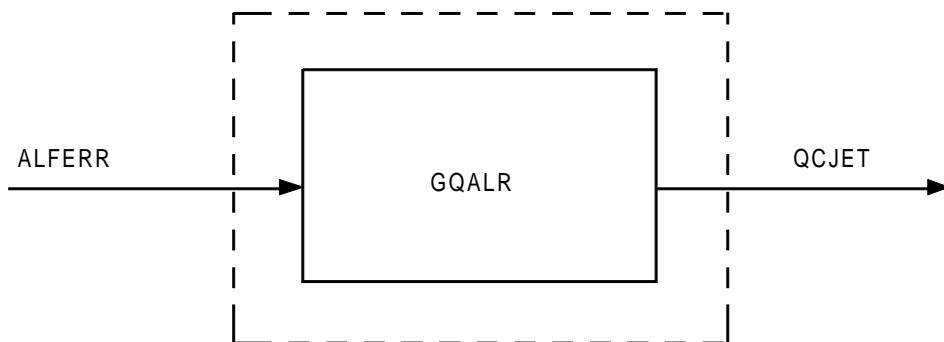


FIGURE 4.3.1.1.26-1. GQALR_MOD

Table 4.3.1.1.26-1. GQALR_MOD Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> ALFERR	Limited angle of attack error	ALFERRLIM, ALFERRLIM_TAL	F	deg	6.25
<u>Output</u> QCJET	Pitch rate command to auto pitch RCS	AUTO_PJET_CMD	F	deg/s	6.25

Table 4.3.1.1.26-2. GQALR_MOD Constants				
Name	Description	Type	MSID/ Value	Units
GQALR	Gain to convert angle of attack error into a pitch rate command	K	V97U0744C/ (1) +4.0 E-01 (2) +3.3 E-01	(deg/s)/deg
(1) Memory Configuration 01				
(2) Memory Configuration 03				

4.3.1.1.27 GSBHI_MOD.

- A. Function – This function module converts the pitch trim increment into a pitch trim rate for large speed brake deflections. The detailed block diagram is presented in Figure 4.3.1.1.27–1.
- B. Processing Requirements – GSBHI_MOD is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for GSBHI_MOD are shown in Table 4.3.1.1.27–1.
- D. Constants – The constants for GSBHI_MOD are shown in Table 4.3.1.1.27–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

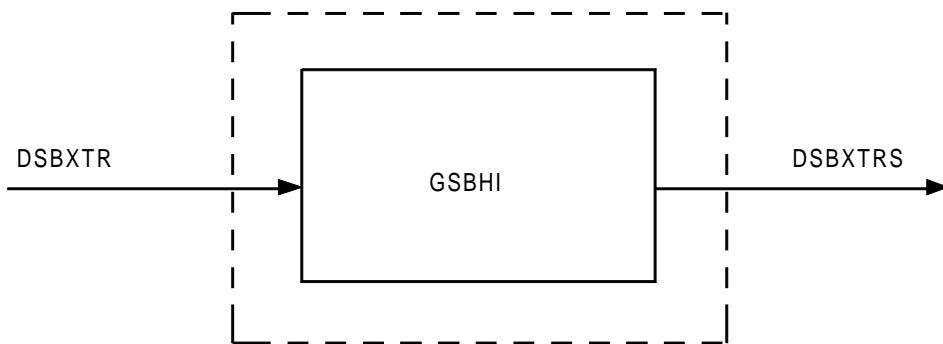


FIGURE 4.3.1.1.27-1. GSBHI_MOD

Table 4.3.1.1.27-1. GSBHI_MOD Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Input</u> DSBXTR	Pitch trim increment	SBXFEED	F	deg	25
<u>Output</u> DSBXTRS	Pitch trim rate	ELFBK	F	deg/s	25

Table 4.3.1.1.27-2. GSBHI_MOD Constants				
Name	Description	Type	MSID/Value	Units
GSBHI	High scaling gain	K	V97U0776C/ +2.5 E+01	(deg/s)/deg

4.3.1.1.28 GSBLO_MOD.

- A. Function – This function module converts the pitch trim increment into a pitch trim rate for small speed brake deflections. The detailed block diagram is presented in Figure 4.3.1.1.28–1.
- B. Processing Requirements – GSBLO_MOD is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for GSBLO_MOD are shown in Table 4.3.1.1.28–1.
- D. Constants – The constants for GSBLO_MOD are shown in Table 4.3.1.1.28–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

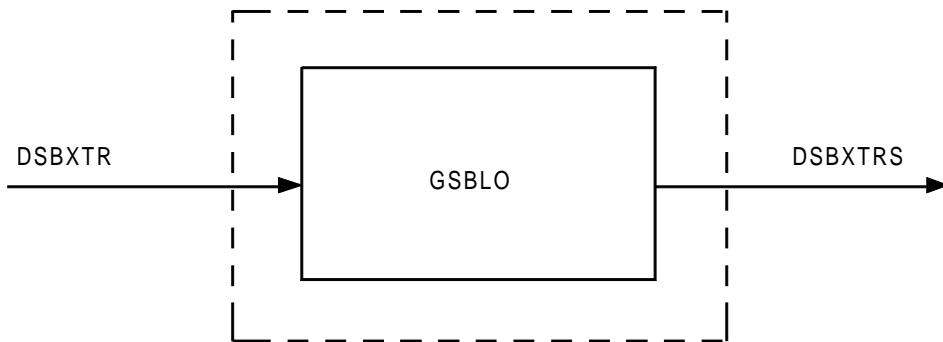


FIGURE 4.3.1.1.28-1. GSBLO_MOD

Table 4.3.1.1.28-1. GSBLO_MOD Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DSBXTR	Pitch trim increment	SBXFEED	F	deg	25
<u>Output</u> DSBXTRS	Pitch trim rate	ELFBK	F	deg/s	25

Table 4.3.1.1.28-2. GSBLO_MOD Constants				
Name	Description	Type	MSID/Value	Units
GSBLO	Low scaling gain	K	V97U0777C/ +1.0 E+01	(deg/s)/deg

4.3.1.1.29 GSD_FILT.

- A. Function – This function module filters the pitch rate error command and converts it into an elevator command which is used at slapdown if auto is enabled to prevent damage to the nosewheel when it makes contact. The detailed block diagram is presented in Figure 4.3.1.1.29-1.
- B. Processing Requirements – GSD_FILT is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for GSD_FILT are shown in Table 4.3.1.1.29-1.
- D. I-Loads – The I-loads for GSD_FILT are shown in Table 4.3.1.1.29-2.
- E. Initialization Requirements – The initialization requirements for GSD_FILT are shown in Table 4.3.1.1.29-3.
- F. Software Configuration – Common.

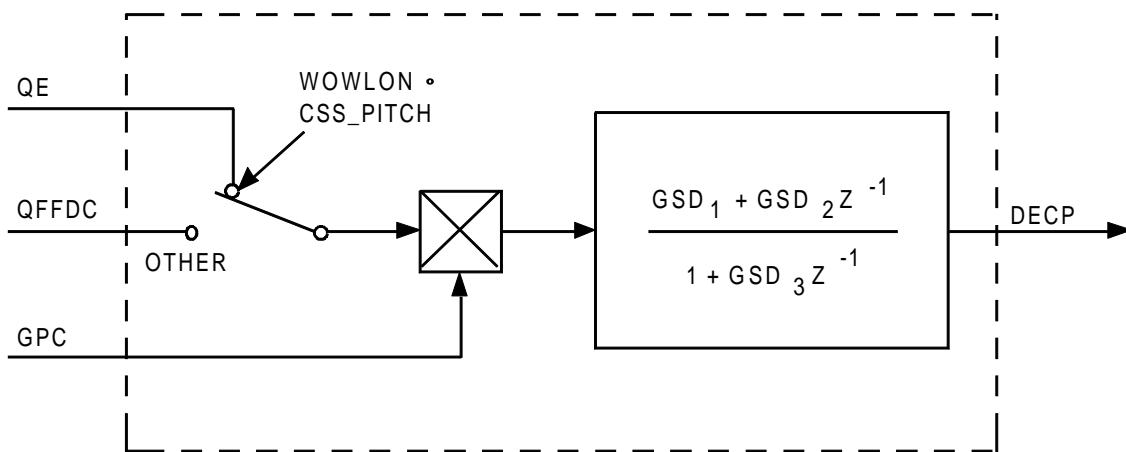


FIGURE 4.3.1.1.29-1. GSD_FILT

Table 4.3.1.1.29-1. GSD_FILT Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
GPC	Scheduled gain	GPC_COMP	F	deg/ (deg/s)	1.04
QFFDC	Pitch rate error	SDCMP	F	deg/s	25
QE	Pitch rate error	ELSUM	F	deg/s	25
<u>Output</u>					
DECP	Preliminary elevator command	ELVCMD	F	deg	25

Table 4.3.1.1.29-2. GSD_FILT I-Loads				
Name	Description	Type	MSID	Units
GSD(1)	Filter coefficient	F	V97U0778C	-
GSD(2)	Filter coefficient	F	V97U0779C	-
GSD(3)	Filter coefficient	F+	V97U0780C	-

Table 4.3.1.1.29-3. GSD_FILT Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Filter	X	X	Node	0.0
X = WOWLON • ROLLOUT				

4.3.1.1.30 GTAS_COMP.

A. Function – This function module computes a variable gain that is a function of true air speed. The detailed block diagram is presented in Figure 4.3.1.1.30–1.

B. Processing Requirements – GTAS_COMP is processed at 1.04 Hz.

C. Interface Requirements – The interface requirements for GTAS_COMP are shown in Table 4.3.1.1.30–1.

D. Constants – The constants for GTAS_COMP are shown in Table 4.3.1.1.30–2.

E. Initialization Requirements – VCO calculated on initialization and when GQN changes values per Subsection 4.3.1.1.30 where 57.3 is radians to degrees conversion and 32.2 is gravity constant.

F. Software Configuration – Common.

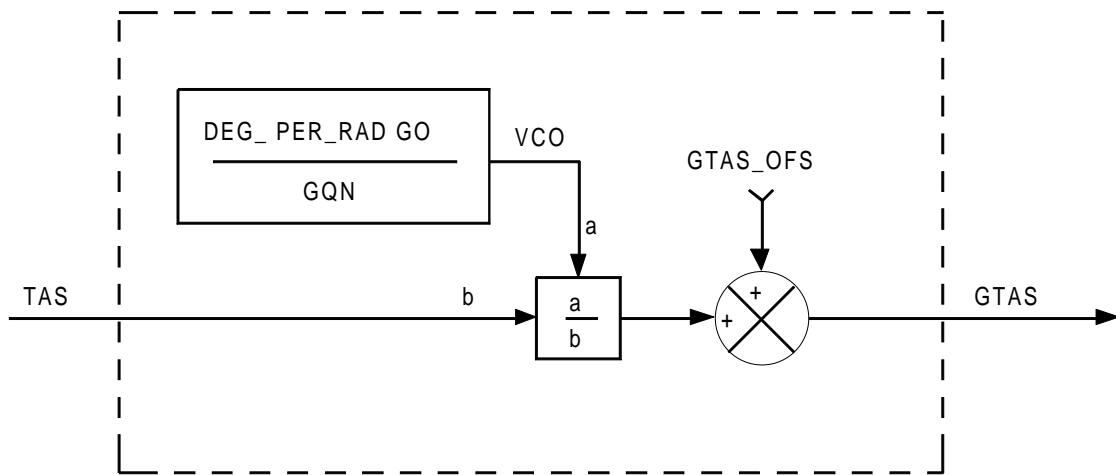


FIGURE 4.3.1.1.30-1. GTAS_COMP

Table 4.3.1.1.30-1. GTAS_COMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> TAS	True airspeed	ADTA SOP	F	ft/s	1.04
<u>Output</u> GTAS	Variable gain	NZTAS	F	—	1.04

Table 4.3.1.1.30-2. GTAS_COMP Constants				
Name	Description	Type	MSID/Value	Units
GTAS_OFS	Bias for GTAS	K	V97U0781C/ +1.0 E+00	—
DEG_PER_RAD	Radian to degree conversion	F	57.2958	deg/rad
GO	Gravitational constant	F	32.17405	ft/s**2
GQN_TAEM	Scale factor when IPHASEB = 0, 1, 2, 3	K	V97U0749C/ (1) +2.5 E+00 (2) +3.36 E+00	(deg/s)/g
GQN_AL	Scale factor when in AL	K	V97U0750C/ +4.2 E+00	(deg/s)/g
GQN_5	Scale factor when IPHASEB = 5	K	V97U1211C/ +6.5 E+00	(deg/s)/g
(1) Memory Configuration 01				
(2) Memory Configuration 03				

4.3.1.1.31 GTRE_COMP. (Aerojet DAP)

- A. Function – This function module schedules a gain as a function of Mach number. This gain is used to convert the preliminary pitch trim command into a pitch trim rate.. The detailed block diagram is presented in Figure 4.3.1.1.31-1.
- B. Processing Requirements – GTRE_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for GTRE_COMP are shown in Table 4.3.1.1.31-1.
- D. Constants – The constants for GTRE_COMP are shown in Table 4.3.1.1.31-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Aerojet DAP unique.

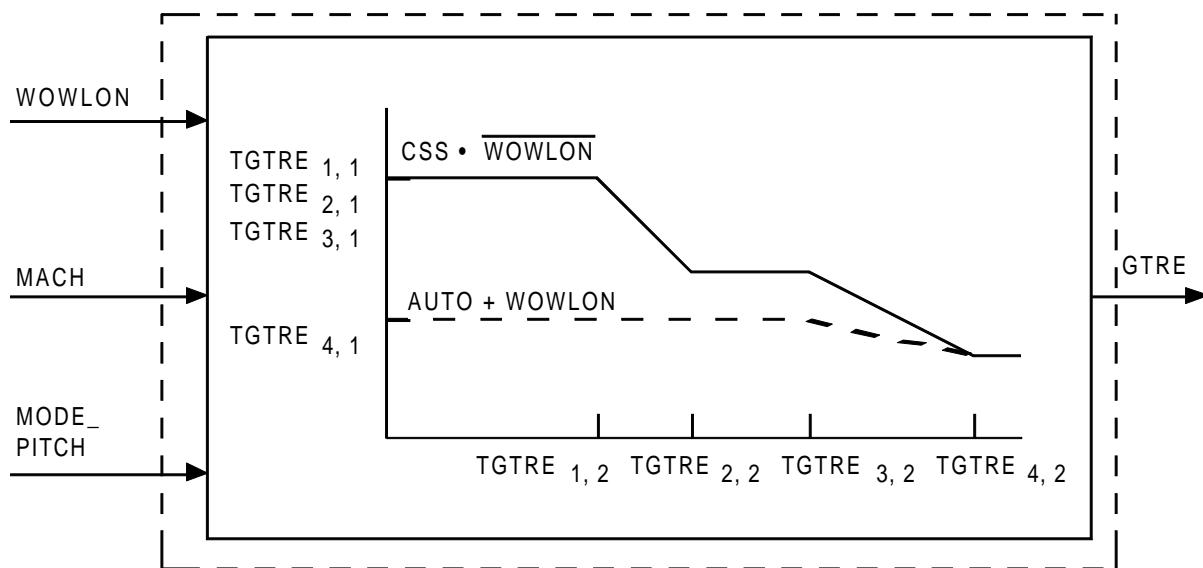


FIGURE 4.3.1.1.31-1. GTRE_COMP (Aerojet DAP)

Table 4.3.1.1.31-1. GTRE_COMP (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
MODE_PITCH	Pitch channel mode indicator	RECON	D	–	6.25
MACH	Mach number	ADTA SOP	F	–	1.04
WOWLON	Buffered Weight on wheels indicator	RECON	D	–	6.25
<u>Output</u>					
GTRE	Gain to convert preliminary pitch trim command into a pitch trim rate	ELFBK, ETRIM	F	(deg/s)/deg	1.04

Table 4.3.1.1.31-2. GTRE_COMP (Aerojet DAP) Constants

Name	Description	Type	MSID/Values	Units
TGTRE_AUTO(1,1)	Tabulated GTRE_AUTO	K	V97U1002C/+6.0 E-01	(deg/s)/deg
TGTRE_CSS(1,1)	Tabulated GTRE_CSS	K	V97U4262C/+1.5 E+00	(deg/s)/deg
TGTRE_(1,2)	Tabulated MACH	K	V97U1003C/+3.0 E+00	–
TGTRE_AUTO(2,1)	Tabulated GTRE_AUTO	K	V97U1004C/+6.0 E-01	(deg/s)/deg
TGTRE_CSS(2,1)	Tabulated GTRE_CSS	K	V97U4264C/+1.0 E+00	(deg/s)/deg
TGTRE(2,2)	Tabulated MACH	K	V97U1005C/+3.5 E+00	–
TGTRE_AUTO(3,1)	Tabulated GTRE_AUTO	K	V97U4258C/+6.0 E-01	(deg/s)/deg
TGTRE_CSS(3,1)	Tabulated GTRE_CSS	K	V97U4266C/+1.0 E+00	(deg/s)/deg
TGTRE(3,2)	Tabulated MACH	K	V97U4259C/+1.0 E+01	–
TGTRE_AUTO(4,1)	Tabulated GTRE_AUTO	K	V97U4260C/+3.0 E-01	(deg/s)/deg
TGTRE_CSS(4,1)	Tabulated GTRE_CSS	K	V97U4268C/+1.0 E+00	(deg/s)/deg
TGTRE(4,2)	Tabulated MACH	K	V97U4261C/+1.2 E+01	–

4.3.1.1.32 GTRE_COMP (GRTLS DAP).

- A. Function – This function module schedules a gain as a function of Mach number. This gain is used to convert the preliminary pitch trim command into a pitch trim rate.. The detailed block diagram is presented in Figure 4.3.1.1.32-1.
- B. Processing Requirements – GTRE_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for GTRE_COMP are shown in Table 4.3.1.1.32-1.
- D. Constants – The constants for GTRE_COMP are shown in Table 4.3.1.1.32-2.
- E. Initialization Requirements – None.
- F. Software Configuration – GRTLS DAP unique.

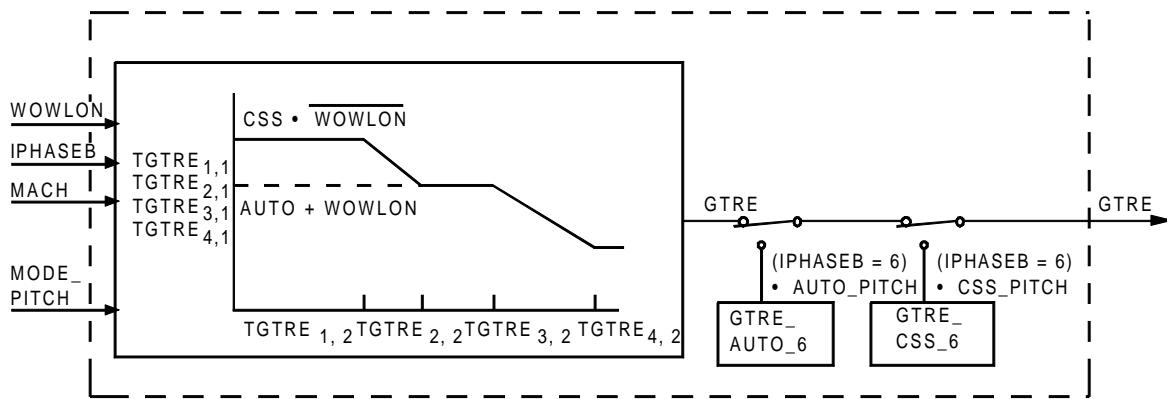


FIGURE 4.3.1.1.32-1. GTRE_COMP (GRTLS DAP)

Table 4.3.1.1.32-1. GTRE_COMP (GRTLS DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
MODE_PITCH	Pitch channel mode indicator	RECON	D	–	6.25
MACH	Mach number	ADTA SOP	F	–	1.04
WOWLON	Buffered weight on wheels indicator	RECON	D	–	6.25
IPHASEB	Buffered phase	RECON	I	–	6.25
<u>Output</u>					
GTRE	Gain to convert preliminary pitch trim command into a pitch trim rate	ELFBK	F	(deg/s)/deg	1.04

Table 4.3.1.1.32-2. GTRE_COMP (GRTLS DAP) Constants

Name	Description	Type	MSID/ Value	Units
TGTRE_AUTO(1,1)	Tabulated GTRE_AUTO	K	V97U1002C/ +1.0 E+00	(deg/s)/deg
TGTRE_CSS(1,1)	Tabulated GTRE_CSS	K	V97U4262C/ +1.5 E+00	(deg/s)/deg
TGTRE_(1,2)	Tabulated MACH	K	V97U1003C/ +3.0 E+00	–
TGTRE_AUTO(2,1)	Tabulated GTRE_AUTO	K	V97U1004C/ +1.0 E+00	(deg/s)/deg
TGTRE_CSS(2,1)	Tabulated GTRE_CSS	K	V97U4264C/ +1.0 E+00	(deg/s)/deg
TGTRE(2,2)	Tabulated MACH	K	V97U1005C/ +3.5 E+00	–
TGTRE_AUTO(3,1)	Tabulated GTRE_AUTO	K	V97U4258C/ +1.0 E+00	(deg/s)/deg
TGTRE_CSS(3,1)	Tabulated GTRE_CSS	K	V97U4266C/ +1.0 E+00	(deg/s)/deg
TGTRE(3,2)	Tabulated MACH	K	V97U4259C/ +5.5 E+00	–
TGTRE_AUTO(4,1)	Tabulated GTRE_AUTO	K	V97U4260C/ +5.0 E-01	(deg/s)/deg
TGTRE_CSS(4,1)	Tabulated GTRE_CSS	K	V97U4268C/ +7.0 E-01	(deg/s)/deg
TGTRE(4,2)	Tabulated MACH	K	V97U4261C/ +5.6 E+00	–
GTRE_AUTO_6	AUTO GTRE for IPHASEB = 6	K	V97U9875C/ +5.0 E-01	(deg/s)/deg
GTRE_CSS_6	CSS GTRE for IPHASEB = 6	K	V97U9876C/ +7.0 E-01	(deg/s)/deg

4.3.1.1.33 JERROR.

- A. Function – This function module sums the pitch rate command and pitch rate feedback to form a pitch error signal. The detailed block diagram is presented in Figure 4.3.1.1.33–1.
- B. Processing Requirements – JERROR is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for JERROR are shown in Table 4.3.1.1.33–1.
- D. Constants – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

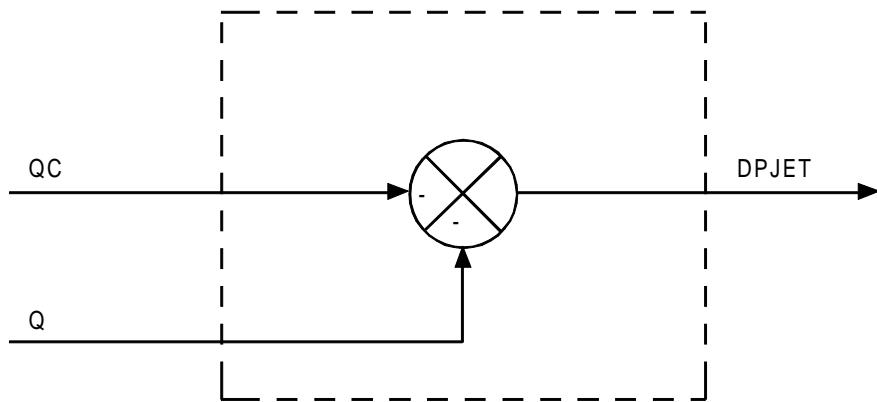


FIGURE 4.3.1.1.33-1. JERROR

Table 4.3.1.1.33-1. JERROR Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
QC	Pitch rate command	PRHC_SUM	F	deg/s	25
Q	Pitch rate feedback	SF	F	deg/s	25
<u>Output</u>					
DPJET	Pitch error signal	UYBB_FILTER	F	deg/s	25

4.3.1.1.34 LREL_COMP.

- A. Function – This function module schedules the elevator command as a function of the equivalent air speed. The detailed block diagram is presented in Figure 4.3.1.1.34–1.
- B. Processing Requirements – LREL_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for LREL_COMP are shown in Table 4.3.1.1.34–1.
- D. I-Loads – The I-loads for LREL_COMP are shown in Table 4.3.1.1.34–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

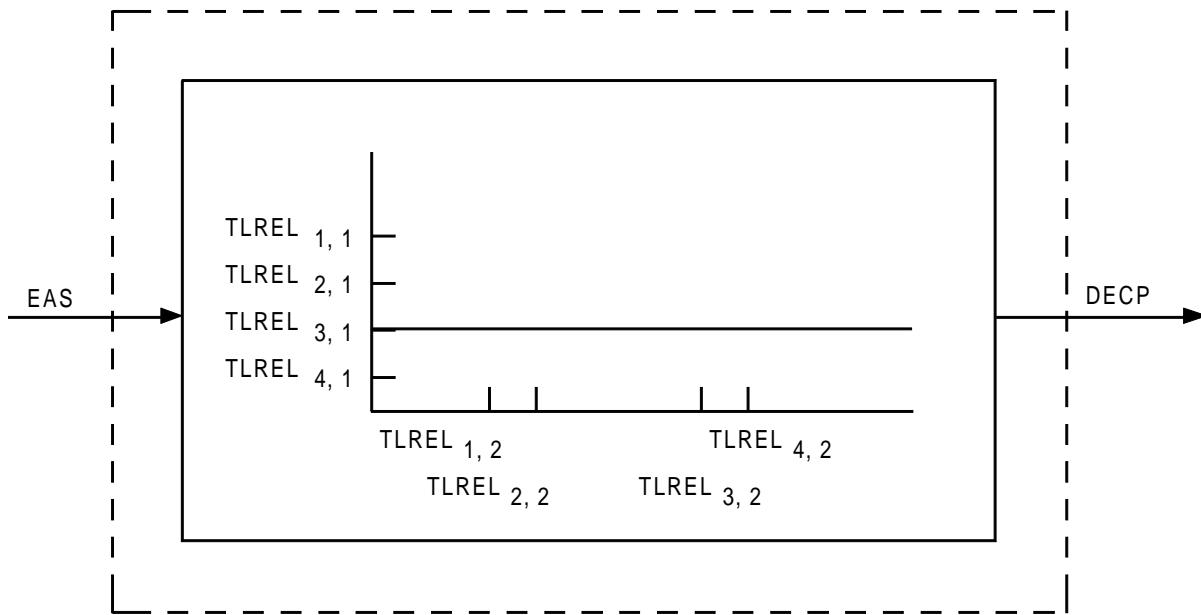


FIGURE 4.3.1.1.34-1. LREL_COMP

Table 4.3.1.1.34-1. LREL_COMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> EAS	Equivalent air speed	ADTA SOP	F	ft/s	1.04
<u>Output</u> DECP	Preliminary elevator command	ELVCMD	F	deg	1.04

Table 4.3.1.1.34-2. LREL_COMP I-Loads				
Name	Description	Type	MSID/Value	Units
TLREL(1,1)	Tabulated DECP	F	V97U0810C	deg
TLREL(1,2)	Tabulated EAS	F	V97U0811C	ft/s
TLREL(2,1)	Tabulated DECP	F	V97U0812C	deg
TLREL(2,2)	Tabulated EAS	F	V97U0813C	ft/s
TLREL(3,1)	Tabulated DECP	F	V97U0814C	deg
TLREL(3,2)	Tabulated EAS	F	V97U0815C	ft/s
TLREL(4,1)	Tabulated DECP	F	V97U0816C	deg
TLREL(4,2)	Tabulated EAS	F	V97U0817C	ft/s

4.3.1.1.35 NZCOMP.

A. Function – This function module computes the nose-up compensation term with limiting on the cosine of the roll attitude. The detailed block diagram is presented in Figure 4.3.1.1.35–1.

B. Processing Requirements – NZCOMP is processed at 6.25 Hz.

C. Interface Requirements – The interface requirements for NZCOMP are shown in Table 4.3.1.1.35–1.

D. I-Loads – The I-loads for NZCOMP are shown in Table 4.3.1.1.35–2.

E. Initialization Requirements – None.

F. Software Configuration – Common.

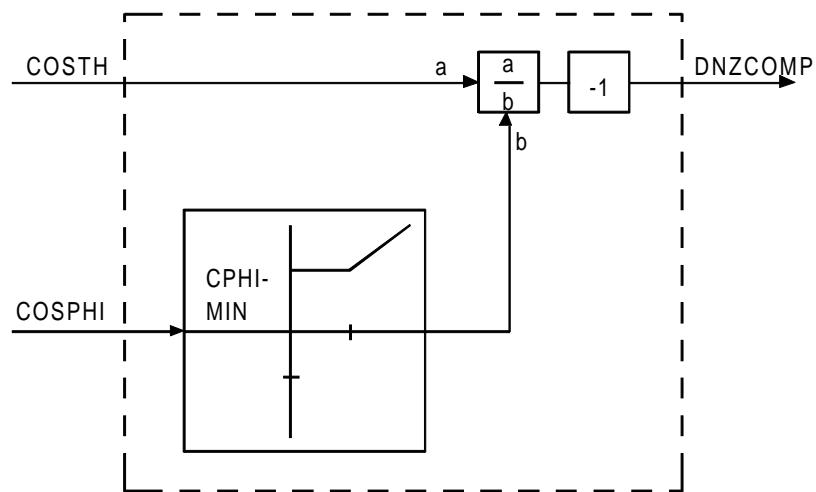


FIGURE 4.3.1.1.35-1. NZCOMP

Table 4.3.1.1.35-1. NZCOMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
COSTH	Cosine of THETA	A/E ATT_PROC	F	—	6.25
COSPHI	Cosine of PHI	A/E ATT_PROC		—	6.25
<u>Output</u>					
DNZCOMP	Nose-up turn compensation term	NZTAS	F	g	6.25

Table 4.3.1.1.35-2. NZCOMP I-Loads				
Name	Description	Type	MSID	Units
CPHIMIN	Minimum value of COSPHI	F	V97U0608C	—

4.3.1.1.36 NZC_SM.

- A. Function – This function module smooths the TAEM NZ command. The detailed block diagram is presented in Figure 4.3.1.1.36–1.
- B. Processing Requirements – NZC_SM is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for NZC_SM are shown in Table 4.3.1.1.36–1.
- D. Constants – The constants for NZC_SM are shown in Table 4.3.1.1.36–2.
- E. Initialization Requirements – The initialization requirements for NZC_SM are shown in Table 4.3.1.1.36–3.
- F. Software Configuration – Common (input Entry/GRTLS dependent).

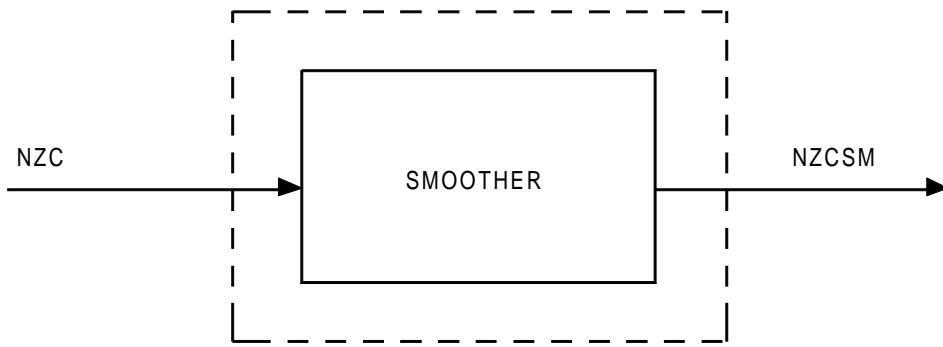


FIGURE 4.3.1.1.36-1. NZC_SM

Table 4.3.1.1.36-1. NZC_SM Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> NZC	Normal acceleration command	TAEM GUID, GRTLS TAEM GUID	F	g	1.04
<u>Output</u> NZCSM	Smoothed NZ command	NZTAS	F	g	6.25

Table 4.3.1.1.36-2. NZC_SM Constants

Name	Description	Type	MSID/ Value	Units
TG	Time increment between TAEM and GRTLS TAEM guidance updates	F	0.960	s
TS	DAP slow cycle time	F	0.160	s
DEG_PER_RAD	Radian to degree conversion	F	57.2958	deg/rad
GO	Gravitational constant	F	32.17405	ft/s**2
GQN_TAEM	Scale factor when IPHASEB = 0,1,2,3 (GRTLS) or TAEM (Aerojet)	K	V97U0749C/ (1) +2.5 E+00 (2) +3.36 E+00	(deg/s)/g
GQN_AL	Scale factor when in AL	K	V97U0750C/ +4.2 E+00	(deg/s)/g
GQN_5	Scale factor when IPHASEB = 5 (GRTLS only)	K	V97U1211C/ +6.5 E+00	(deg/s)/g

(1) Memory Configuration 01
(2) Memory Configuration 03

Table 4.3.1.1.36-3. Nzc_sm Initialization Requirements

Component	Initialize on Transition		Variable*	Actual and Initial Value
	From	To		
Smoothen	—	First invocation	XOUT XPINV	Result 1 Result 1
	A	B**	XOUT XPINV	Result 1 Result 1
	IPHASEB = 6	IPHASEB = 5 ***	XOUT XPINV	Result 2 Result 2
	IPHASEB = 4	IPHASEB = 0,1 ***	XOUT XPINV	Result 1 Result 1
	C	D ***	XOUT XPINV	Result 2 Result 2
	E	F ***	XOUT XPINV	Result 1 Result 1
$\text{Result 1} = \frac{\text{NZ} - \frac{\text{COSTH}}{\text{COSPHI}}}{\left(\text{GTAS_OFS} + \frac{\text{DEG_PER_RAD} * \text{GO}}{\text{GQN} * \text{TAS}} \right)}$ $\text{Result 2} = \frac{\text{NZ} + \text{DNZCP_4}}{\text{GTAS_5}}$				
<small>* See Subsection 4.9.6</small> <small>** AEROJET DAP only</small> <small>*** GRTLS DAP only</small> A = CSS_PITCH • ENTRY B = AUTO_PITCH • ENTRY C = CSS_PITCH • (IPHASEB = 5) D = AUTO_PITCH • (IPHASEB = 5) E = CSS_PITCH • (IPHASEB = 0,1,2,3) F = AUTO_PITCH • (IPHASEB = 0,1,2,3)				

4.3.1.1.37 NZERR_FD.

A. Function – This function module subtracts the pitch rate compensation from the body pitch rate. The result is scaled, and added to the NZ error then filtered for display on the flight director. The detailed block diagram is presented in Figure 4.3.1.1.37–1.

- B. Processing Requirements – NZERR_FD is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for NZERR_FD are shown in Table 4.3.1.1.37–1.
- D. I-Loads/Constants – The I-loads and constants for NZERR_FD are shown in Table 4.3.1.1.37–2.
- E. Initialization Requirements – The initialization requirements for NZERR_FD are shown in Table 4.3.1.1.37–3.
- F. Software Configuration – Common.

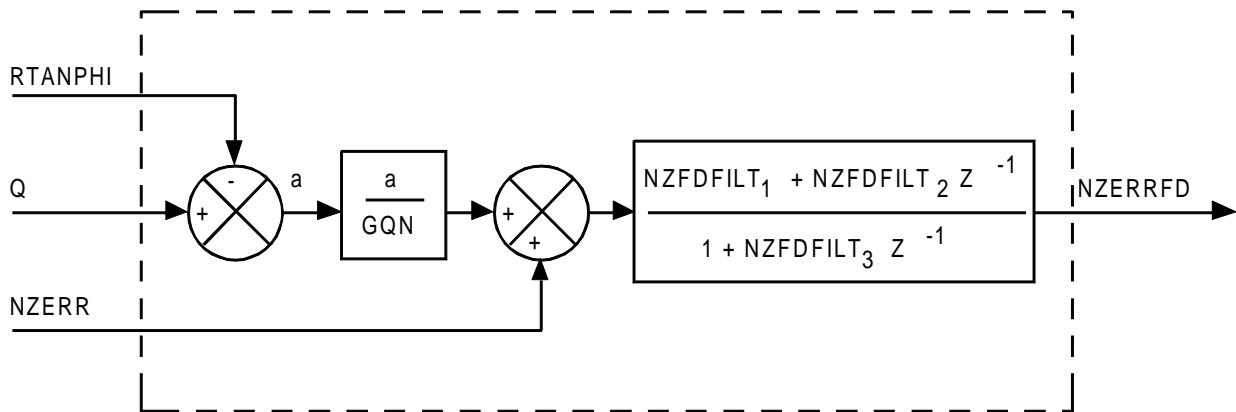


FIGURE 4.3.1.1.37-1. NZERR_FD

Table 4.3.1.1.37-1. NZERR_FD Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
Q	Body pitch rate	SF	F	deg	25
NZERR	NZ error	NZLOOP	F	g	25
RTANPHI	Pitch rate compensation trim	QCOMP	F	deg/s	6.25
<u>Output</u>					
NZERRFD	NZ error for flight director	E/L ADI PROC, TLM	F	g	6.25
			F	g	25

Table 4.3.1.1.37-2. NZERR_FD I-Loads/Constants

Name	Description	Type	MSID/Value	Units
NZFDFILT(1)	Filter coefficient	F	V97U0841C	–
NZFDFILT(2)	Filter coefficient	F	V97U0842C	–
NZFDFILT(3)	Filter coefficient	F	V97U0843C	–
GQN_TAEM	Scale factor when IPHASEB = 0,1,2,3 (GRTLS) or TAEM (Aerojet)	K	V97U0749C/(1) +2.5 E+00 (2) +3.36 E+00	(deg/s)/g
GQN_AL	Scale factor when in AL	K	V97U0750C/+4.2 E+00	(deg/s)/g
GQN_5	Scale factor when IPHASEB = 5 (GRTLS only)	K	V97U1211C+6.5 E+00	(deg/s)/g

(1) Memory Configuration 01

(2) Memory Configuration 03

Table 4.3.1.1.37-3. NZERR_FD Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
First-order filter	–	First pass	Node	*
	IPHASEB = 4, 6 (GRTLS only)	A	Node	*
	ENTRY	TAEM	Node	*

* See Subsection 4.9.1

A = (IPHASEB = 0,1,2,3,5) + AL

4.3.1.1.38 NZ_FILTER.

- A. Function – This function module converts the NZ acceleration error into a pitch rate command and applies a first-order filter to this command. The detailed block diagram is presented in Figure 4.3.1.1.38-1.
- B. Processing Requirements – NZ_FILTER is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for NZ_FILTER are shown in Table 4.3.1.1.38-1.
- D. I-Loads/Constants – The I-loads and constants for NZ_FILTER are shown in Table 4.3.1.1.38-2.
- E. Initialization Requirements – The initialization requirements for NZ_FILTER are shown in Table 4.3.1.1.38-3.
- F. Software Configuration – Common.

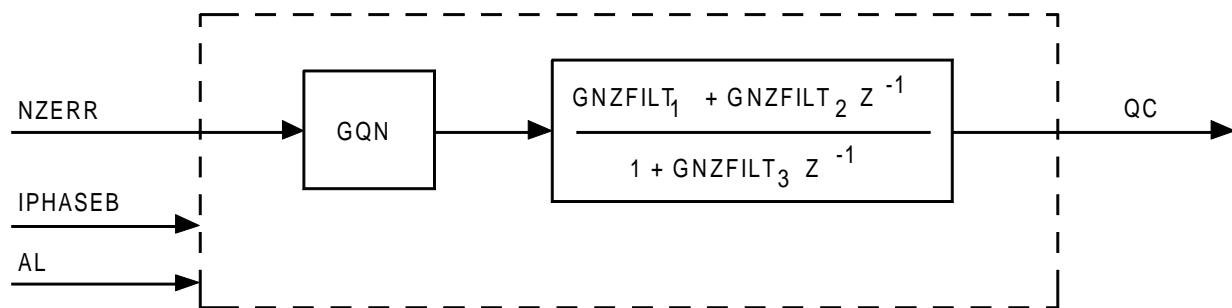


FIGURE 4.3.1.1.38-1. NZ_FILTER

Table 4.3.1.1.38-1. NZ_FILTER Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
IPHASEB	GRTLS Phase	RECON	I	—	6.25
NZERR	NZ error	NZLOOP	F	g	25
AL	Autoland flag	RECON	D	—	6.25
<u>Output</u>					
QC	Pitch rate command	ELERROR, GSD_FILT	F	deg/s	25

Table 4.3.1.1.38-2. NZ_FILTER I-Loads/Constants				
Name	Description	Type	MSID/ Values	Units
GQN_TAEM	Scale factor when IPHASEB = 0, 1, 2, 3 (GRTLS) or TAEM (Aerojet)	K	V97U0749C/ (1) +2.5 E+00 (2) +3.36 E+00	(deg/s)/g
GQN_AL	Scale factor when in AL	K	V97U0750C +4.2 E+00	(deg/s)/g
GQN_5	Scale factor when IPHASEB = 5 (GRTLS only)	K	V97U1211C/ +6.5 E+00	(deg/s)/g
GNZfilt_TAEM(1)	Filter coefficient when IPHASEB = 0, 1, 2, 3, 5	K	V97U0724C/ +2.30769 E-01	—
GNZfilt_AL(1)	Filter coefficient when in AL	F	V96U9616C	—
GNZfilt_TAEM(2)	Filter coefficient when IPHASEB = 0, 1, 2, 3, 5	K	V97U0725C/ -1.53846 E-01	—
GNZfilt_AL(2)	Filter coefficient when in AL	F	V96U9617C	—
GNZfilt_TAEM(3)	Filter coefficient when IPHASEB = 0, 1, 2, 3, 5	K	V97U0726C/ -9.23077 E-01	—
GNZfilt_AL(3)	Filter coefficient when in AL	F	V96U9618C	—

(1) Memory Configuration 01
(2) Memory Configuration 03

Table 4.3.1.1.38-3. NZ_FILTER Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
First-order filter	—	A**	Node	*
	B	\bar{B}^{***}	Node	*

* See Subsection 4.9.1
 ** GRTLS only
 *** Aerojet only
 $A = \text{AUTO_PITCH} \cdot (\text{IPHASEB} = 0, 1, 2, 3, 4, 5 + \text{AL})$
 $\bar{B} = (\overline{\text{TAEM}} + \text{AL}) + \overline{\text{AUTO_PITCH}}$

4.3.1.1.39 NZLOOP.

- A. Function – This function module calculates the NZ error. The detailed block diagram is presented in Figure 4.3.1.1.39–1.
- B. Processing Requirements – NZLOOP is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for NZLOOP are shown in Table 4.3.1.1.39–1.
- D. Constants – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

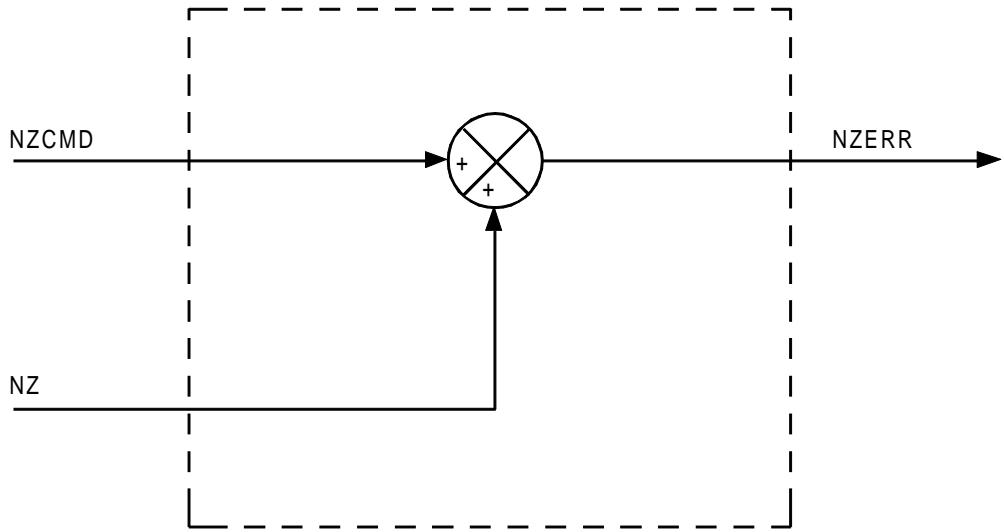


FIGURE 4.3.1.1.39-1. NZLOOP

Table 4.3.1.1.39-1. NZLOOP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
NZCMD	Compensated NZ command	NZTAS	F	g	6.25
NZ	Normal acceleration feedback	SF	F	g	25
<u>Output</u>					
NZERR	NZ error	NZERR_FD, NZ_FILTER	F	g	25

4.3.1.1.40 NZTAS

A. Function – This function module compensates the smoothed NZ guidance command. The detailed block diagram is presented in Figure 4.3.1.1.40–1.

B. Processing Requirements – NZTAS is processed at 6.25 Hz.

C. Interface Requirements – The interface requirements for NZTAS are shown in Table 4.3.1.1.40–1.

D. Constants – None.

E. Initialization Requirements – None

F. Software Configuration – Common (input Entry/GRTLS dependent).

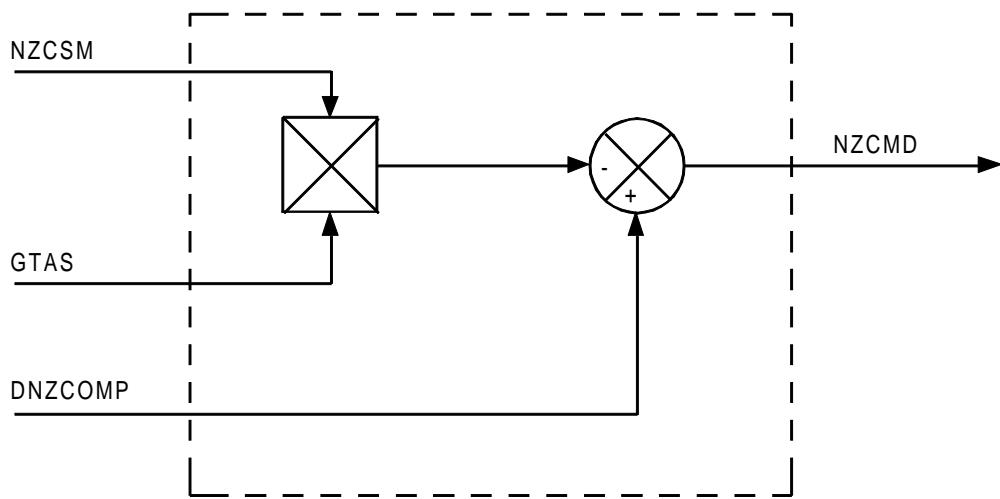


FIGURE 4.3.1.1.40-1. NZTAS

Table 4.3.1.1.40-1. NZTAS Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
NZCSM	Smoothed NZ command	NZC_SM (TAEM), A/L GUID, GRTLS A/L GUID	F	g	6.25
GTAS	Airspeed variable gain	GTAS_COMP	F	—	1.04
DNZCOMP	Nose-up turn compensation term	NZCOMP	F	g	6.25
<u>Output</u>					
NZCMD	Compensated NZ command	NZLOOP	F	g	6.25

4.3.1.1.41 PBBF (Aerojet DAP)

- A. Function – This function module applies an additional body bending filter to the elevator command when required. The detailed block diagram is presented in Figure 4.3.1.1.41–1.
- B. Processing Requirements – PBBF is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for PBBF are shown in Table 4.3.1.1.41–1.
- D. I-Loads – The I-loads for PBBF are shown in Table 4.3.1.1.41–2.
- E. Initialization Requirements – The initialization requirements for PBBF are shown in Table 4.3.1.1.41–3.
- F. Software Configuration – Aerojet DAP unique.

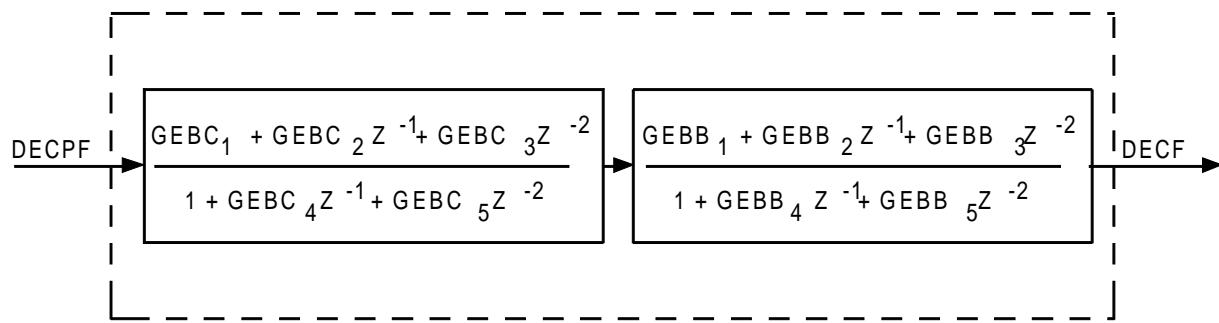


FIGURE 4.3.1.1.41-1. PBBF

Table 4.3.1.1.41-1. PBBF Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DECPF	Filtered elevator command	VPBBF_ELV	F	deg	25
<u>Output</u> DECF	Twice filtered elevator command	ELSUM, SDCMP	F	deg	25

Table 4.3.1.1.41-2. PBBF I-Loads

Name	Description	Type	Value	Units
GEBB(1)	Filter coefficient	F	V97U0712C	—
GEBB(2)	Filter coefficient	F	V97U0713C	—
GEBB(3)	Filter coefficient	F	V97U0714C	—
GEBB(4)	Filter coefficient	F	V97U0715C	—
GEBB(5)	Filter coefficient	F	V97U0716C	—
GEBC(1)	Filter coefficient	F	V96U8573C	—
GEBC(2)	Filter coefficient	F	V96U8574C	—
GEBC(3)	Filter coefficient	F	V96U7897C	—
GEBC(4)	Filter coefficient	F	V96U7898C	—
GEBC(5)	Filter coefficient	F	V96U7899C	—

Table 4.3.1.1.41-3. PBBF Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Fourth-order filter**	—	First-pass	Node	*
	ZERO_YAWJET	ZERO_YAWJET	Node	*

*See Subsection 4.9.3

**This filter is not reinitialized on transition from "LOAD_RELIEF • AUTO_PITCH to "CSS_PITCH" by design. The vehicle will be on the ground when the above transition takes place and the body bending filters will have minimal performance effects.

4.3.1.1.42 PIO_FILTER.

A. Function – This module computes the square term coefficient for the parabolic shaping of the RHC pitch command. The detailed block diagram is presented in Figure 4.3.1.1.42–1.

B. Processing Requirements – PIO_FILTER is processed at 25 Hz.

C. Interface Requirements – The interface requirements for PIO_FILTER are shown in Table 4.3.1.1.42–1.

D. I-Loads – The I-loads for PIO_FILTER are shown in Table 4.3.1.1.42–2.

E. Initialization Requirements – The initialization requirements for PIO_FILTER are shown in Table 4.3.1.1.42–3.

F. Software Configuration – Common.

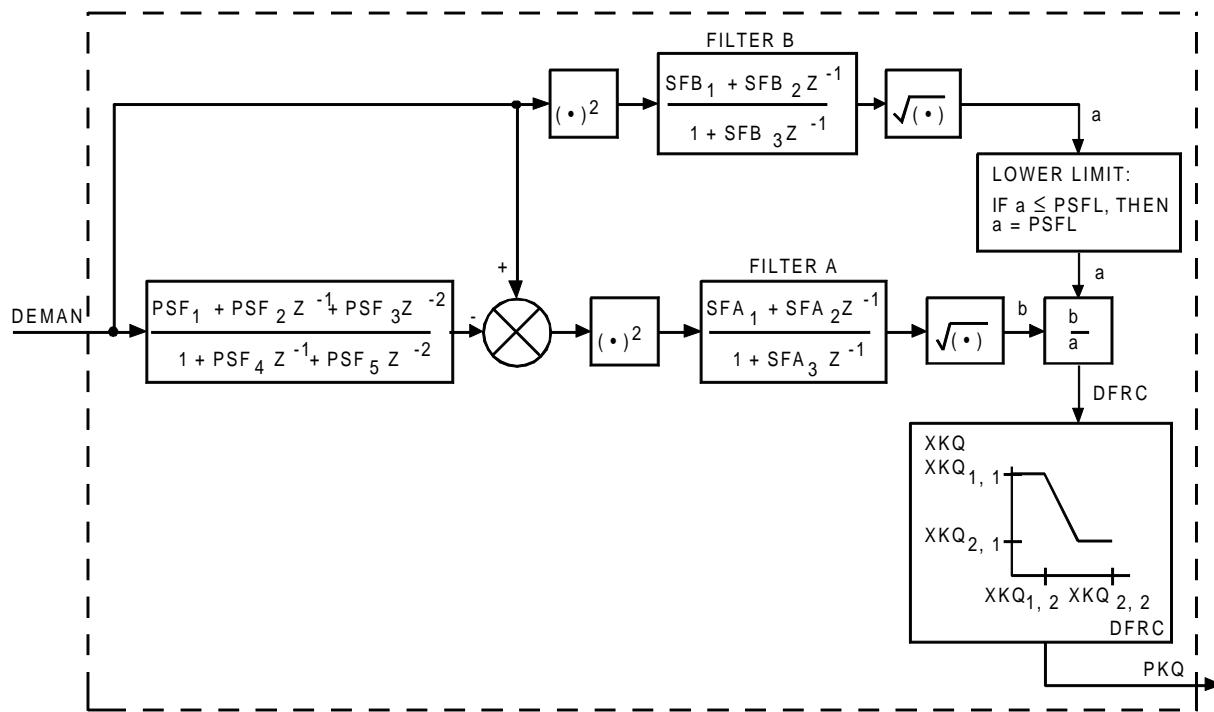


FIGURE 4.3.1.1.42-1. PIO_FILTER

Table 4.3.1.1.42-1. PIO_FILTER Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DEMAN	Pitch RHC command	2-AX RHC SOP	F	deg	25
<u>Output</u> PKQ	Square term coefficient in parabolic shaping	ESHAPE, TLM	F	deg/ deg**2	25

Table 4.3.1.1.42-2. PIO_FILTER I-Loads				
Name	Description	Type	MSID	Units
PSF(1)	Filter coefficient	F	V96U8762C	—
PSF(2)	Filter coefficient	F	V96U8763C	—
PSF(3)	Filter coefficient	F	V96U8764C	—
PSF(4)	Filter coefficient	F	V96U8765C	—
PSF(5)	Filter coefficient	F	V96U8766C	—
SFA(1)	Filter coefficient	F	V96U8767C	—
SFA(2)	Filter coefficient	F	V96U8768C	—
SFA(3)	Filter coefficient	F	V96U8769C	—
SFB(1)	Filter coefficient	F	V96U8770C	—
SFB(2)	Filter coefficient	F	V96U8771C	—
SFB(3)	Filter coefficient	F	V96U8772C	—
PSFL	Denominator lower limit	F	V96U8773C	deg
XKQ(1, 1)	Tabulated XKQ	F	V96U8774C	deg/deg**2
XKQ(1, 2)	Tabulated DFRC	F	V96U8775C	—
XKQ(2, 1)	Tabulated XKQ	F	V96U8776C	deg/deg**2
XKQ(2, 2)	Tabulated DFRC	F	V96U8777C	—

Table 4.3.1.1.42-3. PIO_FILTER Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
First-order filter – A	—	First-pass	Node	*
	A	B		
	C	B		
First-order filter – B	—	First-pass	Node	*
	A	B		
	C	B		
Second-order filter	—	First-pass	Node	**
	A	B		
	C	B		

* See Subsection 4.9.1
** See Subsection 4.9.2
A = PIO_ON • AUTO_PITCH
B = PIO_ON • AUTO_PITCH
C = PIO_ON • AUTO_PITCH

4.3.1.1.43 PITCH_HYST (Aerojet DAP).

- A. Function – This function module applies hysteresis to the pitch rate error in order to determine the number of pitch RCS jets to fire. The detailed block diagram is presented in Figure 4.3.1.1.43–1.
- B. Processing Requirements – PITCH_HYST is processed at 12.5 Hz.
- C. Interface Requirements – The interface requirements for PITCH_HYST are shown in Table 4.3.1.1.43–1.
- D. Constants – The constants for PITCH_HYST are shown in Table 4.2.1.1.43–2.
- E. Initialization Requirements – The initialization requirements for PITCH_HYST are shown in Table 4.3.1.1.43–3.
- F. Software Configuration – Aerojet DAP unique.

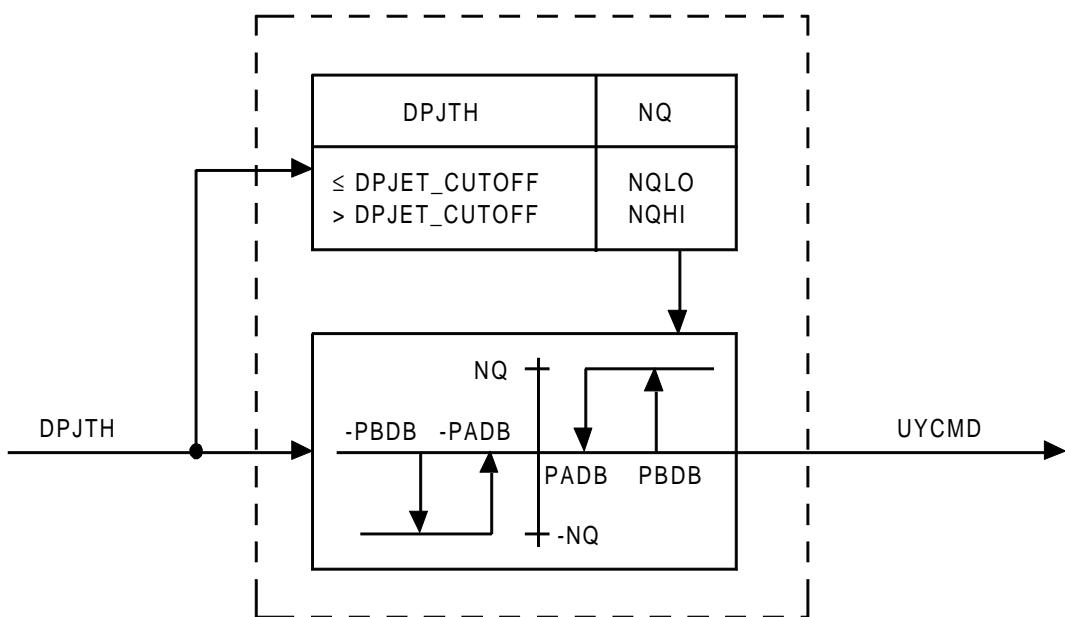


FIGURE 4.3.1.1.43-1. PITCH_HYST (Aerojet Dap)

Table 4.3.1.1.43-1. PITCH_HYST (Aerojet DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DPJTH	Pitch rate error	PIT_SUM	F	deg/s	12.5
<u>Output</u> UYCMD	Number of pitch RCS jets to fire	JET_SELECT_LOGIC, ETRIM, RCS ACT LT	I	—	12.5

Table 4.3.1.1.43-2. PITCH_HYST (Aerojet DAP) Constants				
Name	Description	Type	MSID/Value	Units
NOLO	Lower number of pitch jets which can be fired	K	V97U0835C/ +2	—
NQHI	Higher number of pitch jets which can be fired	K	V97U0834C/ +4	—
DPJET_CUTOFF	Cutoff point between using LO and HI number of pitch jets	K	V97U0654C/ +1.00 E+00	deg/s
PADB	Inner deadband	K	V97U1110C/ +2.45 E-01	deg/s
PBDB	Outer deadband	K	V97U0854C/ +2.5 E-01	deg/s

Table 4.3.1.1.43-3. PITCH_HYST (Aerojet DAP) Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Hysteresis	— A	First-pass A	*	*

* See Subsection 4.9.5
A = ENTRY • ZERO_PITCH_JET

4.3.1.1.44 PIT_SUM (Aerojet DAP).

A. Function – This function module sums the pitch jet PTI pulse with the standard pitch jet error signal. The detailed block diagram is presented in Figure 4.3.1.1.44–1.

B. Processing Requirements – PIT_SUM is processed at 12.5 Hz.

C. Interface Requirements – The interface requirements for PIT_SUM are shown in Table 4.3.1.1.44–1.

D. Constants – None.

E. Initialization Requirements – None.

F. Software Configuration – Aerojet DAP unique.

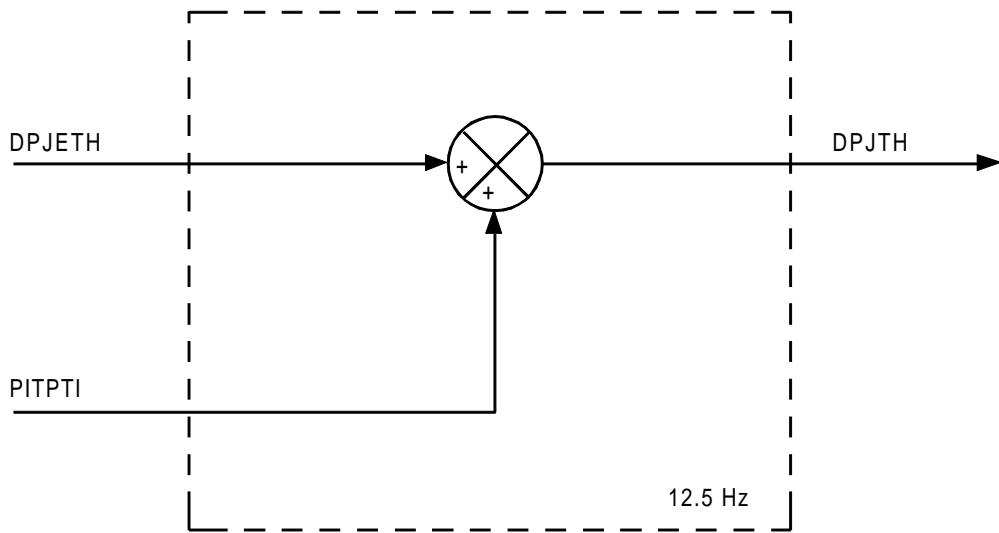


FIGURE 4.3.1.1.44-1. PIT_SUM (Aerojet DAP)

Table 4.3.1.1.44-1. PIT_SUM (Aerojet DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
PITPTI	PITCH PTI pulse	PJPTI_MOD	F	deg/s	12.5
DPJETH	Normal pitch jet error	UYBB_FILTER	F	deg/s	25
<u>Output</u>					
DPJTH	Total pitch jet error signal	PITCH_HYST	F	deg/s	12.5

4.3.1.1.45 PJPTI_MOD (Aerojet DAP).

- A. Function – This function module integrates the pitch PTI signal to obtain the pitch pulse. The detailed block diagram is presented in Figure 4.3.1.1.45–1.
- B. Processing Requirements – PJPTI_MOD is processed at 12.5 Hz.
- C. Interface Requirements – The interface requirements for PJPTI_MOD are shown in Table 4.3.1.1.45–1.
- D. Constants – The constants for PJPTI_MOD are shown in Table 4.2.1.1.45–2.
- E. Initialization Requirements – The initialization requirements for PJPTI_MOD are shown in Table 4.3.1.1.45–3.
- F. Software Configuration – Aerojet DAP unique

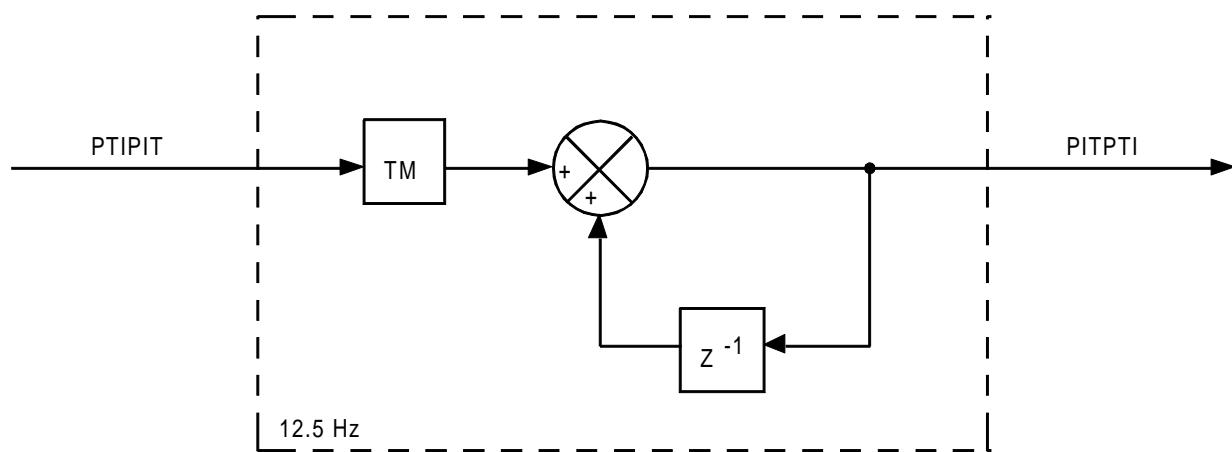


FIGURE 4.3.1.1.45-1. PJPTI_MOD (Aerojet Dap)

Table 4.3.1.1.45-1. PJPTI_MOD (Aerojet DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Input</u> PTIPIT	Pitch PTI signal	PTI_DRIVER	F	deg/s**2	12.5
<u>Output</u> PITPTI	Pitch PTI pulse	PIT_SUM	F	deg/s	12.5

Table 4.3.1.1.45-2. PJPTI_MOD (Aerojet DAP) Constants				
Name	Description	Type	Value	Units
TM	DAP medium cycle time	F	0.08	S

Table 4.3.1.1.45-3. PJPTI_MOD (Aerojet DAP) Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Integrator	PTI_ACT	PTI_ACT	PITPTI	0.0

4.3.1.1.46 PRHC_SUM.

- A. Function – This function module sums the RHC pitch trim rate and RHC pitch rate commands to form a net pitch rate command. The detailed block diagram is presented in Figure 4.3.1.1.46–1.
- B. Processing Requirements – PRHC_SUM is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for PRHC_SUM are shown in Table 4.3.1.1.46–1.
- D. Constants – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

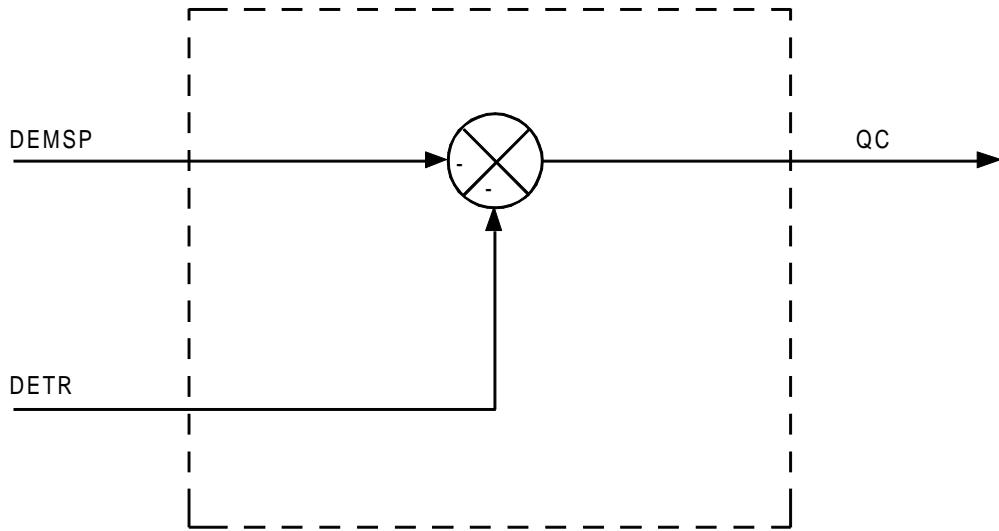


FIGURE 4.3.1.1.46-1. PRHC_SUM

Table 4.3.1.1.46-1. PRHC_SUM Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DEMSP	Shaped and scaled RHC pitch rate command	ESHAPE, GPX_MOD	F	deg/s	25
DETR	RHC pitch trim rate command	PRHCT	F	deg/s	12.5
<u>Output</u>					
QC	Pitch rate command	ELSUM, JERROR, GSD_FILT	F	deg/s	25

4.3.1.1.47 PRHCT.

- A. Function – This function module scans the RHC pitch beep trim acceleration. The scaled trim acceleration is then integrated to a clamped limit to form a pitch trim rate. The detailed block diagram is presented in Figure 4.3.1.1.47-1.
- B. Processing Requirements – PRHCT is processed at 12.5 Hz.
- C. Interface Requirements – The interface requirements for PRHCT are shown in Table 4.3.1.1.47-1.
- D. I-Loads/Constants – The I-loads/constants for PRHCT are shown in Table 4.2.1.1.47-2.
- E. Initialization Requirements – The initialization requirements for PRHCT are shown in Table 4.3.1.1.47-3.
- F. Software Configuration – Common.

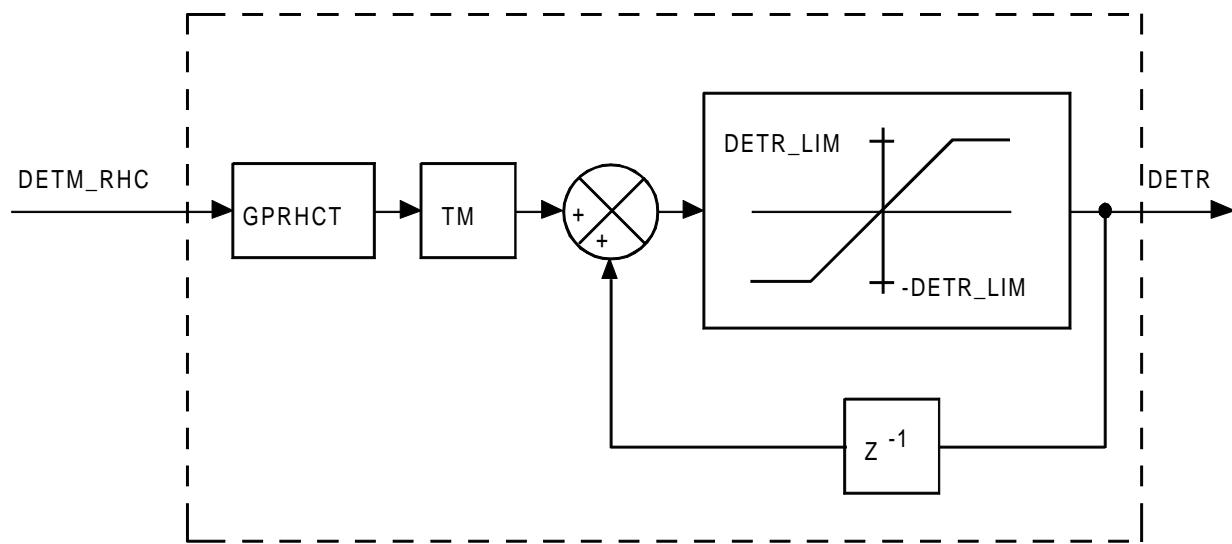


FIGURE 4.3.1.1.47-1. PRHCT

Table 4.3.1.1.47-1. PRHCT Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DETM_RHC	RHC pitch trim command	2-AX RHC SOP	I	—	6.25
<u>Output</u> DETR	RHC pitch trim rate	PRHC_SUM	F	deg/s	12.5

Table 4.3.1.1.47-2. PRHCT I-Loads/Constants				
Name	Description	Type	MSID/Value	Units
GPRHCT	Gain to convert RHC pitch beep trim command into a pitch trim acceleration command	F	V97U0741C	deg/s**2
DETR_LIM TM	Limit on RHC pitch trim rate DAP medium cycle time	F F	V97U0643C 0.080	deg/s s

Table 4.3.1.1.47-3. PRHCT Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Integrator	— AUTO_PITCH	First pass CSS_PITCH	DETR DETR	0.0 0.0

4.3.1.1.48 QBLIM_MOD.

A. Function – This function module, when ZERO_YAWJET is TRUE, applies a lower limit to AirData SOP dynamic pressure. The detailed block diagram is presented in Figure 4.3.1.1.48–1.

B. Processing Requirements – QBLIM_MOD is processed at 1.04 Hz.

C. Interface Requirements – The interface requirements for QBLIM_MOD are shown in Table 4.3.1.1.48–1.

D. I-Loads/Constants – The I-loads and constants for QBLM_MOD are shown in Table 4.3.1.1.48–2.

E. Initialization Requirements – None.

F. Software Configuration – Common.

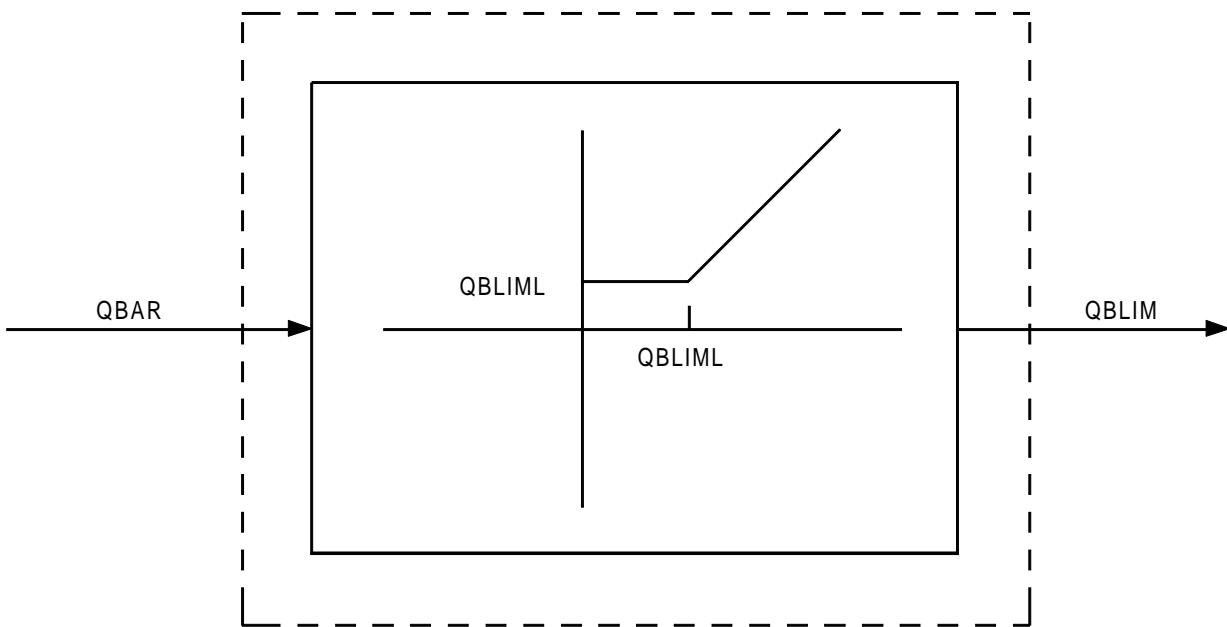


FIGURE 4.3.1.1.48-1. QBLIM_MOD

Table 4.3.1.1.48-1. QBLIM_MOD Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> QBAR	Dynamic pressure	ADTA SOP	F	lb/ft ²	1.04
<u>Output</u> QBLIM	Dynamic pressure for FCS	GDQ_COMP, RECON, Roll channel, Yaw channel, GPC_COMP, GJET_COMP	F	lb/ft ²	1.04

Table 4.3.1.1.48-2. QBLIM_MOD I-Loads/Constants				
Name	Description	Type	MSID/Value	Units
QBLIML_CSS	Minimum value of dynamic pressure, when ZERO_YAWJET is TRUE, CSS mode	F	V97U1153C	lb/ft ²
QBLIML_AUTO	Minimum value of dynamic pressure, when ZERO_YAWJET is TRUE, Auto mode	K	V96U9369C/ +5.0 E+01	lb/ft ²

4.3.1.1.49 QCOMP (Aerojet DAP).

- A. Function – This function module computes a nose-up correction term to compensate the pitch loop for turn maneuvers. The detailed block diagram is presented in Figure 4.3.1.1.49–1.
- B. Processing Requirements – QCOMP is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for QCOMP are shown in Table 4.3.1.1.49–1.
- D. Constants – The constants for QCOMP are shown in Table 4.2.1.1.49–2.
- E. Initialization Requirements – The initialization requirements for QCOMP are shown in Table 4.3.1.1.49–3.
- F. Software Configuration – Aerojet DAP unique.

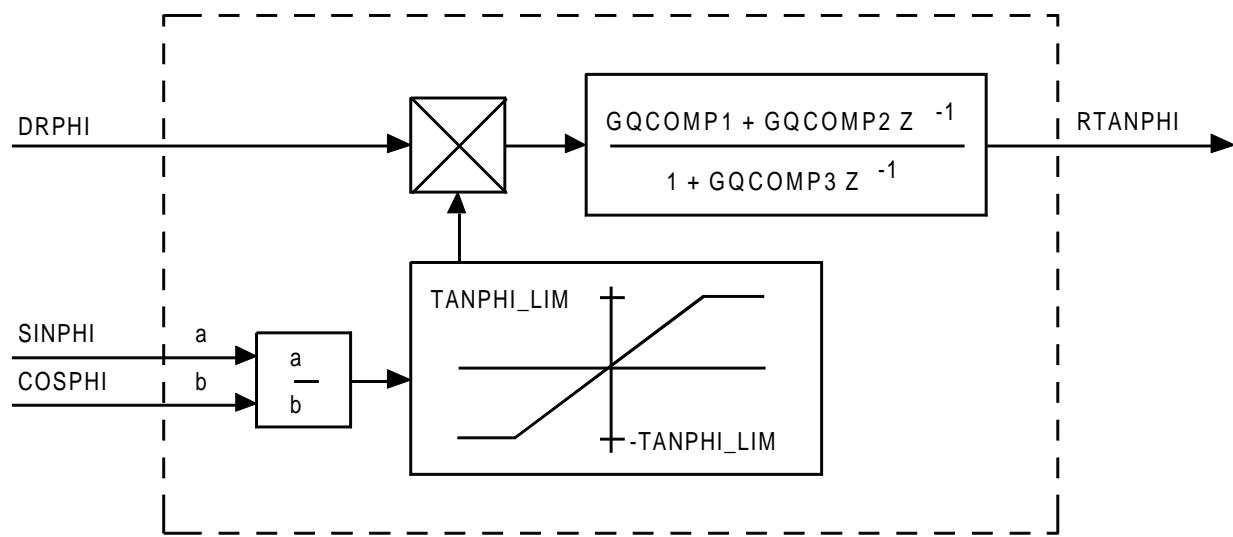


FIGURE 4.3.1.1.49-1. QCOMP (Aerojet DAP)

Table 4.3.1.1.49-1. QCOMP (Aerojet DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DRPHI	Turn coordination, yaw rate component	BYCOR (YAW Channel)	F	deg/s	6.25
SINPHI	Sine of PHI	A/E ATT PROC	F	—	6.25
COSPHI	Cosine of PHI	A/E ATT PROC	F	—	6.25
<u>Output</u>					
RTANPHI	Pitch rate compensation trim	NZERR_FD, ELERROR	F	deg/s	6.25

Table 4.3.1.1.49-2. QCOMP (Aerojet DAP) Constants				
Name	Description	Type	MSID/Value	Units
TANPHI_LIM	Limit for tangent (PHI)	K	V97U1096C/ +1.0 E+00	—
GQCOMP(1)	Filter coefficient	K	V97U0745C/ +7.4074 E-02	—
GQCOMP(2)	Filter coefficient	K	V97U0746C/ +7.4074 E-02	—
GQCOMP(3)	Filter coefficient	K	V97U0747C/ -8.51852 E-01	—

Table 4.3.1.1.49-3. QCOMP (Aerojet DAP) Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
First-order filter	A	Other	Node	*

*See Subsection 4.9.1
A = ENTRY + TURN_COORD

4.3.1.1.50 QCOMP (GRTLS DAP).

- A. Function – This function module computes a nose-up correction term to compensate the pitch loop for turn maneuvers. The detailed block diagram is presented in Figure 4.3.1.1.50-1.
- B. Processing Requirements – QCOMP is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for QCOMP are shown in Table 4.3.1.1.50-1.
- D. Constants – The constants for QCOMP are shown in Table 4.2.1.1.50-2.
- E. Initialization Requirements – The initialization requirements for QCOMP are shown in Table 4.3.1.1.50-3.
- F. Software Configuration – GRTLS DAP unique.

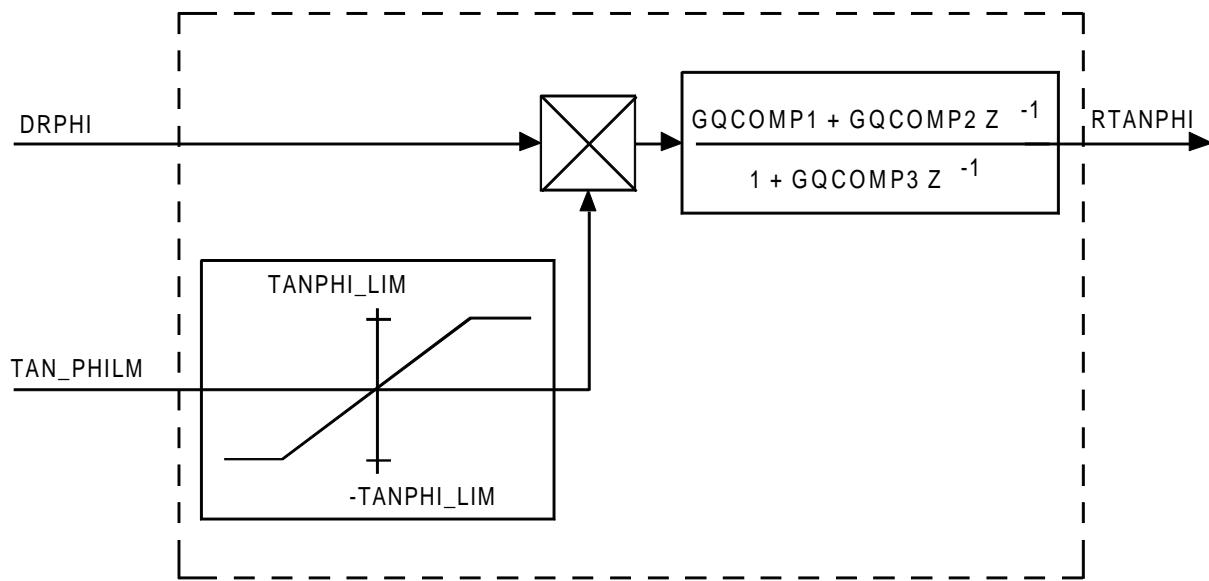


FIGURE 4.3.1.1.50-1. QCOMP (GRTLS DAP)

Table 4.3.1.1.50-1. QCOMP (GRTLS DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DRPHI	Turn coordination, yaw rate component	BYCOR (YAW_CHAN)	F	deg/s	6.25
TAN_PHILM	Tangent of limited roll angle	BRCOR (ROLL_CHAN)	F	—	6.25
<u>Output</u>					
RTANPHI	Pitch rate compensation trim	NZERR_FD, ELERROR	F	deg/s	6.25

Table 4.3.1.1.50-2. QCOMP (GRTLS DAP) Constants				
Name	Description	Type	MSID/ Value	Units
GQCOMP1	Filter coefficient	K	V97U0745C/ +7.4074 E-02	—
GQCOMP2	Filter coefficient	K	V97U0746C/ +7.4074 E-02	—
GQCOMP3	Filter coefficient	K	V97U0747C/ -8.51852 E-01	—
TANPHI_LIM	Limit on tangent phi limited (TAN_PHILM)	K	V97U1096C/ +1.0 E+00	—

Table 4.3.1.1.50-3. QCOMP (GRTLS DAP) Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
First-order filter	A	Other	Node	*

*See Subsection 4.9.1
A = (IPHASEB = 4, 5, 6) + TURN_COORD

4.3.1.1.51 SBXFEED.

- A. Function – This function module converts the speed brake increment crossfeed into a pitch trim increment. The detailed block diagram is presented in Figure 4.3.1.1.51-1.
- B. Processing Requirements – SBXFEED is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for SBXFEED are shown in Table 4.3.1.1.51-1.
- D. Constants – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

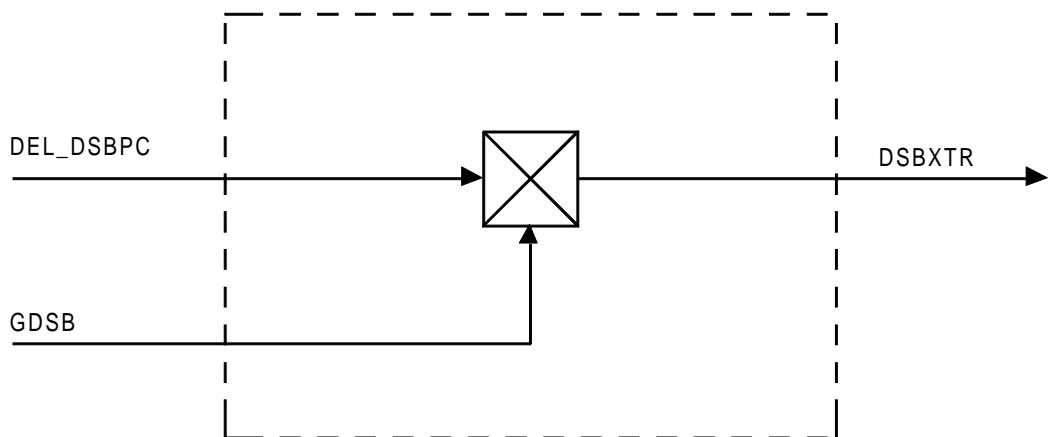
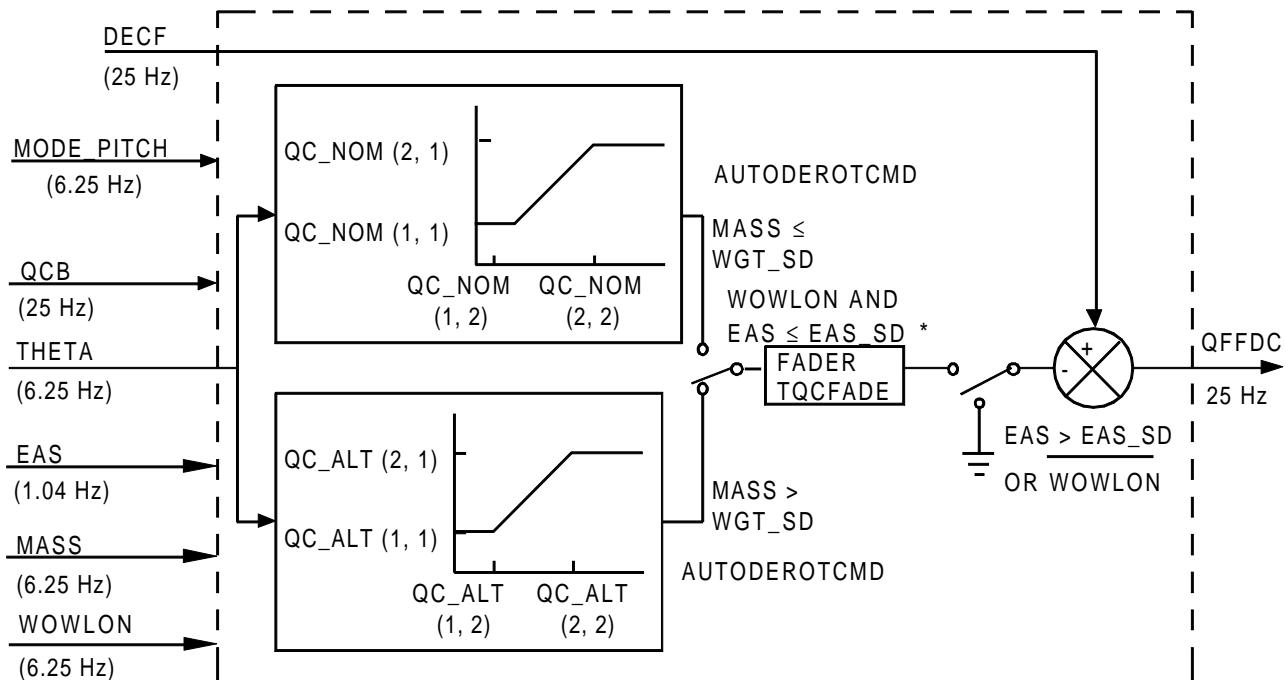


FIGURE 4.3.1.1.51-1. SBXFEED

Table 4.3.1.1.51-1. SBXFEED Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DEL_DSBPC	Speedbrake increment crossfeed	PRIOR_RATE_LIMITING	F	deg	25
GDSB	Gain to convert speedbrake increment crossfeed into a pitch trim increment	GDSB_COMP	F	deg/deg	1.04
<u>Output</u>					
DSBXTR	Pitch trim increment	GSBHI_MOD, GSBLO_MOD	F	deg	25

4.3.1.1.52 SDCMP (Aerojet DAP).

- A. Function – This function generates pitch rate commands during slap-down and roll-out. The commands are generated as a function of pitch attitude, indicated main gear touchdown, equivalent airspeed, time, mode, and vehicle weight. The detailed block diagram is presented in Figure 4.3.1.1.52-1.
- B. Processing Requirements – SDCMP is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for SCDMP are shown in Table 4.3.1.1.52-1.
- D. I-Loads – The I-loads for SDCMP are shown in Table 4.3.1.1.52-2.
- E. Initialization Requirements – The initialization requirements for SDCMP are shown in Table 4.3.1.1.52-3.
- F. Software Configuration – Aerojet DAP unique.



* THIS SWITCH, USING EAS AND WOWLON, SHOULD BE LATCHED IN THE CLOSED POSITION AS SOON AS THE WOWLON = TRUE AND EAS \leq EAS_SD CRITERIA IS SATISFIED

FIGURE 4.3.1.1.52-1. SDCMP (Aerojet DAP)

Table 4.3.1.1.52-1. SDCMP (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
MODE_PITCH	Mode indicator	RECON	D	–	6.25
THETA	Pitch attitude	A/E ATT PROC (4.226)	F	deg	6.25
DECF	Twice filtered pitch rate feedback	PBBF, VPBBF_ELV, VPBBF_MGT1, VPBBF_MLT1	F	deg/s	25
EAS	Equivalent airspeed	ADTA SOP (4.39)	F	ft/s	1.04
MASS	Vehicle weight (OPS 3 only)	DEORB GUID (4.209)	F	slugs	6.25
QCB	Pitch rate command	PRHC_SUM, ALFFLOOP, NZ_FILTER	F	deg/s	25
WOWLON	Weight on main gear indicator	RECON	D	–	6.25
<u>Output</u>					
QFFDC	Pitch rate error	E/L ADI PROC GSD_FILT, TLM	F	deg/s	25

Table 4.3.1.1.52-2. SDCMP (Aerojet DAP) I-Loads

Name	Description	Type	MSID	Units
WGT_SD	Slap-down weight index	F	V96U9510C	slugs
EAS_SD	Slap-down speed switch	F	V96U9372C	ft/s
QC_NOM(1,1)	Tabulated pitch rate command	F	V96U9373C	deg/s
QC_NOM(2,1)	Tabulated pitch rate command	F	V96U9374C	deg/s
QC_NOM(1,2)	Tabulated THETA	F	V96U9375C	deg
QC_NOM(2,2)	Tabulated THETA	F	V96U9376C	deg
QC_ALT(1,1)	Tabulated pitch rate command	F	V96U9377C	deg/s
QC_ALT(2,1)	Tabulated pitch rate command	F	V96U9378C	deg/s
QC_ALT(1,2)	Tabulated THETA	F	V96U9379C	deg
QC_ALT(2,2)	Tabulated THETA	F	V96U9380C	deg
TQC_FADE	Auto Pitch derotation command fade time	F	V97U2905C	sec

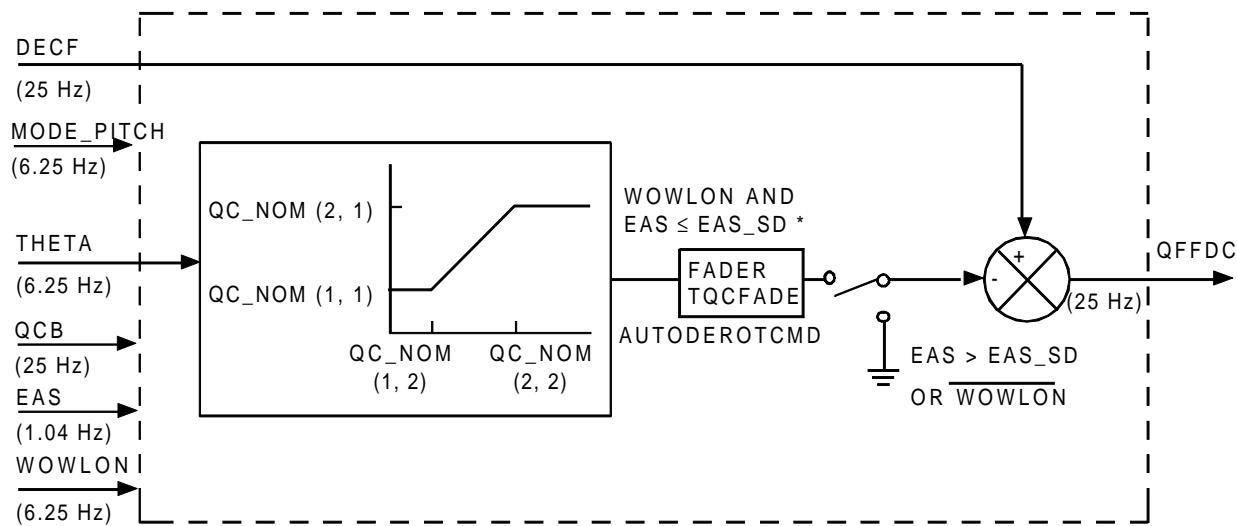
Table 4.3.1.1.52-3. SDCMP (AEROJET DAP) Fader Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
**** Fader input	Not X	X	** AUTODEROTCMD	* Trigger 0.0
**** Fader input	X • CSS_PITCH	X • AUTO_PITCH	** AUTODEROTCMD	* Trigger **** QCB

where X = WOWLON • EAS ≤ EAS_SD

- * See section 4.9.4 (FADER)
- ** Fader triggering shall occur one minor cycle following transition condition
- *** In the case of the above transitions (Not WOWLON, EAS > EAS_SD, CSS_PITCH) occurring simultaneously, the first case (not x to x) shall take precedence
- **** Use value from past minor cycle

4.3.1.1.53 SDCMP (GRTLS DAP).

- A. Function – This function generates pitch rate commands during slap-down and roll-out. The commands are generated as a function of pitch attitude, indicated main gear touchdown, and equivalent airspeed, time, and mode. The detailed block diagram is presented in Figure 4.3.1.1.53-1.
- B. Processing Requirements – SDCMP is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for SDCMP are shown in Table 4.3.1.1.53-1.
- D. I-Loads – The I-loads for SDCMP are shown in Table 4.3.1.1.53-2.
- E. Initialization Requirements – The initialization requirements for SDCMP are shown in Table 4.3.1.1.53-3.
- F. Software Configuration – GRTLS DAP unique.
- G. Supplemental Information – Because the values for the QC_NOM table are weight dependent, appropriate values must be chosen to agree with the expected GRTLS return weight.



* THIS SWITCH, USING EAS AND WOWLON, SHOULD BE LATCHED IN THE CLOSED POSITION AS SOON AS THE EAS \leq EAS_SD AND WOWLON = TRUE CRITERIA ARE SATISFIED

FIGURE 4.3.1.1.53-1. SDCMP (GRTLS DAP)

Table 4.3.1.1.53-1. SDCMP (GRTLS DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
MODE_PITCH	MODE indicator	RECON	D	–	6.25
THETA	Pitch attitude	A/E ATT PROC (4.226)	F	deg	6.25
DECF	Twice filtered pitch rate feedback	PBBF, VPBBF_ELV, VPBBF_MGT1, VPBBF_MLT1	F	deg/s	25
EAS	Equivalent airspeed	ADTA SOP (4.39)	F	ft/s	1.04
QCB	Pitch rate command	ELSUM	F	deg/s	25
WOWLON	Weight on main gear indicator	RECON	D	–	6.25
<u>Output</u>					
QFFDC	Pitch rate error	E/L ADI PROC, GSD_FILT	F	deg	25

Table 4.3.1.1.53-2. SDCMP (GRTLS DAP) I-Loads

Name	Description	Type	MSID	Units
EAS_SD	Slap-down special switch	F	V96U9372C	ft/s
QC_NOM(1,1)	Tabulated pitch rate command	F	V96U9373C	deg/s
QC_NOM(2,1)	Tabulated pitch rate command	F	V96U9374C	deg/s
QC_NOM(1,2)	Tabulated Theta	F	V96U9375C	deg
QC_NOM(2,2)	Tabulated Theta	F	V96U9376C	deg
TQCFADE	Auto pitch derotation command fade time	F	V97U2905C	sec

Table 4.3.1.1.53-3. SDCMP (GRTLS DAP) Fader Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
**** Fader input	Not X	X	** AUTODEROTCMD	Trigger 0.0
**** Fader input	X • CSS_PITCH	X • AUTO_PITCH	* AUTODEROTCMD	Trigger **** QCB

where X = WOWLON • EAS ≤ EAS_SD

* See section 4.9.4 (FADER)

** Fader triggering shall occur one minor cycle following transition condition

*** In the case of the above transitions (Not WOWLON, EAS > EAS_SD, CSS_PITCH) occurring simultaneously, the first case (not x to x) shall take precedence

**** Use value from past minor cycle

4.3.1.1.54 UYBB_FILTER.

- A. Function – This function module applies a second-order bending filter to the preliminary pitch jet command. The detailed block diagram is presented in Figure 4.3.1.1.54–1.
- B. Processing Requirements – UYBB_FILTER is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for UYBB_FILTER are shown in Table 4.3.1.1.54–1.
- D. Constants – The constants for UYBB_FILTER are shown in Table 4.3.1.1.54–2.
- E. Initialization Requirements – The initialization requirements for UYBB_FILTER are shown in Table 4.3.1.1.54–3.
- F. Software Configuration – Common.

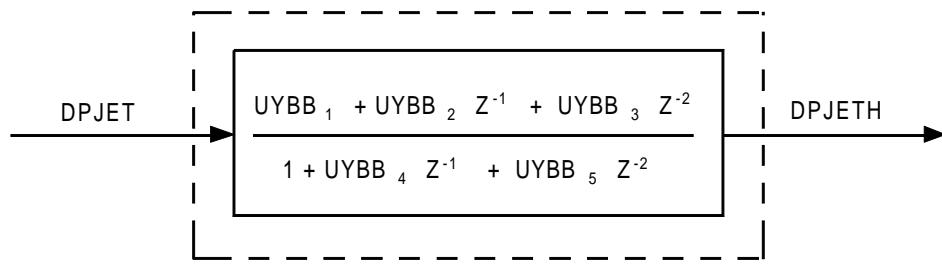


FIGURE 4.3.1.1.54-1. UYBB_FILTER

Table 4.3.1.1.54-1. UYBB_FILTER Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DPJET	Preliminary pitch jet command	AUTO_PJET_CMD, JERROR	F	deg	25
<u>Output</u> DPJETH	Filtered preliminary pitch jet command	PIT_SUM, PITCH_QUANT	F	deg	25

Table 4.3.1.1.54-2. UYBB_FILTER Constants				
Name	Description	Type	MSID/Value	Units
UYBB(1)	Filter coefficient	K	V96U8563C/ +1.733907 E-01	ND
UYBB(2)	Filter coefficient	K	V96U7886C/ -1.198055 E-01	ND
UYBB(3)	Filter coefficient	K	V96U7887C/ +1.559513 E-01	ND
UYBB(4)	Filter coefficient	K	V96U7888C/ -1.2396259 E+00	ND
UYBB(5)	Filter coefficient	K	V96U7889C/ +4.491623 E-01	ND

Table 4.3.1.1.54-3. UYBB_FILTER Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Second-order filter	—	First pass	Node	*

*See Subsection 4.9.2

4.3.1.1.55 VPBBF_ELV (Aerojet DAP)

A. Function – This function module applies body bending filter to the preliminary elevator and trim commands. The detailed block diagram is presented in Figure 4.3.1.1.55–1.

B. Processing Requirements – VPBBF_ELV is processed at 25 Hz.

C. Interface Requirements – The interface requirements for VPBBF_ELV are shown in Table 4.3.1.1.55–1.

D. I-Loads – The I-loads for VPBBF_ELV are shown in Table 4.3.1.1.55–2.

E. Initialization Requirements – The initialization requirements for VPBBF_ELV are shown in Table 4.3.1.1.55–3.

F. Software Configuration – Aerojet DAP unique.

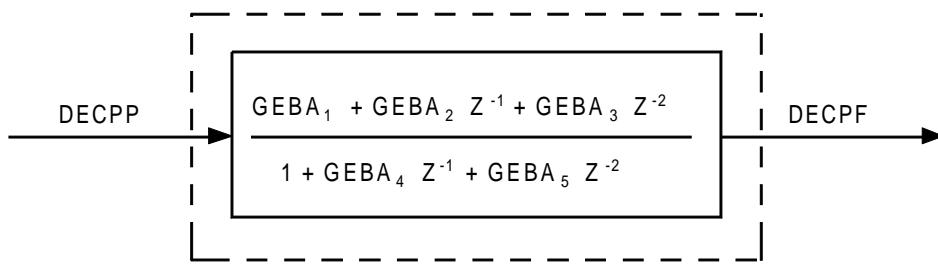


FIGURE 4.3.1.1.55-1. VPBBF_ELV

Table 4.3.1.1.55-1. VPBBF_ELV Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Input</u> DECPP	Preliminary elevator command and trim command	ELERROR	F	deg	25
<u>Output</u> DECPF	Filtered elevator command	ELSUM, PBBF, SDCMP	F	deg	25

Table 4.3.1.1.55-2. VPBBF_ELV I-Loads				
Name	Description	Type	MSID	Units
GEBA(1)	Filter coefficient	F	V97U0707C	—
GEBA(2)	Filter coefficient	F	V97U0708C	—
GEBA(3)	Filter coefficient	F	V97U0709C	—
GEBA(4)	Filter coefficient	F	V97U0710C	—
GEBA(5)	Filter coefficient	F	V97U0711C	—

Table 4.3.1.1.55-3. VPBBF_ELV Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Second-order filter**	—	First pass	Node	*
	FILT	<u>FILT</u>	Node	*

*See Subsection 4.9.2
**This filter is not reinitialized on transition from "LOAD_RELIEF • AUTO_PITCH" to "CSS_PITCH" by design. The vehicle will be on the ground when the above transition takes place and the body bending filters will have minimal performance effects.

4.3.1.1.56 VPBBF_MGT1.

A. Function – This function module applies body bending filter to the elevator command when required. The detailed block diagram is presented in Figure 4.3.1.1.56–1.

B. Processing Requirements – VPBBF_MGT1 is processed at 25 Hz.

C. Interface Requirements – The interface requirements for VPBBF_MGT1 are shown in Table 4.3.1.1.56–1.

D. I-Loads – The I-loads for VPBBF_MGT1 are shown in Table 4.3.1.1.56–2.

E. Initialization Requirements – The initialization requirements for VPBBF_MGT1 are shown in Table 4.3.1.1.56–3.

F. Software Configuration – Common.

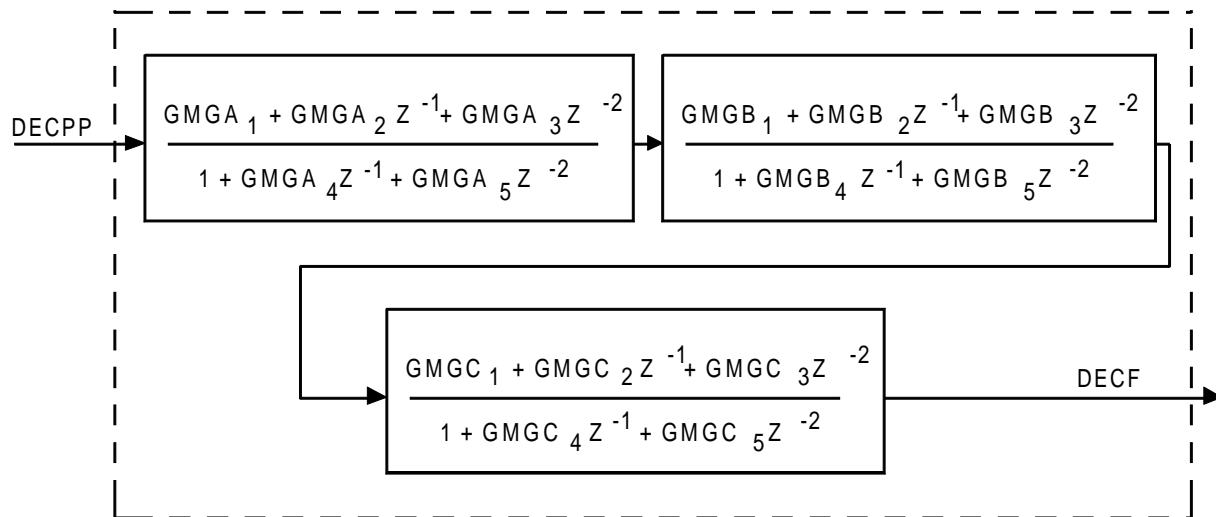


FIGURE 4.3.1.1.56-1. VPBBF_MGT1

Table 4.3.1.1.56-1. VPBBF_MGT1 Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DECPP	Preliminary elevator command and trim command	ELERROR	F	deg	25
<u>Output</u> DECPF	Filtered elevator command	ELSUM, SDCMP	F	deg	25

Table 4.3.1.1.56-2. VPBBF_MGT1 I-Loads

Name	Description	Type	MSID	Units
GMGA ₁	Filter coefficient	F	V99U7170C	—
GMGA ₂	Filter coefficient	F	V99U7171C	—
GMGA ₃	Filter coefficient	F	V99U7172C	—
GMGA ₄	Filter coefficient	F	V99U7173C	—
GMGA ₅	Filter coefficient	F	V99U7174C	—
GMGB ₁	Filter coefficient	F	V99U7175C	—
GMGB ₂	Filter coefficient	F	V99U7176C	—
GMGB ₃	Filter coefficient	F	V99U7177C	—
GMGB ₄	Filter coefficient	F	V99U7178C	—
GMGB ₅	Filter coefficient	F	V99U7179C	—
GMGC ₁	Filter coefficient	F	V99U7180C	—
GMGC ₂	Filter coefficient	F	V99U7181C	—
GMGC ₃	Filter coefficient	F	V99U7182C	—
GMGC ₄	Filter coefficient	F	V99U7183C	—
GMGC ₅	Filter coefficient	F	V99U7184C	—

Table 4.3.1.1.56-3. VPBBF_MGT1 Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Sixth-order filter**	A	First pass	Nodes	*
		B	Nodes	*
	ZERO_YAWJET	ZERO_YAWJET	Nodes	*

* See Subsection 4.9.3
**This filter is not reinitialized on transition from “LOAD_RELIEF • AUTO _PITCH” to “CSS_PITCH” by design. The vehicle will be on the ground when the above transition takes place and the body bending filters will have minimal performance effects.
A = Aerojet • $\overline{\text{FILT}}$
B = GRTLS + FILT

4.3.1.1.57 VPBBF_MLT1.

A. Function – This function module applies body bending filter to the elevator command when required. The detailed block diagram is presented in Figure 4.3.1.1.57-1.

B. Processing Requirements – VPBBF_MLT1 is processed at 25 Hz.

C. Interface Requirements – The interface requirements for VPBBF_MLT1 are shown in Table 4.3.1.1.57-1.

D. I-Loads – The I-loads for VPBBF_MLT1 are shown in Table 4.3.1.1.57-2.

E. Initialization Requirements – The initialization requirements for VPBBF_MLT1 are shown in Table 4.3.1.1.57-3.

F. Software Configuration – Common.

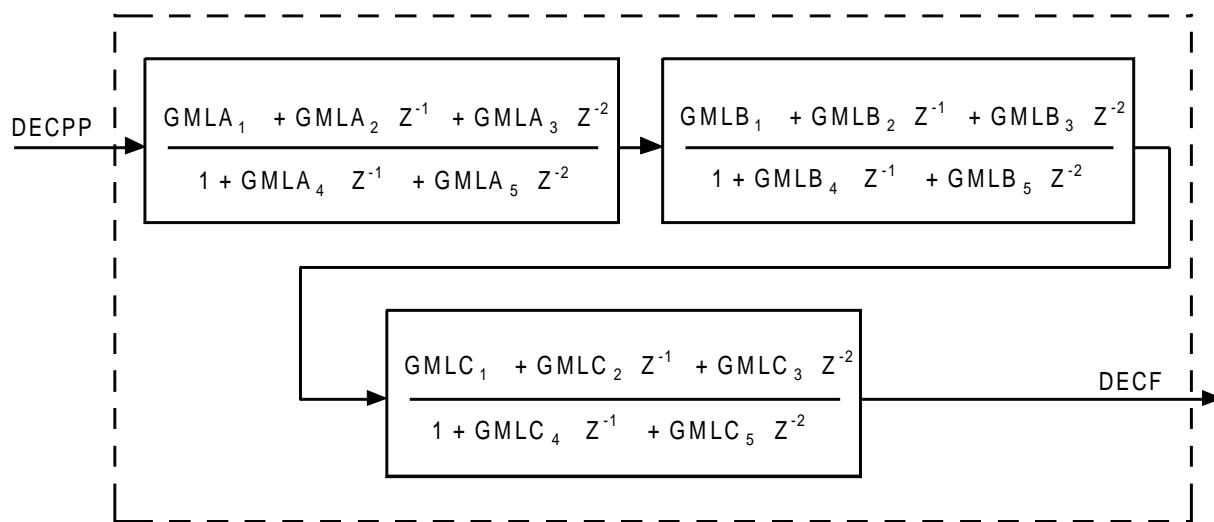


FIGURE 4.3.1.1.57-1. VPBBF_MLT1

Table 4.3.1.1.57-1. VPBBF_MLT1 Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DECPP	Preliminary elevator command and trim command	ELERROR	F	deg	25
<u>Output</u> DECF	Twice filtered elevator command	ELSUM, SDCMP	F	deg	25

Table 4.3.1.1.57-2. VPBBF_MLT1 I-Loads

Name	Description	Type	MSID	Units
GMLA ₁	Filter coefficient	F	V99U7185C	—
GMLA ₂	Filter coefficient	F	V99U7186C	—
GMLA ₃	Filter coefficient	F	V99U7187C	—
GMLA ₄	Filter coefficient	F	V99U7188C	—
GMLA ₅	Filter coefficient	F	V99U7189C	—
GMLB ₁	Filter coefficient	F	V99U7190C	—
GMLB ₂	Filter coefficient	F	V99U7191C	—
GMLB ₃	Filter coefficient	F	V99U7192C	—
GMLB ₄	Filter coefficient	F	V99U7193C	—
GMLB ₅	Filter coefficient	F	V99U7194C	—
GMLC ₁	Filter coefficient	F	V99U7195C	—
GMLC ₂	Filter coefficient	F	V99U7196C	—
GMLC ₃	Filter coefficient	F	V99U7197C	—
GMLC ₄	Filter coefficient	F	V99U7198C	—
GMLC ₅	Filter coefficient	F	V99U7199C	—

Table 4.3.1.1.57-3. VPBBF_MLT1 Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Sixth-order filter**	—	First pass	Nodes	*
	ZERO_YAWJET	ZERO_YAWJET	Nodes	*

* See Subsection 4.9.3

**This filter is not reinitialized on transition from "LOAD_RELIEF • AUTO_PITCH" to "CSS_PITCH" by design. The vehicle will be on the ground when the above transition takes place and the body bending filters will have minimal performance effects.

4.3.1.1.58 ELSHAPE.

- A. Function – This function module filters the pitch rate error. The detailed block diagram is presented in Figure 4.3.1.1.58-1.
- B. Processing Requirements – ELSHAPE is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for ELSHAPE are shown in Table 4.3.1.1.58-1.
- D. I-Loads – The I-loads for ELSHAPE are shown in Table 4.3.1.1.58-2.
- E. Initialization Requirements – The initialization requirements for ELSHAPE are shown in Table 4.3.1.1.58-3.
- F. Software Configuration – Common.

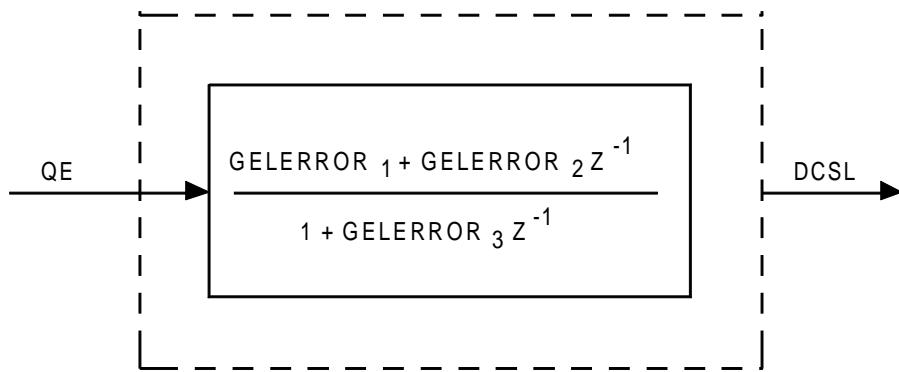


FIGURE 4.3.1.1.58-1. ELSHAPE

Table 4.3.1.1.58-1. ELSHAPE Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> QE	Pitch Rate Error	ELSUM	F	deg/s	25
<u>Outputs</u> DCSL	Pitch Rate Error	ELLOOP	F	deg/s	25

Table 4.3.1.1.58-2. ELSHAPE I-Loads

Name	Description	Type	MSID	Units
GELERROR(1)	Filter coefficient	F	V99U0717C	—
GELERROR(2)	Filter coefficient	F	V99U0718C	—
GELERROR(3)	Filter coefficient	F	V99U0719C	—

Table 4.3.1.1.58-3. ELSHAPE Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Second-order filter	—	First pass	Nodes	*
	LOWQ A	<u>LOWQ</u> CSS_PITCH	Nodes	*

* See Subsection 4.9.1
A = AUTO_PITCH • WOWLON

4.3.1.1.59 ELSUM.

- A. Function – This function module twice filtered computes the CSS–pitch rate error by summing the unfiltered pitch rate command and pitch rate feedback signal. The detailed block diagram is presented in Figure 4.3.1.1.59–1.
- B. Processing Requirements – ELSUM is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for ELSUM are shown in Table 4.3.1.1.59–1.
- D. I-Loads – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

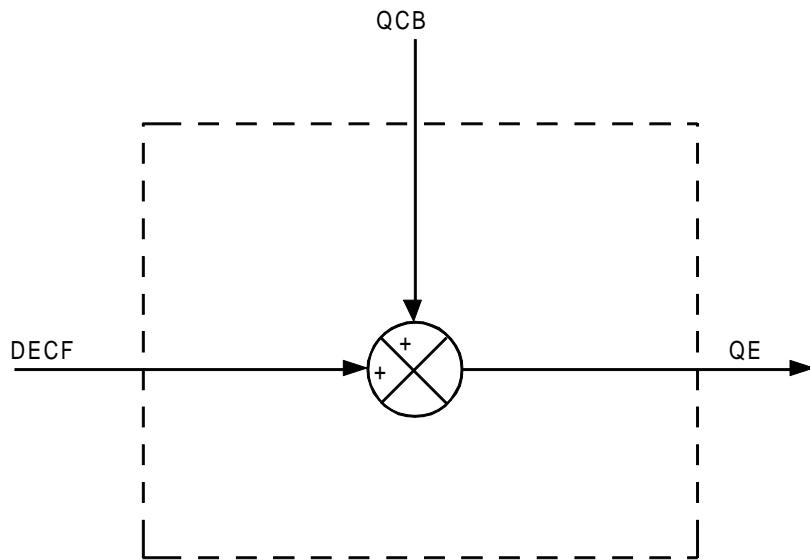


FIGURE 4.3.1.1.59-1. ELSUM

Table 4.3.1.1.59-1. ELSUM Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
QCB	CSS pitch rate command	PRHC_SUM	F	deg/s	25
DECF	Twice filtered pitch rate feedback	PBBF, VPBBF_ELV, VPBBF_MGTI, VPBBF_MLTI	F	deg/s	25
<u>Output</u>					
QE	Pitch rate error	ELSHAPE, GSD FILT	F	deg/s	25

4.3.1.2 Roll Channel Control Modules.

- A. Functional Requirements – The roll channel control laws are presented in block diagram form in Figure 4.3.1.2–1. The roll channel provides roll attitude control and lateral control by means of the roll RCS jets and the ailerons.
- B. Function Modules – The function modules that make up the roll channel control laws are described in this subsection in the order shown in Table 4.3.1.2–1.
- C. Sequencing Requirements – The sequencing requirements for the roll channel function modules may be inferred from Figure 4.3.1.2–1.
- D. Interface Requirements – The interface requirements for the roll channel are presented in Table 4.3.1.2–2.
- E. I-Loads – The I-loads for the roll channel are given in Table 4.3.1.2–3.
- F. Initialization Requirements – The initialization requirements for the roll channel are presented in Table 4.3.1.2–4.

Table 4.3.1.2-1. Roll Channel Modules

Module	Subsection
ABF	4.3.1.2.1
ABFF	4.3.1.2.2
AILCMD (Aerojet DAP)	4.3.1.2.3
AILCMD (GRTLS DAP)	4.3.1.2.4
ALPHA_TRIG	4.3.1.2.6
ATRIM	4.3.1.2.7
AUTO_LOAD_BALANCE	4.3.1.2.8
BANKERR_LIMITER	4.3.1.2.9
BANK_SUM (Aerojet DAP)	4.3.1.2.10
BANK_SUM (GRTLS DAP)	4.3.1.2.11
BANKERR_THRESH	4.3.1.2.12
BANKERR_THRESH_NYJET (Aerojet DAP)	4.3.1.2.12a
BETASINALF	4.3.1.2.13
BRCOR	4.3.1.2.14
COTALF_COMP	4.3.1.2.15
DAC_GAIN	4.3.1.2.16
DAPTI_MOD (Aerojet DAP)	4.3.1.2.17
DAT_SUM	4.3.1.2.18
DATRIM_LIM_COMP (Aerojet DAP)	4.3.1.2.18a
DNYP_COMP	4.3.1.2.19
DRRC_LIM	4.3.1.2.20
DRR_LIM_COMP (Aerojet DAP)	4.3.1.2.20a
ENT_BANKC_SMOOTH (Aerojet DAP)	4.3.1.2.21
GALR_CMD	4.3.1.2.22
GALR_COMP	4.3.1.2.23
GALR_MOD	4.3.1.2.24
GALRD_COMP	4.3.1.2.25
GBAY_COMP	4.3.1.2.26
GDA_COMP (Aerojet DAP)	4.3.1.2.27
GDA_COMP (GRTLS DAP)	4.3.1.2.28
GPAY_COMP	4.3.1.2.29
GPBANK_COMP	4.3.1.2.30
GRPANT_MOD	4.3.1.2.32
GRRHC_COMP	4.3.1.2.33
GTRA_COMP	4.3.1.2.34
GTRA_MOD	4.3.1.2.35

Table 4.3.1.2-1. Roll Channel Modules

Module	Subsection
GTRIMB_COMP (Aerojet DAP)	4.3.1.2.35a
NY_SINALF	4.3.1.2.36
PCLIM_COMP	4.3.1.2.37
PCLIM_COMP_NYJET (Aerojet DAP)	4.3.1.2.37a
PCOMP	4.3.1.2.38
PCOR_COMP	4.3.1.2.39
PCPTI_MOD (Aerojet DAP)	4.3.1.2.39a
PLOOP	4.3.1.2.40
P_STAB_COMP	4.3.1.2.41
QUAD_COMP	4.3.1.2.42
RJPTI_MOD (Aerojet DAP)	4.3.1.2.43
ROLL_HYST (Aerojet DAP)	4.3.1.2.44
ROLLJET_BBF	4.3.1.2.45
ROLL_STICK	4.3.1.2.46
ROLL_SUM (Aerojet DAP)	4.3.1.2.47
TAEM_BANKC_SMOOTH	4.3.1.2.48

NOTE: Additional roll channel functions included in Figure 4.3.1.2-1 and in Table 4.3.1.2-2 are included in Section 4.7.

Table 4.3.1.2-2. Roll Channel Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
AL	Autoland flag	RECON	D	—	6.25
ALPHA	Angle of attack	ADTA SOP	F	deg	1.04
BETAF	Filtered beta	Yaw channel	F	deg/s	6.25
CONT_3EO_START	Contingency 3 engines out start flag	CONT 3E/O GUID	D	—	6.25
CONT_3EO_REGION	Contingency 3 engines out region index	CONT 3E/O GUID	I	—	6.25
COSPHI	Cosine of phi	A/E ATT PROC	F	—	6.25
DAMAN	Roll RHC command	2-AX RHC SOP	F	deg	25
DATM_PAN	Roll panel trim command	2-AX RHC SOP	I	—	6.25
DATM_RHC	Roll RHC trim command	2-AX RHC SOP	I	—	6.25
DRPRM	Compensated yaw rate	RCOR (Yaw channel)	F	deg/s	25
DRRCFJ	Yaw jet rate command	YAWJET_BBF (Yaw channel)	F	deg/s	25
EARLY	Low gain downmode discrete	RECON	D	—	6.25
EBFB ₁	Roll attitude error component of attitude error vector (EBFB)	G/C STEER	F	deg	12.5
EBFB ₃	Yaw attitude error component of attitude error vector (EBFB)	G/C STEER	F	deg	12.5
ETSEP	External tank separation flag	RECON	D	—	6.25
ETSEP_PR_ENABLE	Flag to enable pitch & roll control during Contingency ET SEP	RECON	D	—	6.25
ETSEP_Y_ENABLE	Flag to enable roll and yaw control during ET SEP using yaw jets	RECON	D	—	6.25
ENTRY	Entry phase flag	RECON	D	—	6.25
FLATTURN	Buffered FLATTURN_CMD	RECON	D	—	6.25
GDET	Gain adjustment for aileron trim	GDET_COMP (Pitch channel)	F	ND	1.04
IPHASEB	Buffered IPHASE	RECON	I	—	6.25
LATE	No yaw jet downmode discrete	RECON	D	—	6.25
MACH	Mach Number	ADTA SOP	F	—	1.04
MACH_PHIERR	Mach regime for bank error threshold	RECON	D	—	6.25
MACH_REGIME_RRXF	Mach level to reconfigure roll crossfeed	RECON	D	—	6.25
MC	Mated coast flag	RECON	D	—	6.25
MODE_BANK	Bank mode indicator	RECON	D	—	6.25
MRB_AILE	Mach regime for aileron trim	RECON	D	—	6.25
MRB_AILL	Mach regime for zero aileron trim	RECON	D	—	6.25
MRB_RRXF	Mach regime for roll rate crossfeed	RECON	D	—	6.25

Table 4.3.1.2-2. Roll Channel Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
MRB_RUDE	Mach regime for zero rudder trim	RECON	D	—	6.25
MRB_RUDL	Mach regime for rudder trim	RECON	D	—	6.25
P	Roll rate	SF	F	deg/s	25
NYP	Buffered lateral acceleration	Yaw channel	F	g	25
PDAY	Commanded yaw rate	PNY_COMP (Yaw channel)	F	deg/s	25
PHI	Roll angle	A/E ATT PROC	F	deg	6.25
PHIC	Roll angle command	ENT GUID, TAEM GUID, A/L GUID	F	deg	0.52
PHIC_AT	Roll angle command, TAEM	GRTLS TAEM GUID	F	deg	1.04
PHIC_AL	Roll angle command, AL	GRTLS A/L GUID	I	deg	6.25
PTI_ACT	Flag indicating an Aerojet DAP PTI is in progress	PTI_DRIVER	D	—	12.5
PTI_ACT_D	Flag indicating a PTI is in progress	PTI_DRIVER	D	—	12.5
PTI_AIL	PTI aileron command	PTI_DRIVER	F	ND	12.5
PTI_RHC	PTI roll rate command	PTI_DRIVER	F	deg/s	12.5
PTI_ROLL	PTI aft roll jet command	PTI_DRIVER	F	ND	12.5
PTI_WRAP	PTI wraparound mode discrete	PTI_DRIVER	D	—	12.5
QBARFC	Dynamic pressure for FCS	Pitch Channel	F	lb/ft **2	1.04
QBAR_REGIME	Range of QBAR indicator	RECON	I	—	6.25
R	Yaw rate feedback	SF	F	deg/s	25
ROLLOUT	Buffered weight on nose gear indicator	RECON	D	—	6.25
SINPHI	Sine of phi	A/E ATT PROC	F	—	6.25
SINTH	Sine of theta	A/E ATT PROC	F	—	6.25
TAEM	TAEM phase flag	RECON	D	—	6.25
TAS	True airspeed	ADTA SOP	F	ft/s	1.04
TURN_COORD	Turn coordination indicator	RECON	D	—	6.25
WFBI_FB ₁	Roll rate command component of angular rate command vector (WFBI-FB)	G/C STEER	F	deg/s	12.5
WRAP	Wraparound mode discrete	RECON	D	—	6.25
ZERO_YAWJET	Channel moding discrete	RECON	D	—	6.25
<u>Outputs</u>					
COSALF	Cosine of ALPHA	NY_COSALF, RCOMP, BETACOSALF (Yaw channel)	F	—	1.04

Table 4.3.1.2-2. Roll Channel Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
DAC	Aileron command	PRIORATE_LIMITING, TLM (Aerojet only)	F	deg	25
DATRIM	Aileron trim command	VERT SIT n DISP (1 and 2) ENTRY TRAJ n (1-5), TLM (Aerojet only)	F	deg	25
GERYFWDS	R/Y forward loop downmoding gain factor	GDM (Yaw channel)	F	—	6.25
HUD_AIL_CMD	Aileron load balance increment	HUDE1 HUDE2 TLM	F	deg	25
P_STAB	Roll rate in stability axes	E/L ADI PROC, TLM (Aerojet only)	F	deg/s	6.25
PC	Roll rate command	AXFDCOMP, TLM (Yaw channel)	F	deg/s	25 CSS_BANK 6.25 AUTO BANK
PCOR	Compensated roll rate	RCOMP, AXFDCOMP (Yaw channel)	F	deg/s	25
PE_MC	Roll error signal, MC	CONT_PITCH_QUANT (Pitch channel), JSL	F	deg/s	12.5
PE_SEP	Roll error signal, ETSEP	CONT_PITCH_QUANT (Pitch channel)	F	deg/s	12.5
PE_BIG	Large roll error signal flag	CONT_PITCH_QUANT (Pitch channel)	D	—	12.5
HIROLL	High roll command level	JSL	I	—	12.5
SINALF	Sine of ALPHA	AXFDCOMP, RCOMP (Yaw channel)	F	—	1.04
TAN_PHILM	Tangent of PHI limited	QCOMP (Pitch channel)	F	—	6.25
UXCMD	Quantized roll error signal	JSL, RCS ACT LT	F	—	12.5

Table 4.3.1.2-3. Roll Channel I-Loads/Constants

Name	Description	Type	MSID	Units
GRYFWDLO	Low roll/yaw forward loop gain factor	F	V97U1162C	—
DATRIM_LIM	Limit on aileron trim command	K	V97U0616C/ +3.0 E+00	deg
DRR_LIM	Limit for aileron trim command from yaw channel	F	V98U9653C	deg/s
GTRIMB	Gain to convert yaw command to aileron trim command	F	V96U8085C	ND

Table 4.3.1.2-4. Roll Channel Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
DAC	—	FIRST PASS	0.0	Aileron command
DAT	—	A	0.0	Aileron trim command
DATRIM	—	B	0.0	Aileron trim command
DPPHI	TURN_COORD	TURN_COORD	0.0	Steady-state roll turn coordination component
DRRCL	C	\bar{C}	0.0	Aileron trim command from yaw channel
PEP	LOWMIDQ	LOWMIDQ	0.0	Roll rate error
PEX	$\overline{\text{LOWQ}}$	LOWQ	0.0	Preliminary aileron command prior to deadband
UXCMD (ENTRY)	D	\bar{D}	0.0	Quant roll error
UXCMD (GRTLS)	—	other	0.0	
A = (AUTO_BANK • FLATTURN) + PTI_ACT B = AUTO_BANK • ROLLOUT C = MRB_AILE • LOWQ D = ENTRY • (LOWMIDQ + LOWQ)				

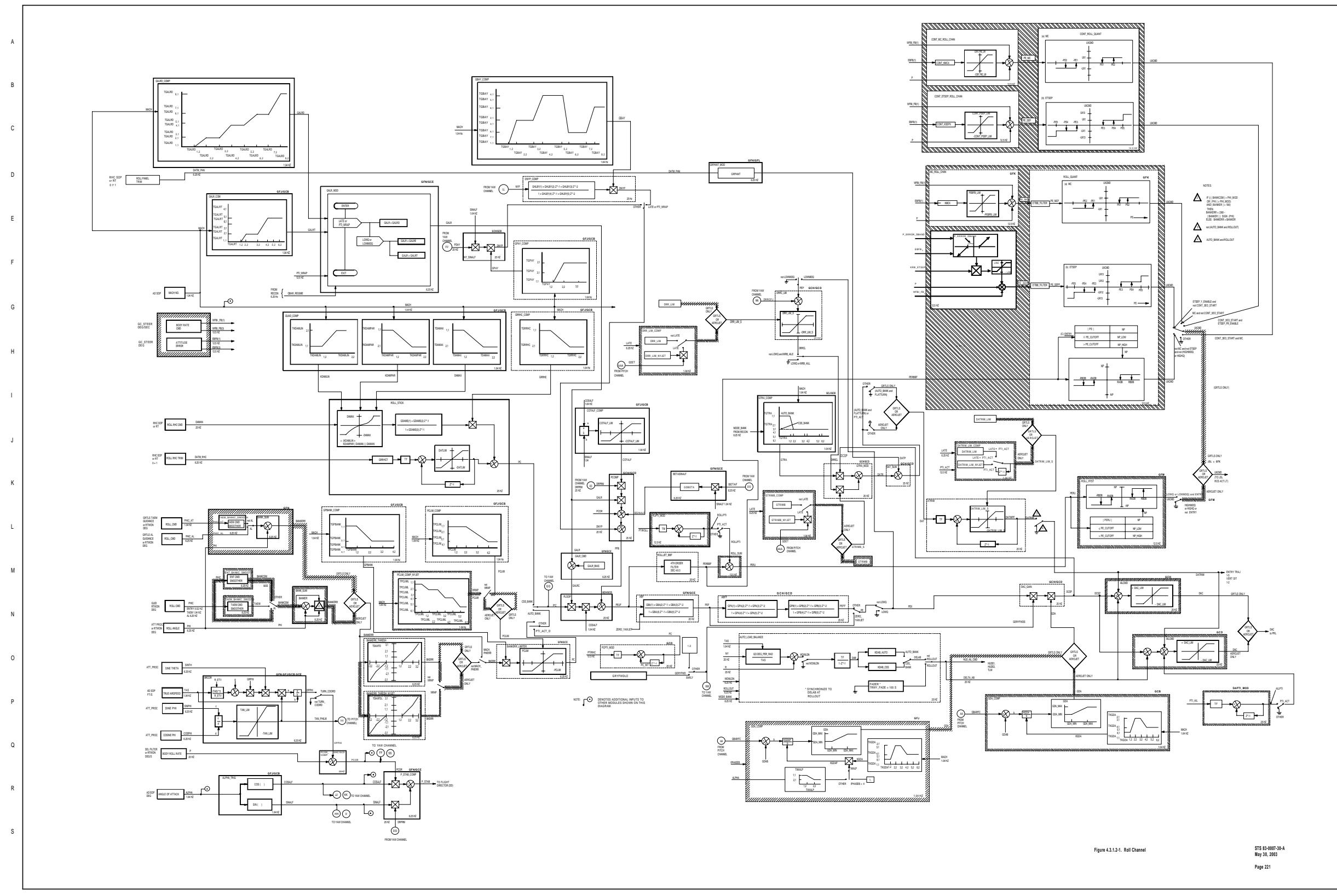


FIGURE 4.3.1.2-1. Roll Channel

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4.3.1.2.1 ABF.

- A. Function – This function module applies a second-order bending filter with Mach dependent coefficients to the roll rate error. The detailed block diagram is presented in Figure 4.3.1.2.1–1.
- B. Processing Requirements – ABF is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for ABF are shown in Table 4.3.1.2.1–1.
- D. I-Loads – The I-loads for ABF are shown in Table 4.3.1.2.1–2.
- E. Initialization Requirements – The initialization requirements for ABF are shown in Table 4.3.1.2.1–3.
- F. Software Configuration – Common.

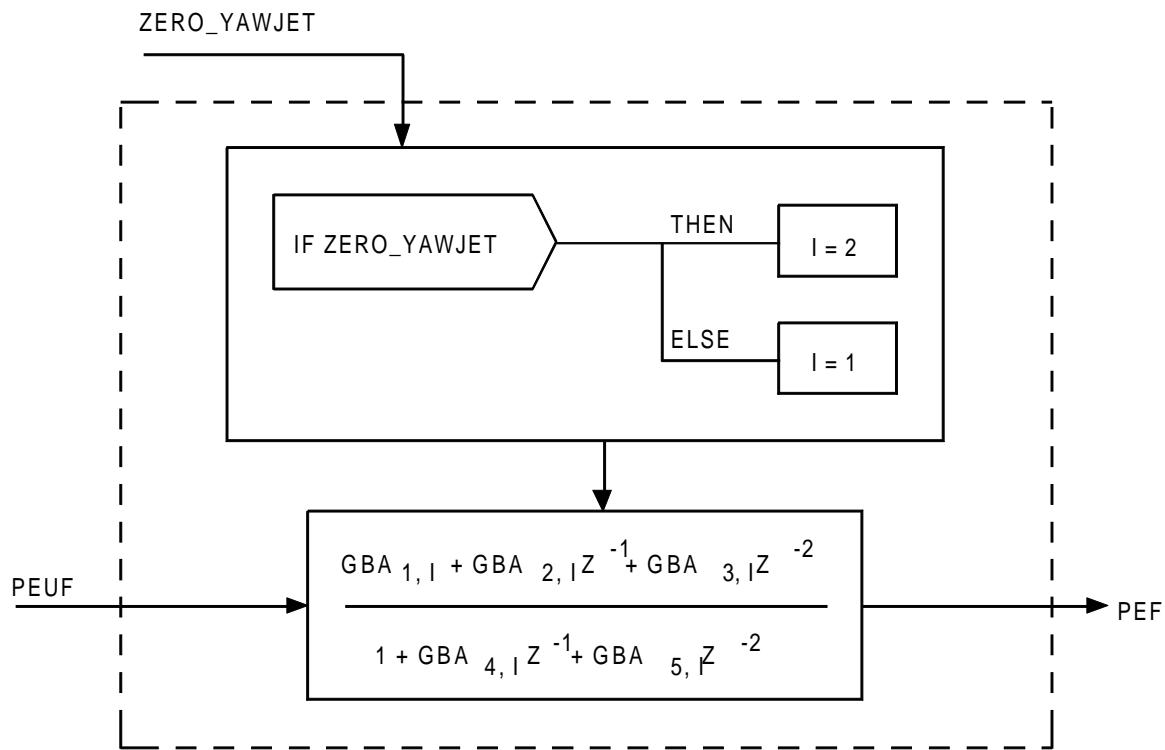


FIGURE 4.3.1.2.1-1. ABF

Table 4.3.1.2.1-1. ABF Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
PEUF	Unfiltered roll rate error	PLOOP	F	deg/s	25
ZERO_YAWJET	Yaw jet termination discrete	RECON	D	—	6.25
<u>Outputs</u>					
PEF	Filtered roll rate error	ABFF, DRRC_LIM, DAC_GAIN	F	deg/s	25

Table 4.3.1.2.1-2. ABF I-Loads

Name	Description	Type	MSID	Units
GBA(1,1)	Filter coefficient	F	V96U9604C	—
GBA(2,1)	Filter coefficient	F	V96U9605C	—
GBA(3,1)	Filter coefficient	F	V96U9606C	—
GBA(4,1)	Filter coefficient	F	V96U9607C	—
GBA(5,1)	Filter coefficient	F	V96U9608C	—
GBA(1,2)	Filter coefficient	F	V96U9619C	—
GBA(2,2)	Filter coefficient	F	V96U9620C	—
GBA(3,2)	Filter coefficient	F	V96U9621C	—
GBA(4,2)	Filter coefficient	F	V96U9622C	—
GBA(5,2)	Filter coefficient	F	V96U9623C	—

Table 4.3.1.2.1-3. ABF Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Second-order filter	—	First pass	Node	*
	ZERO_YAWJET	ZERO_YAWJET		
	ZERO_YAWJET	ZERO_YAWJET		

*See Subsection 4.9.2

4.3.1.2.2 ABFF.

- A. Function – This function module applies a fourth-order bending filter to the filtered roll rate error. The detailed block diagram is presented in Figure 4.3.1.2.2–1.
- B. Processing Requirements – ABFF is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for ABFF are shown in Table 4.3.1.2.2–1.
- D. I-Loads – The I-loads for ABFF are shown in Table 4.3.1.2.2–2.
- E. Initialization Requirements – The initialization requirements for ABFF are shown in Table 4.3.1.2.2–3.
- F. Software Configuration – Common.

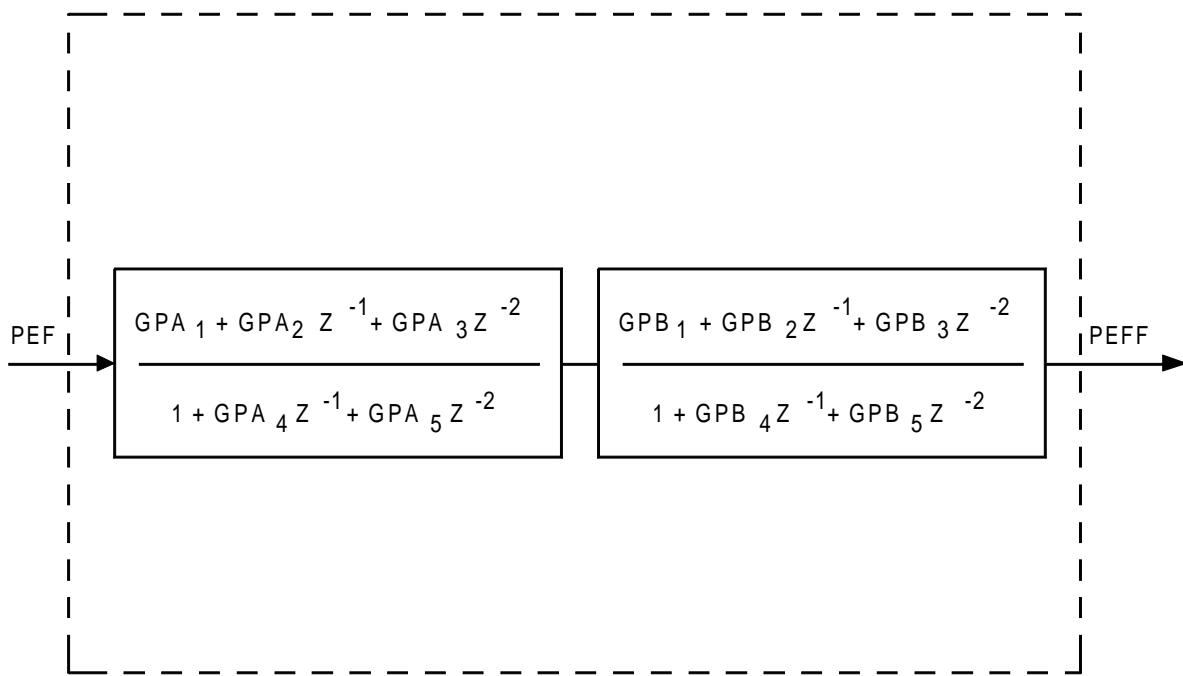


FIGURE 4.3.1.2.2-1. ABFF

Table 4.3.1.2.2-1. ABFF Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> PEF	Filtered roll rate error	ABF		deg/s	25
<u>Outputs</u> PEFF	Twice filtered roll rate error	DAC_GAIN, DRRC_LIM	F	deg/s	25

Table 4.3.1.2.2-2. ABFF I-Loads

Name	Description	Type	MSID	Units
GPA(1)	Filter coefficient	F	V97U0727C	—
GPA(2)	Filter coefficient	F	V97U0728C	—
GPA(3)	Filter coefficient	F	V97U0729C	—
GPA(4)	Filter coefficient	F	V97U0730C	—
GPA(5)	Filter coefficient	F	V97U0731C	—
GPB(1)	Filter coefficient	F	V97U0732C	—
GPB(2)	Filter coefficient	F	V97U0733C	—
GPB(3)	Filter coefficient	F	V97U0734C	—
GPB(4)	Filter coefficient	F	V97U0735C	—
GPB(5)	Filter coefficient	F	V97U0736C	—

Table 4.3.1.2.2-3. ABFF Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Fourth-order filter	—	First pass	Node	*
	ZERO_YAWJET	ZERO_YAWJET	Node	*

*See Subsection 4.9.3

4.3.1.2.3 AILCMD (Aerojet DAP).

- A. Function – This function module sums the aileron trim command, aileron incremental command, filtered preliminary aileron command, and the PTI aileron pulse. The detailed block diagram is presented in Figure 4.3.1.2.3–1.
- B. Processing Requirements – AILCMD is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for AILCMD are shown in Table 4.3.1.2.3–1.
- D. I-Loads – The I-loads for AILCMD are shown in Table 4.3.1.2.3–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Aerojet DAP unique.

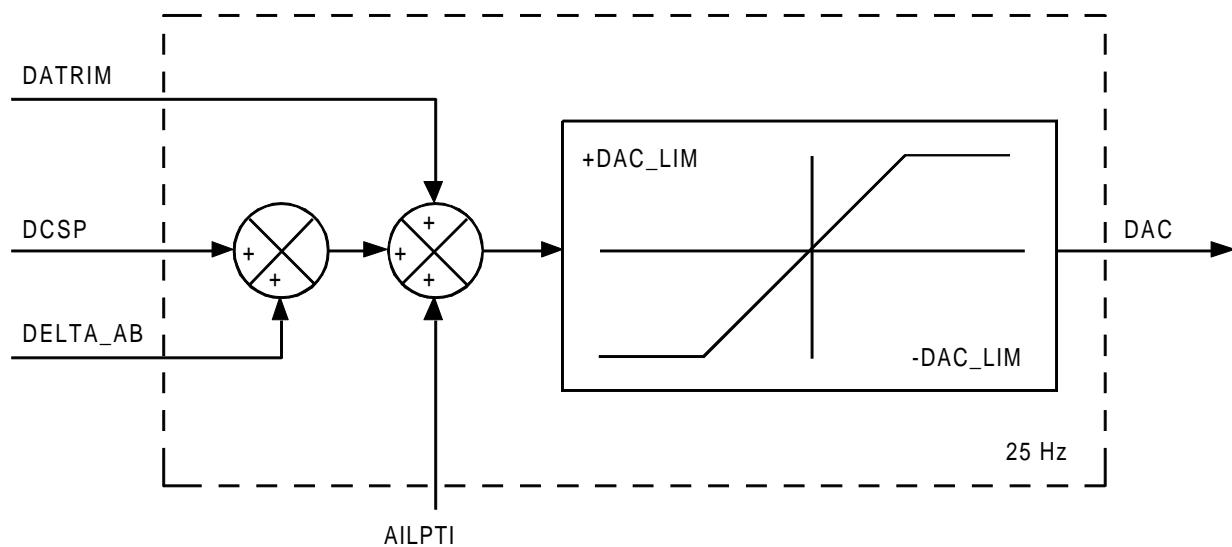


FIGURE 4.3.1.2.3-1. AILCMD (Aerojet DAP)

Table 4.3.1.2.3-1. AILCMD (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DCSP	Filtered preliminary aileron command	DAC_GAIN	F	deg	25
DELTA_AB	Aileron incremental command	AUTO_LOAD_BALANCE	F	deg	25
DATRIM	Aileron trim command	ATRIM	F	deg	25
AILPTI	Aileron PTI pulse	DAPTI_MOD	F	deg	25
<u>Outputs</u>					
DAC	Aileron deflection command	PRIOR_RATE_LIMITING, TLM	F	deg	25

Table 4.3.1.2.3-2. AILCMD (Aerojet DAP) I-Loads

Name	Description	Type	MSID	Units
DAC_LIM	Aileron deflection limit	F	V97U0612C	deg

4.3.1.2.4 AILCMD (GRTLS DAP).

- A. Function – This function module adds the aileron trim angle command to the preliminary aileron command and , if necessary, limits the sum. The detailed block diagram is presented in Figure 4.3.1.2.4–1.
- B. Processing Requirements – AILCMD is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for AILCMD are shown in Table 4.3.1.2.4–1.
- D. I-Loads – The I-loads for AILCMD are shown in Table 4.3.1.2.4–2.
- E. Initialization Requirements – None.
- F. Software Configuration – GRTLS DAP unique.

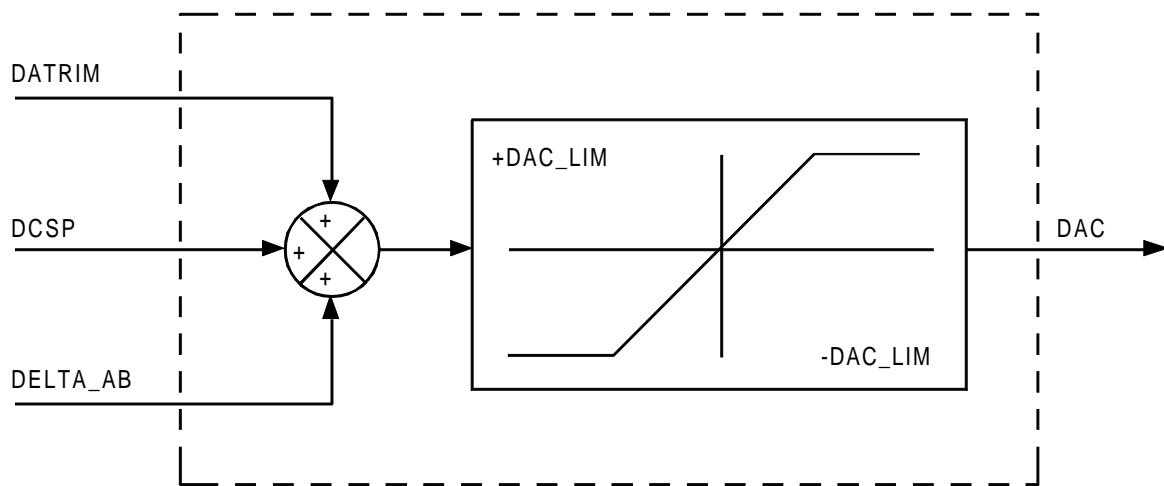


FIGURE 4.3.1.2.4-1. AILCMD (GRTLS DAP)

Table 4.3.1.2.4-1. AILCMD (GRTLS DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DCSP	Filtered preliminary aileron command	DAC_GAIN	F	deg	25
DELTA_AB	Aileron incremental command	AUTO_LOAD_BALANCE	F	deg	25
DATRIM	Aileron trim command	ATTRIM	F	deg	25
<u>Output</u>					
DAC	Aileron deflection command	PRIOR_RATE_LIMITING	F	deg	25

Table 4.3.1.2.4-2. AILCMD (GRTLS DAP) I-Loads

Name	Description	Type	MSID	Units
DAC_LIM	Aileron deflection limit	F	V97U0612C	deg

4.3.1.2.5 DELETED

4.3.1.2.6 ALPHA_TRIG.

- A. Function – This function module computes trigonometric functions of the angle of attack. The detailed block diagram is presented in Figure 4.3.1.2.6-1.
- B. Processing Requirements – ALPHA_TRIG is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for ALPHA_TRIG are shown in Table 4.3.1.2.6-1.
- D. Constants – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

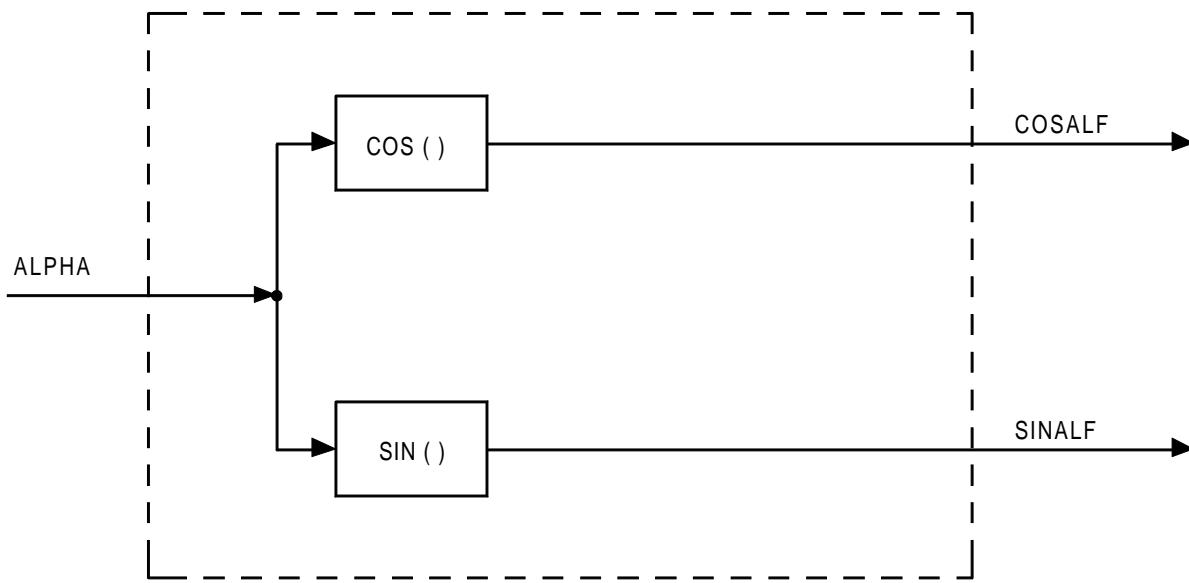


FIGURE 4.3.1.2.6-1. ALPHA_TRIG

Table 4.3.1.2.6-1. ALPHA_TRIG Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
ALPHA	Angle of attack	ADTA SOP	F	deg	1.04
<u>Outputs</u>					
SINALF	Sine of ALPHA	P_STAB_COMP, RCOMP (Yaw channel), AXFDCOMP Yaw channel), COTALF_COMP, BETASINALF, NY_SINALF	F	—	1.04
COSALF	Cosine of ALPHA	P_STAB_COMP, RCOMP (Yaw channel), COTALP_COMP, BETACOSALF (Yaw channel), NY_COSALF (Yaw channel), PLOOP	F	—	1.04

4.3.1.2.7 ATRIM.

- A. Function – This function module integrates the aileron trim rate to produce a limited aileron trim angle command angle. The detailed block diagram is presented in Figure 4.3.1.2.7-1.
- B. Processing Requirements – ATRIM is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for ATRIM are shown in Table 4.3.1.2.7-1.
- D. Constants – The constants for ATRIM are shown in Table 4.3.1.2.7-2.
- E. Initialization Requirements – The initialization requirements for ATRIM are shown in Table 4.3.1.2.7-3.
- F. Software Configuration – Common.

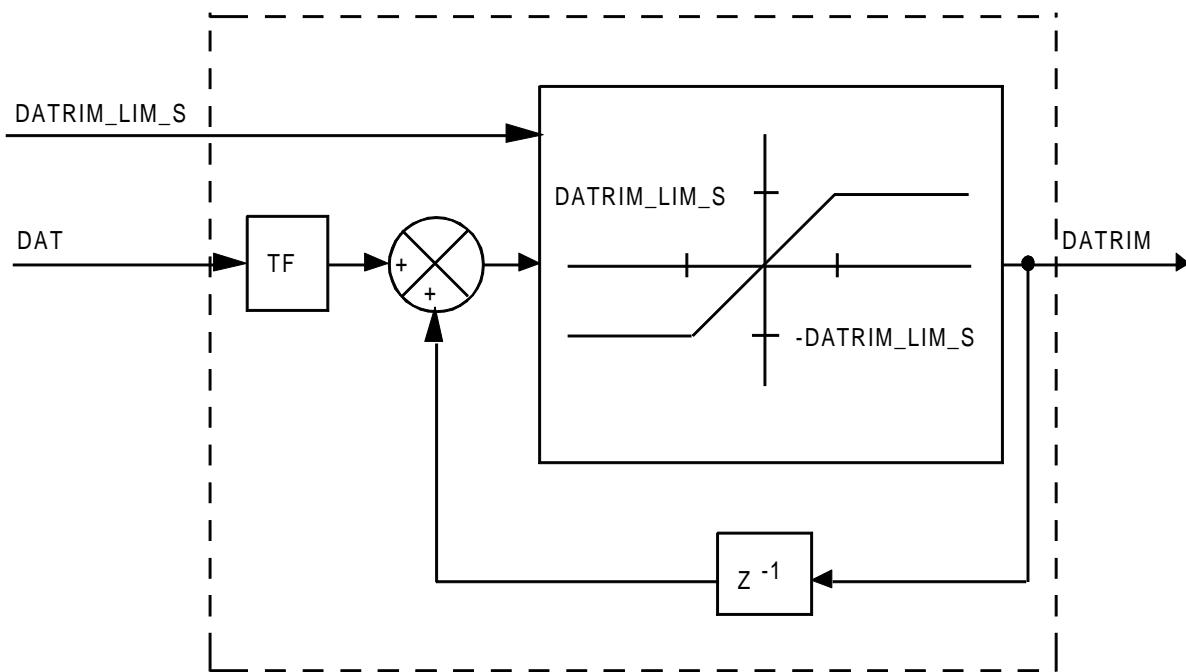


FIGURE 4.3.1.2.7-1. ATRIM

Table 4.3.1.2.7-1. ATRIM Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Input</u> DAT	Aileron trim rate	DAT_SUM	F	deg/s	25
DATRIM_LIM_S	Selected aileron trim limit	DATRIM_LIM_COMP, Roll Channel	F	deg	1.04
<u>Output</u> DATRIM	Aileron trim command	ENTRY TRAJ n (1-5)*, VERT SIT n DISP (1 and 2), AILCMD, TLM	F	deg	25

*Aerojet only

Table 4.3.1.2.7-2. ATRIM Constants				
Name	Description	Type	MSID/Value	Units
TF	DAP fast cycle time	F	0.040	s

Table 4.3.1.2.7-3. ATRIM Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Integrator	—	First pass	Output	0
Integrator	A	\bar{A}	Output	0

A = AUTO_BANK • ROLLOUT

4.3.1.2.8 AUTO_LOAD_BALANCE.

A. Function – This function balances gear loads in a cross-wind landing. The detailed block diagram is presented in Figure 4.3.1.2.8-1.

B. Processing Requirements – AUTO_LOAD_BALANCE is processed at 25 Hz.

C. Interface Requirements – The interface requirements for AUTO_LOAD_BALANCE are shown in Table 4.3.1.2.8-1.

D. I-Loads/Constants – The I-loads/constants for AUTO_LOAD_BALANCE are shown in Table 4.3.1.2.8-2.

E. Initialization Requirements – The initialization requirements for AUTO_LOAD_BALANCE are shown in Table 4.3.1.2.8-3.

F. Software Configuration – Common.

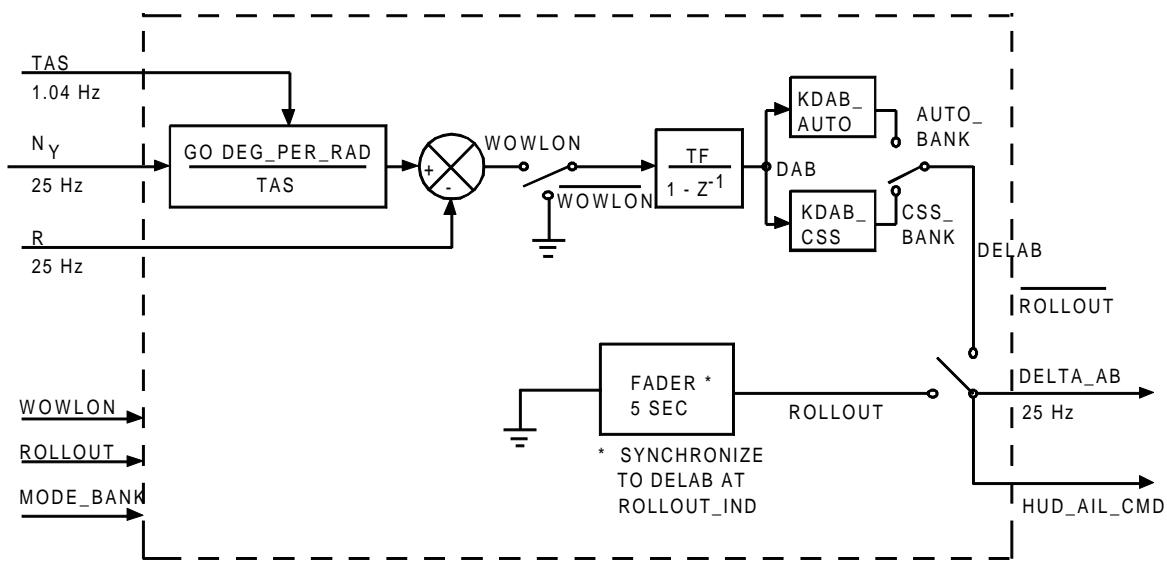


FIGURE 4.3.1.2.8-1. AUTO_LOAD_BALANCE

Table 4.3.1.2.8-1. AUTO_LOAD_BALANCE Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
WOWLON	Buffered WOWLON_IND discrete	RECON	D	—	6.25
ROLLOUT	Buffered ROLLOUT_IND discrete	RECON	D	—	6.25
MODE_BANK	BANK (roll/yaw) channel configuration	RECON	D	—	6.25
TAS	True air speed	ADTA SOP	F	ft/s	1.04
NY	Lateral acceleration	SF	F	g	25
R	Body yaw rate	SF	F	deg/s	25
<u>Outputs</u>					
DELTA_AB	Aileron incremental command	AILCMD	F	deg	25
HUD_AIL_CMD	Aileron load balance increment	HUDE1, HUDE2, TLM	F	deg	25

Table 4.3.1.2.8-2. AUTO_LOAD_BALANCE I-Loads/Constants				
Name	Description	Type	MSID/Value	Units
GO	Earth gravitational acceleration constant (application)	F	32.174	ft/s ²
DEG_PER_RAD	Radian to degree conversion (application)	F	57.2958	deg/rad
KDAB_AUTO	Sideslip scaling constant, Auto mode	F	V96U9371C	ND
TRWY_FADE	Time to fade aileron command to runway centerline	F	V96U9381C	s
TF	DAP fast cycle time	F	0.040	s
KDAB_CSS	Sideslip scaling constant, CSS mode	F	V96U9370C	ND

Table 4.3.1.2.8-3. AUTO_LOAD_BALANCE Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Integrator	WOWLON	WOWLON	DAB	0

4.3.1.2.9 BANKERR_LIMITER.

- A. Function – This function module converts the roll angle error into a roll rate command and limits this command. The detailed block diagram is presented in Figure 4.3.1.2.9-1.
- B. Processing Requirements – BANKERR_LIMITER is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for BANKERR_LIMITER are shown in Table 4.3.1.2.9-1.
- D. Constants – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

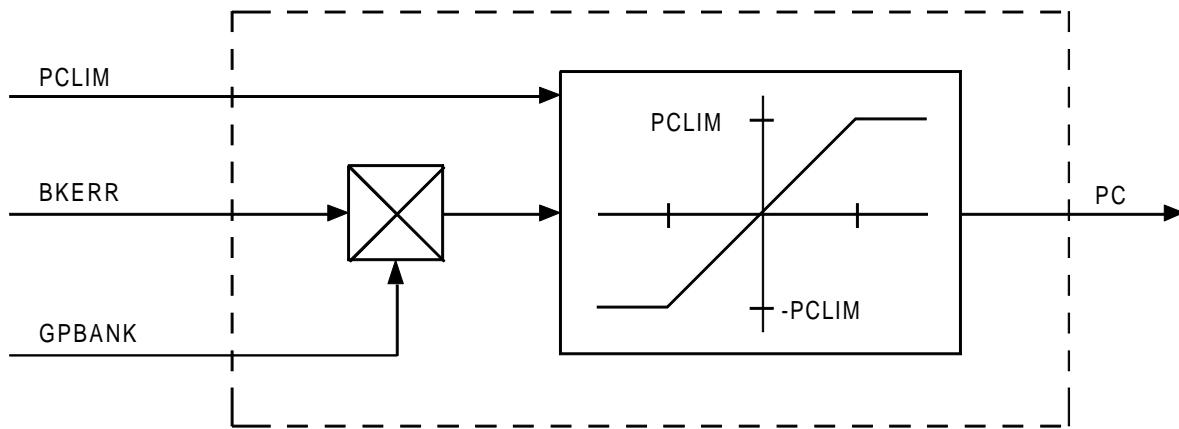


FIGURE 4.3.1.2.9-1. BANKERR_LIMITER

Table 4.3.1.2.9-1. BANKERR_LIMITER Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
BKERR	Roll angle error	BANKERR_THRESH, BANKERR_THRESH_NYJET, BANK_SUM	F	deg	6.25
GPBANK	Gain to convert roll angle error into a roll rate command	GPBANK_COMP	F	(deg/s/deg)	1.04
PCLIM	Limit applied to roll rate command	PCLIM_COMP, PCLIM_COMP_NYJET	F	deg/s	1.04
<u>Outputs</u>					
PC	Roll rate command	PLOOP, AXFDCOM (Yaw channel)	F	deg/s	6.25

4.3.1.2.10 BANK_SUM (Aerojet DAP).

- A. Function – This function module sums the smoothed guidance Euler roll angle command and the roll angle feedback. The detailed block diagram is presented in Figure 4.3.1.2.10-1.
- B. Processing Requirements – BANK_SUM is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for BANK_SUM are shown in Table 4.3.1.2.10-1.
- D. Constants – The constants for BANK_SUM are shown in Table 4.3.1.2.10-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Aerojet DAP unique.

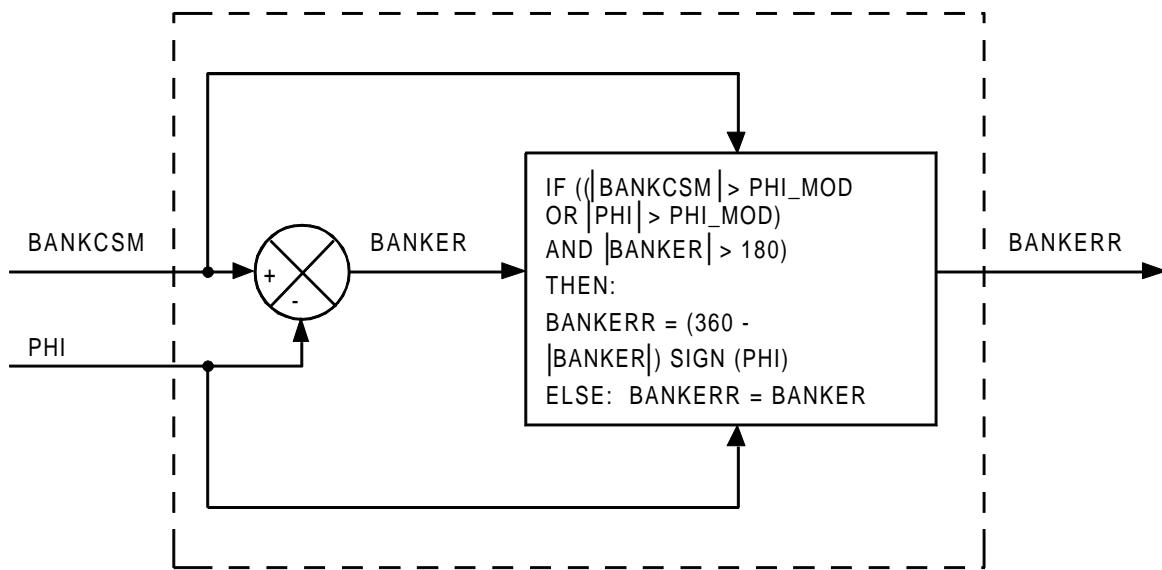


FIGURE 4.3.1.2.10-1. BANK_SUM (Aerojet DAP)

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Table 4.3.1.2.10-1. BANK_SUM (Aerojet DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
BANKCSM	Smoothed Euler roll angle command	ENT_BANKC_SMOOTH TAEM_BANKC_SMOOTH A/L GUID	F	deg	6.25
PHI	Euler roll angle	A/E ATT PROC	F	deg	6.25
<u>Outputs</u>					
BANKERR	Roll angle error	BANKERR_LIMITER BANKERR_THRESH BANKERR_THRESH_NYJET	F	deg	6.25

Table 4.3.1.2.10-2. BANK_SUM (Aerojet DAP) Constants				
Name	Description	Type	MSID/ Value	Units
PHI_MOD	Maximum roll command to roll through zero	K	V97U0494C/ +1.6 E+02	deg

4.3.1.2.11 BANK_SUM (GRTLS DAP).

- A. Function – This function module sums the smoothed guidance Euler roll angle command and the roll angle feedback. The detailed block diagram is presented in Figure 4.3.1.2.11-1.
- B. Processing Requirements – BANK_SUM is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for BANK_SUM are shown in Table 4.3.1.2.11-1.
- D. I-Loads/Constants – None
- E. Initialization Requirements – None.
- F. Software Configuration – GRTLS DAP unique.

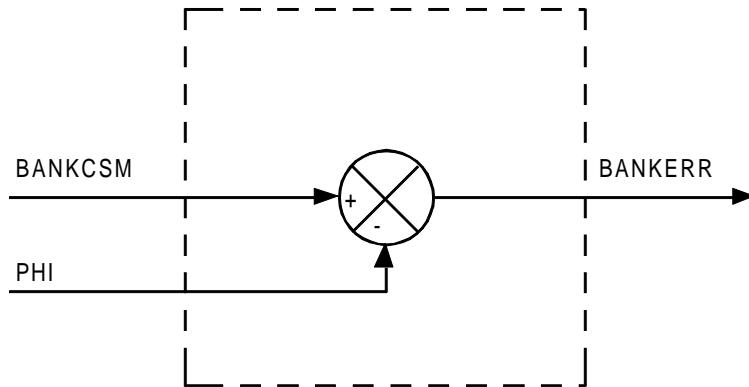


FIGURE 4.3.1.2.11-1. BANK_SUM (GRTLS DAP)

Table 4.3.1.2.11-1. BANK_SUM (GRTLS DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> BANKCSM	Smoothed Euler roll angle command	TAEM_BANKC_SMOOTH GRTLS A/L GUID	F	deg	6.25
PHI	Euler roll angle	A/E ATT PROC	F	deg	6.25
<u>Outputs</u> BANKERR	Roll angle error	BANKERR_LIMITER BANKERR_THRESH	F	deg	6.25

4.3.1.2.12 BANKERR_THRESH.

- A. Function – This function module applies a threshold to the roll angle error and effectively converts to a roll rate error. The detailed block diagram is presented in Figure 4.3.1.2.12-1.
- B. Processing Requirements – BANKERR_THRESH is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for BANKERR_THRESH are shown in Table 4.3.1.2.12-1.
- D. Constants – The constants for BANKERR_THRESH are shown in Table 4.3.1.2.12-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common (I-loads/constants Entry/GRTLS dependent).

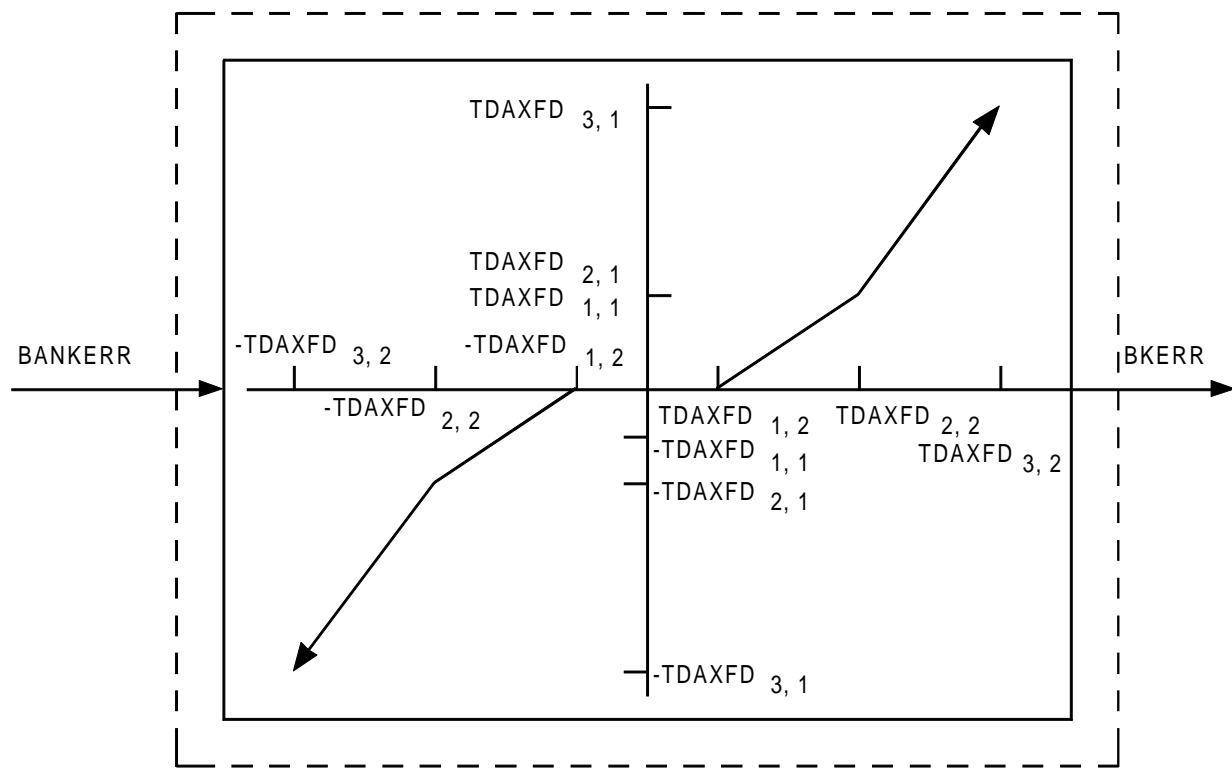


FIGURE 4.3.1.2.12-1. BANKERR_THRESH

Table 4.3.1.2.12-1. BANKERR_THRESH Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> BANKERR	Roll angle error	BANK_SUM	F	deg	6.25
<u>Output</u> BKERR	Scaled roll angle error	BANKERR_LIMITER	F	deg	6.25

Table 4.3.1.2.12-2. BANKERR_THRESH Constants

Name	Description	Type	MSID/Value	Units
TDAXFD _{1,1}	Tabulated BKERR (Aerojet)	K	V97U0852C/ +0.0 E+00	deg
TDAXFD _{1,2}	Tabulated BANKERR (Aerojet)	K	V97U1106C/ +5.0 E-01	deg
TDAXFD _{2,1}	Tabulated BKERR (Aerojet)	K	V97U1107C/ +2.0 E+00	deg
TDAXFD _{2,2}	Tabulated BANKERR (Aerojet)	K	V97U1108C/ +5.0 E+00	deg
TDAXFD _{3,1}	Tabulated BKERR (Aerojet)	K	V97U1117C/ +7.0 E+00	deg
TDAXFD _{3,2}	Tabulated BANKERR (Aerojet)	K	V97U1118C/ +1.0 E+01	deg
TDAXFD _{1,1}	Tabulated BKERR (GRTLS)	F	0.0	deg
TDAXFD _{1,2}	Tabulated BANKERR (GRTLS)	F	0.5	deg
TDAXFD _{2,1}	Tabulated BKERR (GRTLS)	F	2.0	deg
TDAXFD _{2,2}	Tabulated BANKERR (GRTLS)	F	5.0	deg
TDAXFD _{3,1}	Tabulated BKERR (GRTLS)	F	7.0	deg
TDAXFD _{3,2}	Tabulated BANKERR (GRTLS)	F	10.0	deg

4.3.1.2.12a BANKERR_THRESH_NYJET (Aerojet DAP).

A. Function – This function module applies a threshold to the roll angle error and effectively converts to a roll rate error in the No Yaw Jet configuration. The detailed block diagram is presented in Figure 4.3.1.2.12a-1.

B. Processing Requirements – BANKERR_THRESH_NYJET is processed at 6.25 Hz.

C. Interface Requirements – The interface requirements for BANKERR_THRESH_NYJET are shown in Table 4.3.1.2.12a-1.

D. I-Loads – The I-loads for BANKERR_THRESH_NYJET are shown in Table 4.3.1.2.12a-2.

E. Initialization Requirements – None.

F. Software Configuration – Aerojet DAP unique.

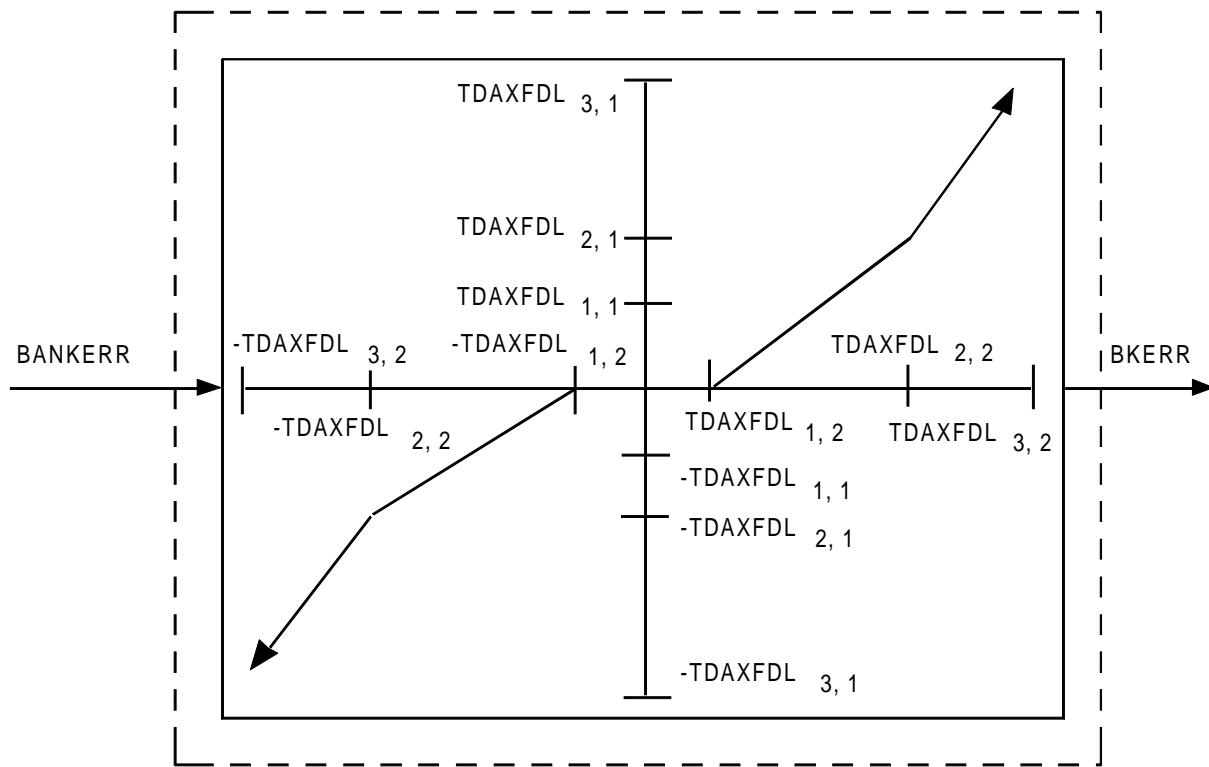


FIGURE 4.3.1.2.12a-1. BANKERR_THRESH_NYJET (Aerojet DAP)

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Table 4.3.1.2.12a-1. BANKERR_THRESH_NYJET (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> BANKERR	Roll angle error	BANK_SUM	F	deg	6.25
<u>Outputs</u> BKERR	Scaled roll angle error	BANKERR_LIMITER	F	deg	6.25

Table 4.3.1.2.12a-2. BANKERR_THRESH_NYJET (Aerojet DAP) I-Loads

Name	Description	Type	MSID	Units
TDAXFDL _{1,1}	Tabulated BKERRL for NYJET	F	V97U7432C	deg
TDAXFDL _{1,2}	Tabulated BANKERR for NYJET	F	V97U7433C	deg
TDAXFDL _{2,1}	Tabulated BKERRL for NYJET	F	V97U7434C	deg
TDAXFDL _{2,2}	Tabulated BANKERR for NYJET	F	V97U7435C	deg
TDAXFDL _{3,1}	Tabulated BKERRL for NYJET	F	V97U7436C	deg
TDAXFDL _{3,2}	Tabulated BANKERR for NYJET	F	V97U7437C	deg

4.3.1.2.13 BETASINALF.

- A. Function – This function module computes the product of the BETAF and the sine of ALPHA. The detailed block diagram is presented in Figure 4.3.1.2.13–1.
- B. Processing Requirements – BETASINALF is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for BETASINALF are shown in Table 4.3.1.2.13–1.
- D. I-Loads – The I-loads for BETASINALF are shown in Table 4.3.1.2.13–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

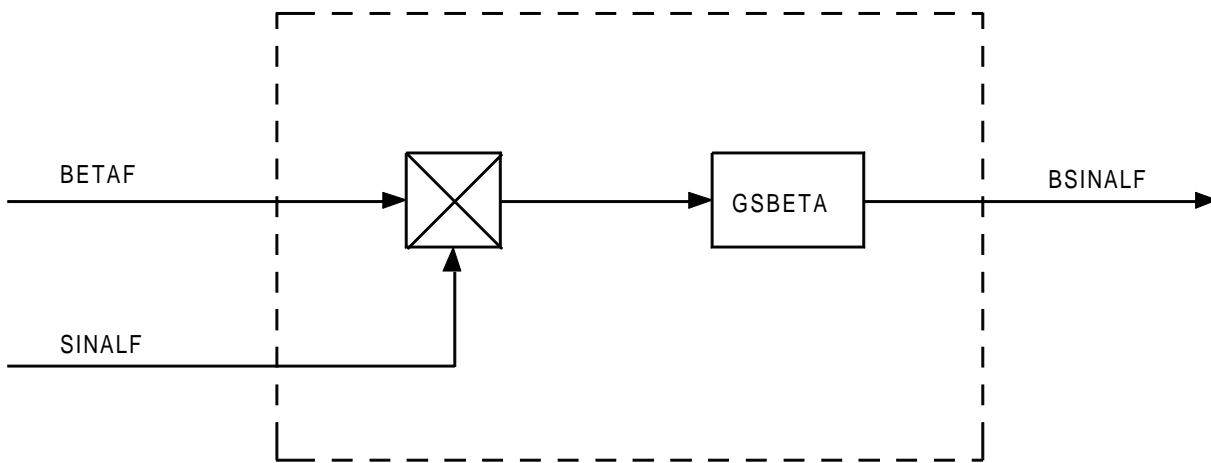


FIGURE 4.3.1.2.13-1. BETASINALF

Table 4.3.1.2.13-1. BETASINALF Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
BETAF	BETA	Yaw channel	F	deg	6.25
SINALF	Sine of ALPHA	ALPHA_TRIG	F	—	1.04
<u>Outputs</u>					
BSINALF	Component of BETA parallel to velocity	PCOMP	F	deg/s	6.25

Table 4.3.1.2.13-2. BETASINALF I-Loads				
Name	Description	Type	MSID	Units
GSBETA	Scale factor on BSINALF	F	V97U1119C	$\frac{\text{deg} / \text{s}}{\text{deg}}$

4.3.1.2.14 BRCOR.

- A. Function – This function module computes the steady-state turn correction term to the roll rate feedback. The detailed block diagram is presented in Figure 4.3.1.2.14-1.
- B. Processing Requirements – BRCOR is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for BRCOR are shown in Table 4.3.1.2.14-1.
- D. Constants – The constants for BRCOR are shown in Table 4.3.1.2.14-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

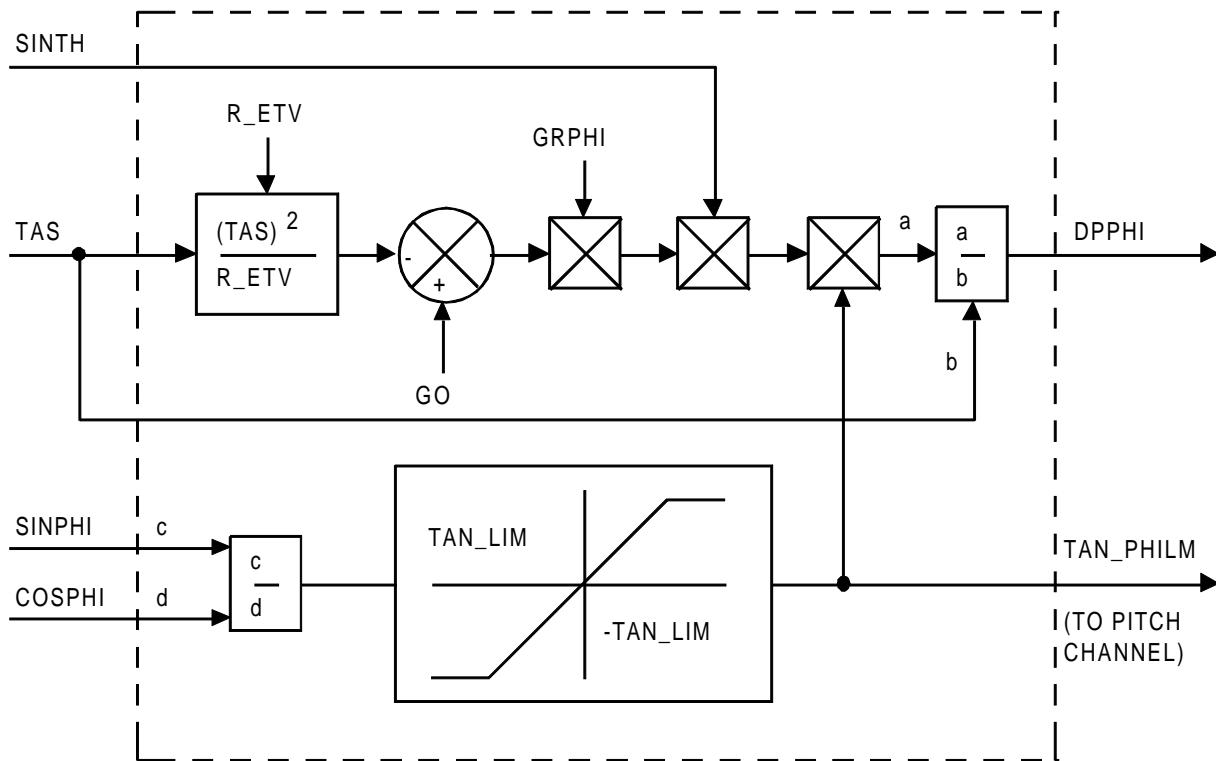


FIGURE 4.3.1.2.14-1. BRCOR

Table 4.3.1.2.14-1. BRCOR Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
SINTH	Sine of theta	A/E ATT PROC	F	—	6.25
TAS	True airspeed	ADTA SOP	F	—	1.04
SINPHI	Sine of phi	A/E ATT PROC	F	—	6.25
COSPHI	Cosine of phi	A/E ATT PROC	F	—	6.25
<u>Outputs</u>					
TAN_PHILM	Tangent of phi limited	QCOMP (Pitch channel)	F	—	6.25
DPPHI	Steady-state roll turn coordination component	PCOR_COMP	F	deg/s	6.25

Table 4.3.1.2.14-2. BRCOR Constants

Name	Description	Type	MSID/Value	Units
GO	Gravity constant	F	32.17405	ft/s**2
GRPHI	Turn coordination scaling factor	K	V97U1089C/ +5.73 E+01	deg
R_ETV	Distance from center of earth to vehicle	K	V98U9683C/ +2.13 E+07	ft
TAN_LIM	Limit on tangent phi	K	V98U9654C/ +1.73 E+00	—

4.3.1.2.15 COTALF_COMP.

- A. Function – This function module computes the cotangent of alpha and limits the result. The detailed block diagram is presented in Figure 4.3.1.2.15–1.
- B. Processing Requirements – COTALF_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for COTALF_COMP are shown in Table 4.3.1.2.15–1.
- D. Constants – The constants for COTALF_COMP are shown in Table 4.3.1.2.15–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

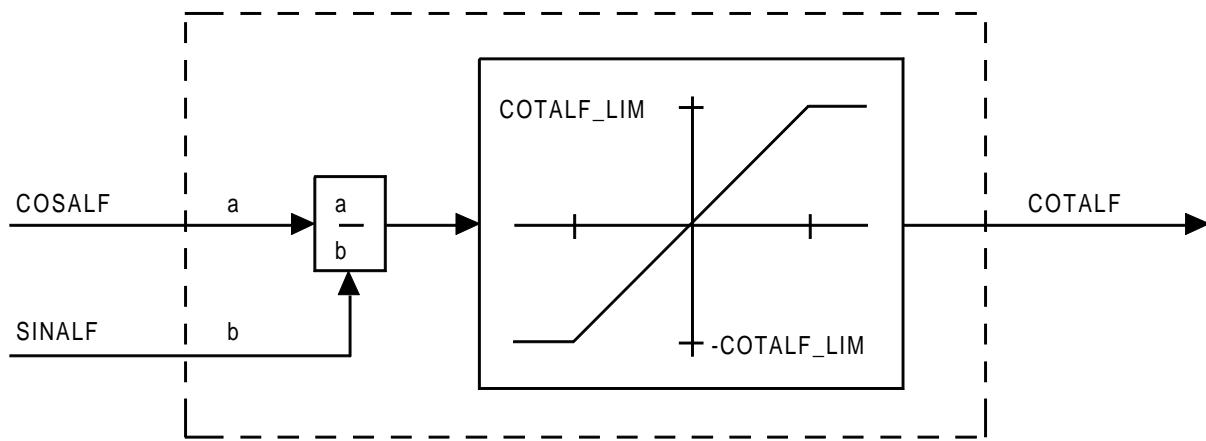


FIGURE 4.3.1.2.15-1. COTALF_COMP

Table 4.3.1.2.15-1. COTALF_COMP Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
SINALF	Sine of ALPHA	ALPHA_TRIG	F	—	1.04
COSALF	Cosine of ALPHA	ALPHA_TRIG	F	—	1.04
<u>Outputs</u>					
COTALF	Cotangent of ALPHA	PCOMP	F	—	1.04

Table 4.3.1.2.15-2. COTALF_COMP Constants

Name	Description	Type	MSID/Value	Units
COTALF_LIM	Limit on the cotangent of ALPHA	K	V97U0607C/ +1.143 E+01	—

4.3.1.2.16 DAC_GAIN.

- A. Function – This function module scales the preliminary aileron command. The detailed block diagram is presented in Figure 4.3.1.2.16-1.
- B. Processing Requirements – DAC_GAIN is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for DAC_GAIN are shown in Table 4.3.1.2.16-1.
- D. Constants – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

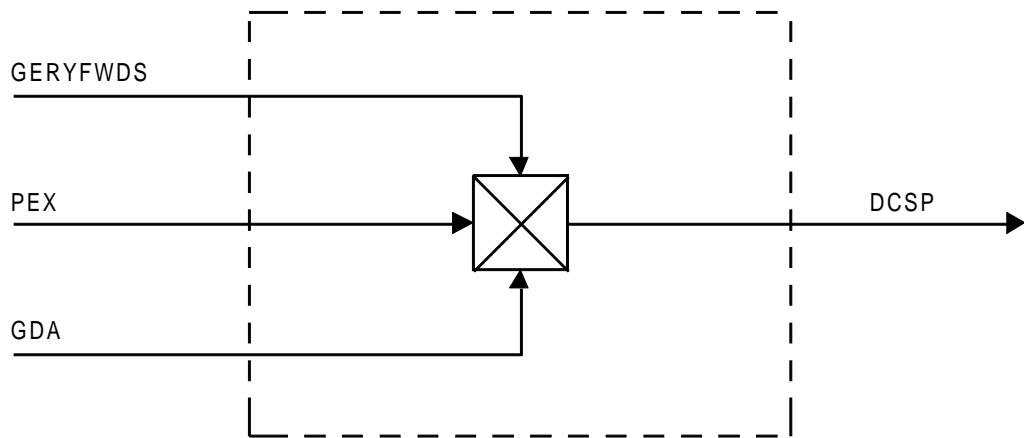


FIGURE 4.3.1.2.16-1. DAC_GAIN

Table 4.3.1.2.16-1. DAC_GAIN Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
PEX	Roll rate error	ABF, ABFF	F	deg	25
GERYFWDS	Roll downmoding gain factor	Roll channel	F	—	6.25
GDA	Scale factor	GDA_COMP		deg/deg	1.04
<u>Output</u>					
DCSP	Preliminary aileron command	AILCMD, TLM, GTRA_MOD	F	deg	25

4.3.1.2.17 DAPTI_MOD (Aerojet DAP).

- A. Function – This function module integrates the AILERON PTI signal to obtain the AILERON pulse. The detailed block diagram is presented in Figure 4.3.1.2.17-1.
- B. Processing Requirements – DAPTI_MOD is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for DAPTI_MOD are shown in Table 4.3.1.2.17-1.
- D. Constants – The constants for DAPTI_MOD are shown in Table 4.3.1.2.17-2.
- E. Initialization Requirements – The initialization requirements for DAPTI_MOD are shown in Table 4.3.1.2.17-3.
- F. Software Configuration – Aerojet DAP unique.

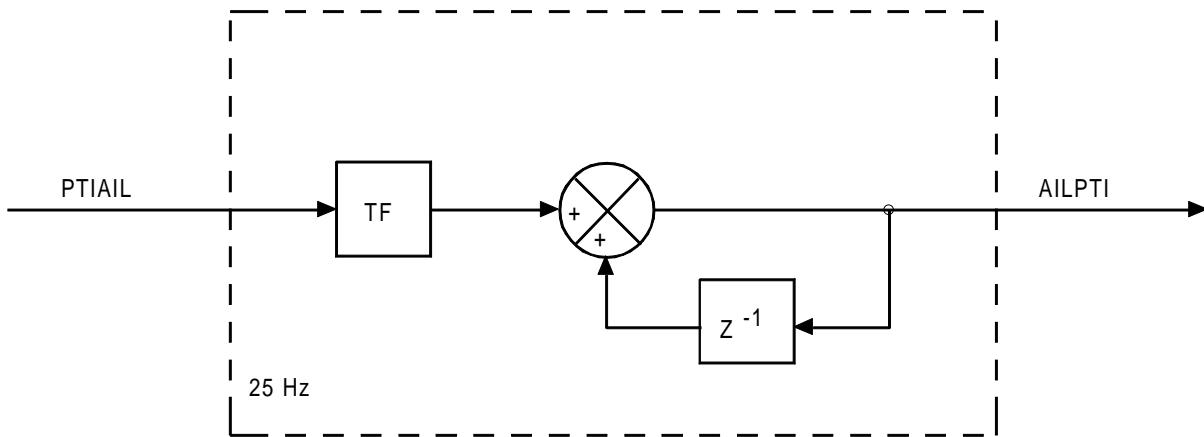


FIGURE 4.3.1.2.17-1. DAPTI_MOD (Aerojet DAP)

Table 4.3.1.2.17-1. DAPTI_MOD (Aerojet DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> PTIAIL	Aileron PTI signal	PTI_DRIVER	F	deg/s	12.5
<u>Outputs</u> AILPTI	Aileron PTI pulse	AILCMD	F	deg	25

Table 4.3.1.2.17-2. DAPTI_MOD (Aerojet DAP) Constants				
Name	Description	Type	Value	Units
TF	DAP fast cycle time	F	0.04	s

Table 4.3.1.2.17-3. DAPTI_MOD (Aerojet DAP) Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Integrator	PTI_ACT	$\overline{\text{PTI}_\text{ACT}}$	AILPTI	0.0

4.3.1.2.18 DAT_SUM.

- A. Function – This function module provides trim rate by summing the automatic trim rate and the derived panel roll trim rate. The detailed block diagram is presented in Figure 4.3.1.2.18-1.
- B. Processing Requirements – DAT_SUM is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for DAT_SUM are shown in Table 4.3.1.2.18-1.
- D. Constants – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

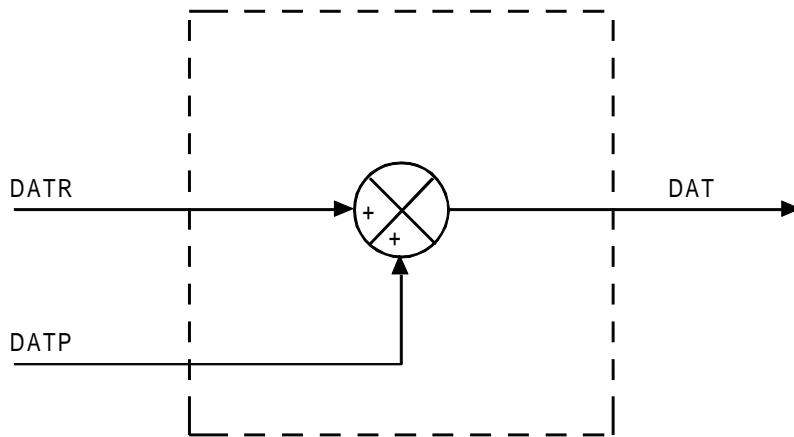


FIGURE 4.3.1.2.18-1. DAT_SUM

Table 4.3.1.2.18-1. DAT_SUM Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DATR	Automatic trim rate	GTRA_MOD	F	deg/s	25
DATP	Panel roll trim rate	GRPANT_MOD	F	deg/s	12.5
<u>Outputs</u>					
DAT	Aileron trim rate command	ATRIM	F	deg/s	25

4.3.1.2.18a DATRIM_LIM_COMP (Aerojet DAP).

- A. Function – This function module selects the aileron trim limit. The detailed block diagram is presented in Figure 4.3.1.2.18a-1.
- B. Processing Requirements – DATRIM_LIM_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for DATRIM_LIM_COMP are shown in Table 4.3.1.2.18a-1.
- D. I-Loads – The I-loads for DATRIM_LIM_COMP are shown in Table 4.3.1.2.18a-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Aerojet DAP unique.

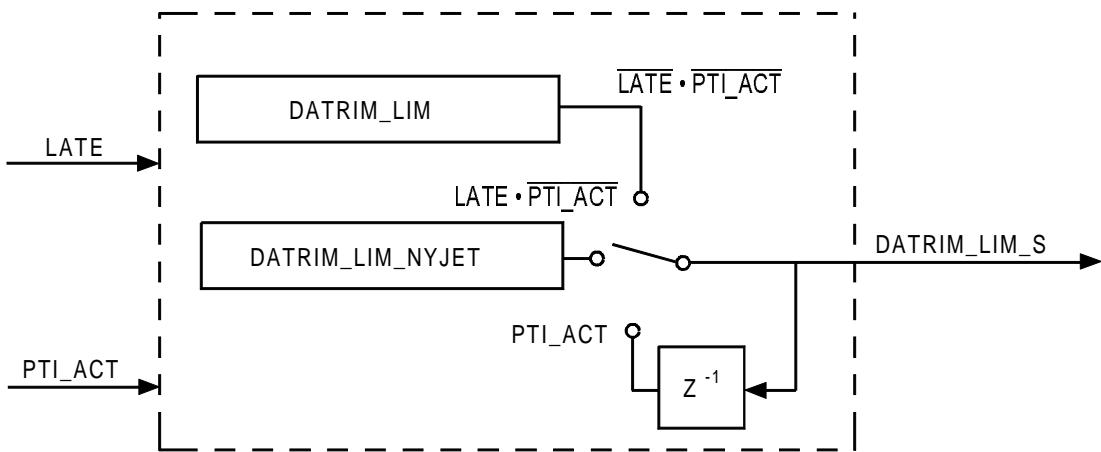


FIGURE 4.3.1.2.18a-1. DATRIM_LIM_COMP (Aerojet DAP)

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Table 4.3.1.2.18a-1. DATRIM_LIM_COMP (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
LATE	No Yaw Jet downmode discrete	RECON	D	–	6.25
PTI_ACT	PTI Active IND	PTI	D	–	12.5
<u>Outputs</u>					
DATRIM_LIM_S	Selected aileron trim limit	ATRIM	F	deg	1.04

Table 4.3.1.2.18a-2. DATRIM_LIM_COMP (Aerojet DAP) I/loads/Constants

Name	Description	Type	MSID/Value	Units
DATRIM_LIM	Limit on aileron trim command	K	V97U0616C/+ 3.0 E+00	deg
DATRIM_LIM_NYJET	Limit on aileron trim command when No Yaw Jet / Wraparound mode	F	V97U7431C	deg

4.3.1.2.19 DNYP_COMP

A. Function – This function module filters the lateral acceleration feedback and applies a scaling gain to form a roll rate component for turn coordination in the no-yaw jet downmode configuration. The detailed block diagram is presented in Figure 4.3.1.2.19–1.

B. Processing Requirements – DNYP_COMP is processed at 25 Hz.

C. Interface Requirements – The interface requirements for DNYP_COMP are shown in Table 4.3.1.2.19–1.

D. I-Loads – The I-loads for DNYP_COMP are shown in Table 4.3.1.2.19–2.

E. Initialization Requirements – The initialization requirements for DNYP_COMP are shown in Table 4.3.1.2.19–3.

F. Software Configuration – Common.

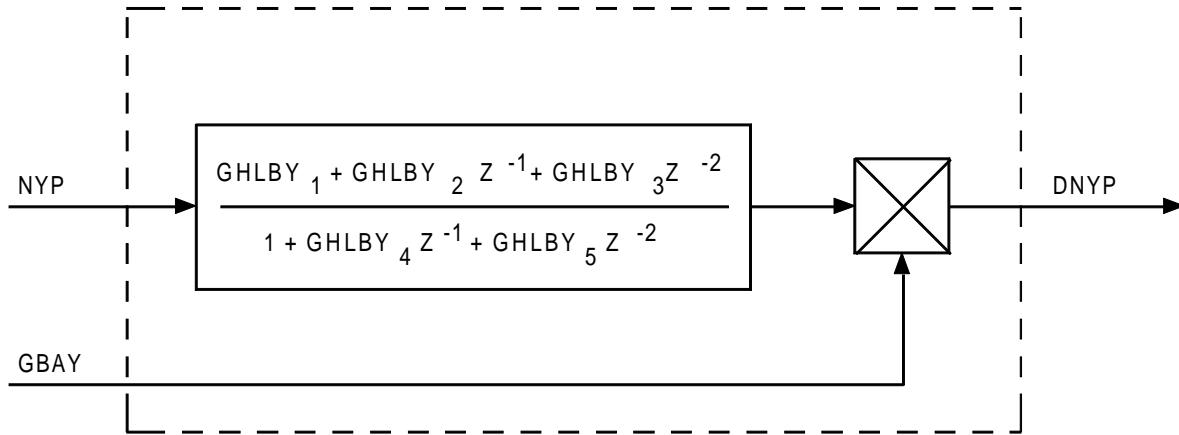


FIGURE 4.3.1.2.19-1. DNYP_COMP

Table 4.3.1.2.19-1. DNYP_COMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> NYP GBAY	Buffered lateral acceleration	Yaw channel GBAY_COMP	F	g (deg/s)/g	25
	Gain to convert filtered lateral acceleration into a roll turn coordination command		F		1.04
<u>Outputs</u> DNYP	Lateral acceleration component of roll rate for no-yaw-jet downmode configuration	PCOMP	F	deg/s	25

Table 4.3.1.2.19-2. DNYP_COMP I-Loads				
Name	Description	Type	MSID	Units
GHLBY(1)	Filter coefficient	F	V99U9753C	—
GHLBY(2)	Filter coefficient	F	V99U9754C	—
GHLBY(3)	Filter coefficient	F	V99U9755C	—
GHLBY(4)	Filter coefficient	F	V99U9756C	—
GHLBY(5)	Filter coefficient	F	V99U9757C	—

Table 4.3.1.2.19-3. DNYP_COMP Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Second-order filter	—	First pass	Node	*
	HIGHQ	HIGHQ	Node	*
	A	A	Node	*

A = LATE + PTI_WRAP
*See Subsection 4.9.2

4.3.1.2.20 DRRC_LIM.

- A. Function – This function module limits the aileron trim command from the yaw channel. The detailed block diagram is presented in Figure 4.3.1.2.20–1.
- B. Processing Requirements – DRRC_LIM is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for DRRC_LIM are shown in Table 4.3.1.2.20–1.
- D. Constants – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

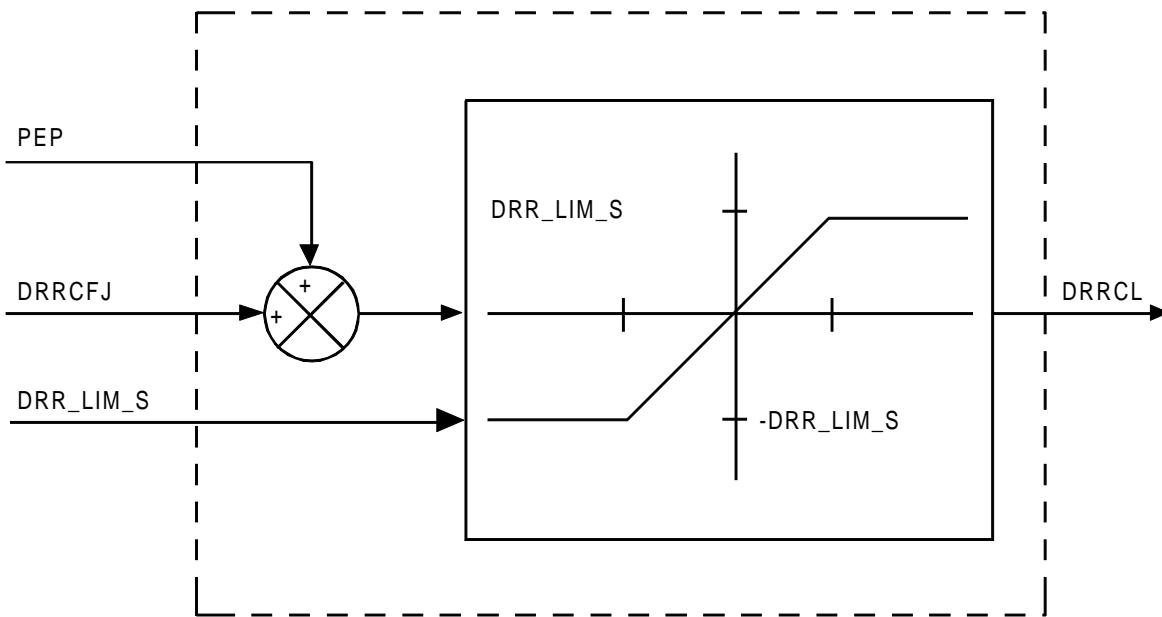


FIGURE 4.3.1.2.20-1. DRRC_LIM

Table 4.3.1.2.20-1. DRRC_LIM Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
PEP	Filtered roll rate error	ABF, ABFF	F	deg/s	25
DRR_CJF	Yaw jet, yaw rate command	YAWJET_BBF (yaw channel)	F	deg/s	25
DRR_LIM_S	Selected limit on aileron trim command from yaw channel	DRR_LIM_COMP, Roll Channel	F	deg/s	1.04
<u>Output</u>					
DRRCL	Aileron trim command from yaw channel	GTRA_MOD	F	deg/s	25

4.3.1.2.20a DRR_LIM_COMP (Aerojet DAP).

A. Function – This function module selects the limit on the aileron trim command from the yaw channel. The detailed block diagram is presented in Figure 4.3.1.2.20a-1.

B. Processing Requirements – DRR_LIM_COMP is processed at 1.04 Hz.

C. Interface Requirements – The interface requirements for DRR_LIM_COMP are shown in Table 4.3.1.2.20a-1.

D. I-Loads – The I-loads for DRR_LIM_COMP are shown in Table 4.3.1.2.20a-2.

E. Initialization Requirements – None.

F. Software Configuration – Aerojet DAP unique.

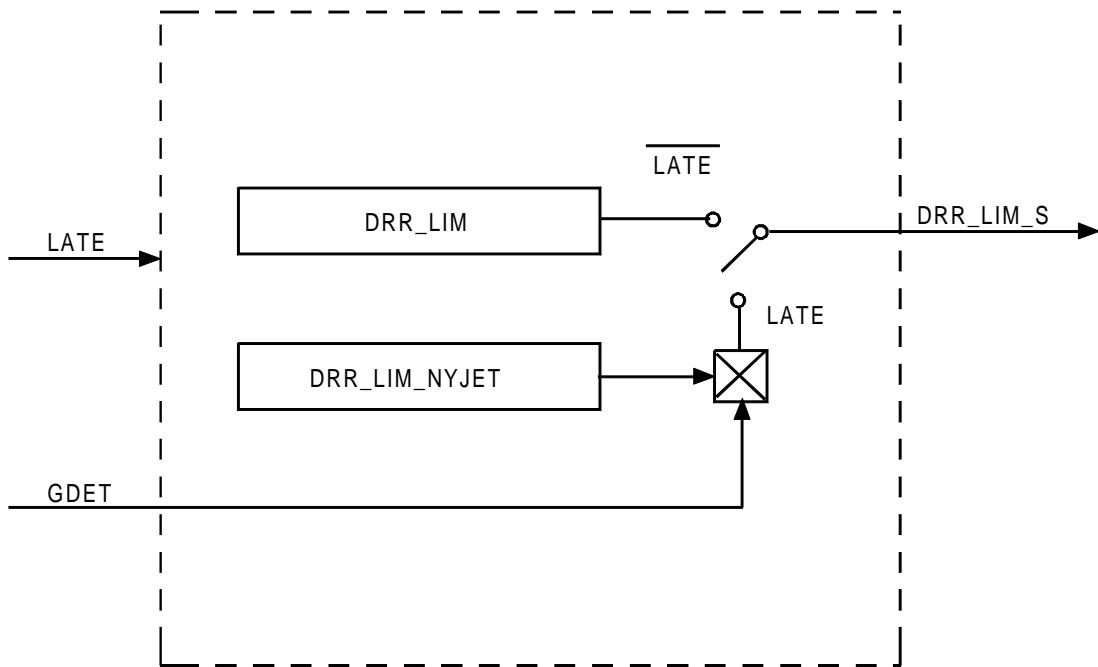


FIGURE 4.3.1.2.20a-1. DRR_LIM_COMP (Aerojet DAP)

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Table 4.3.1.2.20a-1. DRR_LIM_COMP (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
GDET	Gain adjustment based on elevator trim position	GDET_COMP (Pitch channel)	F	ND	1.04
LATE	No Yaw Jet downmode discrete	RECON	D	–	6.25
<u>Outputs</u>					
DRR_LIM_S	Selected limit on aileron trim command from yaw channel	DRRC_LIM	F	deg/s	1.04

Table 4.3.1.2.20a-2. DRR_LIM_COMP (Aerojet DAP) I-Loads

Name	Description	Type	MSID	Units
DRR_LIM	Limit for aileron trim command from yaw channel	F	V98U9653C	deg/s
DRR_LIM_NYJET	Limit for aileron trim command from yaw channel when No Yaw Jet / Wraparound mode	F	V97U7438C	deg/s

4.3.1.2.21 ENT_BANKC_SMOOTH (Aerojet DAP)

- A. Function – This function module acts to smooth the roll angle command from ENTRY guidance. The detailed block diagram is presented in Figure 4.3.1.2.21–1.
- B. Processing Requirements – ENT_BANKC_SMOOTH is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for ENT_BANKC_SMOOTH are shown in Table 4.3.1.2.21–1.
- D. Constants – The constants for ENT_BANKC_SMOOTH are shown in Table 4.3.1.2.21–2.
- E. Initialization Requirements – The initialization requirements for ENT_BANKC_SMOOTH are shown in Table 4.3.1.2.21–3.
- F. Software Configuration – Aerojet DAP unique.

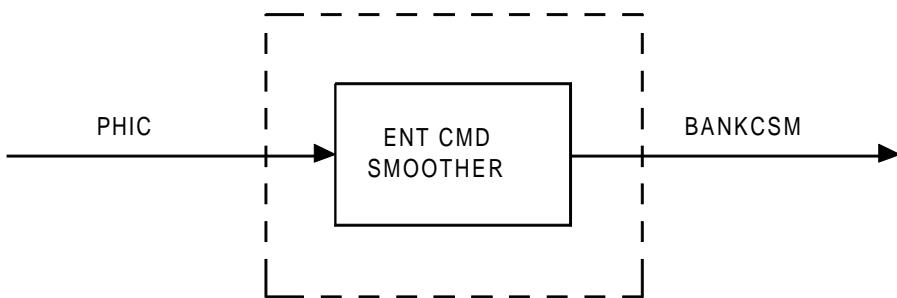


FIGURE 4.3.1.2.21-1. ENT_BANKC_SMOOTH (Aerojet DAP)

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Table 4.3.1.2.21-1. ENT_BANKC_SMOOTH (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> PHIC	Euler roll angle command	ENT_GUID	F	deg	0.52
<u>Outputs</u> BANKCSM	Smoothed Euler roll angle command	BANK_SUM	F	deg	6.25

Table 4.3.1.2.21-2. ENT_BANKC_SMOOTH (AEROJET DAP) Constants

Name	Description	Type	Value	Units
TEG	Time increment between Entry Guidance updates	F	1.920	s
TS	Period at which BANKCSM is updated	F	0.160	s

Table 4.3.1.2.21-3. ENT_BANKC_SMOOTH (AEROJET DAP) Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Smoothener*	—	First invocation	XOUT	PHI**
	CSS_BANK	AUTO_BANK	XPINV	PHI
*See Subsection 4.9.				
** PHI defined in Table 4.3.1.2-2				

4.3.1.2.22 GALR_CMD.

- A. Function – This function module computes the roll rate command gain. The detailed block diagram is presented in Figure 4.3.1.2.22-1.
- B. Processing Requirements – GALR_CMD is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for GALR_CMD are shown in Table 4.3.1.2.22-1.
- D. I-Loads – The I-loads for GALR_CMD are shown in Table 4.3.1.2.22-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

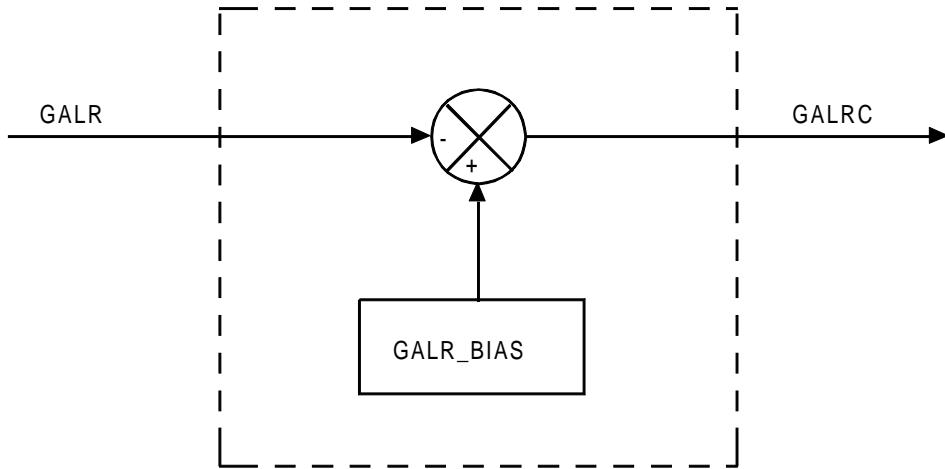


FIGURE 4.3.1.2.22-1. GALR_CMD

Table 4.3.1.2.22-1. GALR_CMD Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> GALR	Scheduled gain for phasing	GALR_MOD	F	—	6.25
<u>Outputs</u> GALRC	Roll rate command gain	PLOOP	F	—	6.25

Table 4.3.1.2.22-2. GALR_CMD I-Loads

Name	Description	Type	MSID	Units
GALR_BIAS	BIAS for scheduled gain GALR	F	V98U9652C	—

4.3.1.2.23 GALR_COMP.

- A. Function – This function module computes a scheduled gain for roll/yaw control authority phasing. The detailed block diagram is presented in Figure 4.3.1.2.23-1.
- B. Processing Requirements – GALR_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for GALR_COMP are shown in Table 4.3.1.2.23-1.
- D. I-Loads – The I-loads for GALR_COMP are shown in Table 4.3.1.2.23-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

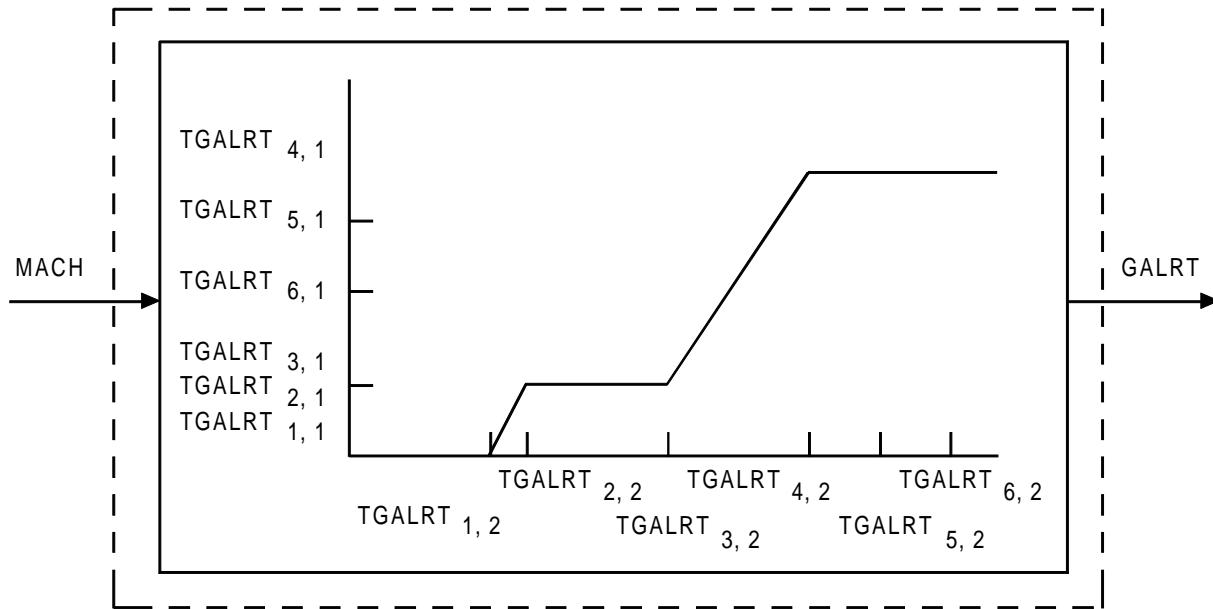


FIGURE 4.3.1.2.23-1. GALR_COMP

Table 4.3.1.2.23-1. GALR_COMP Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> MACH	Mach number	ADTA SOP	F	—	1.04
<u>Output</u> GALRT	Gain for phasing roll/yaw control authority	GALR_MOD	F	—	1.04

Table 4.3.1.2.23-2. GALR_COMP I-Loads

Name	Description	Type	MSID	Units
TGALRT(1,1)	Tabulated GALRT	F	V98U9638C	—
TGALRT(1,2)	Tabulated MACH	F	V98U9639C	—
TGALRT(2,1)	Tabulated GALRT	F	V98U9640C	—
TGALRT(2,2)	Tabulated MACH	F	V98U9641C	—
TGALRT(3,1)	Tabulated GALRT	F	V98U9642C	—
TGALRT(3,2)	Tabulated MACH	F	V98U9643C	—
TGALRT(4,1)	Tabulated GALRT	F	V98U9644C	—
TGALRT(4,2)	Tabulated MACH	F	V98U9645C	—
TGALRT(5,1)	Tabulated GALRT	F	V98U9646C	—
TGALRT(5,2)	Tabulated MACH	F	V98U9647C	—
TGALRT(6,1)	Tabulated GALRT	F	V98U9648C	—
TGALRT(6,2)	Tabulated MACH	F	V98U9649C	—

4.3.1.2.24 GALR_MOD.

- A. Function – This function module computes a scheduled gain for phasing control between roll/yaw axes. The detailed block diagram is presented in Figure 4.3.1.2.24–1.
- B. Processing Requirements – GALR_MOD is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for GALR_MOD are shown in Table 4.3.1.2.24–1.
- D. I-Loads – The I-loads for GALR_MOD are shown in Table 4.3.1.2.24–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

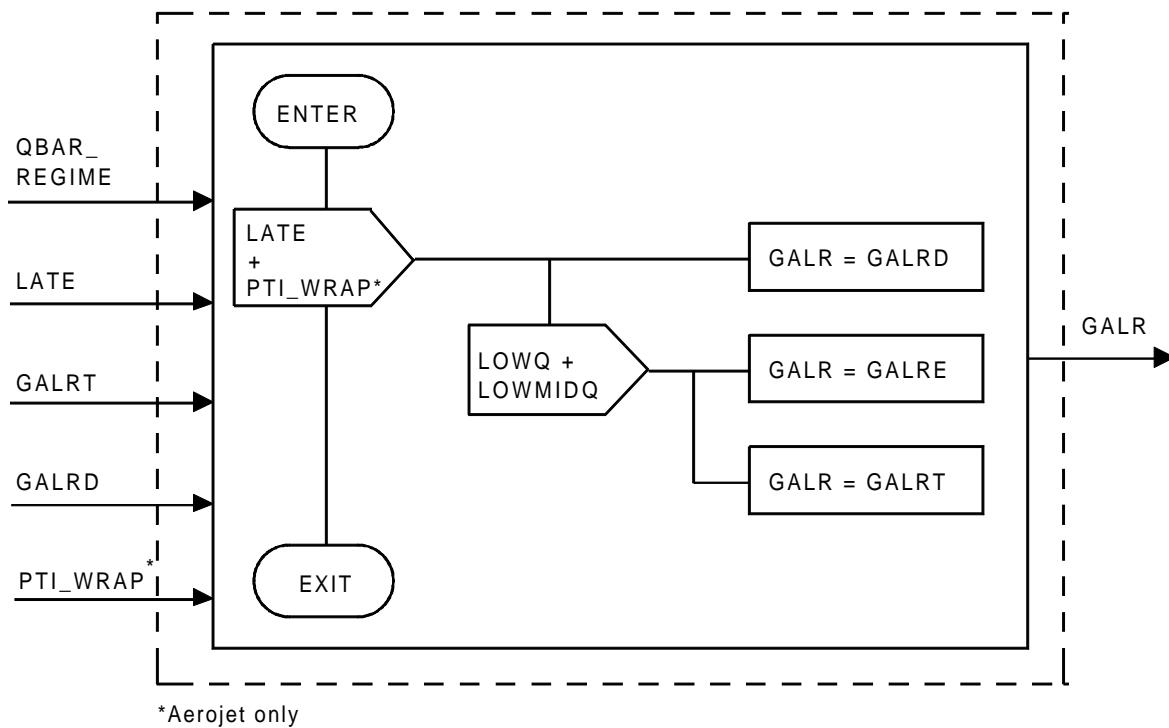


FIGURE 4.3.1.2.24-1. GALR_MOD

Table 4.3.1.2.24-1. GALR_MOD Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
LOWQ	LOW QBAR regime	RECON	D	—	6.25
LOWMIDQ	Low to mid QBAR regime	RECON	D	—	6.25
LATE	No yaw jet downmode discrete	RECON	D	—	6.25
GALRT	Gain for phasing roll/yaw control authority	GALR_COMP	F	—	1.04
GALRD	Gain for phasing roll/yaw control authority in no yaw-jet downmode configuration or for PTI wraparound mode	GALRD_COMP	F	—	1.04
PTI_WRAP*	PTI wraparound mode discrete	PTI_DRIVER	D	—	12.5
<u>Outputs</u>					
GALR	Schedule gain for phasing	GALR_CMD, PCOMP	F	—	6.25
* Aerojet only					

Table 4.3.1.2.24-2. GALR_MOD I-Loads

Name	Description	Type	MSID	Units
GALRE	Gain for phasing in EARLY flight phase	F	V98U9650C	—

4.3.1.2.25 GALRD_COMP

- A. Function – This function module computes a scheduled gain for roll/yaw control authority phasing in the NO_YAW_JET downmode configuration. The detailed block diagram is presented in Figure 4.3.1.2.25-1.
- B. Processing Requirements – GALRD_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for GALRD_COMP are shown in Table 4.3.1.2.25-1.
- D. I-Loads – The I-loads for GALRD_COMP are shown in Table 4.3.1.2.25-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

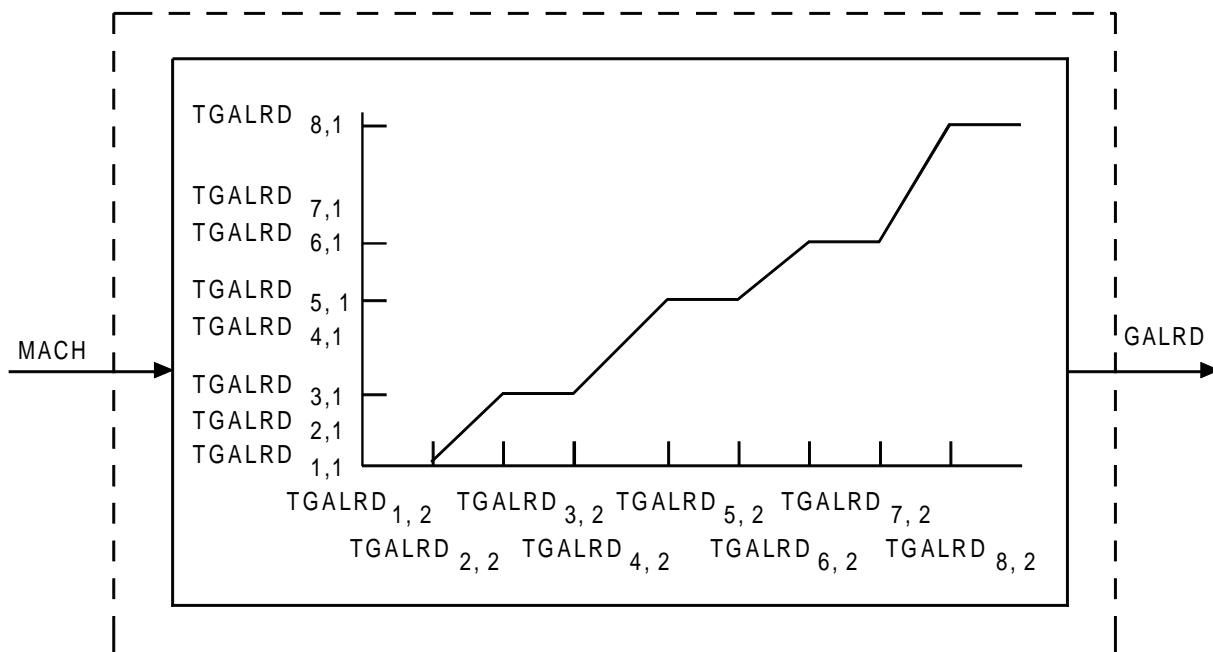


FIGURE 4.3.1.2.25-1. GALRD_COMP

Table 4.3.1.2.25-1. GALRD_COMP Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> MACH	Mach number	ADTA SOP	F	—	1.04
<u>Outputs</u> GALRD	Gain for phasing roll/yaw control authority in the NO_YAW_JET downmode configuration	GALR_MOD	F	—	1.04

Table 4.3.1.2.25-2. GALRD_COMP I-Loads

Name	Description	Type	MSID	Units
TGALRD(1,1)	Tabulated GALRD	F	V99U9721C	—
TGALRD(1,2)	Tabulated Mach	F	V99U9722C	—
TGALRD(2,1)	Tabulated GALRD	F	V99U9723C	—
TGALRD(2,2)	Tabulated Mach	F	V99U9724C	—
TGALRD(3,1)	Tabulated GALRD	F	V99U9725C	—
TGALRD(3,2)	Tabulated Mach	F	V99U9726C	—
TGALRD(4,1)	Tabulated GALRD	F	V99U9727C	—
TGALRD(4,2)	Tabulated Mach	F	V99U9728C	—
TGALRD(5,1)	Tabulated GALRD	F	V99U9729C	—
TGALRD(5,2)	Tabulated Mach	F	V99U9730C	—
TGALRD(6,1)	Tabulated GALRD	F	V99U9731C	—
TGALRD(6,2)	Tabulated Mach	F	V99U9732C	—
TGALRD(7,1)	Tabulated GALRD	F	V99U9733C	—
TGALRD(7,2)	Tabulated Mach	F	V99U9734C	—
TGALRD(8,1)	Tabulated GALRD	F	V99U9735C	—
TGALRD(8,2)	Tabulated Mach	F	V99U9736C	—

4.3.1.2.26 GBAY_COMP.

- A. Function – This function module computes a scheduled gain to scale the lateral acceleration to aileron feedback in the NO_YAW_JET downmode configuration. The detailed block diagram is presented in Figure 4.3.1.2.26–1.
- B. Processing Requirements – GBAY_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for GBAY_COMP are shown in Table 4.3.1.2.26–1.
- D. I-Loads – The I-loads for GBAY_COMP are shown in Table 4.3.1.2.26–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

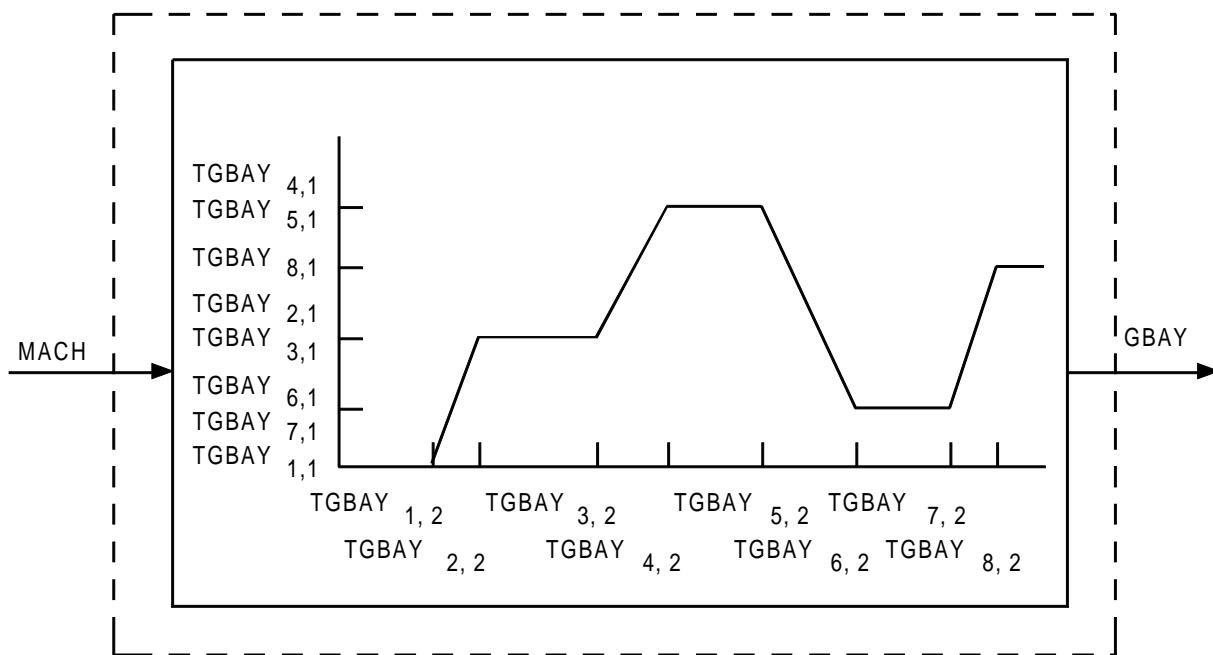


FIGURE 4.3.1.2.26-1. GBAY_COMP

Table 4.3.1.2.26-1. GBAY_COMP Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> MACH	Mach number	ADTA SOP	F	—	1.04
<u>Outputs</u> GBAY	Gain to scale lateral acceleration in the NO_YAW_JET downmode configuration	DNYP_COMP	F	(deg/s)/g	1.04

Table 4.3.1.2.26-2. GBAY_COMP I-Loads

Name	Description	Type	MSID	Units
TGBAY(1,1)	Tabulated GBAY	F	V99U9737C	(deg/s)/g
TGBAY(1,2)	Tabulated Mach	F	V99U9738C	—
TGBAY(2,1)	Tabulated GBAY	F	V99U9739C	(deg/s)/g
TGBAY(2,2)	Tabulated Mach	F	V99U9740C	—
TGBAY(3,1)	Tabulated GBAY	F	V99U9741C	(deg/s)/g
TGBAY(3,2)	Tabulated Mach	F	V99U9742C	—
TGBAY(4,1)	Tabulated GBAY	F	V99U9743C	(deg/s)/g
TGBAY(4,2)	Tabulated Mach	F	V99U9744C	—
TGBAY(5,1)	Tabulated GBAY	F	V99U9745C	(deg/s)/g
TGBAY(5,2)	Tabulated Mach	F	V99U9746C	—
TGBAY(6,1)	Tabulated GBAY	F	V99U9747C	(deg/s)/g
TGBAY(6,2)	Tabulated Mach	F	V99U9748C	—
TGBAY(7,1)	Tabulated GBAY	F	V99U9749C	(deg/s)/g
TGBAY(7,2)	Tabulated Mach	F	V99U9750C	—
TGBAY(8,1)	Tabulated GBAY	F	V99U9751C	(deg/s)/g
TGBAY(8,2)	Tabulated Mach	F	V99U9752C	—

4.3.1.2.27 GDA_COMP (Aerojet DAP).

- A. Function – This function module schedules a limited gain as a function of Mach, dynamic pressure, and angle of attack. The gain is used to scale the roll rate error. The detailed block diagram is presented in Figure 4.3.1.2.27-1.
- B. Processing Requirements – GDA_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for GDA_COMP are shown in Table 4.3.1.2.27-1.
- D. I-Loads – The I-loads for GDA_COMP are shown in Table 4.3.1.2.27-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Aerojet DAP unique.

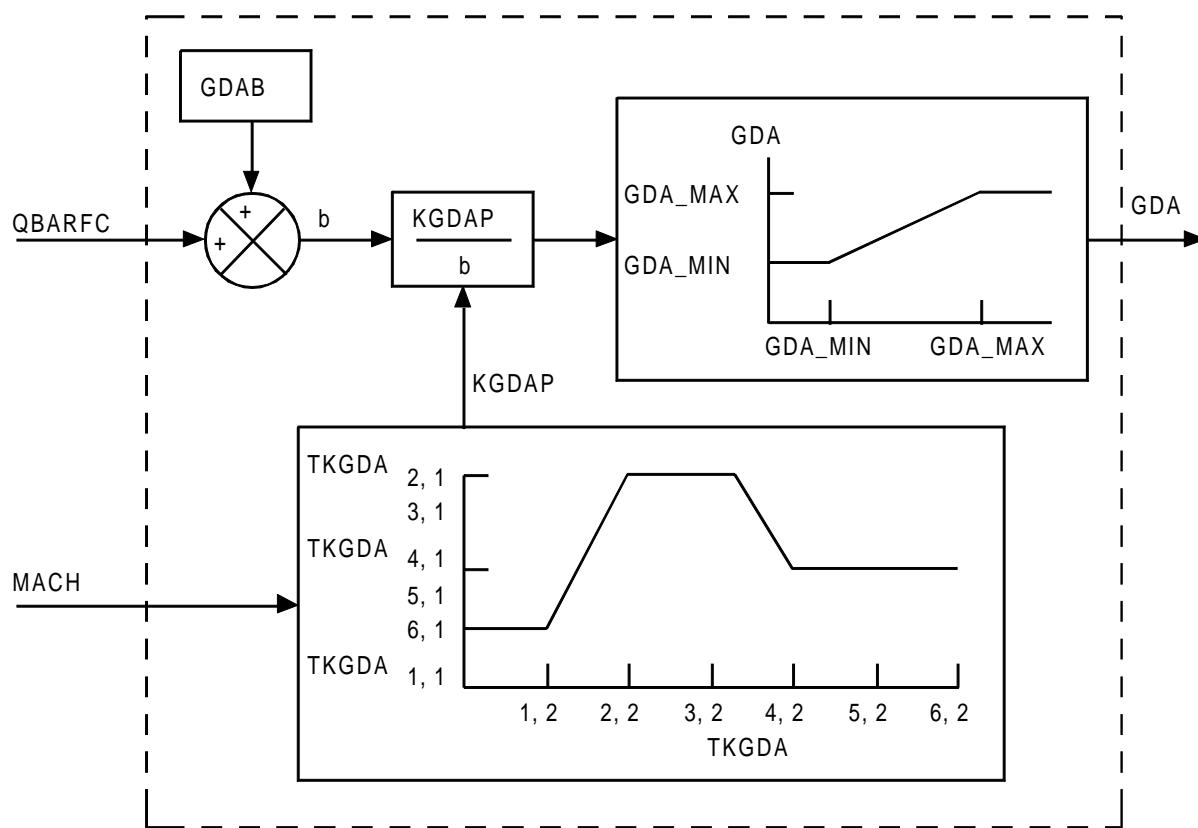


FIGURE 4.3.1.2.27-1. GDA_COMP (Aerojet DAP)

Table 4.3.1.2.27-1. GDA_COMP (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
QBARFC	Dynamic pressure for FCS	Pitch Channel	F	lbf/ft**2	1.04
MACH	Mach number	ADTA SOP	F	—	1.04
<u>Outputs</u>					
GDA	Scale factor	DAC_GAIN	F	deg/(deg/s)	1.04

Table 4.3.1.2.27-2. GDA_COMP (Aerojet DAP) I-Loads

Name	Description	Type	MSID	Units
GDA_MAX	Maximum value of GDA	F	V97U0683C	deg/deg/s
GDA_MIN	Minumum value of GDA	F	V97U0684C	deg/deg/s
GDAB	Bias to QBAR	F	V97U0685C	lb/ft**2
TKGDA(1,1)	Tabulated KGDA	F	V98U9622C	lb-s/ft**2
TKGDA(1,2)	Tabulated Mach	F	V98U9623C	—
TKGDA(2,1)	Tabulated KGDA	F	V98U9624C	lb-s/ft**2
TKGDA(2,2)	Tabulated Mach	F	V98U9625C	—
TKGDA(3,1)	Tabulated KGDA	F	V96U8075C	lb-s/ft**2
TKGDA(3,2)	Tabulated Mach	F	V96U8076C	—
TKGDA(4,1)	Tabulated KGDA	F	V96U8077C	lb-s/ft**2
TKGDA(4,2)	Tabulated Mach	F	V96U8078C	—
TKGDA(5,1)	Tabulated KGDA	F	V96U8079C	lb-s/ft**2
TKGDA(5,2)	Tabulated Mach	F	V96U8080C	—
TKGDA(6,1)	Tabulated KGDA	F	V96U8081C	lb-s/ft**2
TKGDA(6,2)	Tabulated Mach	F	V96U8082C	—

4.3.1.2.28 GDA_COMP (GRTLS DAP).

A. Function – This function module schedules a limited gain as a function of Mach, dynamic pressure, and angle of attack. The gain is used to scale the roll rate error. The detailed block diagram is presented in Figure 4.3.1.2.28-1.

B. Processing Requirements – GDA_COMP is processed at 1.04 Hz.

C. Interface Requirements – The interface requirements for GDA_COMP are shown in Table 4.3.1.2.28-1.

D. I-Loads – The I-loads for GDA_COMP are shown in Table 4.3.1.2.28-2.

E. Initialization Requirements – None.

F. Software Configuration – GRTLS DAP unique.

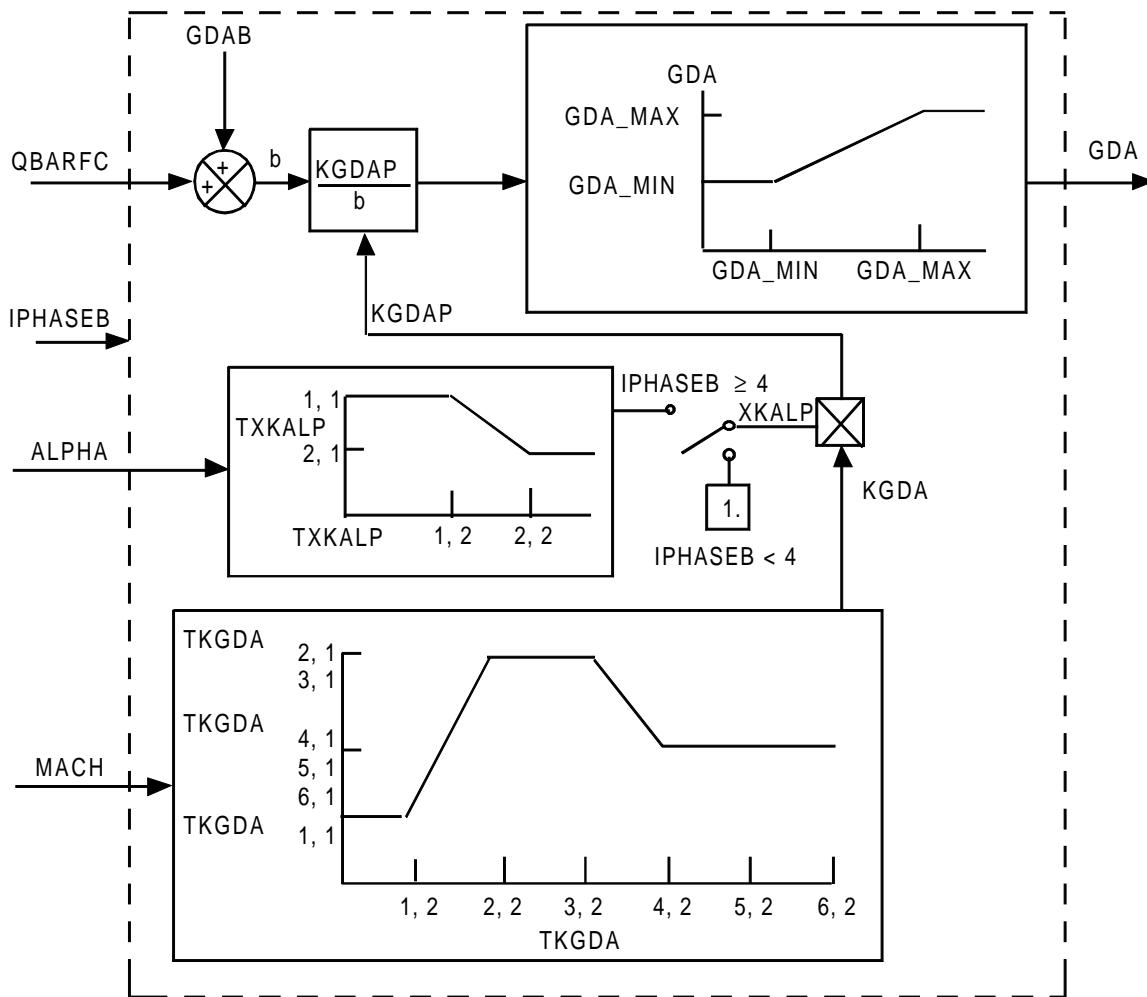


FIGURE 4.3.1.2.28-1. GDA_COMP (GRTLS DAP)

Table 4.3.1.2.28-1. GDA_COMP (GRTLS DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
QBARFC	Dynamic pressure for FCS	Pitch Channel	F	lbf/ft** ²	1.04
MACH	Mach number	ADTA SOP	F	—	1.04
ALPHA	Angle of attack	ADTA SOP	F	deg	1.04
IPHASEB	Buffered IPHASE	RECON	I	—	6.25
<u>Outputs</u>					
GDA	Scale factor	DAC_GAIN	F	deg/(deg/s)	1.04

Table 4.3.1.2.28-2. GDA_COMP (GRTLS DAP) I-Loads

Name	Description	Type	MSID	Units
GDA_MAX	Maximum value of GDA	F	V97U0683C	deg/deg/s
GDA_MIN	Minumum value of GDA	F	V97U0684C	deg/deg/s
GDAB	Bias to QBAR	F	V97U0685C	lb/ft** ²
TKGDA(1,1)	Tabulated KGDA	F	V98U9622C	lb-s/ft** ²
TKGDA(1,2)	Tabulated Mach	F	V98U9623C	—
TKGDA(2,1)	Tabulated KGDA	F	V98U9624C	lb-s/ft** ²
TKGDA(2,2)	Tabulated Mach	F	V98U9625C	—
TKGDA(3,1)	Tabulated KGDA	F	V96U8075C	lb-s/ft** ²
TKGDA(3,2)	Tabulated Mach	F	V96U8076C	—
TKGDA(4,1)	Tabulated KGDA	F	V96U8077C	lb-s/ft** ²
TKGDA(4,2)	Tabulated Mach	F	V96U8078C	—
TKGDA(5,1)	Tabulated KGDA	F	V96U8079C	lb-s/ft** ²
TKGDA(5,2)	Tabulated Mach	F	V96U8080C	—
TKGDA(6,1)	Tabulated KGDA	F	V96U8081C	lb-s/ft** ²
TKGDA(6,2)	Tabulated Mach	F	V96U8082C	—
TXKALP(1,1)	Tabulated XKALP	F	V99U7568C	—
TXKALP(1,2)	Tabulated Alpha	F	V99U7569C	deg
TXKALP(2,1)	Tabulated XKALP	F	V99U7570C	—
TXKALP(2,2)	Tabulated Alpha	F	V99U7571C	deg

4.3.1.2.29 GPAY_COMP.

A. Function – This function module computes a scheduled gain to scale the lateral acceleration. The detailed block diagram is presented in Figure 4.3.1.2.29–1.

B. Processing Requirements – GPAY_COMP is processed at 1.04 Hz.

C. Interface Requirements – The interface requirements for GPAY_COMP are shown in Table 4.3.1.2.29–1.

D. I-Loads – The I-loads for GPAY_COMP are shown in Table 4.3.1.2.29–2.

E. Initialization Requirements – None.

F. Software Configuration – Common.

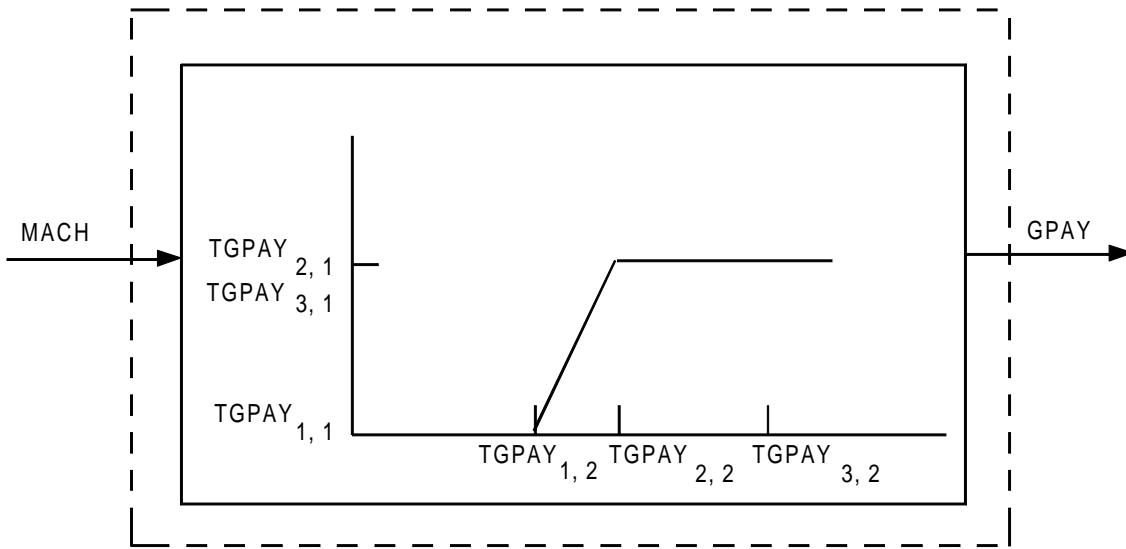


FIGURE 4.3.1.2.29-1. GPAY_COMP

Table 4.3.1.2.29-1. GPAY_COMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> MACH	Mach number	ADTA SOP	F	—	1.04
<u>Outputs</u> GPAY	Gain to scale lateral acceleration	NY_SINALF	F	—	1.04

Table 4.3.1.2.29-2. GPAY_COMP I-Loads				
Name	Description	Type	MSID	Units
TGPAY(1,1)	Tabulated GPAY	F	V98U9634C	—
TGPAY(1,2)	Tabulated MACH	F	V98U9635C	—
TGPAY(2,1)	Tabulated GPAY	F	V98U9636C	—
TGPAY(2,2)	Tabulated MACH	F	V98U9637C	—
TGPAY(3,1)	Tabulated GPAY	F	V97U1120C	—
TGPAY(3,2)	Tabulated MACH	F	V97U1121C	—

4.3.1.2.30 GPBANK_COMP.

- A. Function – This function module schedules a gain as a function of Mach number. This gain is used to convert the bank angle error into a roll rate command. The detailed block diagram is presented in Figure 4.3.1.2.30-1.
- B. Processing Requirements – GPBANK_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for GPBANK_COMP are shown in Table 4.3.1.2.30-1.
- D. Constants – The constants for GPBANK_COMP are shown in Table 4.3.1.2.30-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

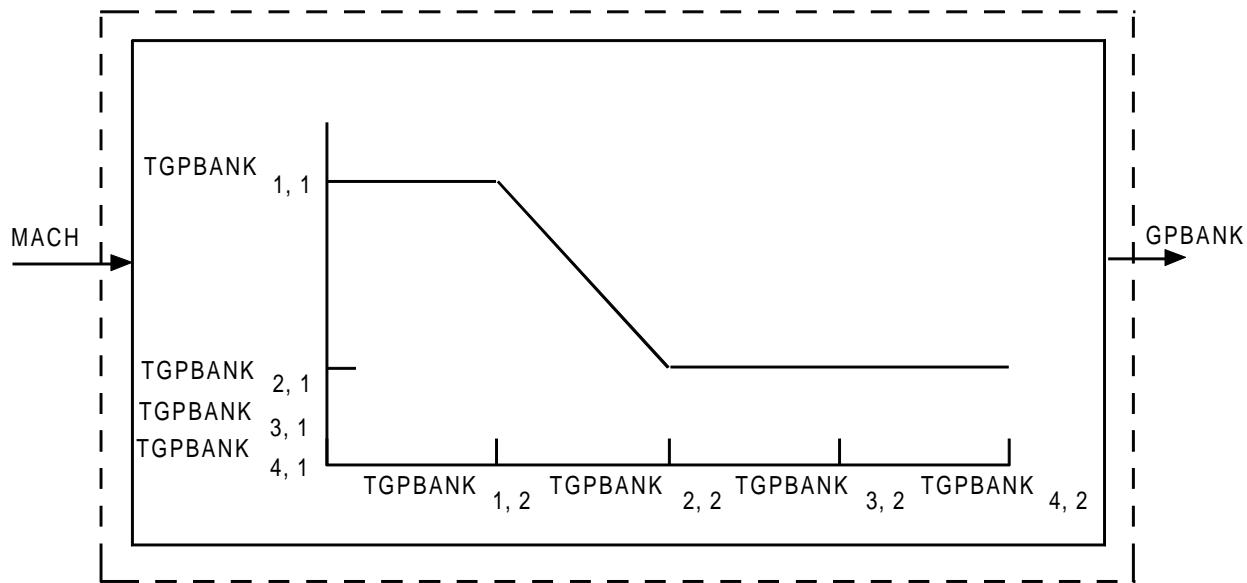


FIGURE 4.3.1.2.30-1. GPBANK_COMP

Table 4.3.1.2.30-1. GPBANK_COMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> MACH	Mach number	ADTA SOP	F	—	1.04
<u>Outputs</u> GPBANK	Gain to convert bank angle error into a roll rate command	BANKERR_LIMITER	F	(deg/s)/deg	1.04

Table 4.3.1.2.30-2. GPBANK_COMP Constants				
Name	Description	Type	MSID/Value	Units
TGPBANK(1,1)	Tabulated GPBANK	K	V97U0972C/ +1.2 E+00	(deg/s)/deg
TGPBANK(1,2)	Tabulated MACH	K	V97U0973C/ +6.0 E-01	—
TGPBANK(2,1)	Tabulated GPBANK	K	V97U0938C/ +5.0 E-01	(deg/s)/deg
TGPBANK(2,2)	Tabulated MACH	K	V97U0939C/ +1.2 E+00	—
TGPBANK(3,1)	Tabulated GPBANK	K	V96U8071C/ +5.0 E-01	(deg/s)/deg
TGPBANK(3,2)	Tabulated MACH	K	V96U8072C/ +1.4 E+01	—
TGPBANK(4,1)	Tabulated GPBANK	K	V96U8073C/ +5.0 E-01	(deg/s)/deg
TGPBANK(4,2)	Tabulated MACH	K	V96U8074C/ +2.6 E+01	—

4.3.1.2.31 DELETED

4.3.1.2.32 GRPANT_MOD.

- A. Function – This function module converts the panel roll beep trim command into an aileron rate trim command. The detailed block diagram is presented in Figure 4.3.1.2.32–1.
- B. Processing Requirements – GRPANT_MOD is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for GRPANT_MOD are shown in Table 4.3.1.2.32–1.
- D. I-Loads – The I-loads for GRPANT_MOD are shown in Table 4.3.1.2.32–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

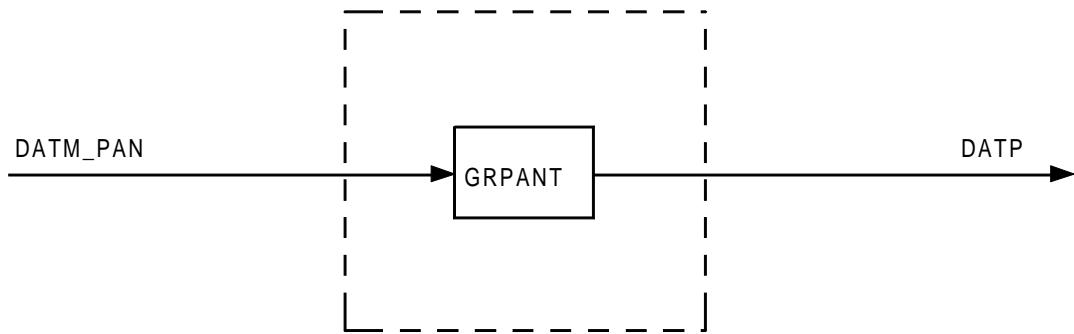


FIGURE 4.3.1.2.32-1. GRPANT_MOD

Table 4.3.1.2.32-1. GRPANT_MOD Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DATM_PAN	Panel roll beep trim	2-AX RHC SOP	I	—	6.25
<u>Outputs</u> DATP	Panel roll trim rate	DAT_SUM	F	deg/s	6.25

Table 4.3.1.2.32-2. GRPANT_MOD I-Loads				
Name	Description	Type	MSID	Units
GRPANT	Roll panel trim gain	F	V98U9626C	deg/s

4.3.1.2.33 GRRHC_COMP.

- A. Function – This function module schedules a gain as a function of Mach number. This gain is used to convert the already shaped, limited, and filtered RHC roll command into a roll rate command. The detailed block diagram is presented in Figure 4.3.1.2.33-1.
- B. Processing Requirements – GRRHC_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for GRRHC_COMP are shown in Table 4.3.1.2.33-1.
- D. Constants – The constants for GRRHC_COMP are shown in Table 4.3.1.2.33-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

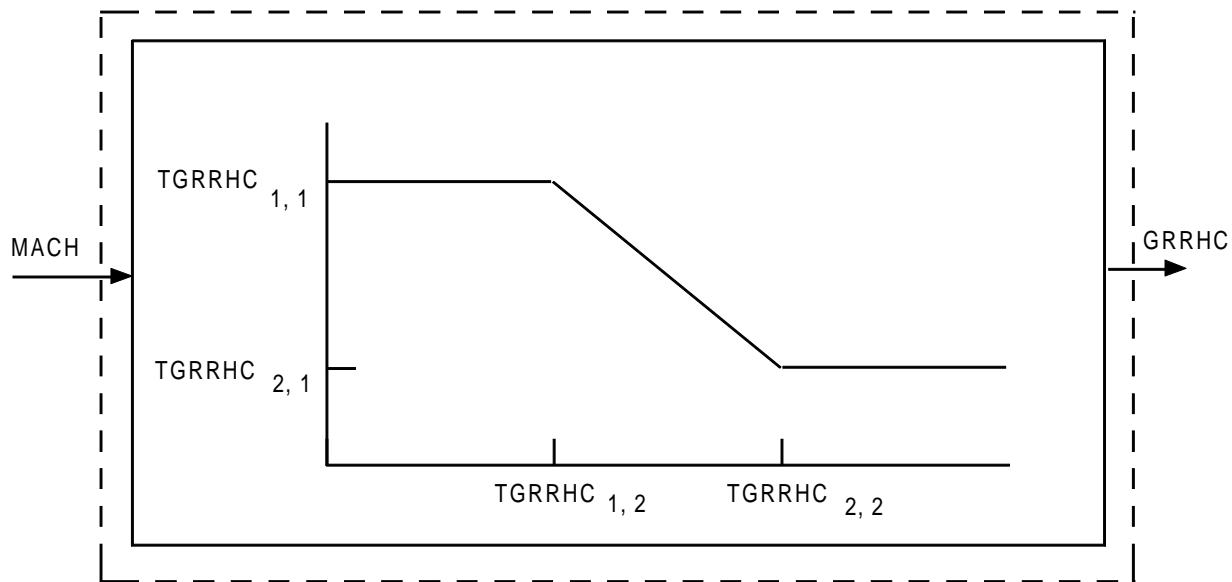


FIGURE 4.3.1.2.33-1. GRRHC_COMP

Table 4.3.1.2.33-1. GRRHC_COMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> MACH	Mach number	ADTA SOP	F	—	1.04
<u>Outputs</u> GRRHC	Gain to convert RHC roll command into a roll rate command	ROLL_STICK	F	(deg/s)/deg	1.04

Table 4.3.1.2.33-2. GRRHC_COMP Constants				
Name	Description	Type	MSID/Value	Units
TGRRHC(1,1)	Tabulated GRRHC	K	V97U0998C/ +1.17 E+00	(deg/s)/deg
TGRRHC(1,2)	Tabulated MACH	K	V97U0999C/ +6.0 E-01	—
TGRRHC(2,1)	Tabulated GRRHC	K	V97U1000C/ +3.0 E-01	(deg/s)/deg
TGRRHC(2,2)	Tabulated MACH	K	V97U1001C/ +1.5 E+00	—

4.3.1.2.34 GTRA_COMP.

- A. Function – This function module computes a scheduled gain to scale the aileron trim command. The detailed block diagram is shown in Figure 4.3.1.2.34–1.
- B. Processing Requirements – GTRA_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for GTRA_COMP are shown in Table 4.3.1.2.34–1.
- D. Constants – The constants for GTRA_COMP are shown in Table 4.3.1.2.34–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

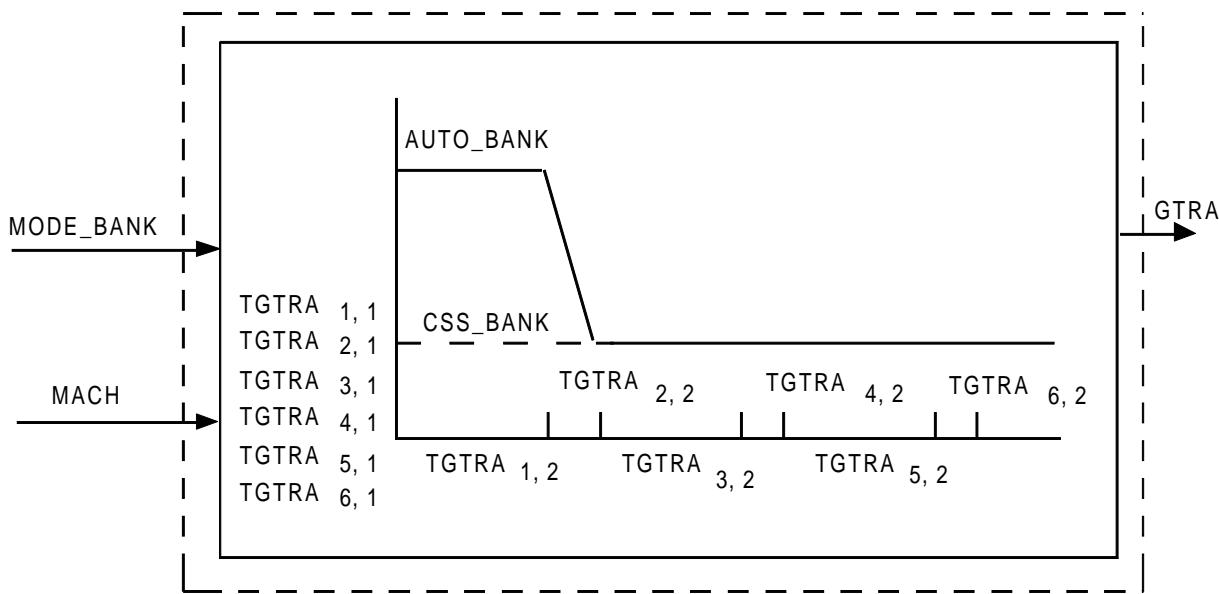


FIGURE 4.3.1.2.34-1. GTRA_COMP

Table 4.3.1.2.34-1. GTRA_COMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
MACH	Mach number	ADTA SOP	F	—	1.04
MODE_BANK	Bank (roll/yaw) channel configuration	RECON	D	—	6.25
<u>Outputs</u>					
GTRA	Preliminary aileron trim scale factor	GTRA_MOD	F	(deg/s)/deg	1.04

Table 4.3.1.2.34-2. GTRA_COMP Constants

Name	Description	Type	MSID/ Value	Units
TGTRA(1,1)	Tabulated GTRA	K	V98U9655CA V98U9655C +2.5 E-01 +0.0 E+00	(deg/s)/deg
TGTRA(1,2)	Tabulated MACH	K	V98U9656C (1) +1.25 E+00 (2) +1.25 E+00	—
TGTRA(2,1)	Tabulated GTRA	K	V98U9657C (1) +1.0 E-01 (2) +1.0 E-01	(deg/s)/deg
TGTRA(2,2)	Tabulated MACH	K	V98U9658C (1) +1.26 E+00 (2) +1.26 E+00	—
TGTRA(3,1)	Tabulated GTRA	K	V98U9659C (1) +1.0 E-01 (2) +1.0 E-01	(deg/s)/deg
TGTRA(3,2)	Tabulated MACH	K	V98U9660C (1) +3.5 E+00 (2) +3.5 E+00	—
TGTRA(4,1)	Tabulated GTRA	K	V98U9661C (1) 0.0 E+00 (2) 0.0 E+00	(deg/s)/deg
TGTRA(4,2)	Tabulated MACH	K	V98U9662C (1) +3.55 E+00 (2) +3.55 E+00	—
TGTRA(5,1)	Tabulated GTRA	K	V98U9663C (1) 0.0 E+00 (2) 0.0 E+00	(deg/s)/deg
TGTRA(5,2)	Tabulated MACH	K	V98U9664C (1) +4.0 E+00 (2) +4.0 E+00	—
TGTRA(6,1)	Tabulated GTRA	K	V98U9665C (1) +0.0 E+00 (2) +0.0 E+00	(deg/s)/deg
TGTRA(6,2)	Tabulated MACH	K	V98U9666C (1) +3.0 E+01 (2) +3.0 E+01	—

(1) Memory Configuration 01

(2) Memory Configuration 03

4.3.1.2.35 GTRA_MOD.

- A. Function – This function module converts the preliminary aileron command into an aileron trim rate. The detailed block diagram is presented in Figure 4.3.1.2.35-1.
- B. Processing Requirements – GTRA_MOD is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for GTRA_MOD are shown in Table 4.3.1.2.35-1.
- D. Constants – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

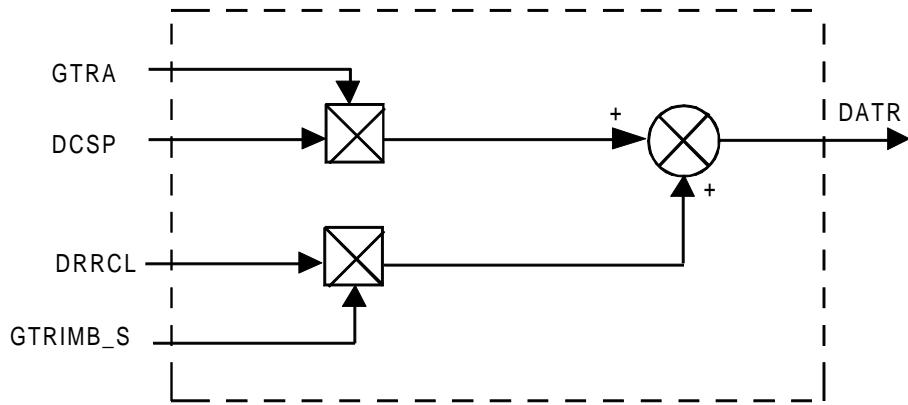


FIGURE 4.3.1.2.35-1. GTRA_MOD

Table 4.3.1.2.35-1. GTRA_MOD Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
GTRA	Preliminary aileron trim scale factor	GTRA_COMP	F	(deg/s)/deg	1.04
DCSP	Preliminary aileron command	DAC_GAIN	F	deg	25
DRRCL	Aileron trim command from yaw	DRRC_LIM		deg/s	25
GTRIMB_S	Selected gain to convert yaw command to aileron trim command	GTRIMB_COMP, Roll channel	F	ND	1.04
<u>Outputs</u>					
DATR	Aileron trim rate command	DAT_SUM	F	deg/s	25

4.3.1.2.35a GTRIMB_COMP (Aerojet DAP).

A. Function – This function module selects the gain to convert the yaw command to an aileron trim command. The detailed block diagram is presented in Figure 4.3.1.2.35a-1.

B. Processing Requirements – GTRIMB_COMP is processed at 1.04 Hz.

C. Interface Requirements – The interface requirements for GTRIMB_COMP are shown in Table 4.3.1.2.35a-1.

D. I-Loads – The I-loads for GTRIMB_COMP are shown in Table 4.3.1.2.35a-2.

E. Initialization Requirements – None.

F. Software Configuration – Aerojet DAP unique.

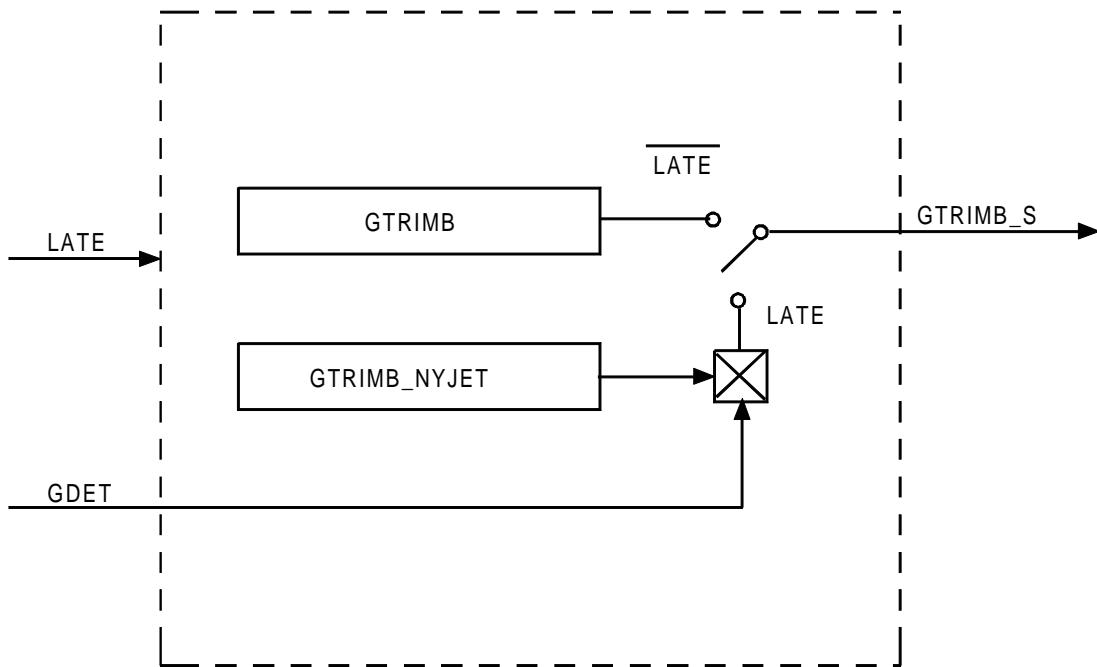


FIGURE 4.3.1.2.35a-1. GTRIMB_COMP (Aerojet DAP)

Table 4.3.1.2.35a-1. GTRIMB_COMP (Aerojet DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
GDET	Gain adjustment based on elevator trim position	GDET_COMP (Pitch channel)	F	ND	1.04
LATE	No Yaw Jet downmode discrete	RECON	D	—	6.25
<u>Outputs</u>					
GTRIMB_S	Selected gain to convert yaw command to aileron trim command	GTRA_MOD	F	ND	1.04

Table 4.3.1.2.35a-2. GTRIMB_COMP (Aerojet DAP) I-loads				
Name	Description	Type	MSID	Units
GTRIMB	Gain to convert yaw command to aileron trim command	F	V96U8085C	ND
GTRIMB_NYJET	Gain to convert yaw command to aileron trim command when No Yaw Jet/Wraparound mode	F	V97U7439C	ND

4.3.1.2.36 NY_SINALF.

A. Function – This function module resolves lateral acceleration error into a roll component for turn coordination. The detailed block diagram is presented in Figure 4.3.1.2.36–1.

B. Processing Requirements – NY_SINALF is processed at 25 Hz.

C. Interface Requirements – The interface requirements for NY_SINALF are shown in Table 4.3.1.2.36–1.

D. Constants – None.

E. Initialization Requirements – None.

F. Software Configuration – Common.

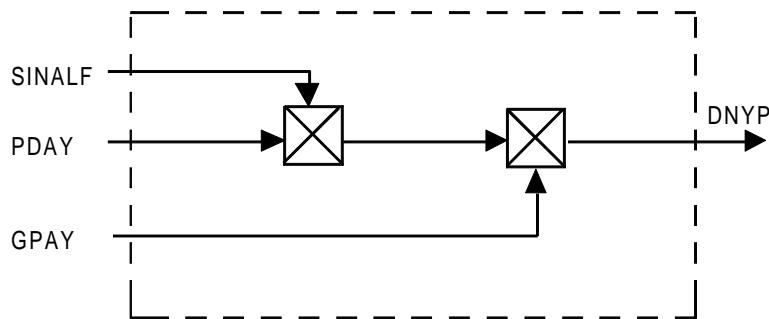


FIGURE 4.3.1.2.36-1. NY_SINALF

Table 4.3.1.2.36-1. NY_SINALF Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
PDAY	Commanded yaw rate	PNY_COMP (yaw channel)	F	deg/s	25
SINALF	Sine of ALPHA	ALPHA_TRIG	F	—	1.04
GPAY	Gain to scale lateral acceleration	GPAY_COMP	F	—	1.04
<u>Outputs</u>					
DNYP	Lateral acceleration component of roll rate	PCOMP	F	deg/s	25

4.3.1.2.37 PCLIM_COMP.

- A. Function – This function module computes a limit to be applied to the scaled roll rate command. The detailed block diagram is presented in Figure 4.3.1.2.37-1.
- B. Processing Requirements – PCLIM_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for PCLIM_COMP are shown in Table 4.3.1.2.37-1.
- D. Constants – The constants for PCLIM_COMP are shown in Table 4.3.1.2.37-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

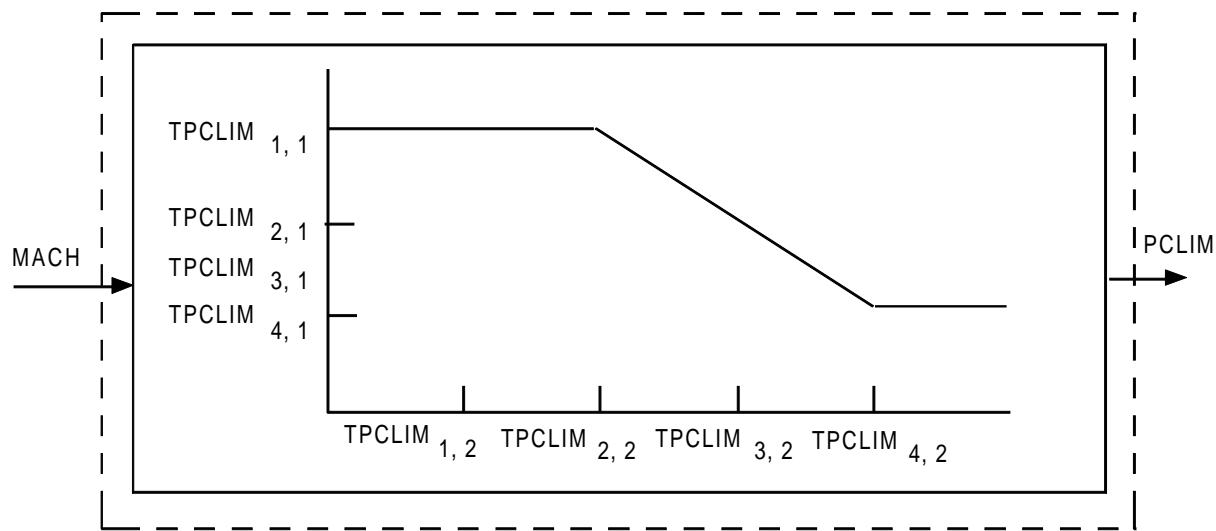


FIGURE 4.3.1.2.37-1. PCLIM_COMP

Table 4.3.1.2.37-1. PCLIM_COMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> MACH	Mach number	ADTA SOP	F	—	1.04
<u>Outputs</u> PCLIM	Roll rate command limit	BANKERR_LIMITER	F	deg/s	1.04

Table 4.3.1.2.37-2. PCLIM_COMP Constants				
Name	Description	Type	MSID/Value	Units
TPCLIM(1,1)	Tabulated PCLIM	K	V97U1037C/ +2.0 E+01	deg/s
TPCLIM(1,2)	Tabulated MACH	K	V97U1038C/ +6.0 E-01	—
TPCLIM(2,1)	Tabulated PCLIM	K	V97U1039C/ +5.0 E+00	deg/s
TPCLIM(2,2)	Tabulated MACH	K	V97U1040C/ +1.5 E+00	—
TPCLIM(3,1)	Tabulated PCLIM	K	V97U1041C/ +5.0 E+00	deg/s
TPCLIM(3,2)	Tabulated MACH	K	V97U1042C/ +2.3 E+01	—
TPCLIM(4,1)	Tabulated PCLIM	K	V97U1043C/ +3.0 E+00	deg/s
TPCLIM(4,2)	Tabulated MACH	K	V97U1044C/ +2.35 E+01	—

4.3.1.2.37a PCLIM_COMP_NYJET (Aerojet DAP).

A. Function – This function module computes a limit to be applied to the scaled roll rate command in the No Yaw Jet configuration. The detailed block diagram is presented in Figure 4.3.1.2.37a-1.

B. Processing Requirements – PCLIM_COMP_NYJET is processed at 1.04 Hz.

C. Interface Requirements – The interface requirements for PCLIM_COMP_NYJET are shown in Table 4.3.1.2.37a-1.

D. I-Loads – The I-loads for PCLIM_COMP_NYJET are shown in Table 4.3.1.2.37a-2.

E. Initialization Requirements – None.

F. Software Configuration – Aerojet DAP unique.

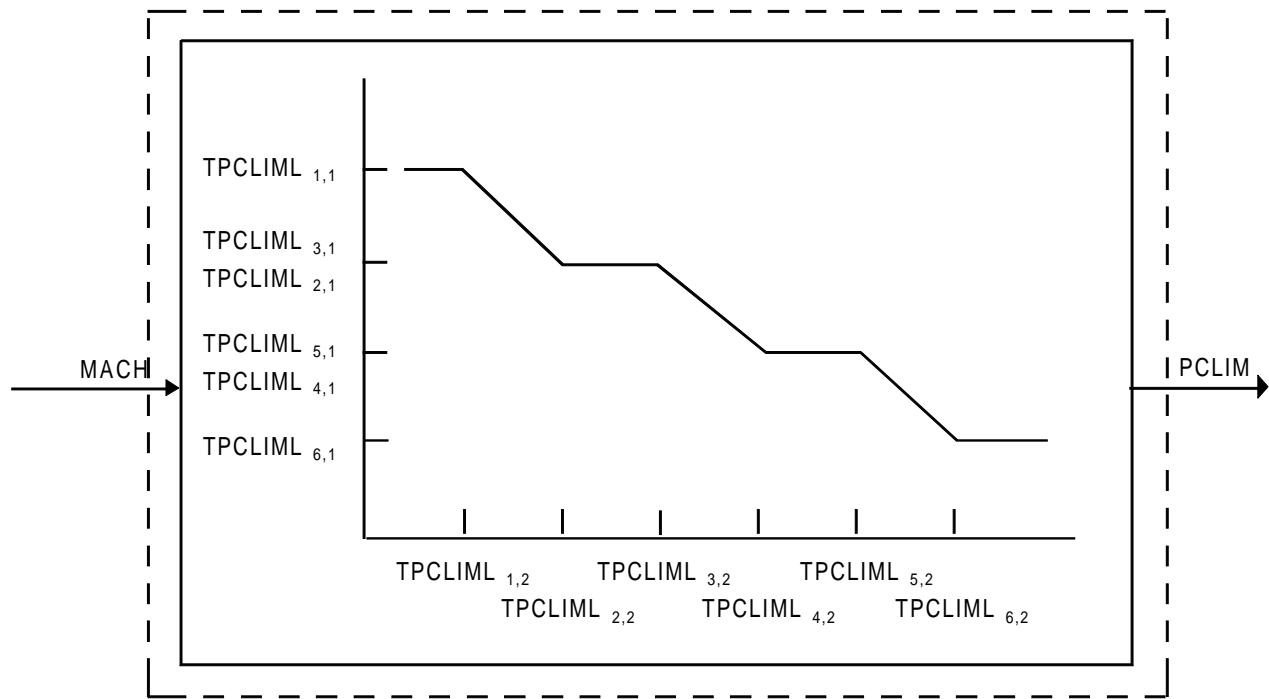


FIGURE 4.3.1.2.37a-1. PCLIM_COMP_NYJET (Aerojet DAP)

Table 4.3.1.2.37a-1. PCLIM_COMP_NYJET (Aerojet DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> MACH	Mach number	ADTA SOP	F	—	1.04
<u>Outputs</u> PCLIM	Roll rate command limit	BANKERR_LIMITER	F	deg/s	1.04

Table 4.3.1.2.37a-2. PCLIM_COMP_NYJET (Aerojet DAP) I-loads				
Name	Description	Type	MSID/Value	Units
TPCLIML(1,1)	Tabulated PCLIML	F	V97U0567C	deg/s
TPCLIML(1,2)	Tabulated Mach	F	V97U0568C	—
TPCLIML(2,1)	Tabulated PCLIML	F	V97U0569C	deg/s
TPCLIML(2,2)	Tabulated Mach	F	V97U0570C	—
TPCLIML(3,1)	Tabulated PCLIML	F	V97U0571C	deg/s
TPCLIML(3,2)	Tabulated Mach	F	V97U0572C	—
TPCLIML(4,1)	Tabulated PCLIML	F	V97U0573C	deg/s
TPCLIML(4,2)	Tabulated Mach	F	V97U0574C	—
TPCLIML(5,1)	Tabulated PCLIML	F	V97U0590C	deg/s
TPCLIML(5,2)	Tabulated Mach	F	V97U0591C	—
TPCLIML(6,1)	Tabulated PCLIML	F	V97U0592C	deg/s
TPCLIML(6,2)	Tabulated Mach	F	V97U0593C	—

4.3.1.2.38 PCOMP.

A. Function – This function module computes the roll rate feedback. The detailed block diagram is shown in Figure 4.3.1.2.38-1.

B. Processing Requirements – PCOMP is processed at 25 Hz.

C. Interface Requirements – The interface requirements for PCOMP are shown in Table 4.3.1.2.38-1.

D. Constants – None.

E. Initialization Requirements – None.

F. Software Configuration – Common.

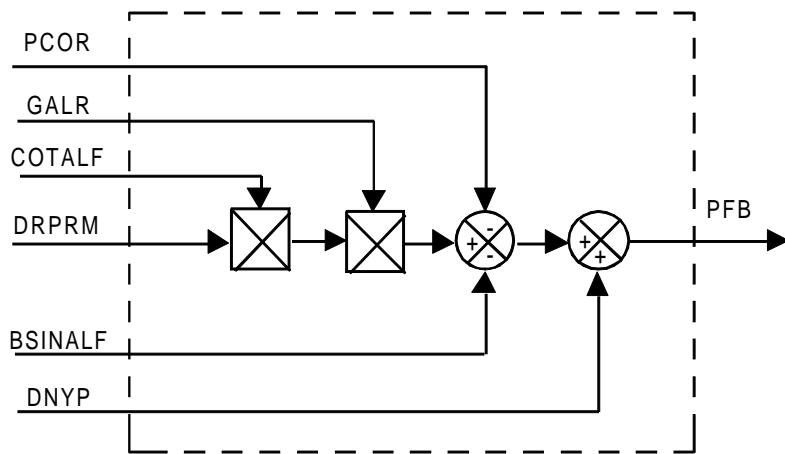


FIGURE 4.3.1.2.38-1. PCOMP

Table 4.3.1.2.38-1. PCOMP Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
PCOR	Compensated roll rate	PCOR_COMP	F	deg/s	25
GALR	Scheduled gain for phasing	GALR_MOD	F	—	6.25
COTALF	Cotangent of alpha	COTALF_COMP	F	—	1.04
DRPRM	Compensated yaw rate	RCOR (yaw channel)	F	deg/s	25
BSINALF	Component of BETAF parallel to velocity	BETASINALF	F	deg/s	6.25
DNYP	Lateral acceleration component of roll rate	NY_SINALF, DNYP_COMP	F	deg/s	25
<u>Outputs</u>					
PFB	Roll rate feedback	PLOOP	F	deg/s	25

4.3.1.2.39 PCOR_COMP.

- A. Function – This function module compensates roll rate for turn coordination. The detailed block diagram is presented in Figure 4.3.1.2.39-1.
- B. Processing Requirements – PCOR_COMP is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for PCOR_COMP are shown in Table 4.3.1.2.39-1.
- D. Constants – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

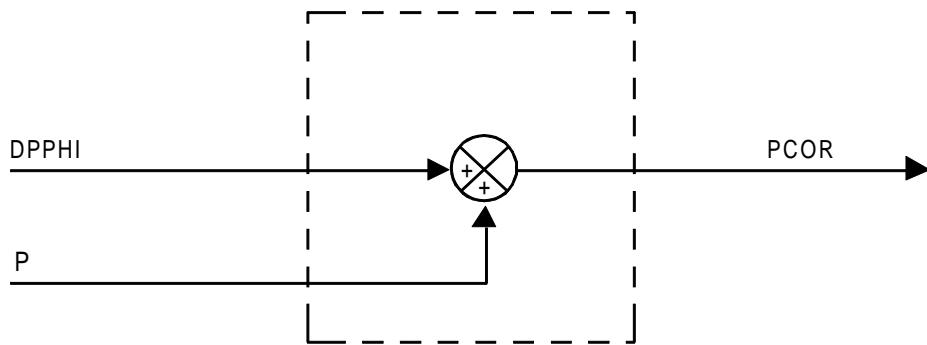


FIGURE 4.3.1.2.39-1. PCOR_COMP

Table 4.3.1.2.39-1. PCOR_COMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DPPHI	Steady-state roll turn coordination component	BRCOR	F	deg/s	6.25
P	Roll rate feedback	SF	F	deg/s	25
<u>Outputs</u>					
PCOR	Compensated roll rate	PCOMP, AXFDCOMP (Yaw channel), P_STAB_COMP, RCOMP (Yaw channel)	F	deg/s	25

4.3.1.2.39a PCPTI_MOD (Aerojet DAP).

- A. Function – This function module integrates the roll command PTI signal to obtain the roll command pulse. The detailed block diagram is presented in Figure 4.3.1.2.39a-1.
- B. Processing Requirements – PCPTI_MOD is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for PCPTI_MOD are shown in Table 4.3.1.2.39a-1.
- D. Constants – The contents for PCPTI_MOD are shown in Table 4.3.1.2.39a-2.
- E. Initialization Requirements – The initialization requirements for PCPTI_MOD are shown in Table 4.3.1.2.39a-3.
- F. Software Configuration – Aerojet DAP Unique.

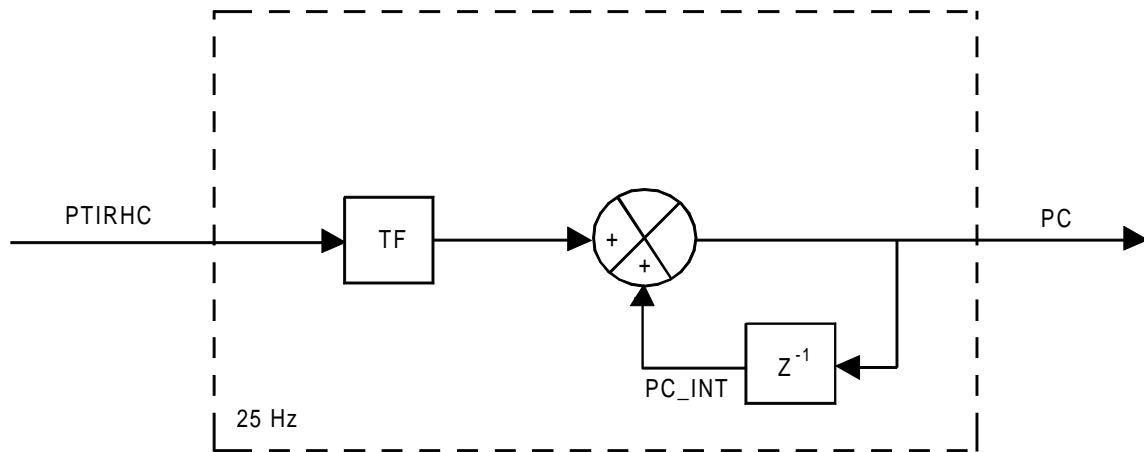


FIGURE 4.3.1.2.39a-1. PCPTI_MOD (Aerojet DAP)

Table 4.3.1.2.39a-1. PCPTI_MOD (Aerojet DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> PTIRHC	Roll command PTI signal	PTI_DRIVER	F	deg/s	12.5
<u>Outputs</u> PC	Roll command PTI pulse	PLOOP, TLM, AXFDCOMP (YAW Channel)	F	deg	25

Table 4.3.1.2.39a-2. PCPTI_MOD (Aerojet DAP) Constants				
Name	Description	Type	MSID/Value	Units
TF	DAP fast cycle time	F	0.04	s

Table 4.3.1.2.39a-3. PCPTI_MOD (Aerojet DAP) Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Integrator	PTI_ACT_D	PTI_ACT_D	PC_INT	0.0

4.3.1.2.40 PLOOP.

A. Function – This function module generates a roll rate error. The detailed block diagram is presented in Figure 4.3.1.2.40-1.

B. Processing Requirements – PLOOP is processed at 25 Hz.

C. Interface Requirements – The interface requirements for PLOOP are shown in Table 4.3.1.2.40-1. Upon termination of a PTI (PTL_ACT_D = ON to OFF), the last value of PC computed by PCPTI_MOD will be used by PLOOP until the next scheduled execution of BANKERR_LIMITER (6.25 Hz) which will compute PC when PTI_ACT_D is off (AUTO only).

D. Constants – None.

E. Initialization Requirements – None.

F. Software Configuration – Common.

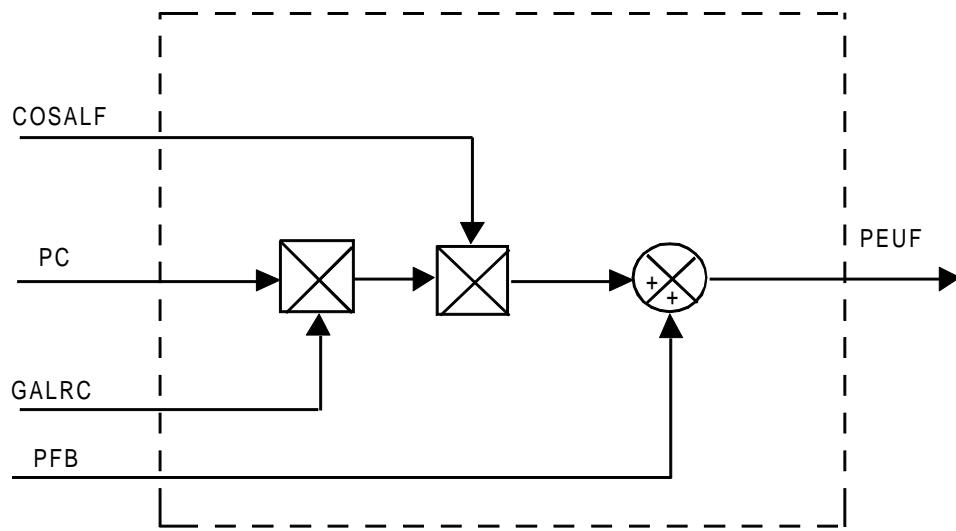


FIGURE 4.3.1.2.40-1. PLOOP

Table 4.3.1.2.40-1. PLOOP Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
PFB	Roll rate feedback	PCOMP	F	deg/s	25
PC	Roll rate command	ROLL_STICK, BANKERR_ LIMITER, PCPTI_MOD	F	deg/s	25 6.25
COSALF	Cosine of alpha	ALPHA_TRIG	F	—	25
GALRC	Roll rate command gain	GALR_CMD	F	—	6.25
<u>Output</u>					
PEUF	Unfiltered roll rate error	ABF, ROLLJET_BBF	F	deg/s	25

4.3.1.2.41 P_STAB_COMP.

- A. Function – This function module computes the roll rate in vehicle stability axes. The detailed block diagram is presented in Figure 4.3.1.2.41-1.
- B. Processing Requirements – P_STAB_COMP is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for P_STAB_COMP are shown in Table 4.3.1.2.41-1.
- D. Constants – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

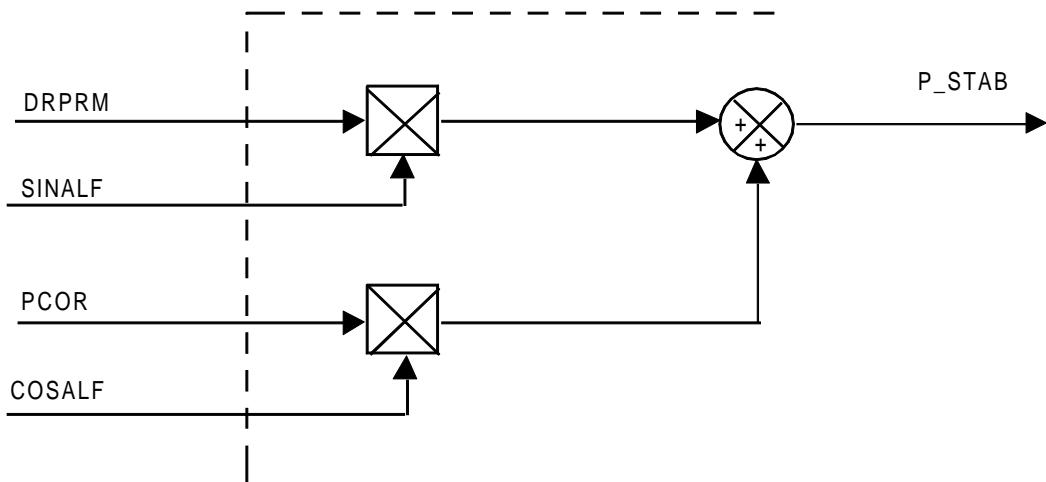


FIGURE 4.3.1.2.41-1. P_STAB_COMP

Table 4.3.1.2.41-1. P_STAB_COMP Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DRPRM	Compensated yaw rate	RCOR (Yaw channel)	F	deg/s	25
PCOR	Compensated roll rate	PCOR_COMP	F	deg/s	25
SINALF	Sine of angle of attack	ALPHA_TRIG	F	—	1.04
COSALF	Cosine of angle of attack	ALPHA_TRIG	F	—	1.04
<u>Outputs</u>					
P_STAB	Roll rate in vehicle stability axes	E/L ADI PROC, TLM (Aerojet only)	F	deg/s	6.25

4.3.1.2.42 QUAD_COMP.

- A. Function – This function module determines the quadratic shaping parameters and limits for parabolic shaping of RHC roll commands. The detailed block diagram is presented in Figure 4.3.1.2.42–1.
- B. Processing Requirements – QUAD_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for QUAD_COMP are shown in Table 4.3.1.2.42–1.
- D. Constants – The constants for QUAD_COMP are shown in Table 4.3.1.2.42–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

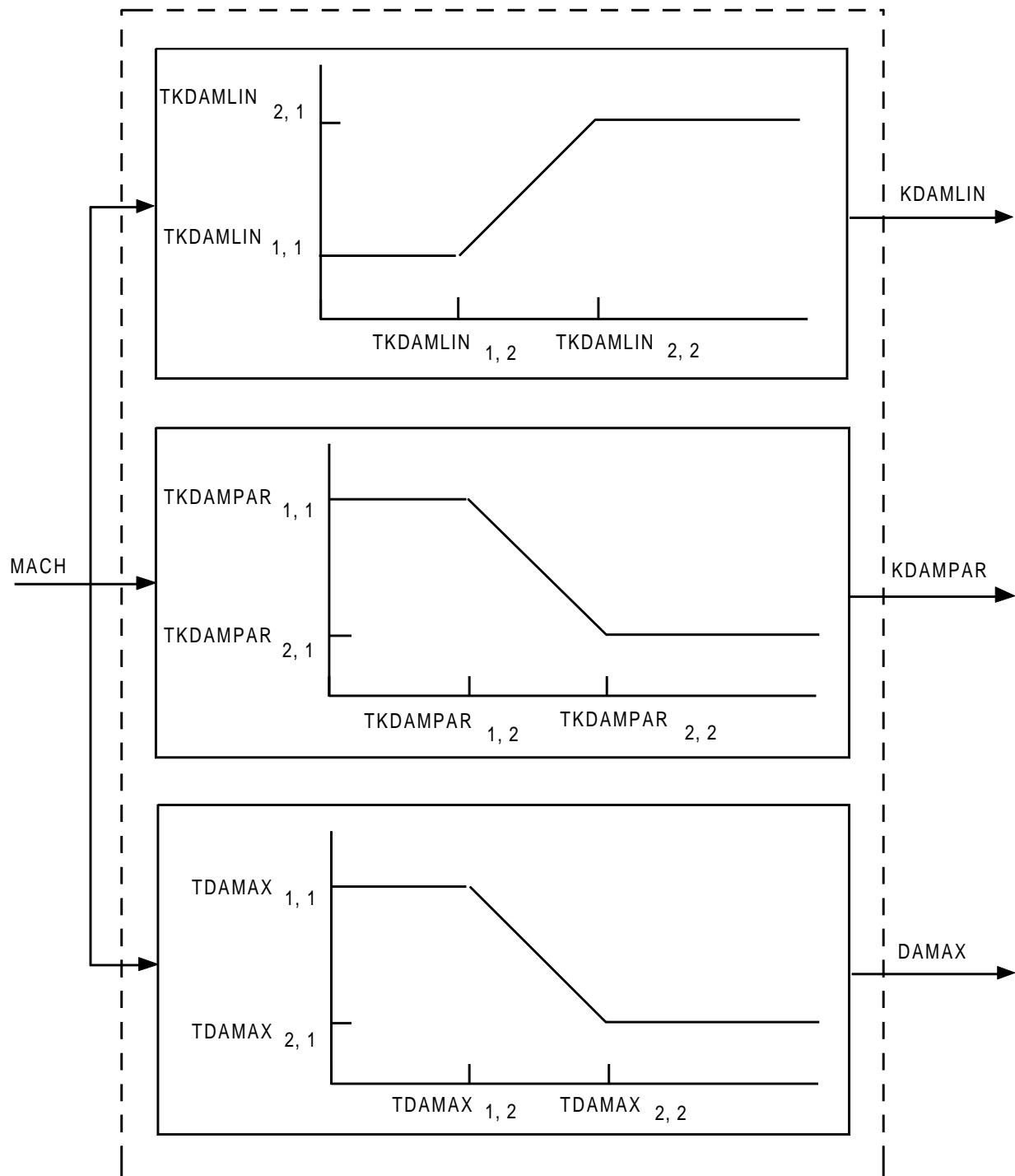


FIGURE 4.3.1.2.42-1. QUAD_COMP

Table 4.3.1.2.42-1. QUAD_COMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
MACH	Mach number	ADTA SOP	F	—	1.04
<u>Outputs</u>					
KDAMLIN	Linear coefficient for parabolic shaping	ROLL_STICK	F	deg/deg	1.04
KDAMPAR	Square term coefficient for parabolic shaping	ROLL_STICK	F	deg/deg**2	1.04
DAMAX	Limit of RHC roll command to which parabolic shaping is applied	ROLL_STICK	F	deg	1.04

Table 4.3.1.2.42-2. QUAD_COMP Constants				
Name	Description	Type	MSID/Value	Units
TKDAMLIN(1,1)	Tabulated KDAMLIN	K	V97U1006C/+2.0 E-01	deg/deg
TKDAMLIN(1,2)	Tabulated Mach	K	V97U1007C/+6.0 E-01	—
TKDAMLIN(2,1)	Tabulated KDAMLIN	K	V97U1008C/+9.324 E-01	deg/deg
TKDAMLIN(2,2)	Tabulated Mach	K	V97U1009C/+1.5 E+00	—
TKDAMPAR(1,1)	Tabulated KDAMPAR	K	V97U1010C/+5.71 E-02	deg/deg**2
TKDAMPAR(1,2)	Tabulated Mach	K	V97U1011C/+6.0 E-01	—
TKDAMPAR(2,1)	Tabulated KDAMPAR	K	V97U1012C/+8.0 E-03	deg/deg**2
TKDAMPAR(2,2)	Tabulated Mach	K	V97U1013C/+1.5 E+00	—
TDAMAX (1,1)	Tabulated DAMAX	K	V97U0897C/+2.3 E+01	deg
TDAMAX (1,2)	Tabulated Mach	K	V97U0898C/+6.0 E-01	—
TDAMAX (2,1)	Tabulated DAMAX	K	V97U0899C/+2.0 E+01	deg
TDAMAX (2,2)	Tabulated Mach	K	V97U0900C/+1.5 E+00	—

4.3.1.2.43 RJPT1_MOD (Aerojet DAP).

- A. Function – This function module integrates the roll PTI signal to obtain the roll pulse. The detailed block diagram is presented in Figure 4.3.1.2.43-1.
- B. Processing Requirements – RJPT1_MOD is processed at 12.5 Hz.
- C. Interface Requirements – The interface requirements for RJPT1_MOD are shown in Table 4.3.1.2.43-1.
- D. Constants – The constants for RJPT1_MOD are shown in Table 4.3.1.2.43-2.
- E. Initialization Requirements – The initialization requirements for RJPT1_MOD are shown in Table 4.3.1.2.43-3.
- F. Software Configuration – Aerojet DAP unique.

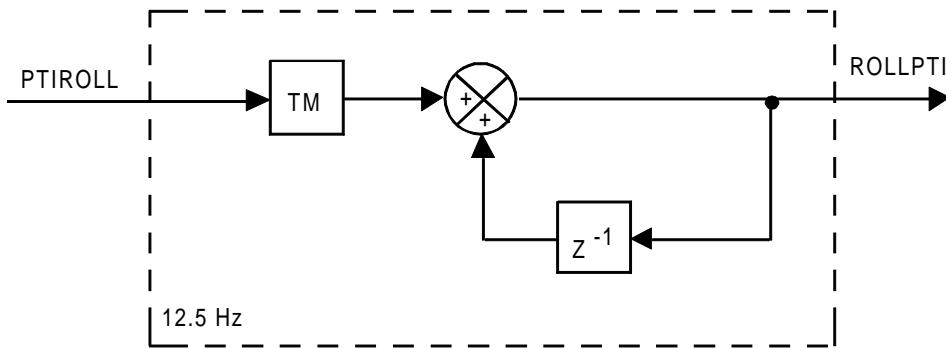


FIGURE 4.3.1.2.43-1. RJPT1_MOD (Aerojet DAP)

Table 4.3.1.2.43-1. RJPTI_MOD (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> PTIROLL	Roll PTI signal	PTI_DRIVER	F	deg/s**2	12.5
<u>Outputs</u> ROLLPTI	Roll PTI pulse	ROLL_SUM	F	deg/s	12.5

Table 4.3.1.2.43-2. RJPTI_MOD (Aerojet DAP) Constants

Name	Description	Type	MSID	Units
TM	DAP medium cycle time	F	0.08	s

Table 4.3.1.2.43-3. RJPTI_MOD (Aerojet DAP) Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Integrator	PTI_ACT	PTI_ACT	ROLL PTI	0.0

4.3.1.2.44 ROLL_HYST (Aerojet DAP).

A. Function – This function module applies hysteresis to the roll RCS command. The detailed block diagram is presented in Figure 4.3.1.2.44-1.

B. Processing Requirements – ROLL_HYST is processed at 12.5 Hz.

C. Interface Requirements – The interface requirements for ROLL_HYST are shown in Table 4.3.1.2.44-1.

D. I-Loads/Constants – The I-loads/constants for ROLL_HYST are shown in Table 4.3.1.2.44-2.

E. Initialization Requirements – The initialization requirements for ROLL_HYST are shown in Table 4.3.1.2.44-3.

F. Software Configuration – Aerojet DAP unique.

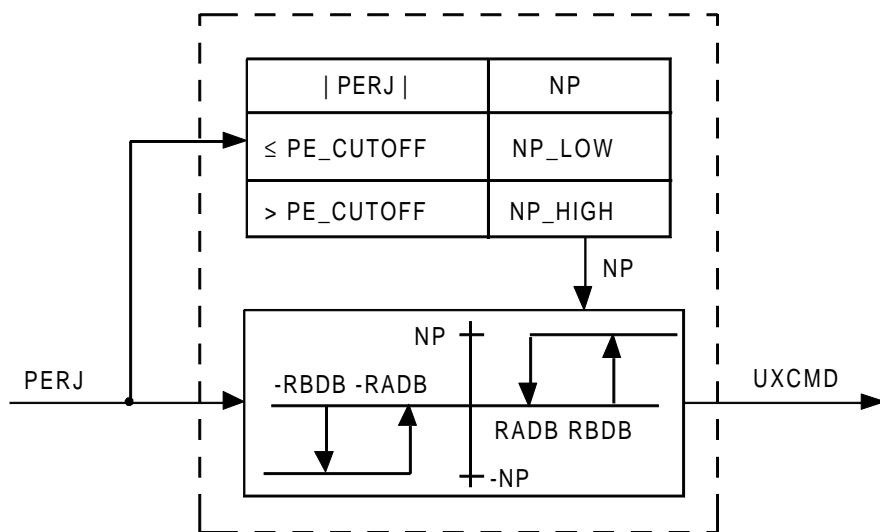


FIGURE 4.3.1.2.44-1. ROLL_HYST (Aerojet DAP)

Table 4.3.1.2.44-1. ROLL_HYST (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> PERJ	Roll rate error for roll jets	ROLL_SUM	F	deg/s	12.5
<u>Outputs</u> UXCMD	Number of roll RCS jets commanded to fire	JSL, RCS ACT LT (4.230)	I	—	12.5

Table 4.3.1.2.44-2. ROLL_HYST (Aerojet DAP) I-Loads/Constants

Name	Description	Type	MSID/Value	Units
PE_CUTOFF	Magnitude of PE at which the number of roll RCS jets selected changes	K	V97U0855C/ +5.00 E-01	deg/s
NP_LOW	Lower number of roll RCS jets selectable	I	V97U0833C	—
NP_HIGH	Higher number of roll RCS jets selectable	I	V97U0832C	—
RADB	Inner deadband	K	V97U1090C/ +3.3 E-01	deg/s
RBDB	Outer deadband	K	V97U1091C/ +3.5 E-01	deg/s

Table 4.3.1.2.44-3. ROLL_HYST (Aerojet DAP) Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Hysteresis	— A	First pass A	*	*

*See Subsection 4.9.5
A = ENTRY • (LOWQ + LOWMIDQ)

4.3.1.2.45 ROLLJET_BBF.

- A. Function – This function module applies a fourth-order bending filter to the roll rate error used to determine the roll jet command. The detailed block diagram is shown in Figure 4.3.1.2.45–1.
- B. Processing Requirements – ROLLJET_BBF is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for ROLLJET_BBF are shown in Table 4.3.1.2.45–1.
- D. I-Loads – The I-loads for ROLLJET_BBF are shown in Table 4.3.1.2.45–2.
- E. Initialization Requirements – The initialization requirements for ROLLJET_BBF are shown in Table 4.3.1.2.45–3.
- F. Software Configuration – Common.

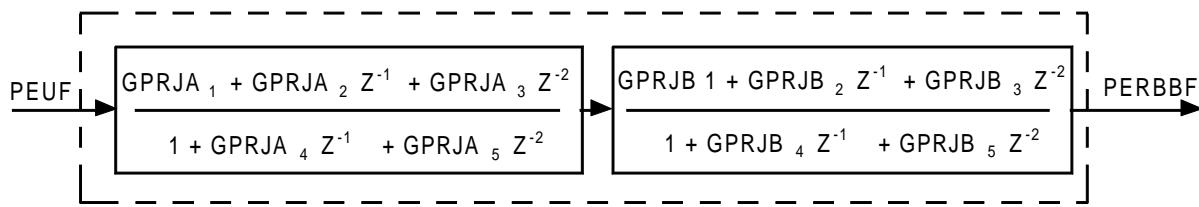


FIGURE 4.3.1.2.45-1. ROLLJET_BBF

Table 4.3.1.2.45-1. ROLLJET_BBF Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> PEUF	Unfiltered roll rate error	PLOOP	F	deg/s	25
<u>Outputs</u> PERBBF	Roll rate error for roll jets	ROLL_QUANT, ROLL_SUM	F	deg/s	25

Table 4.3.1.2.45-2. ROLLJET_BBF I-Loads				
Name	Description	Type	MSID	Units
GPRJA(1)	Filter coefficient	F	V96U9594C	—
GPRJA(2)	Filter coefficient	F	V96U9595C	—
GPRJA(3)	Filter coefficient	F	V96U9596C	—
GPRJA(4)	Filter coefficient	F	V96U9597C	—
GPRJA(5)	Filter coefficient	F	V96U9598C	—
GPRJB(1)	Filter coefficient	F	V96U9599C	—
GPRJB(2)	Filter coefficient	F	V96U9600C	—
GPRJB(3)	Filter coefficient	F	V96U9601C	—
GPRJB(4)	Filter coefficient	F	V96U9602C	—
GPRJB(5)	Filter coefficient	F	V96U9603C	—

Table 4.3.1.2.45-3. ROLLJET_BBF Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Fourth-order filter	— A	First pass A	Node	*
*See Subsection 4.9.3 A = ENTRY • (LOWQ + LOWMIDQ)				

4.3.1.2.46 ROLL_STICK.

A. Function – This function module applies parabolic shaping, limiting, filtering, and scaling to the RHC roll command. It also converts the RHC roll trim command into a roll acceleration signal. This signal is integrated and limited to form a roll trim rate. Both of these processed RHC commands are then summed. The detailed block diagram is presented in Figure 4.3.1.2.46–1.

B. Processing Requirements – ROLL_STICK is processed at 25 Hz.

C. Interface Requirements – The interface requirements for ROLL_STICK are shown in Table 4.3.1.2.46–1.

D. I-Loads/Constants – The I-loads/constants for ROLL_STICK are shown in Table 4.3.1.2.46–2.

E. Initialization Requirements – The initialization requirements for ROLL STICK are shown in Table 4.3.1.2.46–3.

F. Software Configuration – Common.

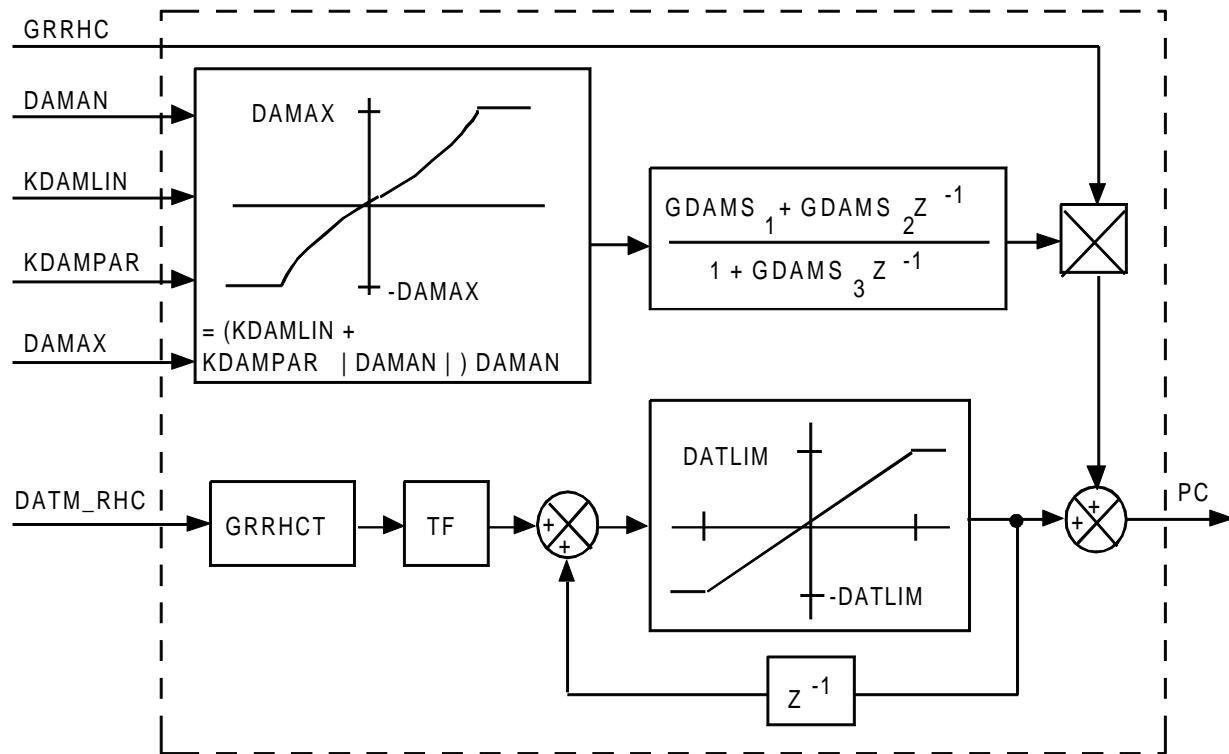


FIGURE 4.3.1.2.46-1. ROLL_STICK

Table 4.3.1.2.46-1. ROLL_STICK Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DAMAN	RHC roll command	2-AX RHC SOP	F	deg	25
DATM_RHC	RHC roll trim command	2-AX RHC SOP	I	—	6.25
KDAMLIN	Linear coefficient in parabolic shaping	QUAD_COMP	F	deg/deg	1.04
KDAMPAR	Square term coefficient in parabolic shaping	QUAD_COMP	F	deg/deg**2	1.04
DAMAX	Limit of RHC roll command to which parabolic shaping is applied	QUAD_COMP	F	deg	1.04
GRRHC	Gain used to convert the filtered RHC roll rate command	GRRHC_COMP	F	deg/s/deg	1.04
<u>Outputs</u>					
PC	Roll rate command	PLOOP, AXFDCOMP, TLM (Yaw channel)	F	deg/s	25

Table 4.3.1.2.46-2. ROLL_STICK I-Loads/Constants

Name	Description	Type	MSID/Value	Units
GDAMS(1)	Filter coefficient	K	V97U0687C/ +3.2968 E-01	—
GDAMS(2)	Filter coefficient	K	V97U0688C/ +0.0 E+00	—
GDAMS(3)	Filter coefficient	K	V97U0689C/ -6.7032 E-01	—
GRRHCT	Converts beep trim to a trim acceleration	K	V97U0769C/ +6.0 E-01	deg/s**2
DATLIM	RHC roll trim rate limit	F	V97U0615C	deg/s
TF	DAP fast cycle time	F	0.040	s

Table 4.3.1.2.46-3. ROLL_STICK Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
First-order filter	— CSS_BANK	First pass CSS_BANK	Node	*
Integrator	— CSS_BANK	First pass CSS_BANK	Output	0.0

*See Subsection 4.9.1

4.3.1.2.47 ROLL_SUM (Aerojet DAP).

A. Function – This function module will sum the filtered roll jet error signal with the roll jet PTI pulse. The detailed block diagram is presented in Figure 4.3.1.2.47-1.

B. Processing Requirements – ROLL_SUM is processed at 12.5 Hz.

C. Interface Requirements – The interface requirements for ROLL_SUM are shown in Table 4.3.1.2.47-1.

D. Constants – None.

E. Initialization Requirements – None.

F. Software Configuration – Aerojet DAP unique.

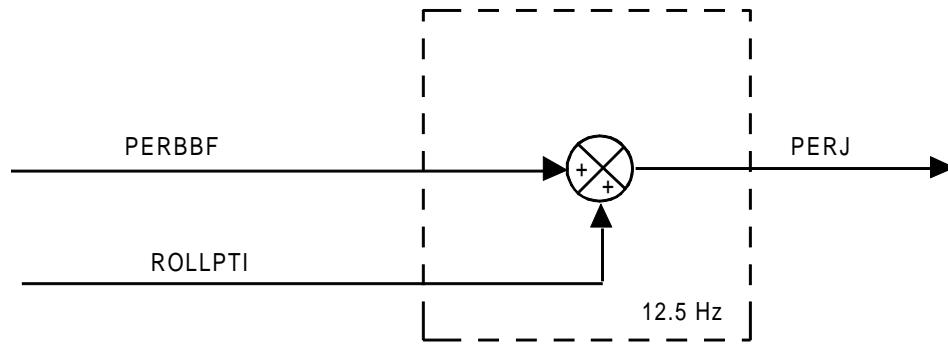


FIGURE 4.3.1.2.47-1. ROLL_SUM (Aerojet DAP)

Table 4.3.1.2.47-1. ROLL_SUM (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> ROLLPTI	Roll jet PTI pulse	RJPTI_MOD	F	deg/s	12.5
PERBBF	Filtered roll jet error signal	ROLLJET_BBF	F	deg/s	25
<u>Outputs</u> PERJ	Final roll jet error signal	ROLL_HYST	F	deg/s	12.5

4.3.1.2.48 TAEM_BANKC_SMOOTH.

- A. Function – This function module smooths the roll angle command from GRTLS guidance. The detailed block diagram is presented in Figure 4.3.1.2.48-1.
- B. Processing Requirements – TAEM_BANKC_SMOOTH is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for TAEM_BANKC_SMOOTH are shown in Table 4.3.1.2.48-1.
- D. Constants – The constants for TAEM_BANKC_SMOOTH are shown in Table 4.3.1.2.48-2.
- E. Initialization Requirements – The initialization requirements for TAEM_BANKC_SMOOTH are shown in Table 4.3.1.2.48-3.
- F. Software Configuration – Common (input and initialization Entry/GRTLS dependent).

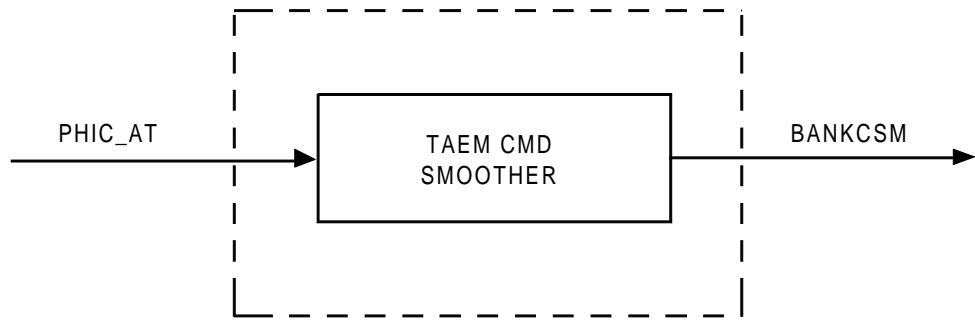


FIGURE 4.3.1.2.48-1. TAEM_BANKC_SMOOTH

Table 4.3.1.2.48-1. TAEM_BANKC_SMOOTH Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> PHIC_AT	Euler roll angle command, auto TAEM	GRTLS TAEM GUID TAEM GUID	F F	deg deg	1.04 1.04
<u>Outputs</u> BANKCSM	Smoothed Euler roll angle command	BANK_SUM	F	deg	6.25

Table 4.3.1.2.48-2. TAEM_BANKC_SMOOTH Constants				
Name	Description	Type	Value	Units
TG	Time increment between TAEM and GRTLS TAEM guidance updates	F	0.960	s
TS	DAP slow cycle time	F	0.160	s

Table 4.3.1.2.48-3. TAEM_BANKC_SMOOTH Initialization Requirements				
Component	Initialize on Transition		Variable*	Initial Value
	From	To		
Smoothen	—	First invocation	XOUT	PHI**
	CSS_BANK	AUTO_BANK	XPINV	PHI
	ETSEP	IPHASEB = 6 ⁺	XOUT XPINV	PHI PHI

* See Subsection 4.9.6
 ** PHI defined in Table 4.3.1.2-2
 + GRTLS DAP only

4.3.1.3 Yaw Channel Control Modules.

- A. Functional Requirements – The yaw channel control laws are presented in block diagram form in Figure 4.3.1.3–1. The yaw channel provides yaw attitude control and lateral control by means of the yaw RCS jets and the rudder.
- B. Function Modules – The function modules that make up the yaw channel control laws are described in this subsection in the order shown in Table 4.3.1.3–1.
- C. Sequencing Requirements – The sequencing requirements for the yaw channel function modules may be inferred from Figure 4.3.1.3–1.
- D. Interface Requirements – The interface requirements for the yaw channel, are presented in Table 4.3.1.3–2.
- E. Constants – None.
- F. Initialization Requirements. The initialization requirements for the yaw channel are presented in Table 4.3.1.3–3.

Table 4.3.1.3-1. Yaw Channel Modules

Module	Subsection
AXFDCOMP	4.3.1.3.1
BETACOSALF	4.3.1.3.2
BETA_FILTER	4.3.1.3.3
BYCOR	4.3.1.3.4
DELRF_COMP	4.3.1.3.5
DRPTI_MOD (Aerojet DAP)	4.3.1.3.6
DRT_INT	4.3.1.3.7
ESTIMATED_BETA	4.3.1.3.8
GDM	4.3.1.3.9
GDRC_COMP	4.3.1.3.10
GNYDRM_COMP	4.3.1.3.11
GRAY_COMP	4.3.1.3.13
GRCSA_MOD	4.3.1.3.14
GRH_COMP	4.3.1.3.15
GTRR_COMP	4.3.1.3.16
KRMBETA_COMP	4.3.1.3.17
KYAIL_COMP	4.3.1.3.18
NYCOMP	4.3.1.3.19
NY_COSALF	4.3.1.3.20
PNY_COMP	4.3.1.3.21
RCOMP	4.3.1.3.22
RCOR	4.3.1.3.23
RRCS_FEED	4.3.1.3.24
RUDCMD (Aerojet DAP)	4.3.1.3.25
RUDCMD (GRTLS DAP)	4.3.1.3.26
RUD_INT	4.3.1.3.27
RUDSHAPE	4.3.1.3.28
WRAP_COMP (Aerojet DAP)	4.3.1.3.28a
WRAP_QUANT (Aerojet DAP)	4.3.1.3.28b
YAW_HYST (Aerojet DAP)	4.3.1.3.29
YAW_RATE_BBF	4.3.1.3.29a
YAWJET_BBF	4.3.1.3.30
YAW_SUM (Aerojet DAP)	4.3.1.3.31
YBB_FILTER	4.3.1.3.32
YJPTI_MOD (Aerojet DAP)	4.3.1.3.33

NOTE: Additional yaw channel function included in Figure 4.3.1.3-1 and in Table 4.3.1.3-2 are included in Section 4.7.

Table 4.3.1.3-2. Yaw Channel Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
AL	Autoland flag	RECON	D	–	6.25
ALPHA	Angle of attack	ADTA SOP	F	deg	1.04
ALT_ZERO_YAWJET	Mach YAWJET termination discrete	RECON	D	–	6.25
BETA_N	Inertial sideslip angle	A/E ATT PROC	F	deg	6.25
CONT_3EO_START	Contingency 3 engines out start flag	CONT 3E/O GUID	D	–	6.25
COSALF	Cosine of alpha	ALPHA_TRIG (Roll channel)	F	–	1.04
COSTH	Cosine of theta	A/E ATT PROC	F	–	6.25
DRMAN	Rudder pedal command	RPTA SOP	F	deg	6.25
DRT	Manual yaw trim command	RPTA SOP	I	–	6.25
EARLY	Low gain downmode discrete	RECON	D	–	6.25
EBFB ₁	Roll attitude error component of attitude error vector (EBFB)	G/C STEER	F	deg	12.5
EBFB ₃	Yaw attitude error component of attitude error vector (EBFB)	G/C STEER	F	deg	12.5
ETSEP	External tank separation flag	RECON	D	–	6.25
ETSEP_Y_ENABLE	Yaw axis control enable	RECON	D	–	6.25
FLATTURN	Buffered FLATTURN command	RECON	D	–	6.25
GERYFWDS	R/Y forward loop downmoding gain factor	Roll channel	F	–	6.25
HYST_FLAG	Yaw hysteresis discrete	RECON	D	–	6.25
LATE	No yaw jet downmode discrete	RECON	D	–	6.25
MACH	Mach number	ADTA SOP	F	–	1.04
MACH_REGIME_RUDDER	Mach regime for rudder trim	RECON	D	–	6.25
MC	Mated coast flag	RECON	D	–	6.25
MODE_BANK	Bank mode indicator	RECON	D	–	6.25
MRB_RRXF	Roll rate crossfeed switch	RECON	D	–	6.25
MRB_RUDE	Mach regime for zero rudder trim	RECON	D	–	6.25
MRB_RUDL	Mach regime for rudder trim	RECON	D	–	6.25
NY	Lateral acceleration feedback	SF	F	g	25
P	Roll rate feedback	SF	F	deg/s	25
PC	Roll rate command	Roll channel	F	deg/s	25
PCOR	Compensated roll rate feedback	PCOR_COMP (Roll channel)	F	deg/s	25
PTI_WRAP	PTI wraparound mode discrete	PTI_DRIVER	D	–	12.5

Table 4.3.1.3-2. Yaw Channel Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
ROLLOUT	Buffered ROLLOUT_IND discrete	RECON	D	–	6.25
ENTRY	Entry phase flag	RECON	D	–	6.25
TAEM	TAEM phase flag	RECON	D	–	6.25
QBAR	Dynamic pressure	ADTA SOP	F	lb/ ft**2	1.04
QBARFC	Dynamic pressure for FCS	Pitch Channel	F	lb/ ft**2	1.04
QBAR_REGIME	Range of QBAR indicator	RECON	I	–	6.25
R	Yaw rate feedback	SF	F	deg/s	25
RC	Guidance yaw rate command	A/L GUID	F	deg/s	6.25
SINALF	Sine of alpha	ALPHA_TRIG (Roll channel)	F	–	1.04
SINPHI	Sine of phi	A/E ATT PROC	F	–	6.25
TAS	True airspeed	ADTA SOP	F	ft/s	1.04
TURN_COORD	Turn coordination indicator	RECON	D	–	6.25
WFBI_FB ₃	Yaw rate command component of angular rate command vector (WFBI_FB)	G/C STEER	F	deg/s	12.5
WOWLON	Buffered WOWLON_IND	RECON	D	–	6.25
WRAP	Wraparound mode discrete	RECON	D	–	6.25
YAW_RCS_FLAG	Yaw RCS discrete	RECON	D	–	6.25
ZERO_YAWJET	Channel moding discrete	RECON	D	–	6.25
PTI_ACT	Flag indicating an AEROJET DAP PTI is in progress	PTI_DRIVER	D	–	12.5
PTI_RUD	PTI rudder command	PTI_DRIVER	F	ND	12.5
PTI_YAW	PTI aft jaw jet command	PTI_DRIVER	F	ND	12.5
<u>Outputs</u>					
BETAF	Filtered beta	BETASINALF (Roll channel)	F	deg	6.25
BETAF DC	Filtered sideslip angle	E/L ADI PROC	F	deg	6.25
PDAY	Commanded yaw rate	NY_SINALF (Roll channel)	F	deg/s	25
DRC	Rudder command	PRIORATE_ LIMITING	F	deg	25
DRPHI	Turn coordination yaw rate component	QCOMP (Pitch channel)	F	deg/s	6.25
DRPRM	Compensated yaw rate	PCOMP P_STAB_COMP (Roll channel)	F	deg/s	25

Table 4.3.1.3-2. Yaw Channel Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
DRRCFJ	Yaw jet yaw rate command	DRRC_LIM (Roll channel)	F	deg/s	25
DRTI	Lateral acceleration trim	ENTRY TRAJ n (1-5), VERT SIT n DISP (1-2)	F	g	6.25
DRCPF	Preliminary Rudder Command	TLM	F	deg	25
DAY		TLM			25
DRTRIM	Integral rudder trim	VERT SIT n DISP (1-2), ENTRY TRAJ n (1-5)	F	deg	25
NYP	Buffered lateral acceleration	DNYP_COMP (Roll channel)	F	g	25
RMBETA	Estimated sideslip angle	ADTA RM	F	deg	6.25
R_STAB	Yaw rate in stability axes	E/L ADI PROC, TLM (Aerojet only)	F	deg/s	25
UZCMD	Quantized yaw error signal	JSL RCS ACT LT, TLM	I	-	12.5
DRJET_MC	Yaw error signal, MC	JSL	F	deg/s	12.5

Table 4.3.1.3-3. Yaw Channel Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
BETAF	HIGHQ	HIGHQ	0.0	BETA
DAY	—	First-pass	0.0	
DAY	HIGHQ	HIGHQ	0.0	Commanded, yaw rate
DRCP	—	First-pass	0.0	Yaw jets to rudder
DRCP	—	Other	0.0	crossfeed
DRCPF	—	First-pass	0.0	Preliminary rudder command
DRJET	Other	Late	0.0	Yaw rate error
DRMS	—	First-pass	0.0	Shaped and scaled rudder
	A	Other	0.0	pedal command
DRPHI	TURN_COORD	TURN_COORD	0.0	Steady-state turn coordination component
DRTI	MRB_RUDE	MRB_RUDL	0.0	Integrated yaw panel trim
DRTRIM	—	First pass	0.0	Integral rudder trim
NYP	TURN_COORD	TURN_COORD	0.0	Buffered lateral acceleration
RCP	B	C	0.0	Buffered yaw rate command
RI (Entry)	—	D	0.0	Rudder trim rate
RI (GRTLS)	—	E	0.0	Rudder trim rate
UZCMD	ALT_ZERO_YAWJET	ALT_ZERO_YAWJET	0.0	Yaw RCS command
UZCMD	—	Other	0.0	
A = CSS_BANK MRB_RUDL B = AL • AUTO_BANK C = AL + CSS_BANK D = (FLATTURN + PTI_ACT) E = (FLATTURN + MC + ETSEP)				

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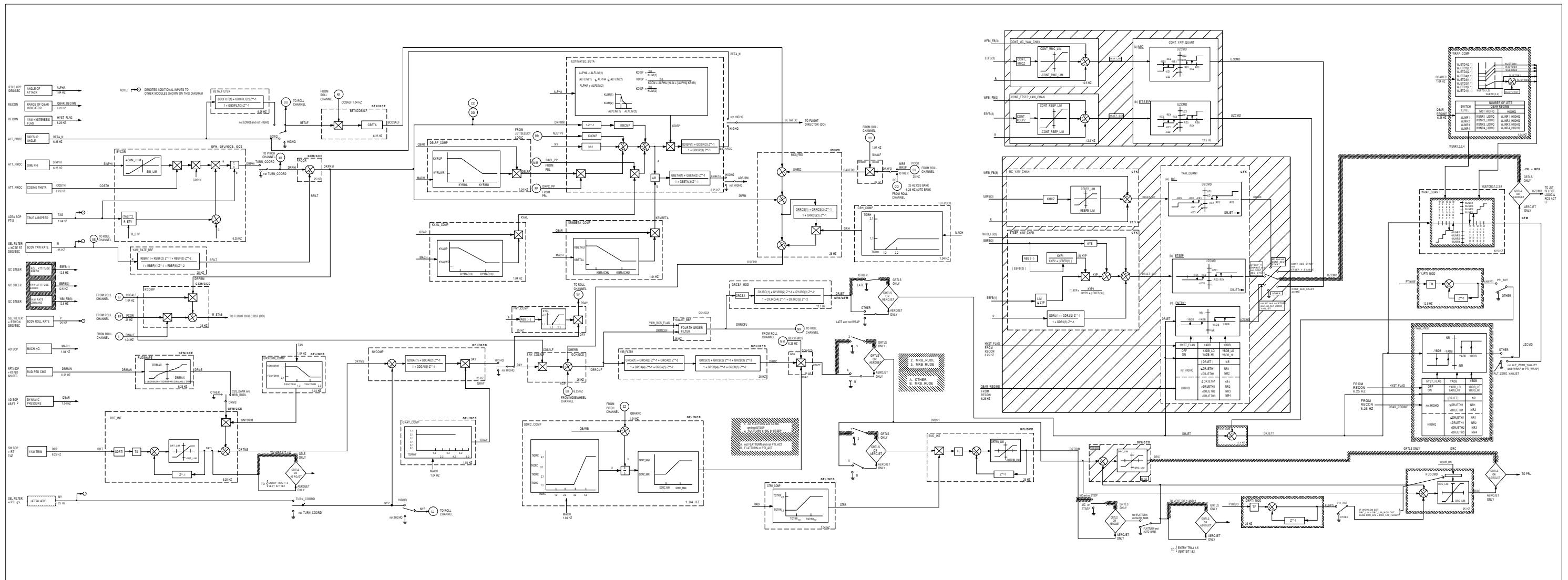


FIGURE 4.3.1.3-1. Yaw Channel

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4.3.1.3.1 AXFDCOMP.

A. Function – This function module computes the yaw rate command. The detailed block diagram is presented in Figure 4.3.1.3.1–1.

B. Processing Requirements – AXFDCOMP is processed at 25 Hz.

C. Interface Requirements – The interface requirements for AXFDCOMP are shown in Table 4.3.1.3.1–1. Upon termination of a PTI (PTI_ACT_D = ON to OFF), the last value of PC (DAXFD) computed by PCPTI_MOD will be used by AXFDCOMP (when the flag MRB_RRXF is off) until the next scheduled execution of BANKERR_LIMITER (6.25 Hz) which will compute PC (DAXFD) when PTI_ACT_D is off (AUTO only).

D. Constants – None.

E. Initialization Requirements – None.

F. Software Configuration – Common.

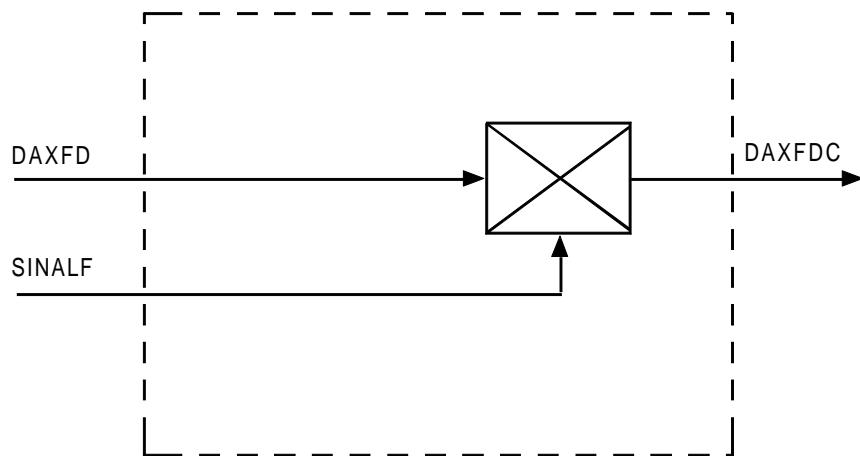


FIGURE 4.3.1.3.1-1. AXFDCOMP

Table 4.3.1.3.1-1. AXFDCOMP Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DAXFD	Roll rate command crossfeed	BANKEER_LIMITER (Roll channel), ROLL_STICK (Roll channel), PCOR_COMP, PCPTI_MOD (Roll channel)	F F F	deg/s deg/s deg/s	6.25 25 25
SINALF	Sine of alpha	ALPHA_TRIG (Roll channel)	F	—	1.04
<u>Outputs</u>					
DAXFDC	Yaw rate command	RRCS_FEED	F	deg/s	25

4.3.1.3.2 BETACOSALF.

- A. Function – This function module computes the product of the BETAF and the cosine of ALPHA. The detailed block diagram is presented in Figure 4.3.1.3.2–1.
- B. Processing Requirements – BETACOSALF is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for BETACOSALF are shown in Table 4.3.1.3.2–1.
- D. I-Loads – The I-loads for BETACOSALF are listed in Table 4.3.1.3.2–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

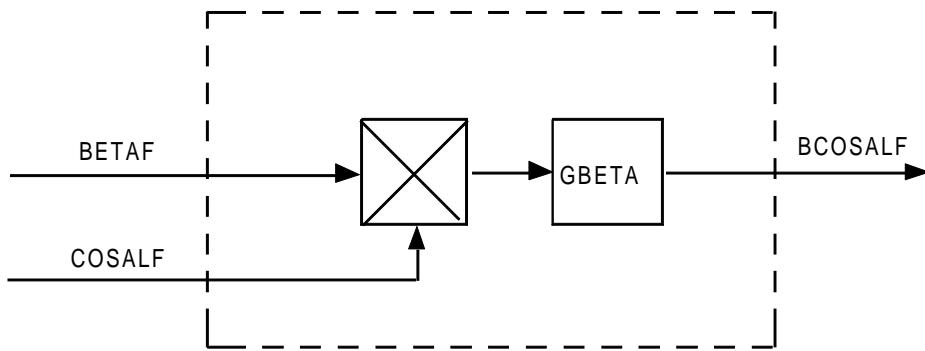


FIGURE 4.3.1.3.2-1. BETACOSALF

Table 4.3.1.3.2-1. BETACOSALF Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
BETAF	BETA	BETA_FILTER, A/E ATT PROC	F	deg	6.25
COSALF	Cosine of ALPHA	ALPHA_TRIG (Roll channel)	F	—	1.04
<u>Outputs</u>					
BCOSALF	Component of BETAF normal to	RRCS_FEED	F	deg/s	6.25

Table 4.3.1.3.2-2. BETACOSALF I-Loads

Name	Description	Type	Value	Units
GBETA	BETACOSALF scale factor	F	V97U1140C	(deg/sec)/deg

4.3.1.3.3 BETA_FILTER.

- A. Function – This function applies a first-order filter dependent on QBARFC to remove the Beta steady-state effects during low q-bar regime. The detailed block diagram is presented in Figure 4.3.1.3.3-1.
- B. Processing Requirements – BETA_FILTER is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for BETA_FILTER are shown in Table 4.3.1.3.3-1.
- D. Constants – The constants for BETA_FILTER are listed in Table 4.3.1.3.3-2.
- E. Initialization Requirements – Initialization requirements for .BETA_FILTER are shown in Table 4.3.1.3.3-3
- F. Software Configuration – Common.

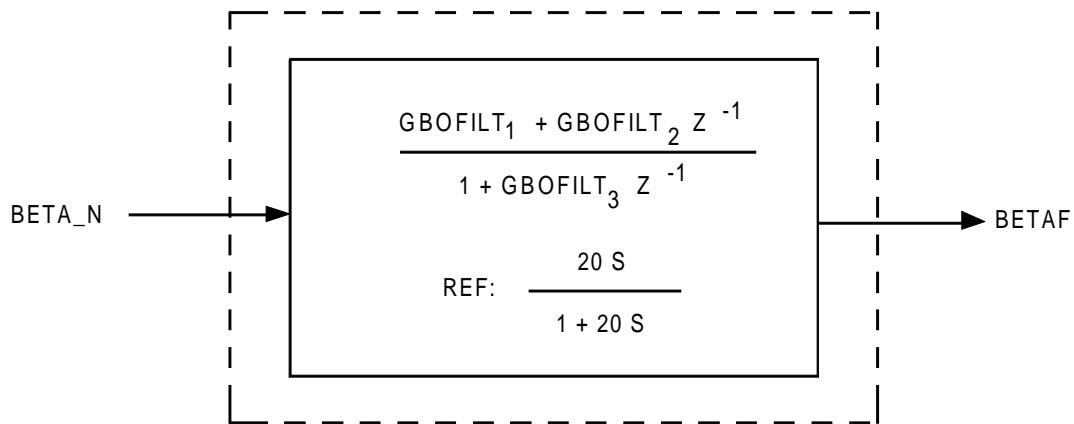


FIGURE 4.3.1.3.3-1. BETA_FILTER

Table 4.3.1.3.3-1. BETA_FILTER Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> BETA_N	Unfiltered sideslip angle	A/E ATT PROC	F	deg	6.25
<u>Outputs</u> BETAF	Filtered sideslip angle	ROLL CHANNEL BETACOSALF	F	deg	6.25

Table 4.3.1.3.3-2. BETA_FILTER Constants

Name	Description	Type	MSID/Value	Units
GBOFILT1	Filter coefficient	K	V99U7410C/ +9.96016 E-01	—
GBOFILT2	Filter coefficient	K	V99U7411C/ -9.96016 E-01	—
GBOFILT3	Filter coefficient	K	V99U7412C/ -9.92032E-01	—

Table 4.3.1.3.3-3. BETA_FILTER Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
First-order filter	LOWQ + HIGHQ	$\overline{\text{LOWQ}} \cdot \overline{\text{HIGHQ}}$	Node	*
* See Subsection 4.9.1				

4.3.1.3.4 BYCOR.

A. Function – This function module computes the steady state turn correction for the yaw rate feedback. The detailed block diagram is presented in Figure 4.3.1.3.4–1.

B. Processing Requirements – BYCOR is processed at 6.25 Hz.

C. Interface Requirements – The interface requirements for BYCOR are shown in Table 4.3.1.3.4–1.

D. I-Loads/Constants – The I-loads/constants for BYCOR are shown in Table 4.3.1.3.4–2.

E. Initialization Requirements – None.

F. Software Configuration – Common.

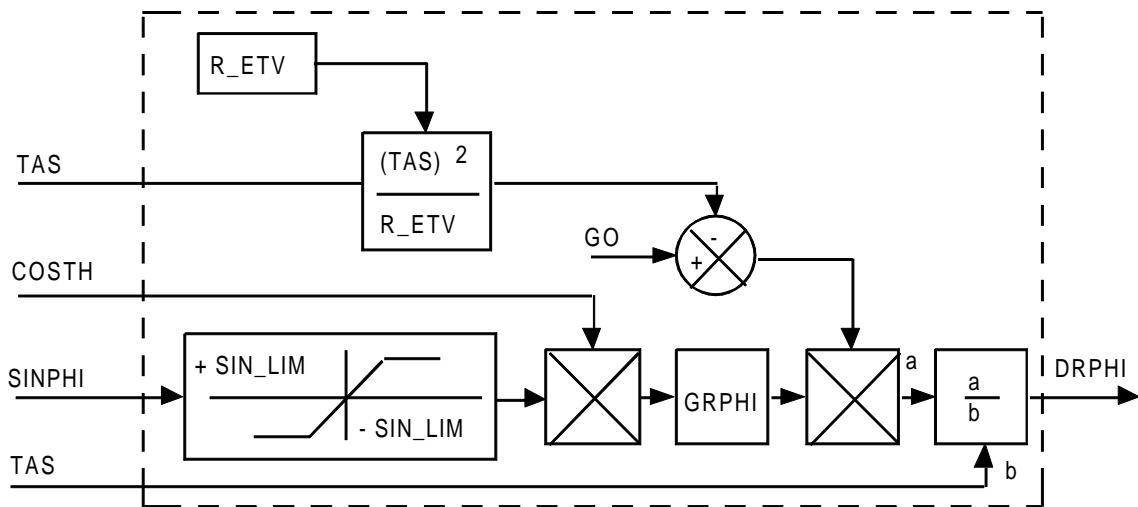


FIGURE 4.3.1.3.4-1. BYCOR

Table 4.3.1.3.4-1. BYCOR Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
SINPHI	Sine of PHI	A/E ATT PROC	F	—	6.25
COSTH	Cosine of THETA	A/E ATT PROC	F	—	6.25
TAS	True airspeed	ADTA SOP	F	ft/s	1.04
<u>Outputs</u>					
DRPHI	Steady-state turn coordination component	RCOR, QCMP (Pitch channel)	F	deg/s	6.25

Table 4.3.1.3.4-2. BYCOR I-Loads/Constants

Name	Description	Type	MSID/ Value	Units
GRPHI	Turn coordination scaling factor	K	V97U1089C/ +5.73 E+01	deg
GO	Gravity constant	F	32.17405	ft/s**2
R_ETV	Distance from center of earth to vehicle	K	V98U9683C/ +2.13 E+07	ft
SIN_LIM	Limit on sine of PHI	F	V97U1128C	—

4.3.1.3.5 DELRF_COMP.

A. Function – This function computes the lateral acceleration due to side force induced by rudder deflection. The detailed block diagram is presented in Figure 4.3.1.3.5–1.

B. Processing Requirements – DELRF_COMP is processed at 1.04 Hz.

C. Interface Requirements – The interface requirements for DELRF_COMP are shown in Table 4.3.1.3.5–1.

D. Constants – The constants for DELRF_COMP are shown in Table 4.3.1.3.5–2.

E. Initialization Requirements – None.

F. Software Configuration – Common.

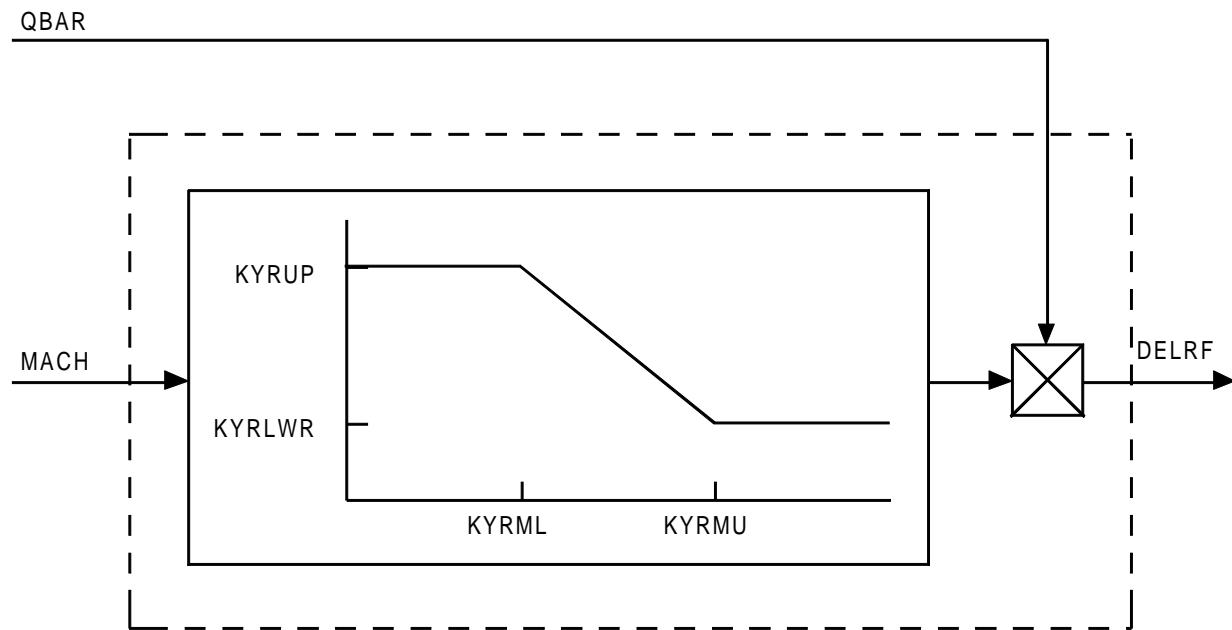


FIGURE 4.3.1.3.5-1. DELRF_COMP

Table 4.3.1.3.5-1. DELRF_COMP Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
Mach	Mach number	ADTA SOP	F	—	1.04
QBAR	Dynamic pressure	ADTA SOP	F	lb/ft ²	1.04
<u>Output</u>					
DELRF	Rudder acceleration factor	ESTIMATED_BETA	F	ft/s ² /deg	1.04

Table 4.3.1.3.5-2. DELRF_COMP Constants

Name	Description	Type	MSID/Value	Units
KYRUP	Tabulated KYR	K	V97U8735C/+1.2 E-03	(ft ³ /s ²)/(deg-lb)
KYRLWR	Tabulated KYR	K	V97U8736C/+4.0 E-04	(ft ³ /s ²)/(deg-lb)
KYRML	Tabulated MACH	K	V97U8737C/+9.0 E-01	ND
KYRMU	Tabulated MACH	K	V97U8738C/+2.3 E+00	ND

4.3.1.3.6 DRPTI_MOD (Aerojet DAP).

- A. Function – This function module integrates the rudder PTI signal to obtain the rudder pulse. The detailed block diagram is presented in Figure 4.3.1.3.6–1.
- B. Processing Requirements – DRPTI_MOD is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for DRPTI_MOD are shown in Table 4.3.1.3.6–1.
- D. Constants – The constants for DRPTI_MOD are shown in Table 4.3.1.3.6–2.
- E. Initialization Requirements – The initialization requirements for DRPTI_MOD are shown in Table 4.3.1.3.6–3.
- F. Software Configuration – Aerojet DAP unique.

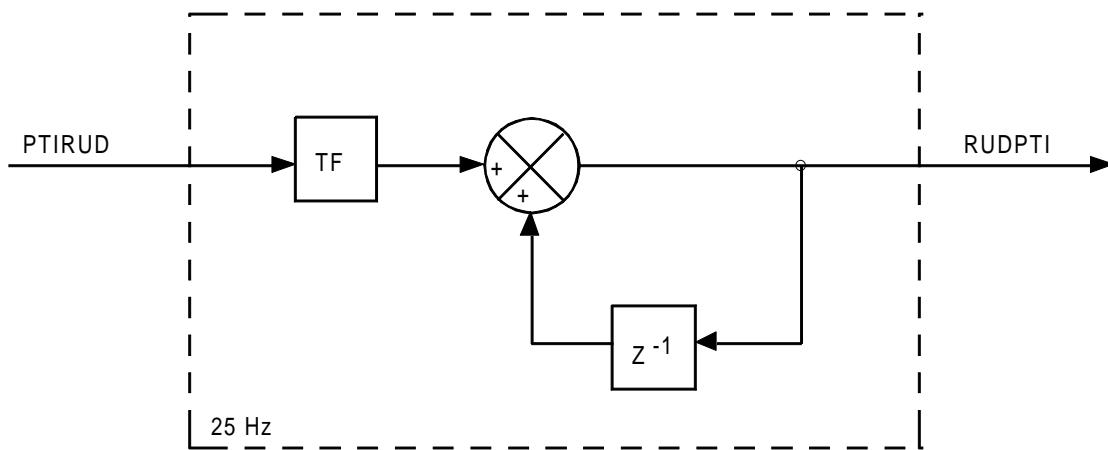


FIGURE 4.3.1.3.6-1. DRPTI_MOD (Aerojet DAP)

Table 4.3.1.3.6-1. DRPTI_MOD (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> PTIRUD	Rudder PTI signal	PTI_DRIVER	F	deg/s	12.5
<u>Output</u> RUDPTI	Rudder PTI pulse	RUDCMD	F	deg	25

Table 4.3.1.3.6-2. DRPTI_MOD (Aerojet DAP) Constants

Name	Description	Type	Value	Units
TF	DAP fast cycle time	F	0.04	S

Table 4.3.1.3.6-3. DRPTI_MOD (Aerojet DAP) Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Integrator	PTI_ACT	$\overline{\text{PTI}_\text{ACT}}$	RUDPTI	0.0

4.3.1.3.7 DRT_INT.

A. Function – This function module converts yaw beep trim into a lateral acceleration bias and applies rectangular integration. This resultant trim command is then summed with the shaped rudder pedal command. The detailed block diagram is presented in Figure 4.3.1.3.7–1.

- B. Processing Requirements – DRT_INT is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for DRT_INT are shown in Table 4.3.1.3.7–1.
- D. Constants – The constants for DRT_INT are shown in Table 4.3.1.3.7–2.
- E. Initialization Requirements – The initialization requirements for DRT_INT are shown in Table 4.3.1.3.7–3.
- F. Software Configuration – Common.

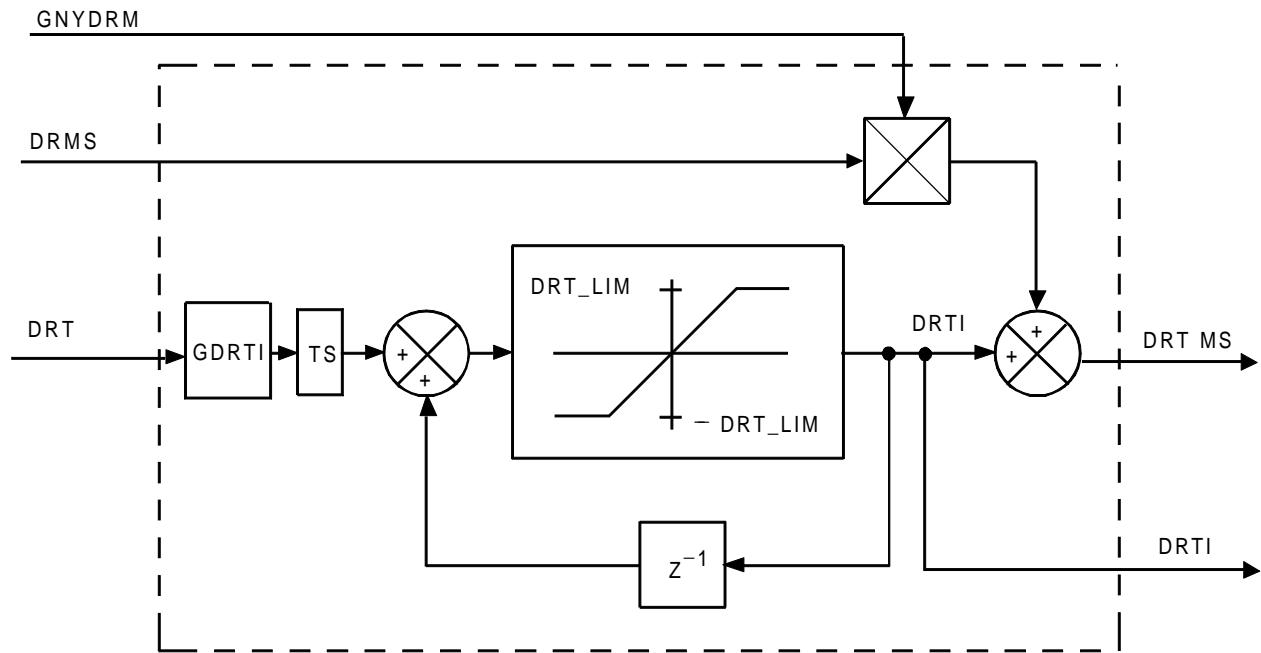


FIGURE 4.3.1.3.7-1. DRT_INT

Table 4.3.1.3.7-1. DRT_INT Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DRT	Manual yaw trim command	RPTA SOP	I	—	6.25
DRMS	Shaped and scaled rudder pedal command	RUDSHAPE	F	deg	6.25
GNYDRM	TAS-dependent gain	GNYDRM_COMP	F	g/deg	1.04
<u>Outputs</u>					
DRTMS	Lateral acceleration command	NYCOMP	F	g	6.25
DRTI	Lateral acceleration trim	VERT SIT n DISP (1 and 2) Entry Traj 1-5 (Aerojet only)	F	g	6.25

Table 4.3.1.3.7-2. DRT_INT Constants

Name	Description	Type	MSID/ Value	Units
GDRTI	Gain to convert yaw beep trim into acceleration bias	K	V97U0705C/ +2.0 E-02	g/s
TS	DAP slow cycle time	F	0.160	s
DRT_LIM	Limit on manual yaw trim	K	V97U0662C/ +1.0 E-01	g

Table 4.3.1.3.7-3. DRT_INT Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Integrator	HIGHQ	HIGHQ	DRTI	0.0

4.3.1.3.8 ESTIMATED_BETA.

A. Function – This function module computes an estimate of sideslip angle for use by the ADS RM function and scales Ny acceleration as a function of angle of attack for display. The Ny acceleration from the accelerometer is corrected for yaw jet firing, rudder deflection, aileron deflection, and yaw angular acceleration. The corrected Ny is then multiplied by a scale factor computed from angle of attack, filtered, and output to display. The corrected Ny is also multiplied by a scale factor to get an estimate of sideslip, which is filtered and output to ADS RM. The detailed block diagram is presented in Figure 4.3.1.3.8–1.

B. Processing Requirements – ESTIMATED_BETA is processed at 6.25 Hz.

C. Interface Requirements – The interface requirements for ESTIMATED_BETA are shown in Table 4.3.1.3.8–1.

D. Constants – The constants for ESTIMATED_BETA are shown in Table 4.3.1.3.8–2.

E. Initialization Requirements – The initialization requirements for ESTIMATED_BETA are presented in Table 4.3.1.3.8–3.

F. Software Configuration – Common.

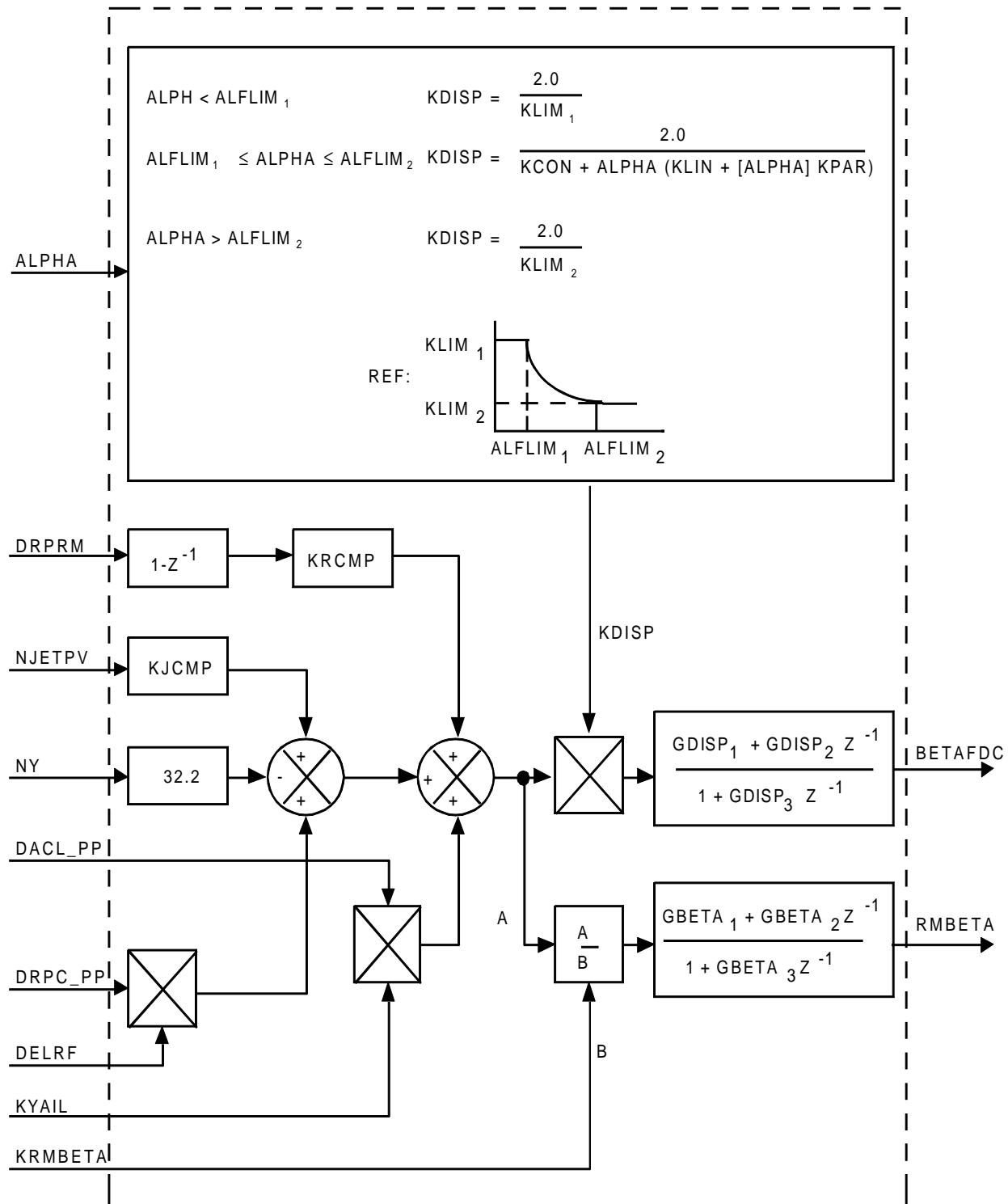


FIGURE 4.3.1.3.8-1. ESTIMATED_BETA

Table 4.3.1.3.8-1. ESTIMATED_BETA Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
ALPHA	Angle of attack	ADTA SOP	F	deg	1.04
DRPRM	Compensated yaw rate	RCOR	F	deg/s	25
NJETPV	Number of yaw jets commanded on previous cycle	JSL	I	—	12.5
NY	Lateral acceleration feedback	SF	F	g	6.25
DRPC_PP	Past value of rate-limited rudder deflection command	PRIO_RATE_LIMITING	F	deg	25
DACL_PP	Past value of rate-limited aileron deflection command	PRIO_RATE_LIMITING	F	deg	25
DELRF	Scale factor to convert rudder deflection into side acceleration	DELRF_COMP	F	ft/s ² / deg	1.04
KRMBETA	Scale factor that converts corrected lateral acceleration to estimated sideslip angle	KRMBETA_COMP	F	ft/s ² / deg	1.04
KYAIL	Scale factor that converts aileron deflection to lateral acceleration	KYAIL_COMP	F	ft/s ² / deg	1.04
<u>Outputs</u>					
BETAFDC	Scaled lateral acceleration	E/L ADI PROC	F	—	6.25
RMBETA	Estimated sideslip angle	ADTA RM	F	deg	6.25

Table 4.3.1.3.8-2. ESTIMATED_BETA Constants

Name	Description	Type	MSID/ Value	Units
ALFLIM1	Tabulated alpha	K	V97U8712C/ +1.0 E+01	deg
ALFLIM2	Tabulated alpha	K	V97U8713C/ +2.0 E+01	deg
KLIM1	Tabulated gain	K	V97U8714C/ +6.342 E+00	ft/s ² /deg
KLIM2	Tabulated gain	K	V97U8715C/ +9.02 E-01	ft/s ² /deg
KCON	Constant for KDISP calculation	K	V97U8716C/ +1.7082 E+01	ft/s ² /deg
KLIN	Linear term constant for KDISP calculation	K	V97U8717C/ -1.339 E+00	ft/s ² /deg ²
KPAR	Parabolic constant for KDISP calculation	K	V97U8718C/ +2.65 E-02	ft/s ² /deg ³
KRCMP	Gain to convert angular yaw acceleration to linear acceleration	K	V97U8719C/ +6.545 E+00	ft/deg/s
KJCMP	Gain to convert yaw jet firing into linear acceleration	K	V97U8720C/ +1.695 E-01	ft/s ²
GDISP1	Filter coefficient	K	V97U8721C/ +1.37931 E-01	—
GDISP2	Filter coefficient	K	V97U8722C/ +1.37931 E-01	—
GDISP3	Filter coefficient	K	V97U8723C/ -7.241379 E-01	—
GBETA1	Filter coefficient	K	V97U8724C/ +1.37931 E-01	—
GBETA2	Filter coefficient	K	V97U8725C/ +1.37931 E-01	—
GBETA3	Filter coefficient	K	V97U8726C/ -7.241379 E-01	—

Table 4.3.1.3.8-3. ESTIMATED_BETA Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Past value DRPRM	HIGHQ	HIGHQ	Z ⁻¹ (DRPRM)	DRPRM
First-order filters	HIGHQ	HIGHQ	Node	*
*See Subsection 4.9.1				

4.3.1.3.9 GDM.

A. Function – This function module converts the yaw rate error into a preliminary rudder command and applies a downmoding gain factor to it. The detailed block diagram is presented in Figure 4.3.1.3.9–1.

B. Processing Requirements – GDM is processed at 25 Hz.

C. Interface Requirements – The interface requirements for GDM are shown in Table 4.3.1.3.9–1.

D. Constants – None.

E. Initialization Requirements – None.

F. Software Configuration – Common.

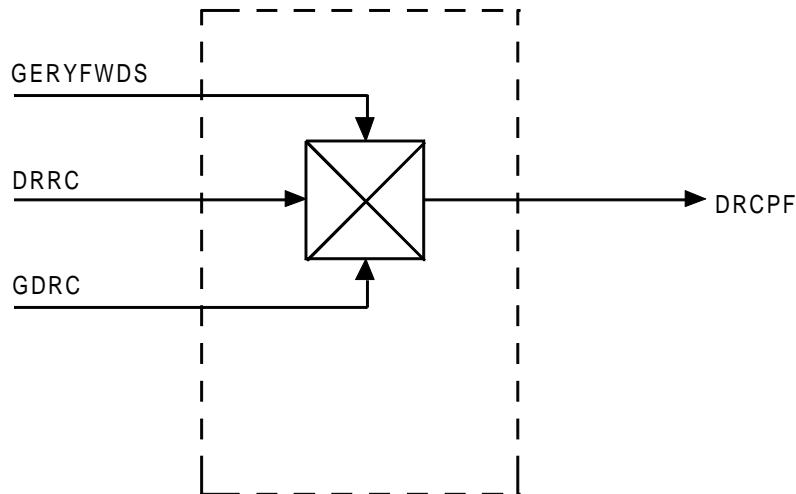


FIGURE 4.3.1.3.9-1. GDM

Table 4.3.1.3.9-1. GDM Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DRRC	Yaw rate error	YBB_FILTER	F	deg/s	25
GERYFWDS	R/Y forward loop downmoding gain factor	Roll channel	F	—	6.25
GDRC	Gain to convert yaw rate error into a preliminary rudder command	GDRC_COMP	F	deg/(deg/s)	1.04
<u>Outputs</u>					
DRCPF	Preliminary rudder command	RUDCMD, RUD_INT, TLM	F	deg	25

4.3.1.3.10 GDRC_COMP.

A. Function – This function module schedules a gain as a function of Mach number and dynamic pressure. This gain is used to convert the yaw rate error into a preliminary rudder command. The detailed block diagram is presented in Figure 4.3.1.3.10-1.

B. Processing Requirements – GDRC_COMP is processed at 1.04 Hz.

C. Interface Requirements – The interface requirements for GDRC_COMP are shown in Table 4.3.1.3.10-1.

D. I-Loads/Constants – The I-loads/constants for GDRC_COMP are shown in Table 4.3.1.3.10-2.

E. Initialization Requirements – None.

F. Software Configuration – Common.

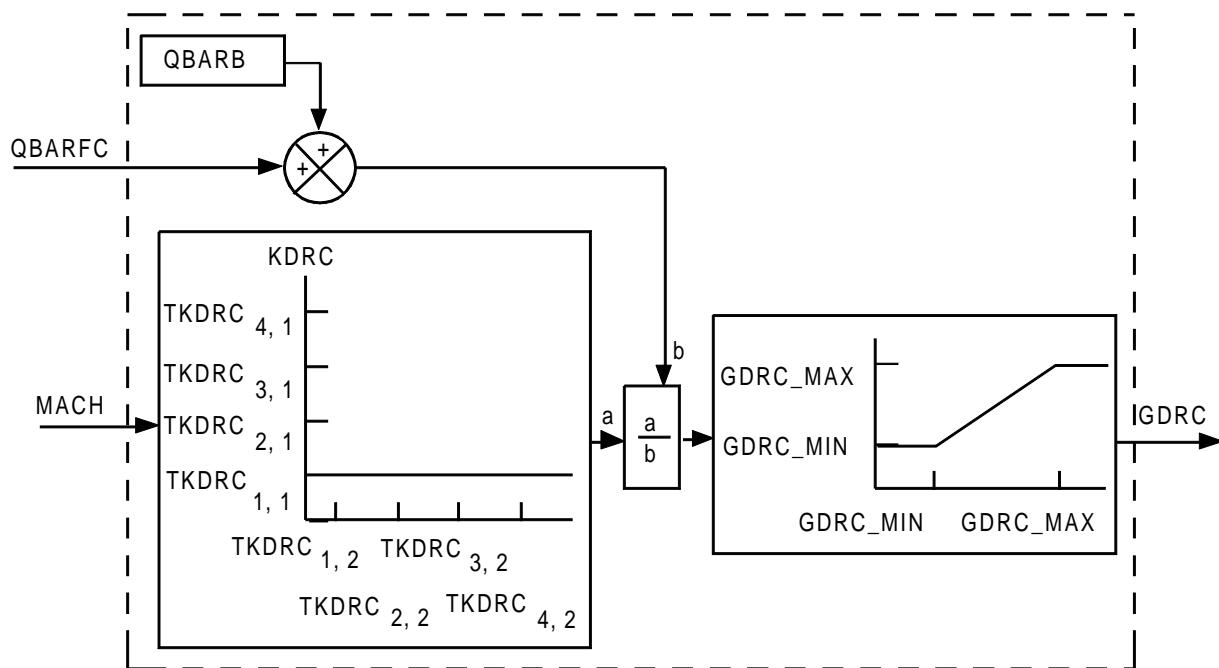


FIGURE 4.3.1.3.10-1. GDRC_COMP

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Table 4.3.1.3.10-1. GDRC_COMP Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
QBARFC	Dynamic pressure for FCS	Pitch Channel	F	lb/ft**2	1.04
MACH	Mach number	ADTA SOP	F	—	1.04
<u>Outputs</u>					
GDRC	Gain to convert yaw rate error into a preliminary rudder command	GDM	F	deg/(deg/s)	1.04

Table 4.3.1.3.10-2. GDRC_COMP I-Loads/Constants

Name	Description	Type	MSID/Value	Units
TKDRC(1,1)	Tabulated KDRC	F	V97U1014C	(lb/s/ft**2)
TKDRC(1,2)	Tabulated MACH	F	V97U1015C	—
TKDRC(2,1)	Tabulated KDRC	F	V97U1016C	(lb/s/ft**2)
TKDRC(2,2)	Tabulated MACH	F	V97U1017C	—
TKDRC(3,1)	Tabulated KDRC	F	V98U9688C	(lb/s/ft**2)
TKDRC(3,2)	Tabulated MACH	F	V98U9689C	—
TKDRC(4,1)	Tabulated KDRC	F	V98U9690C	(lb/s/ft**2)
TKDRC(4,2)	Tabulated MACH	F	V98U9691C	—
GDRC_MAX	Maximum value of GDRC	K	V97U0696C/ +1.50 E+01	deg/(deg/s)
GDRC_MIN	Minimum value of GDRC	K	V97U0697C/ +1.2 E+00	deg/(deg/s)
QBARB	Dynamic pressure bias	F	V97U0873C	(lb/ft**2)

4.3.1.3.11 GNYDRM_COMP.

A. Function – This function module schedules a gain as a function of TAS. This gain is used to convert rudder pedal and yaw trim inputs into lateral acceleration commands. The detailed block diagram is presented in Figure 4.3.1.3.11-1.

B. Processing Requirements – GNYDRM_COMP is processed at 1.04 Hz.

C. Interface Requirements – The interface requirements for GNYDRM_COMP are shown in Table 4.3.1.3.11-1.

D. Constants – The constants for GNYDRM_COMP are shown in Table 4.3.1.3.11-2.

E. Initialization Requirements – None.

F. Software Configuration – Common.

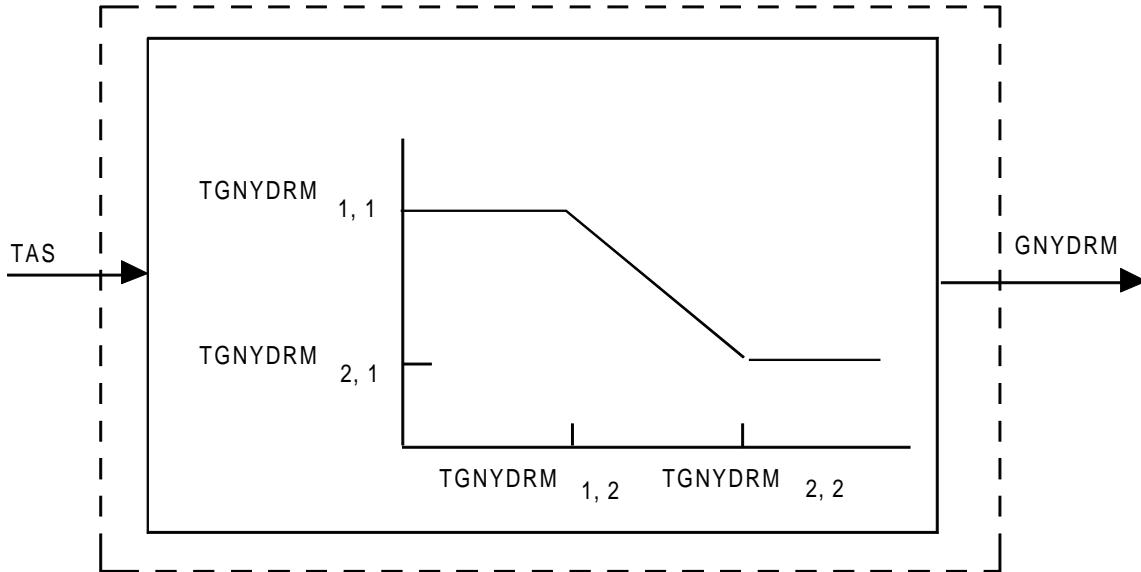


FIGURE 4.3.1.3.11-1. GNYDRM_COMP

Table 4.3.1.3.11-1. GNYDRM_COMP Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> TAS	True airspeed	ADTA SOP	F	ft/s	1.04
<u>Outputs</u> GNYDRM	Gain to convert pedal and yaw trim inputs into lateral acceleration command	DRT_INT	F	g/deg	1.04

Table 4.3.1.3.11-2. GNYDRM_COMP Constants

Name	Description	Type	MSID/Value	Units
TGNYDRM (1,1)	Tabulated GNYDRM	K	V97U0964C/ +4.0 E-02	g/deg
TGNYDRM (1,2)	Tabulated TAS	K	V97U0965C/ +6.833 E+02	ft/s
TGNYDRM (2,1)	Tabulated GNYDRM	K	V97U0966C/ +1.0 E-02	g/deg
TGNYDRM (2,2)	Tabulated TAS	K	V97U0967C/ +9.0 E+02	ft/s

4.3.1.3.12 DELETED

4.3.1.3.13 GRAY_COMP.

A. Function – This function module schedules a gain as a function of Mach number. This gain is used to convert a filtered lateral acceleration error into a yaw rate command. The detailed block diagram is presented in Figure 4.3.1.3.13-1.

B. Processing Requirements – GRAY_COMP is processed at 1.04 Hz.

C. Interface Requirements – The interface requirements for GRAY_COMP are shown in Table 4.3.1.3.13-1.

D. I-Loads – The I-loads for GRAY_COMP are shown in Table 4.3.1.3.13-2.

E. Initialization Requirements – None.

F. Software Configuration – Common.

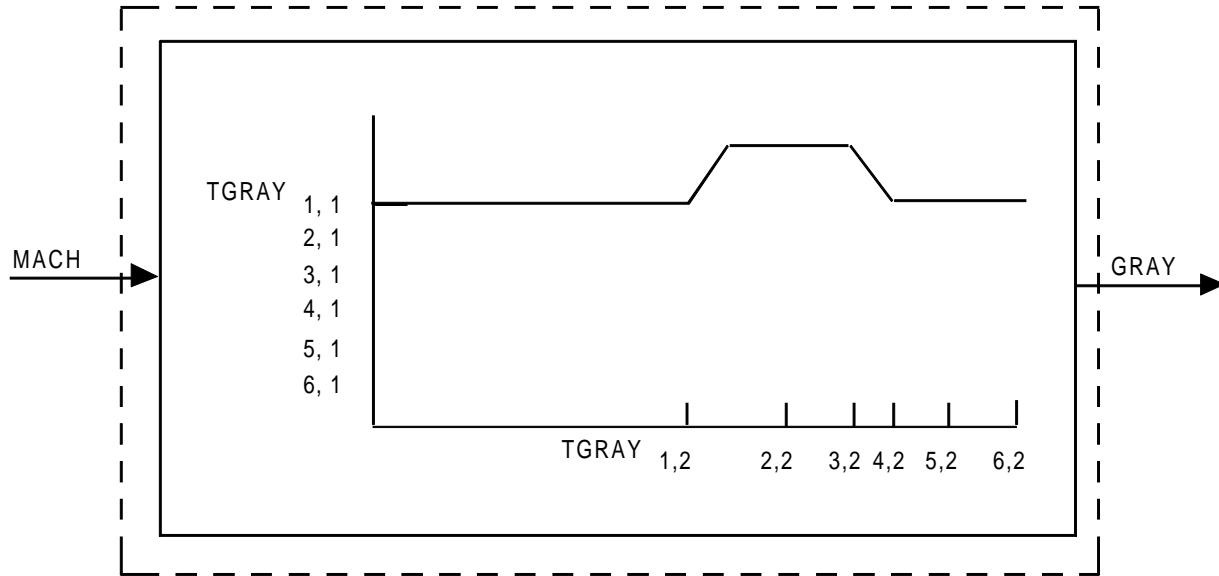


FIGURE 4.3.1.3.13-1. GRAY_COMP

Table 4.3.1.3.13-1. GRAY_COMP Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> MACH	Mach number	ADTA SOP	F	—	1.04
<u>Outputs</u> GRAY	Gain to convert filtered lateral acceleration error into a yaw rate command	NYCOMP	F	(deg/s)/g	1.04

Table 4.3.1.3.13-2. GRAY_COMP I-Loads

Name	Description	Type	MSID	Units
TGRAY(1,1)	Tabulated GRAY	F	V97U0990C	(deg/s)/g
TGRAY(1,2)	Tabulated MACH	F	V97U0991C	—
TGRAY(2,1)	Tabulated GRAY	F	V97U0992C	(deg/s)/g
TGRAY(2,2)	Tabulated MACH	F	V97U0993C	—
TGRAY(3,1)	Tabulated GRAY	F	V97U0994C	(deg/s)/g
TGRAY(3,2)	Tabulated MACH	F	V97U0995C	—
TGRAY(4,1)	Tabulated GRAY	F	V97U0996C	(deg/s)/g
TGRAY(4,2)	Tabulated MACH	F	V97U0997C	—
TGRAY(5,1)	Tabulated GRAY	F	V98U9684C	(deg/s)/g
TGRAY(5,2)	Tabulated MACH	F	V98U9685C	—
TGRAY(6,1)	Tabulated GRAY	F	V98U9686C	(deg/s)/g
TGRAY(6,2)	Tabulated MACH	F	V98U9687C	—

4.3.1.3.14 GRCSA_MOD.

- A. Function – This function module scales and filters the yaw rate error for the jet commands. The detailed block diagram is presented in Figure 4.3.1.3.14–1.
- B. Processing Requirements – GRCSA_MOD is processed at 12.5 Hz.
- C. Interface Requirements – The interface requirements for GRCSA_MOD are shown in Table 4.3.1.3.14–1.
- D. I-Loads/Constants – The I-loads/constants for GRCSA_MOD are shown in Table 4.3.1.3.14–2.
- E. Initialization Requirements – The initialization requirements for GRCSA_MOD are shown in Table 4.3.1.3.14–3.
- F. Software Configuration – Common.

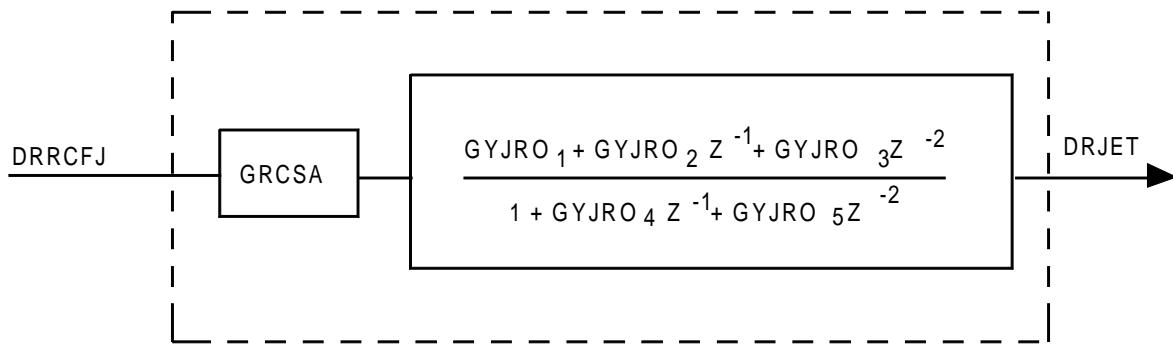


FIGURE 4.3.1.3.14-1. GRCSA_MOD

Table 4.3.1.3.14-1. GRCSA_MOD Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DRRCFJ	Yawjet rate command	YAWJET_BBF	F	deg/s	25
<u>Outputs</u> DRJET	Scaled yaw rate command	YAW_SUM (Aerojet), YAW_QUANT (GRTLS)	F	deg/s	12.5

Table 4.3.1.3.14-2. GRCSA_MOD I-Loads/Constants				
Name	Description	Type	MSID/Value	Units
GRCSA	Gain to scale yaw rate	F	V97U0761C	(deg/s)/(deg/s)
GYJR01	Filter coefficient	K	V99U7200C/ +7.92952 E-01	ND
GYJR02	Filter coefficient	K	V99U7201C/ +1.585904 E+00	ND
GYJR03	Filter coefficient	K	V99U7202C/ +7.92952 E-01	ND
GYJR04	Filter coefficient	K	V99U7203C/ +1.541850 E+00	ND
GYJR05	Filter coefficient	K	V99U7204C/ +6.29956 E-01	ND

Table 4.3.1.3.14-3. GRCSA_MOD Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Second-order filter	—	First pass	Node	*

*See Subsection 4.9.2

4.3.1.3.15 GRH_COMP.

- A. Function – This function module schedules a gain as a function of Mach number. The detailed block diagram is presented in Figure 4.3.1.3.15–1.
- B. Processing Requirements – GRH_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for GRH_COMP are shown in Table 4.3.1.3.15–1.
- D. I-Loads – The I-loads for GRH_COMP are shown in Table 4.3.1.3.15–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

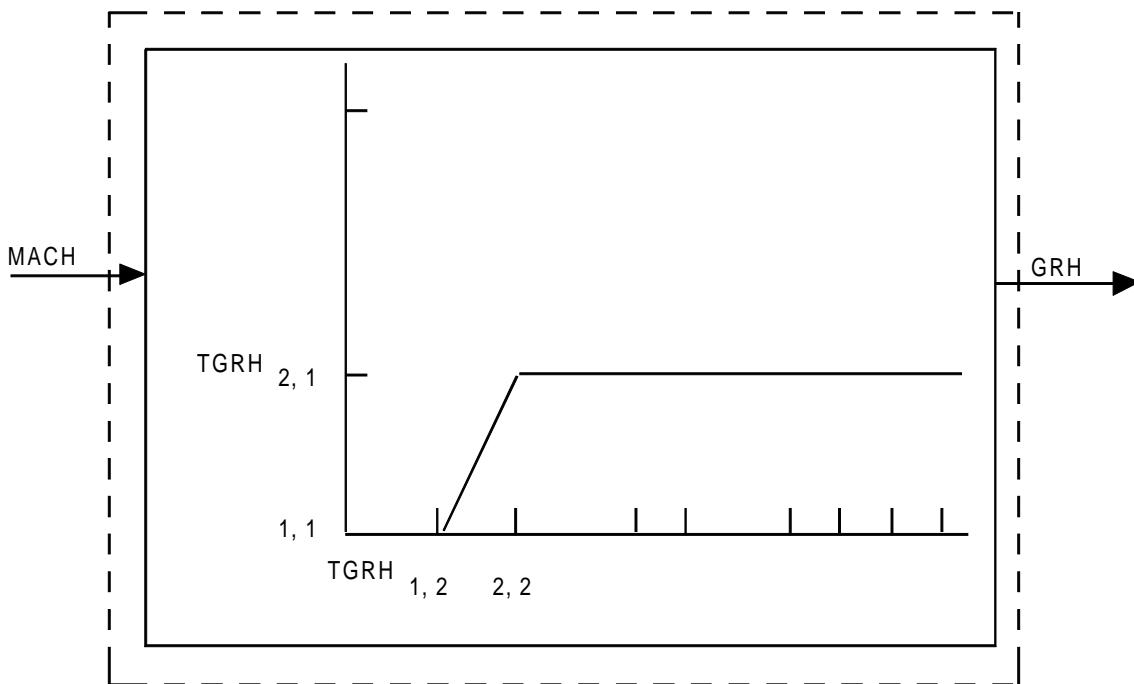


FIGURE 4.3.1.3.15-1. GRH_COMP

Table 4.3.1.3.15-1. GRH_COMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> Mach	Mach number	ADTA SOP	F	—	1.04
<u>Outputs</u> GRH	Gain to scale compensated and filtered yaw rate	RRCS_FEED	F	—	1.04

Table 4.3.1.3.15-2. GRH_COMP I-Loads				
Name	Description	Type	MSID	Units
TGRH(1,1)	Tabulated GRH	F	V98U9667C	—
TGRH(1,2)	Tabulated MACH	F	V98U9668C	—
TGRH(2,1)	Tabulated GRH	F	V98U9669C	—
TGRH(2,2)	Tabulated MACH	F	V98U9670C	—

4.3.1.3.16 GTRR_COMP.

- A. Function – This function module schedules a gain as a function of Mach number. This gain is used to scale the rudder command, which is input to the trim integrator. The detailed block diagram is presented in Figure 4.3.1.3.16-1.
- B. Processing Requirements – GTRR_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for GTRR_COMP are shown in Table 4.3.1.3.16-1.
- D. Constants – The constants for GTRR_COMP are shown in Table 4.3.1.3.16-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

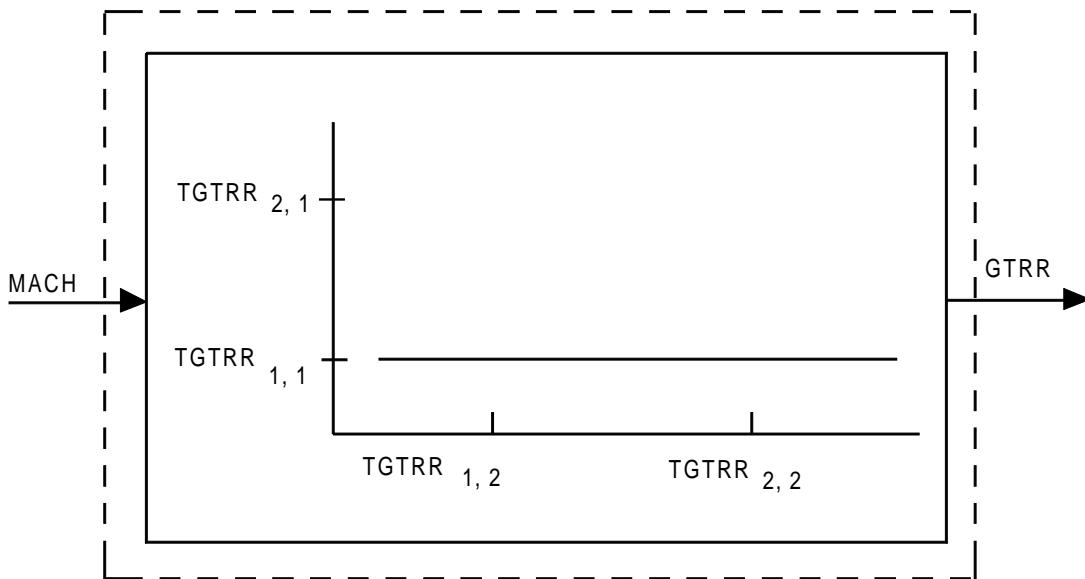


FIGURE 4.3.1.3.16-1. GTRR_COMP

Table 4.3.1.3.16-1. GTRR_COMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> Mach	Mach number	ADTA SOP	F	—	1.04
<u>Outputs</u> GTRR	Scale factor on rudder command input to trim integrator	RUD_INT	F	(deg/s)/deg	1.04

Table 4.3.1.3.16-2. GTRR_COMP Constants				
Name	Description	Type	MSID/Value	Units
TGTRR(1,1)	Tabulated GTRR	K	V97U1135C/ +1.0 E-01	(deg/s)/deg
TGTRR(1,2)	Tabulated MACH	K	V97U1136C/ +9.5 E-01	—
TGTRR(2,1)	Tabulated GTRR	K	V97U1137C/ +5.0 E-01	(deg/s)/deg
TGTRR(2,2)	Tabulated MACH	K	V97U1138C/ +1.2 E+00	—

4.3.1.3.17 KRMBETA_COMP.

- A. Function – This function module computes a scale factor to express compensated lateral acceleration in terms of sideslip angle. The detailed block diagram is presented in Figure 4.3.1.3.17–1.
- B. Processing Requirements – KRMBETA_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for KRMBETA_COMP are presented in Table 4.3.1.3.17–1.
- D. Constants – The constants for KRMBETA_COMP are presented in Table 4.3.1.3.17–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

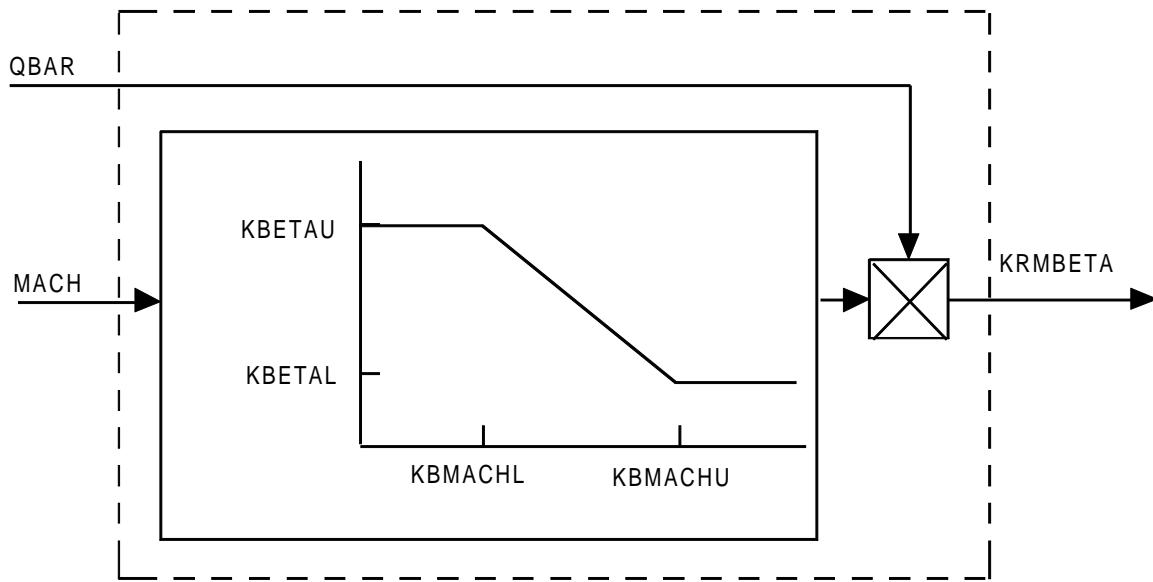


FIGURE 4.3.1.3.17-1. KRMBETA_COMP

Table 4.3.1.3.17-1. KRMBETA_COMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
Mach	Mach number	ADTA SOP	F	—	1.04
QBAR	Dynamic pressure	ADTA SOP	F	lb/ft ²	1.04
<u>Outputs</u>					
KRMBETA	Gain to convert lateral acceleration to sideslip angle	ESTIMATED_BETA	F	ft/s ² /deg	1.04

Table 4.3.1.3.17-2. KRMBETA_COMP Constants				
Name	Description	Type	MSID/Value	Units
KBETAL	Tabulated sideslip	K	V97U8727C/ +5.0 E-03	(ft ³ /s ²)/(deg-lb)
KBETAU	Tabulated sideslip	K	V97U8728C/ +9.00 E-03	(ft ³ /s ²)/(deg-lb)
KBMACHU	Tabulated MACH	K	V97U8729C/ +2.5 E+00	—
KBMACHL	Tabulated MACH	K	V97U8730C/ +1.0 E+00	—

4.3.1.3.18 KYAIL_COMP.

- A. Function – This function module computes a scale factor to correct lateral acceleration for aileron deflection. The detailed block diagram is presented in Figure 4.3.1.3.18–1.
- B. Processing Requirements – KYAIL_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for KYAIL_COMP are shown in Table 4.3.1.3.18–1.
- D. Constants – The constants for KYAIL_COMP are shown in Table 4.3.1.3.18–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

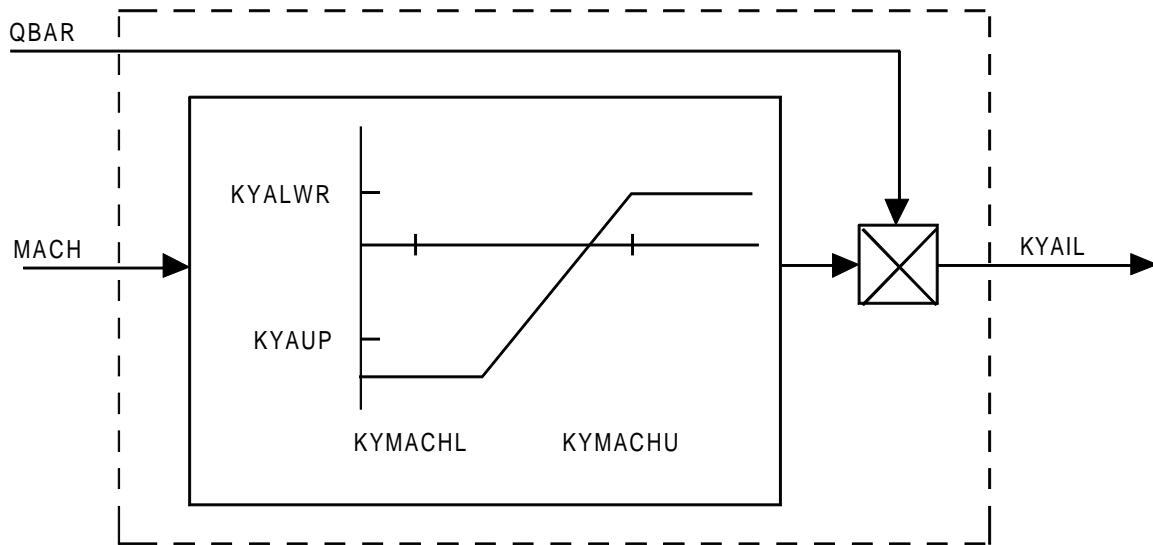


FIGURE 4.3.1.3.18-1. KYAIL_COMP

Table 4.3.1.3.18-1. KYAIL_COMP Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
Mach	Mach number	ADTA SOP	F	—	1.04
QBAR	Dynamic pressure	ADTA SOP	F	lb/ft ²	1.04
<u>Outputs</u>					
KYAIL	Aileron factor	ESTIMATED_BETA	F	ft/s ² /deg	1.04

Table 4.3.1.3.18-2. KYAIL_COMP Constants

Name	Description	Type	MSID/Value	Units
KYAUP	Tabulated aileron constant	K	V97U8731C/-1.4 E-03	(ft ³ /s ²)/(deg-lb)
KYALWR	Tabulated aileron constant	K	V97U8732C/+0.0 E+00	(ft ³ /s ²)/(deg-lb)
KYMACHU	Tabulated aileron constant	K	V97U8733C/+1.1 E+00	—
KYMACHL	Tabulated aileron constant	K	V97U8734C/+8.0 E-01	—

4.3.1.3.19 NYCOMP.

- A. Function – This function module computes the lateral acceleration error and filters the error. It converts the filtered error to form a yaw rate command. The detailed block diagram is presented in Figure 4.3.1.3.19-1.
- B. Processing Requirements – NYCOMP is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for NYCOMP are shown in Table 4.3.1.3.19-1.
- D. I-Loads – The I-loads for NYCOMP are shown in Table 4.3.1.3.19-2.
- E. Initialization Requirements – The initialization requirements for NYCOMP are shown in Table 4.3.1.3.19-3.
- F. Software Configuration – Common.

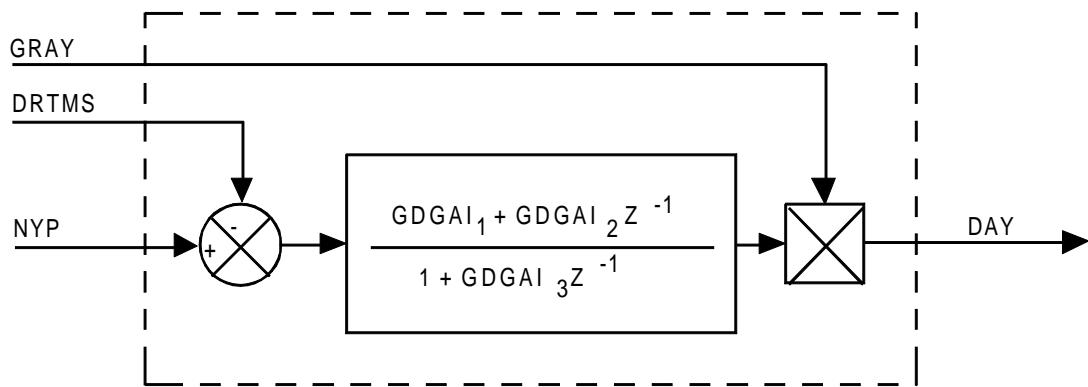


FIGURE 4.3.1.3.19-1. NYCOMP

Table 4.3.1.3.19-1. NYCOMP Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DRTMS	Lateral acceleration command	DRT_INT	F	g	6.25
NYP	Buffered lateral acceleration	SF	F	g	25
GRAY	Gain to convert filtered lateral acceleration error into a yaw rate command	GRAY_COMP	F	(deg/s)/g	1.04
<u>Outputs</u>					
DAY	Commanded yaw rate	TLM (Aerojet only)	F	deg/s	25
		PNY_COMP (Roll channel)	F	deg/s	25
		NY_COSALF	F	deg/s	25

Table 4.3.1.3.19-2. NYCOMP I-Loads

Name	Description	Type	MSID	Units
GDGAI(1)	Filter coefficient	F	V97U0690C	—
GDGAI(2)	Filter coefficient	F	V97U0691C	—
GDGAI(3)	Filter coefficient	F	V97U0692C	—

Table 4.3.1.3.19-3. NYCOMP Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
First-order filter	HIGHQ —	HIGHQ First pass	Node Node	* *

*See Subsection 4.9.1

4.3.1.3.20 NY_COSALF.

- A. Function – This function module computes the yaw rate error to command the yaw thrusters and rudder. The detailed block diagram is presented in Figure 4.3.1.3.20-1.
- B. Processing Requirements – NY_COSALF is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for NY_COSALF are shown in Table 4.3.1.3.20-1.
- D. Constants – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

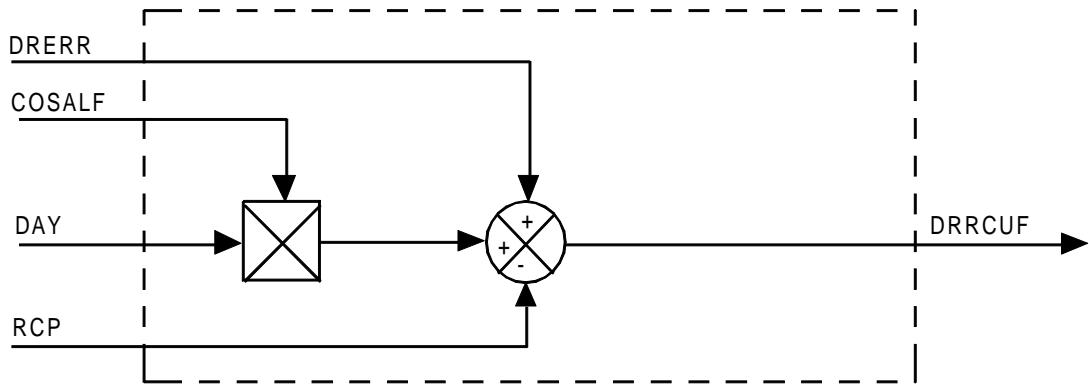


FIGURE 4.3.1.3.20-1. NY_COSALF

Table 4.3.1.3.20-1. NY_COSALF Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DAY	Commanded yaw rate	NYCOMP	F	deg/s	25
DRERR	Yaw rate error	RRCS_FEED	F	deg/s	25
RCP	Guidance yaw rate command	Nosewheel channel	F	deg/s	6.25
COSALF	Cosine of alpha	ALPHA_TRIG (Roll channel)	F	—	1.04
<u>Outputs</u>					
DRRCUF	Unfiltered yaw rate command	YBB_FILTER, YAWJET_BBF	F	deg/s	25

4.3.1.3.21 PNY_COMP.

- A. Function – This function module computes the yaw rate command for the roll axis. The detailed block diagram is presented in Figure 4.3.1.3.21–1.
- B. Processing Requirements – PNY_COMP is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for PNY_COMP are shown in Table 4.3.1.3.21–1.
- D. I-Loads – The I-Loads for PNY_COMP are shown in Table 4.3.1.3.21–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

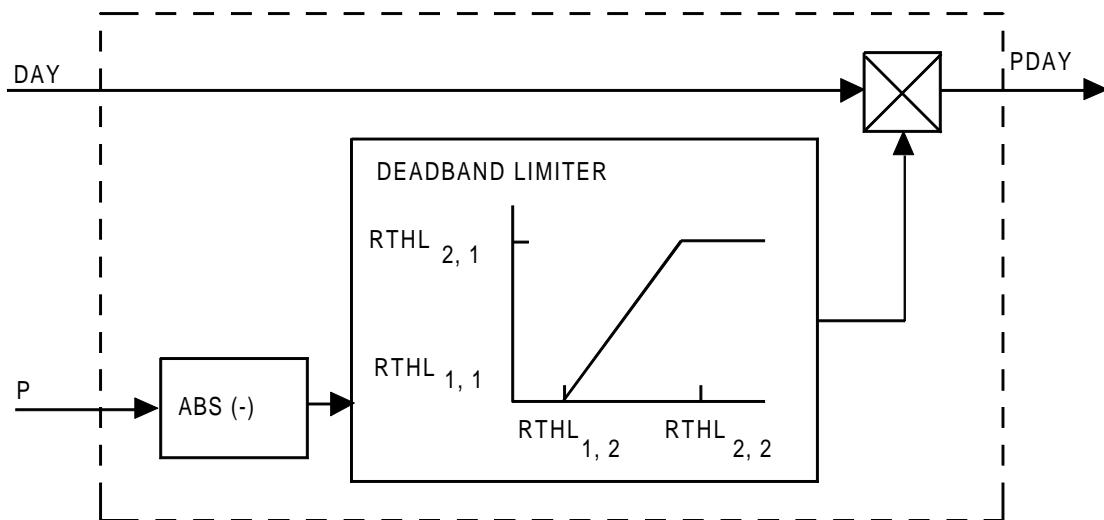


FIGURE 4.3.1.3.21-1. PNY_COMP

Table 4.3.1.3.21-1. PNY_COMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
P	Roll rate feedback	SF	F	deg/s	25
DAY	Commanded yaw rate	NYCOMP	F	deg/s	25
<u>Outputs</u>					
PDAY	Scaled yaw rate command	NY_SINALF (Roll channel)	F	deg/s	25

Table 4.3.1.3.21-2. PNY_COMP I-Loads				
Name	Description	Type	MSID	Units
RTHL(1,1)	Lower limit	F	V96U9659C	—
RTHL(1,2)	Initial breakout point	F	V96U9661C	deg/s
RTHL(2,1)	Upper limit	F	V96U9660C	—
RTHL(2,2)	Final limit point	F	V96U9662C	deg/s

4.3.1.3.22 RCOMP.

- A. Function – This function module produces a compensated yaw rate feedback in stability axes for display to FD. The detailed block diagram is presented in Figure 4.3.1.3.22-1.
- B. Processing Requirements – RCOMP is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for RCOMP are shown in Table 4.3.1.3.22-1.
- D. Constants – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

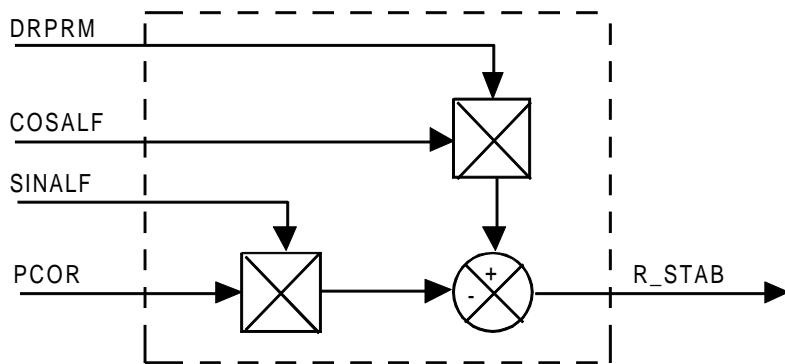


FIGURE 4.3.1.3.22-1. RCOMP

Table 4.3.1.3.22-1. RCOMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
PCOR	Compensated roll rate	PCOR_COMP (Roll channel)	F	deg/s	25
DRPRM	Compensated yaw rate	RCOR	F	deg/s	25
COSALF	Cosine of ALPHA	ALPHA_TRIG (Roll channel)	F	—	1.04
SINALF	Sine of ALPHA	ALPHA_TRIG (Roll channel)	F	—	1.04
<u>Outputs</u>					
R_STAB	yaw rate in stability axes	E/L ADI PROC, TLM (Aerojet only)	F	deg/s	25

4.3.1.3.23 RCOR.

A. Function – This function module subtracts off the steady-state turn correction term from the gain scheduled yaw rate feedback. The detailed block diagram is presented in Figure 4.3.1.3.23-1.

B. Processing Requirements – RCOR is processed at 25 Hz.

C. Interface Requirements – The interface requirements for RCOR are shown in Table 4.3.1.3.23-1.

D. Constants – None.

E. Initialization Requirements – None.

F. Software Configuration – Common.

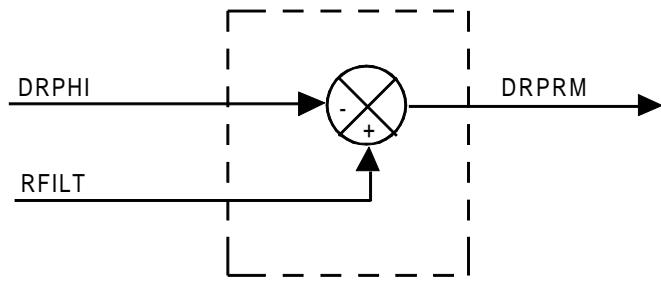


FIGURE 4.3.1.3.23-1. RCOR

Table 4.3.1.3.23-1. RCOR Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DRPHI	Steady-state turn coordination component	BYCOR	F	deg/s	6.25
RFILT	Filtered yaw rate	YAW_RATE_BBF	F	deg/s	25
<u>Outputs</u>					
DRPRM	Compensated yaw rate feedback	RRCS_FEED, RCOMP, P_STAB_COMP (Roll channel), PCOMP (Roll channel), ESTIMATED_BETA	F	deg/s	25

4.3.1.3.24 RRCS_FEED.

- A. Function – This function module computes the yaw rate error. The detailed block diagram is presented in Figure 4.3.1.3.24–1.
- B. Processing Requirements – RRCS_FEED is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for RRCS_FEED are shown in Table 4.3.1.3.24–1.
- D. Constants – The constants for RRCS_FEED are shown in Table 4.3.1.3.24–2.
- E. Initialization Requirements – The initialization requirements for RRCS_FEED are shown in Table 4.3.1.3.24–3.
- F. Software Configuration – Common.

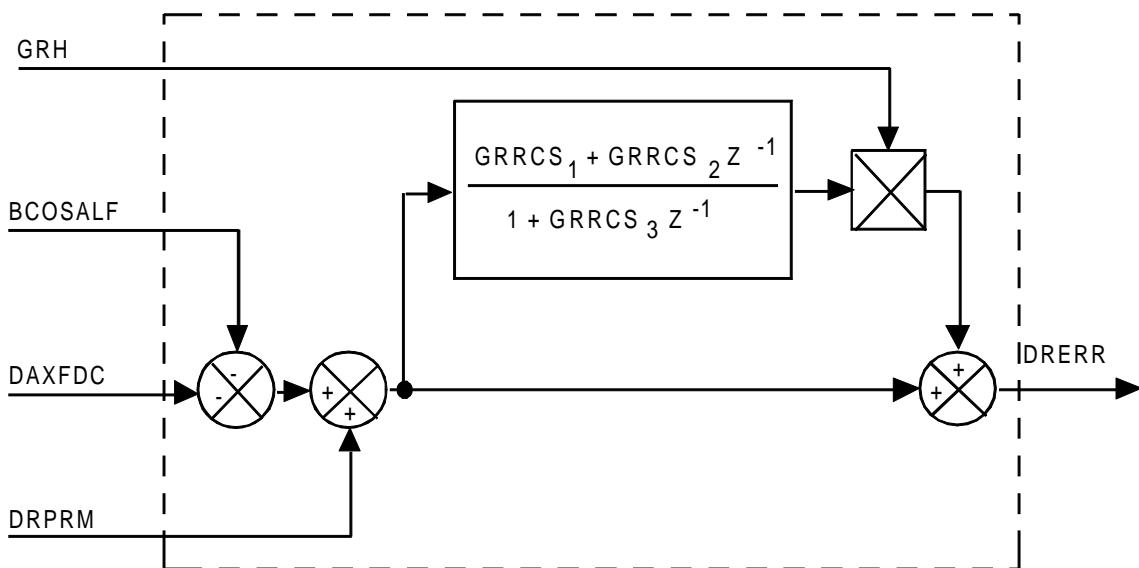


FIGURE 4.3.1.3.24-1. RRCS_FEED

Table 4.3.1.3.24-1. RRCS_FEED Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DRPRM	Compensated yaw rate	RCOR	F	deg/s	25
GRH	Gain to scale compensated and filtered yaw rate	GRH_COMP	F	—	1.04
DAXFDC	Yaw rate command	AXFDCOMP	F	deg/s	25
BCOSALF	Component of BETA _F normal to velocity	BETACOSALF	F	deg/s	6.25
<u>Outputs</u>					
DRERR	Yaw rate error	NY_COSALF	F	deg/s	25

Table 4.3.1.3.24-2. RRCS_FEED Constants				
Name	Description	Type	MSID/Values	Units
GRRCS(1)	Filter coefficient	K	V97U0766C/ +1.96 E+00	—
GRRCS(2)	Filter coefficient	K	V97U0767C/ -1.96 E+00	—
GRRCS(3)	Filter coefficient	K	V97U0768C/ -9.23 E-01	—

Table 4.3.1.3.24-3. RRCS_FEED Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
First-order filter	—	First pass	Node	*
*See Subsection 4.9.1				

4.3.1.3.25 RUDCMD (Aerojet DAP).

- A. Function – This function module sums the filtered rudder command, trim commands, and the PTI rudder pulse. The detailed block diagram is presented in Figure 4.3.1.3.25-1.
- B. Processing Requirements – RUDCMD is to be processed at 25 Hz.
- C. Interface Requirements – The interface requirements for RUDCMD are presented in Table 4.3.1.3.25-1.
- D. Constants – The constants for RUDCMD are shown in Table 4.3.1.3.25-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Aerojet DAP unique.

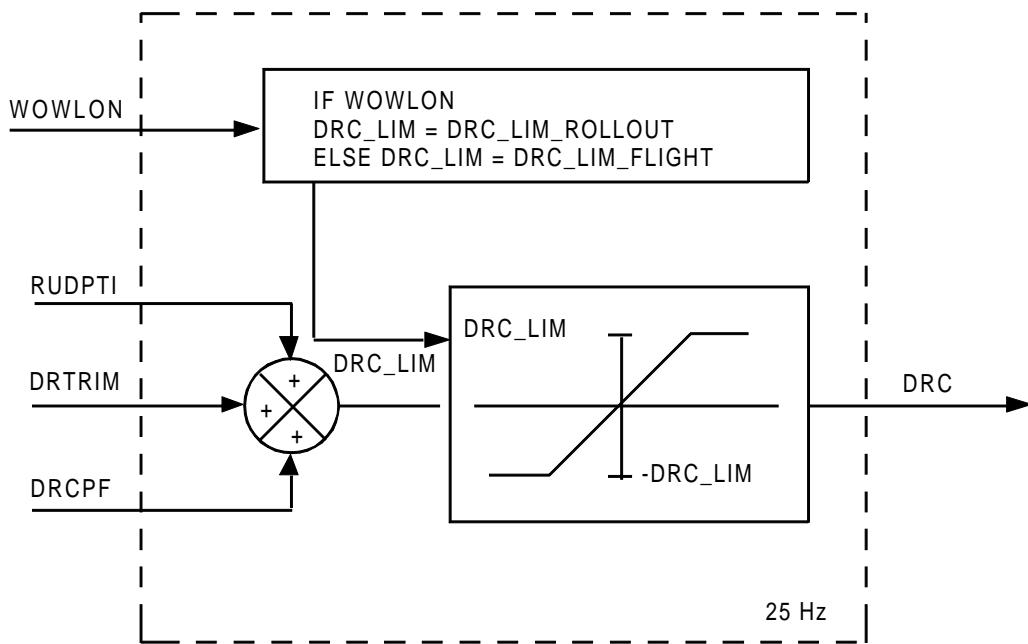


FIGURE 4.3.1.3.25-1. RUDCMD (Aerojet Dap)

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Table 4.3.1.3.25-1. RUDCMD (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
RUDPTI	Rudder PTI pulse	DRPTI_MOD	F	deg	25
DRTRIM	Integral rudder trim	RUD_INT	F	deg	25
DRCPF	Preliminary rudder command	GDM	F	deg	25
WOWLON	Weight on wheels indication	RECON	F	-	6.25
<u>Outputs</u>					
DRC	Rudder deflection command	PRIO_RATE_LIMITING	F	deg	25

Table 4.3.1.3.25-2. RUDCMD (Aerojet DAP) Constants

Name	Description	Type	MSID/Value	Units
DRC_LIM_FLIGHT	Limit on rudder deflection command	K	V97U0655C/ +2.41 E+01	deg
DRC_LIM_ROLLOUT	Limit on rudder deflection command during rollout	K	V99U7415C/ +2.66 E+01	deg

Note: In order to prevent mechanical interference between the RUDDER/SPEED BRAKE hinges and the rudder conical seal, the trailing panel of the RUDDER/SPEED BRAKE assembly must never be driven beyond 20°.

Trailing panel position can be determined by the relation: TRAILING PANEL = RUDDER POS – 1/2 (SPEED BRAKE POS). Note: actuator tolerances and failures must also be taken into account.

4.3.1.3.26 RUDCMD (GRTLS DAP).

- A. Function – This function module sums the filtered rudder command and trims. This sum is limited to form the rudder deflection command. The detailed block diagram is presented in Figure 4.3.1.3.26-1.
- B. Processing Requirements – RUDCMD is to be processed at 25 Hz.
- C. Interface Requirements – The interface requirements for RUDCMD are presented in Table 4.3.1.3.26-1.
- D. Constants – The constants for RUDCMD are shown in Table 4.3.1.3.26-2.
- E. Initialization Requirements – None.
- F. Software Configuration – GRTLS DAP unique.

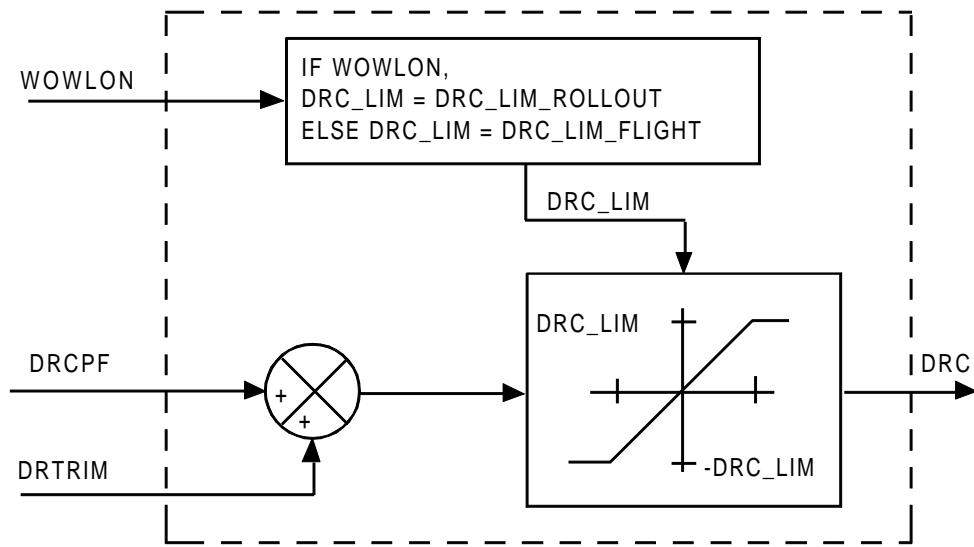


FIGURE 4.3.1.3.26-1. RUDCMD (GRTLS DAP)

Table 4.3.1.3.26-1. RUDCMD (GRTLS DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DRCPF	Preliminary rudder command	GDM	F	deg	25
WOWLON	Weight on wheels indication	RECON	F	–	6.25
DRTRIM	Integral rudder trim	RUD_INT	F	deg	25
<u>Outputs</u>					
DRC	Rudder deflection command	PRIO_RATE_LIMITING	F	deg	25

Table 4.3.1.3.26-2. RUDCMD (GRTLS DAP) Constants

Name	Description	Type	MSID/Value	Units
DRC_LIM_FLIGHT	Limit on rudder deflection command during flight.	K	V97U0655C/ +2.41 E+01	deg
DRC_LIM_ROLLOUT	Limit on rudder deflection command during rollout	K	V99U7415C/ +2.66 E+01	deg

Note: In order to prevent mechanical interference between the RUDDER/SPEED BRAKE hinges and the rudder conical seal, the trailing panel of the RUDDER/SPEED BRAKE assembly must never be driven beyond 20°. Trailing panel position can be determined by the relation: TRAILING PANEL = RUDDER POS – 1/2 (SPEED BRAKE POS). Note: actuator tolerances and failures must also be taken into account.

4.3.1.3.27 RUD_INT.

- A. Function – This function module applies rectangular integration to the rudder trim rate. The detailed block diagram is presented in Figure 4.3.1.3.27-1.
- B. Processing Requirements – RUD_INT is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for RUD_INT are shown in Table 4.3.1.3.27-1.
- D. Constants – The constants for RUD_INT are shown in Table 4.3.1.3.27-2.
- E. Initialization Requirements – The initialization requirements for RUD_INT are shown in Table 4.3.1.3.27-3.
- F. Software Configuration – Common.

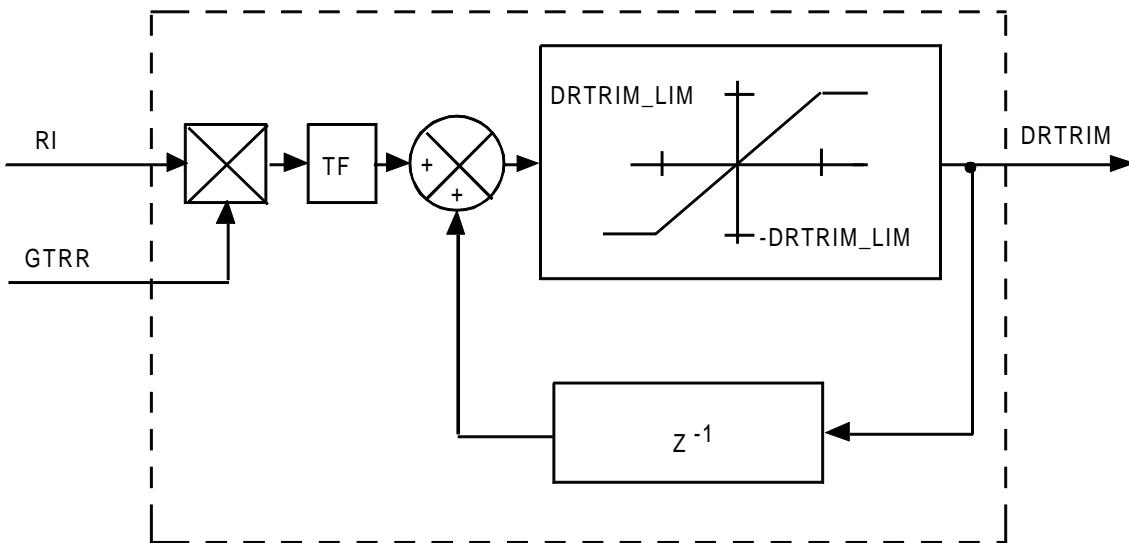


FIGURE 4.3.1.3.27-1. RUD_INT

Table 4.3.1.3.27-1. RUD_INT Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
GTRR	Rudder trim gain	GTRR_COMP	F	(deg/s)/ deg	1.04
RI	Rudder trim rate	GDM	F	deg	25
<u>Outputs</u>					
DRTRIM	Integral rudder trim	ENTRY TRAJ n (1-5), RUDCMD, VERT SIT n DISP (1 AND 2)	F	deg	25

Table 4.3.1.3.27-2. RUD_INT Constants				
Name	Description	Type	MSID/Value	Units
DRTRIM LIM	Limit on integral rudder trim	K	V97U0663C/ +6.0 E+00	deg
TF	DAP fast cycle time	F	0.040	s

Table 4.3.1.3.27-3. RUD_INT Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Integrator	—	First pass	Output	0.0
Integrator	A	—	Output	0.0
A = FLATTURN • AUTO_BANK				

4.3.1.3.28 RUDSHAPE.

- A. Function – This function module applies parabolic shaping to the rudder pedal command. The detailed block diagram is presented in Figure 4.3.1.3.28–1.
- B. Processing Requirements – RUDSHAPE is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for RUDSHAPE are shown in Table 4.3.1.3.28–1.
- D. Constants – The constants for RUDSHAPE are shown in Table 4.3.1.3.28–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

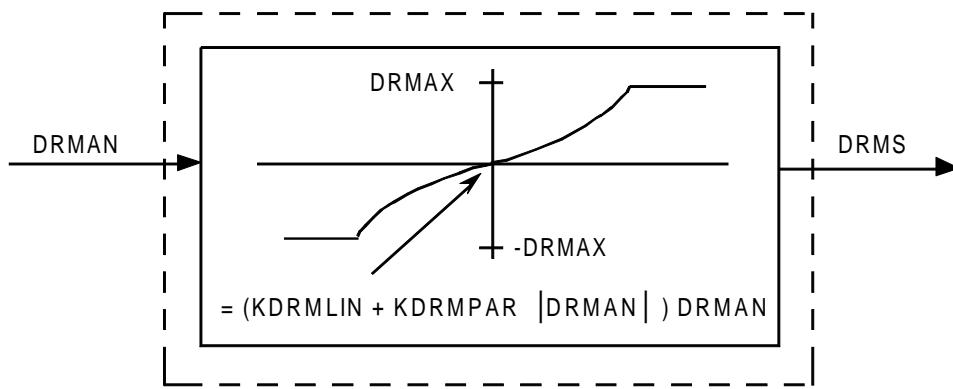


FIGURE 4.3.1.3.28-1. RUDSHAPE

Table 4.3.1.3.28-1. RUDSHAPE Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DRMAN	Rudder pedal command	RPTA SOP	F	deg	6.25
<u>Outputs</u> DRMS	Shaped and scaled rudder pedal command	DRT_INT	F	deg	6.25

Table 4.3.1.3.28-2. RUDSHAPE Constants				
Name	Description	Type	MSID/Value	Units
DRMAX	Maximum value of shaped pedal output	K	V97U0661C/ +2.25 E+01	deg
KDRMLIN	Linear coefficient for parabolic shaping	K	V97U0800C/ +1.0 E+00	deg/deg
KDRMPAR	Square term coefficient for parabolic shaping	K	V97U0801C/ +0.0 E+00	deg/deg**2

4.3.1.3.28a WRAP_COMP (Aerojet DAP).

- A. Function – This function module schedules yaw RCS jet switching levels with dynamic pressure for the wraparound yaw jet downmode configuration. The detailed block diagram is presented in Figure 4.3.1.3.28a–1.
- B. Processing Requirements – WRAP_COMP is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for WRAP_COMP are shown in Table 4.3.1.3.28a–1.
- D. I-Loads – The I-loads for WRAP_COMP are shown in Table 4.3.1.3.28a–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Aerojet DAP unique.

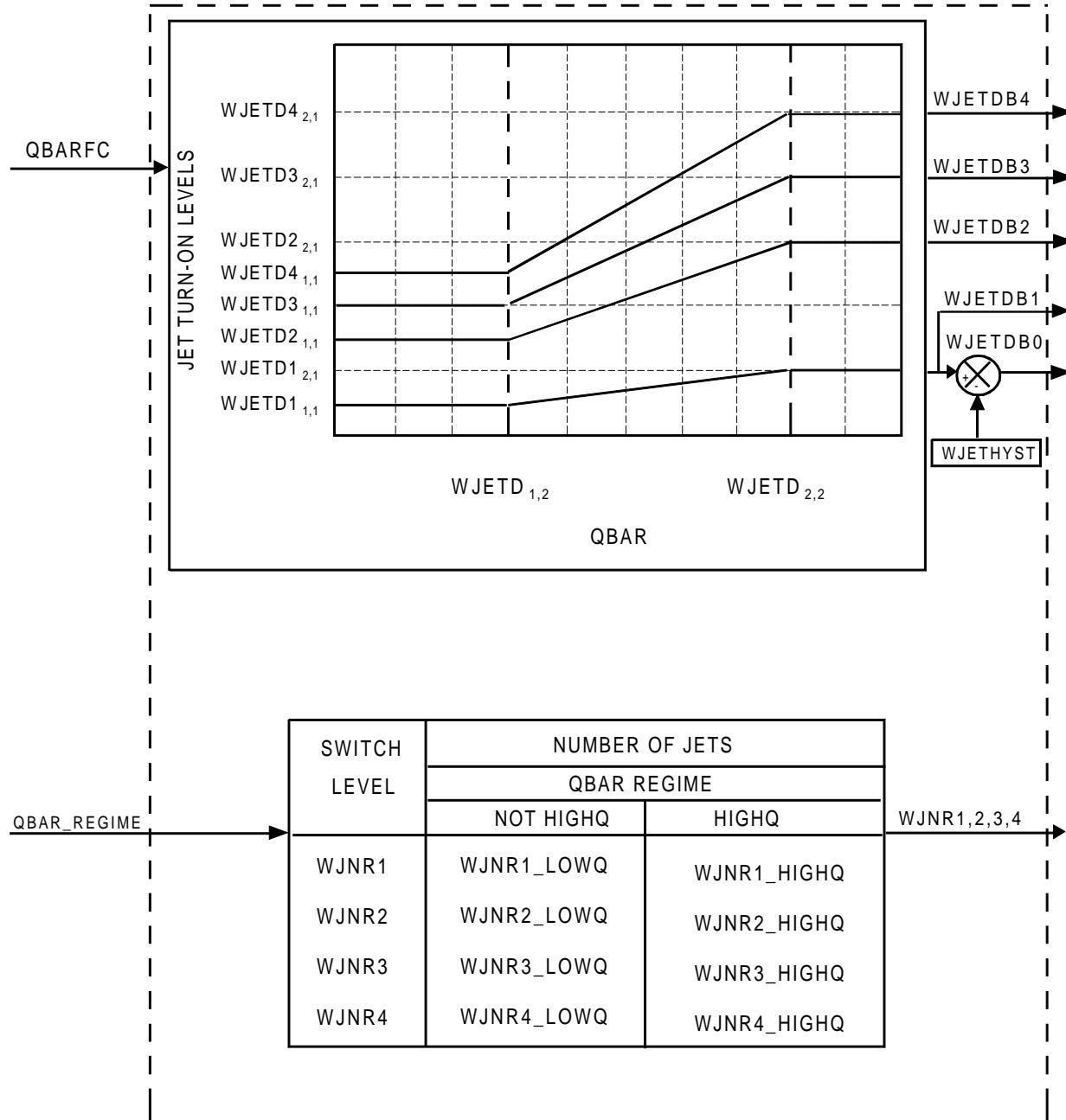


FIGURE 4.3.1.3.28a-1. WRAP_COMP (Aerojet DAP)

Table 4.3.1.3.28a-1. WRAP_COMP (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
QBARFC	Dynamic pressure for FCS	Pitch Channel	F	lb/ ft**2	1.04
QBAR_REGIME	Qbar switching level for number of yaw jets	RECON	I	–	6.25
<u>Outputs</u>					
WJETDB0	Turn-off level for low number of yaw jets	WRAP_QUANT	F	deg/s	1.04
WJETDB1	Turn-on level for low number of yaw jets	WRAP_QUANT	F	deg/s	1.04
WJETDB2	Switching level for low-mid number of yaw jets	WRAP_QUANT	F	deg/s	1.04
WJETDB3	Switching level for high-mid number of yaw jets	WRAP_QUANT	F	deg/s	1.04
WJETDB4	Switching level for high number of yaw jets	WRAP_QUANT	F	deg/s	1.04
WJNR1	Low number of yaw jets	WRAP_QUANT	I	–	1.04
WJNR2	Low-mid number of yaw jets	WRAP_QUANT	I	–	1.04
WJNR3	High-mid number of yaw jets	WRAP_QUANT	I	–	1.04
WJNR4	High number of yaw jets	WRAP_QUANT	I	–	1.04

Table 4.3.1.3.28a-2. WRAP_COMP (Aerojet DAP) I-Loads

Name	Description	Type	MSID/ Value	Units
WJETD1(2,1)	High tabulated WJETDB1	F	V97U7440C	deg/s
WJETD1(1,1)	Low tabulated WJETDB1	F	V97U7441C	deg/s
WJETD2(2,1)	High tabulated WJETDB2	F	V97U7442C	deg/s
WJETD2(1,1)	Low tabulated WJETDB2	F	V97U7443C	deg/s
WJETD3(2,1)	High tabulated WJETDB3	F	V97U7444C	deg/s
WJETD3(1,1)	Low tabulated WJETDB3	F	V97U7445C	deg/s
WJETD4(2,1)	High tabulated WJETDB4	F	V97U7446C	deg/s
WJETD4(1,1)	Low tabulated WJETDB4	F	V97U7447C	deg/s
WJETHYST	Hysteresis between WJETDB0 and WJETDB1	F	V97U7448C	deg/s
WJETD(2,2)	High tabulated QBARFC	F	V97U7449C	lb/ft**2
WJETD(1,2)	Low tabulated QBARFC	F	V97U7450C	lb/ft**2
WJNR1_HIGHQ	Low number of yaw jets, high qbar	I	V97U7451C	–
WJNR1_LOWQ	Low number of yaw jets, low qbar	I	V97U7452C	–
WJNR2_HIGHQ	Low-mid number of yaw jets, high qbar	I	V97U7453C	–
WJNR2_LOWQ	Low-mid number of yaw jets, low qbar	I	V97U7454C	–
WJNR3_HIGHQ	High-mid number of yaw jets, high qbar	I	V97U7455C	–
WJNR3_LOWQ	High-mid number of yaw jets, low qbar	I	V97U7456C	–
WJNR4_HIGHQ	High number of yaw jets, high qbar	I	V97U7457C	–
WJNR4_LOWQ	High number of yaw jets, low qbar	I	V97U7458C	–

4.3.1.3.28b. WRAP_QUANT (Aerojet DAP).

A. Function – This function module applies hysteresis and deadbands to the yaw rate error to determine the number of yaw jets to fire in the wraparound yaw jet configuration. The detailed block diagram is presented in Figure 4.3.1.3.28b-1.

B. Processing Requirements – WRAP_QUANT is processed at 12.5 Hz.

C. Interface Requirements – The interface requirements for WRAP_QUANT are shown in Table 4.3.1.3.28b-1.

D. Constants – None

E. Initialization Requirements – The initialization requirements for WRAP_QUANT are shown in Table 4.3.1.3.28b-2.

F. Software Configuration – Aerojet DAP unique.

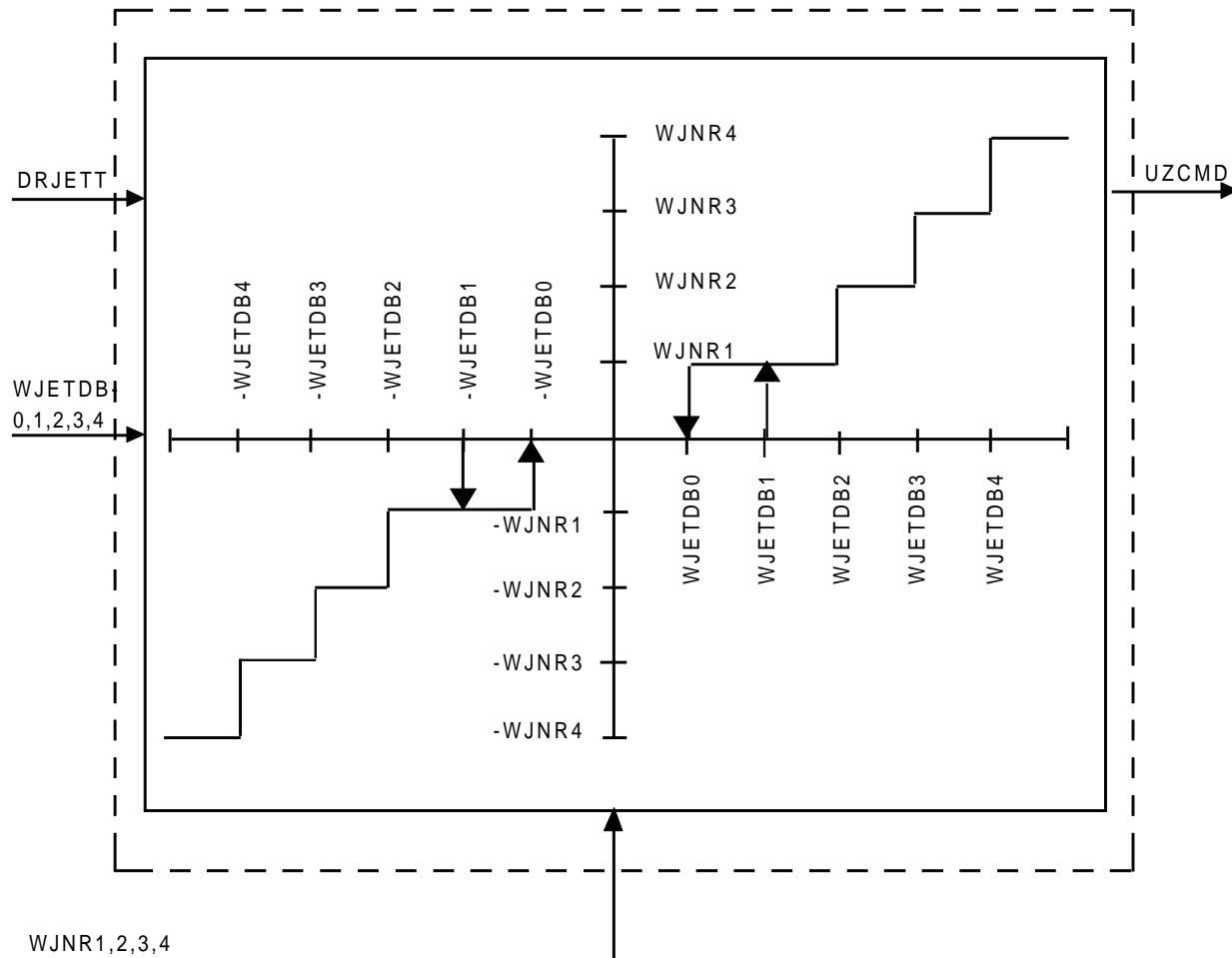


FIGURE 4.3.1.3.28b-1. WRAP_QUANT (Aerojet DAP)

Table 4.3.1.3.28b-1. WRAP_QUANT (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DRJETT	Yaw rate error	YAW_SUM	F	deg/s	12.5
WJRN1	Low number of yaw jets	WRAP_COMP	I	—	1.04
WJRN2	Low–mid number of yaw jets	WRAP_COMP	I	—	1.04
WJRN3	High–mid number of yaw jets	WRAP_COMP	I	—	1.04
WJRN4	High number of yaw jets	WRAP_COMP	I	—	1.04
WJETDB0	Turn–off level for low number of yaw jets	WRAP_COMP	F	deg/s	1.04
WJETDB1	Turn–on level for low number of yaw jets	WRAP_COMP	F	deg/s	1.04
WJETDB2	Switching level for low–mid number of yaw jets	WRAP_COMP	F	deg/s	1.04
WJETDB3	Switching level for high–mid number of yaw jets	WRAP_COMP	F	deg/s	1.04
WJETDB4	Switching level for high number of yaw jets	WRAP_COMP	F	deg/s	1.04
<u>Outputs</u>					
UZCMD	Number of yaw jets to be fired	TLM, JET_SELECT_LOGIC, RCS ALT LT	I	—	12.5

Table 4.3.1.3.28b-2 WRAP_QUANT (Aerojet DAP) Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Hysteresis	— A	First pass A	*	*

* See Subsection 4.9.5, A = WRAP + PTI_WRAP

4.3.1.3.29 YAW_HYST (Aerojet DAP).

- A. Function – This function module applies hysteresis to yaw rate error to determine the number of yaw RCS jets to fire. The detailed block diagram is presented in Figure 4.3.1.3.29-1.
- B. Processing Requirements – YAW_HYST is processed at 12.5 Hz.
- C. Interface Requirements – The interface requirements for YAW_HYST are shown in Table 4.3.1.3.29-1.
- D. I-Loads/Constants – The I-loads/constants for YAW_HYST are shown in Table 4.3.1.3.29-2.
- E. Initialization Requirements – The initialization requirements for YAW_HYST are shown in Table 4.3.1.3.29-3.
- F. Software Configuration – Aerojet DAP unique.

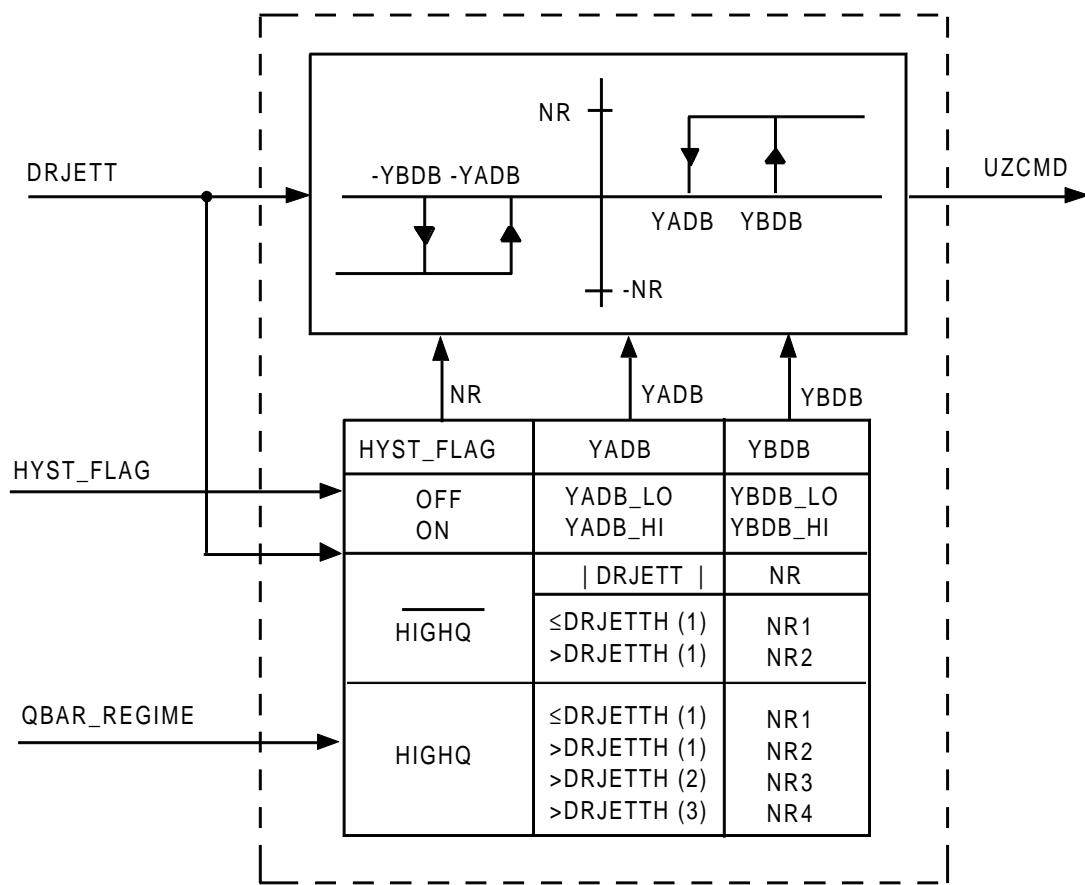


FIGURE 4.3.1.3.29-1. YAW_HYST (Aerojet DAP)

Table 4.3.1.3.29-1. YAW_HYST (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DRJETT	Yaw rate error	YAW_SUM	F	deg/s	12.5
HYST_FLAG	Yaw hysteresis discrete	RECON	D	—	6.25
QBAR_REGIME	Dynamic pressure regime	RECON	I	—	6.25
<u>Outputs</u>					
UZCMD	Number of yaw RCS jets to be fired	TLM, JET_SELECT_LOGIC, RCS ALT LT	I	—	12.5

Table 4.3.1.3.29-2. YAW_HYST (Aerojet DAP) I-Loads/Constants

Name	Description	Type	MSID	Units
DRJETTH(1)	Threshold on DRJETT	K	V97U0658C/ +5.0 E-01	deg/s
DRJETTH(2)	Threshold on DRJETT	K	V97U0659C/ +1.0 E+00	deg/s
DRJETTH(3)	Threshold on DRJETT	K	V97U0660C/ +1.5 E+00	deg/s
NR(1)	Low number of yaw jets	K	V97U0836C/ +2	—
NR(2)	Low-Mid number of yaw jets	I	V97U0837C	—
NR(3)	High-Mid number of yaw jets	I	V97U0838C	—
NR(4)	High number of yaw jets	I	V97U0839C	—
YADB_LO	Initial inner deadband	K	V97U1082C/ +3.3 E-01	deg/s
YADB_HI	Final inner deadband	K	V97U1081C/ +3.3 E-01	deg/s
YBDB_LO	Initial outer deadband	K	V97U1084C/ +3.5 E-01	deg/s
YBDB_HI	Final outer deadband	K	V97U1083C/ +3.5 E-01	deg/s

Table 4.3.1.3.29-3. YAW_HYST (Aerojet DAP) Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Hysteresis	— ALT_ZERO_YAWJET	First pass ALT_ZERO_YAWJET	*	*
			*	0.0

*See Subsection 4.9.5

4.3.1.3.29a YAW_RATE_BBF

- A. Function – This function module applies a body bending filter to the yaw rate feedback. The detailed block diagram is presented in Figure 4.3.1.3.29a-1.
- B. Processing Requirements – YAW_RATE_BBF is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for YAW_RATE_BBF are shown in Table 4.3.1.3.29a-1.
- D. I-Loads – The I-Loads for YAW_RATE_BBF are shown in Table 4.3.1.3.29a-2.
- E. Initialization Requirements – The initialization requirements for YAW_RATE_BBF are shown in Table 4.3.1.3.29a-3.
- F. Software Configuration – Common.

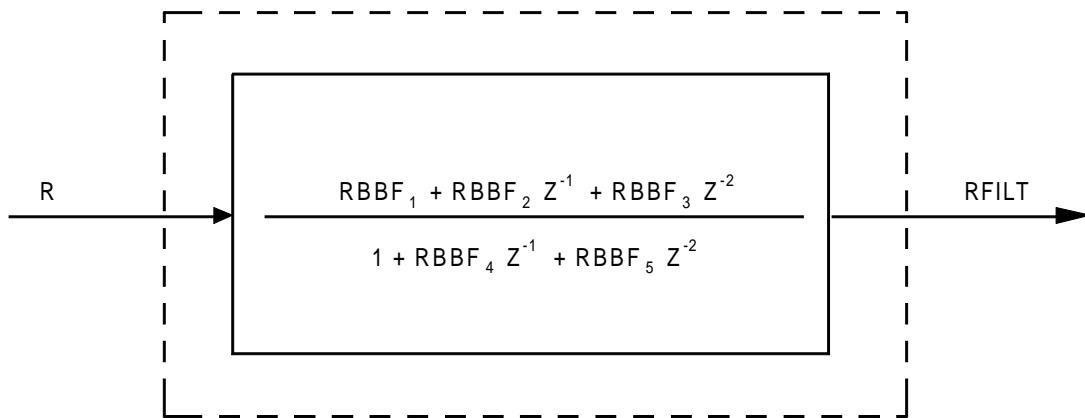


FIGURE 4.3.1.3.29a-1. YAW_RATE_BBF

Table 4.3.1.3.29a-1. YAW_RATE_BBF Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
R	Yaw Rate Feedback	SF	F	deg/s	25
RFILT	Filtered Yaw Rate	RCOR	F	deg/s	25

Table 4.3.1.3.29a-2. YAW_RATE_BBF I-Loads				
Name	Description	Type	MSID	Units
RBBF ₁	Filter Coefficient	F	V99U8870C	—
RBBF ₂	Filter Coefficient	F	V99U8871C	—
RBBF ₃	Filter Coefficient	F	V99U8872C	—
RBBF ₄	Filter Coefficient	F	V99U8873C	—
RBBF ₅	Filter Coefficient	F	V99U8874C	—

Table 4.3.1.3.29a-3. YAW_RATE_BBF Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Second-order filter	—	First pass	node	*

*See Subsection 4.9.2

4.3.1.3.30 YAWJET_BBF.

A. Function – This function module applies a fourth-order bending filter to the yaw rate command used to generate the yaw jet command and for aileron trim. The coefficients for the filter are dependent on the rudder Mach regime status. The detailed block diagram for YAWJET_BBF is shown in Figure 4.3.1.3.30-1.

B. Processing Requirements – YAWJET_BBF is processed at 25 Hz.

C. Interface Requirements – The interface requirements for YAWJET_BBF are shown in Table 4.3.1.3.30-1.

D. I-Loads – The I-loads for YAWJET_BBF are shown in Table 4.3.1.3.30-2.

E. Initialization Requirements – The initialization requirements for YAWJET_BBF are shown in Table 4.3.1.3.30-3.

F. Software Configuration – Common.

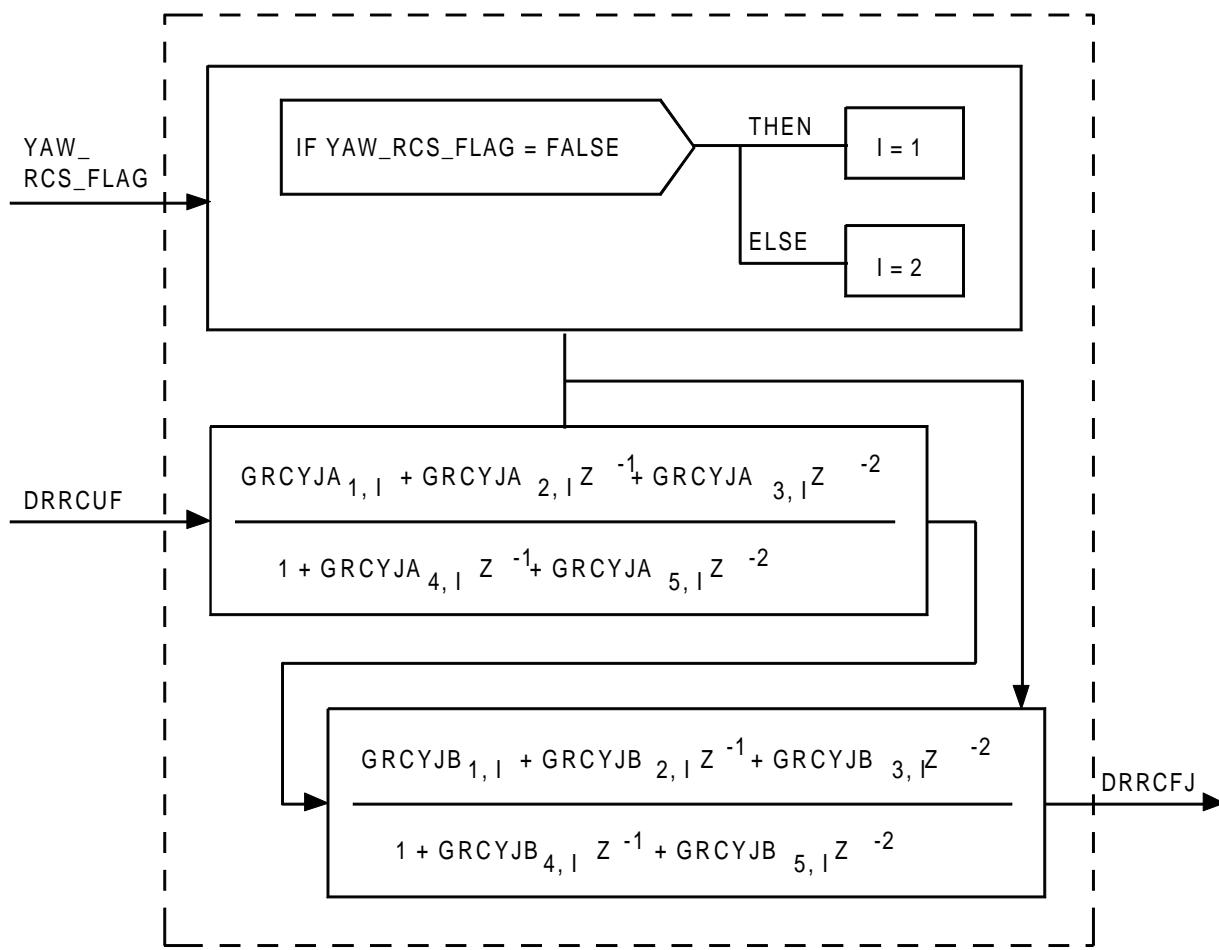


FIGURE 4.3.1.3.30-1. YAWJET_BBF

Table 4.3.1.3.30-1. YAWJET_BBF Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DRRCUF	Unfiltered yaw rate command	NY_COSALF	F	deg/s	25
YAW_RCS_FLAG	Yaw RCS logic discrete	RECON	D	—	6.25
<u>Outputs</u>					
DRRCFJ	Yaw jet yaw rate command	GRCSA_MOD, DRRC_LIM (ROLL_CHAN)	F	deg/s	25

Table 4.3.1.3.30-2. YAWJET_BBF I-Loads				
Name	Description	Type	MSID	Units
GRCYJA(1,1)	Filter coefficient	F	V96U9624C	ND
GRCYJA(1,2)	Filter coefficient	F	V96U9634C	ND
GRCYJA(2,1)	Filter coefficient	F	V96U9625C	ND
GRCYJA(2,2)	Filter coefficient	F	V96U9635C	ND
GRCYJA(3,1)	Filter coefficient	F	V96U9626C	ND
GRCYJA(3,2)	Filter coefficient	F	V96U9636C	ND
GRCYJA(4,1)	Filter coefficient	F	V96U9627C	ND
GRCYJA(4,2)	Filter coefficient	F	V96U9637C	ND
GRCYJA(5,1)	Filter coefficient	F	V96U9628C	ND
GRCYJA(5,2)	Filter coefficient	F	V96U9638C	ND
GRCYJB(1,1)	Filter coefficient	F	V96U9629C	ND
GRCYJB(1,2)	Filter coefficient	F	V96U9639C	ND
GRCYJB(2,1)	Filter coefficient	F	V96U9630C	ND
GRCYJB(2,2)	Filter coefficient	F	V96U9640C	ND
GRCYJB(3,1)	Filter coefficient	F	V96U9631C	ND
GRCYJB(3,2)	Filter coefficient	F	V96U9641C	ND
GRCYJB(4,1)	Filter coefficient	F	V96U9632C	ND
GRCYJB(4,2)	Filter coefficient	F	V96U9642C	ND
GRCYJB(5,1)	Filter coefficient	F	V96U9633C	ND
GRCYJB(5,2)	Filter coefficient	F	V96U9643C	ND

Table 4.3.1.3.30-3. YAWJET_BBF Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Fourth-order filter	—	First pass	Node	*
	YAW_RCS_FLAG	YAW_RCS_FLAG	Node	*

*See Subsection 4.9.3

4.3.1.3.31 YAW_SUM (Aerojet DAP).

- A. Function – This function module sums the yaw rate error with the yaw PTI pulse. The detailed block diagram is presented in Figure 4.3.1.3.31–1.
- B. Processing Requirements – YAW_SUM is processed at 12.5 Hz.
- C. Interface Requirements – The interface requirements for YAW_SUM are shown in Table 4.3.1.3.31–1.
- D. I-Loads – None.
- E. Initialization Requirements – None.
- F. Software Configuration – Aerojet DAP unique.

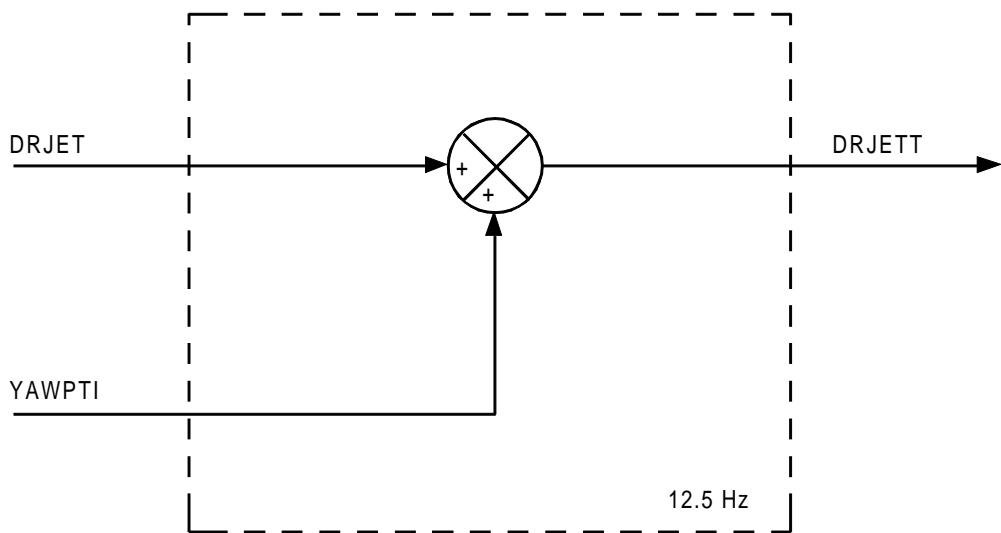


FIGURE 4.3.1.3.31-1. YAW_SUM (Aerojet DAP)

Table 4.3.1.3.31-1. YAW_SUM (Aerojet DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DRJET	Yaw error rate	GRCSA_MOD	F	deg/s	12.5
YAWPTI	Yaw PTI pulse	YJPTI_MOD	F	deg/s	12.5
<u>Outputs</u>					
DRJETT	Total yaw error rate	YAW_HYST, WRAP_QUANT	F	deg/s	12.5

4.3.1.3.32 YBB_FILTER.

- A. Function – This function module applies a body bending filter to the unfiltered yaw rate command. The detailed block diagram is presented in Figure 4.3.1.3.32–1.
- B. Processing Requirements – YBB_FILTER is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for YBB_FILTER are shown in Table 4.3.1.3.32–1.
- D. I-Loads – The I-loads for YBB_FILTER are shown in Table 4.3.1.3.32–2.
- E. Initialization Requirements – The initialization requirements for YBB_FILTER are shown in Table 4.3.1.3.32–3.
- F. Software Configuration – Common.

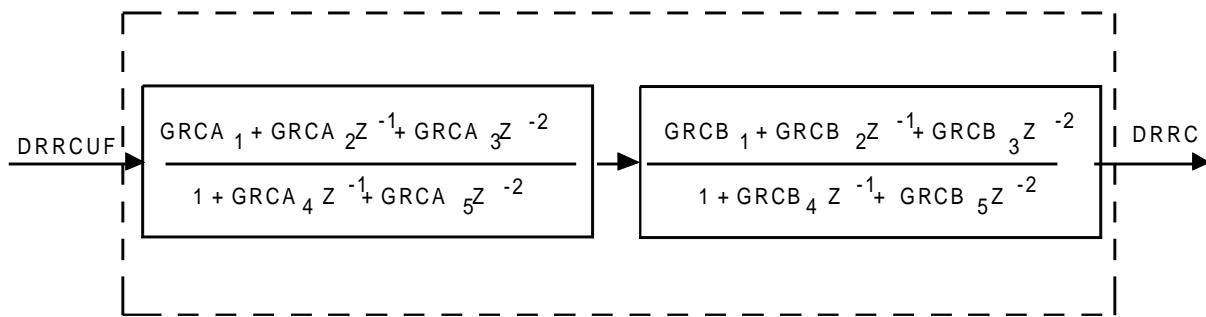


FIGURE 4.3.1.3.32-1. YBB_FILTER

Table 4.3.1.3.32-1. YBB_FILTER Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DRRCAF	Unfiltered yaw rate	NY_COSALF	F	deg/s	25
<u>Outputs</u> DRRC	Yaw command	GDM	F	deg/s	25

Table 4.3.1.3.32-2. YBB_FILTER I-Loads				
Name	Description	Type	MSID	Units
GRCA(1)	Filter coefficient	F	V97U0751C	—
GRCA(2)	Filter coefficient	F	V97U0752C	—
GRCA(3)	Filter coefficient	F	V97U0753C	—
GRCA(4)	Filter coefficient	F	V97U0754C	—
GRCA(5)	Filter coefficient	F	V97U0755C	—
GRCB(1)	Filter coefficient	F	V97U0756C	—
GRCB(2)	Filter coefficient	F	V97U0757C	—
GRCB(3)	Filter coefficient	F	V97U0758C	—
GRCB(4)	Filter coefficient	F	V97U0759C	—
GRCB(5)	Filter coefficient	F	V97U0760C	—

Table 4.3.1.3.32-3. YBB_FILTER Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Fourth-order filter	—	First pass	Node	*

*See Subsection 4.9.3

4.3.1.3.33 YJPTI_MOD (Aerojet DAP).

- A. Function – This function module integrates the yaw PTI signal to obtain the yaw pulse. The detailed block diagram is presented in Figure 4.3.1.3.33–1.
- B. Processing Requirements – YJPTI_MOD is processed at 12.5 Hz.
- C. Interface Requirements – The interface requirements for YJPTI_MOD are shown in Table 4.3.1.3.33–1.
- D. Constants – The constants for YJPTI_MOD are shown in Table 4.3.1.3.33–2.
- E. Initialization Requirements – The initialization requirements for YJPTI_MOD are shown in Table 4.3.1.3.33–3.
- F. Software Configuration – Aerojet DAP unique.

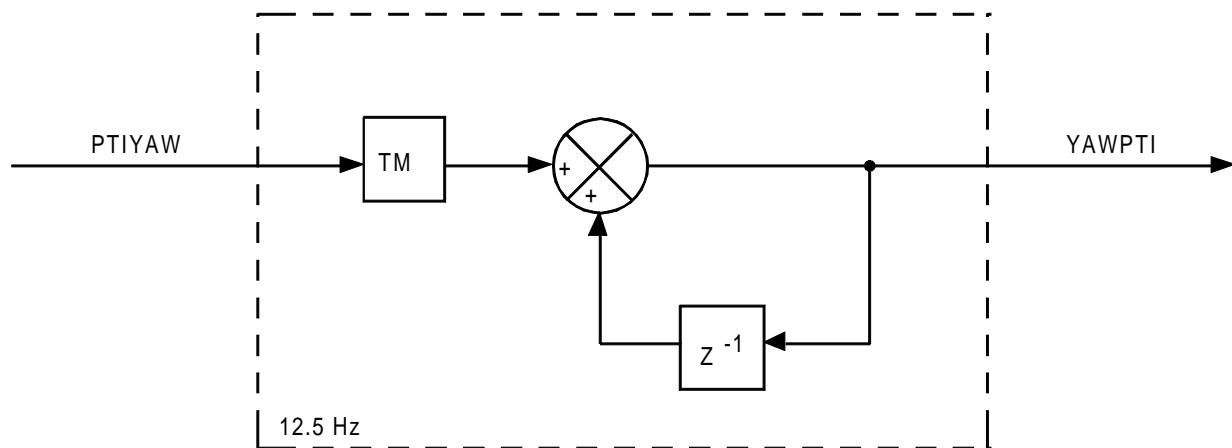


FIGURE 4.3.1.3.33-1. YJPTI_MOD (Aerojet Dap)

Table 4.3.1.3.33-1. YJPTI_MOD (Aerojet DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> PTIYAW	Yaw PTI signal	PTI_DRIVER	F	deg/s**2	12.5
<u>Outputs</u> YAWPTI	Yaw PTI pulse	YAW_SUM	F	deg/s	12.5

Table 4.3.1.3.33-2. YJPTI_MOD (Aerojet DAP) Constants				
Name	Description	Type	Value	Units
TM	DAP medium cycle time	F	0.08	S

Table 4.3.1.3.33-3. YJPTI_MOD (Aerojet DAP) Initialization Requirement					
Component	Initialize on Transition			Variable	Initial Value
	From	To			
Integrator	PTI_ACT	PTI_ACT		YAWPTI	0.0

4.4 PRIORITY RATE LIMITING FOR AEROSURFACE COMMANDS (PRIO_RATE_LIMITING)

A. Function – This function module provides rate limiting of the elevator and aileron commands and conversion of these commands to left and right wing elevon commands. This module also provides rudders and speed brake rate limiting with special speed brake low closing rate limits for small speed brake deflection angles. This is for protecting against collision together of two rudder speed brake panels. Another special feature provides lower rudder rate limiting and maximum speed brake closing rates when either of the rudder-speed brake panels exceeds a prescribed deflection limit.

To alert the crew of control surface rate limiting, special rate saturation light indicators are set when rate limiting of the elevator or aileron commands occur.

Rate limiting is provided by limiting the back difference of the delta position command and by limiting according to the difference of the back difference, respectively.

The hydraulic flow coefficients in the PRL are automatically adjusted to correspond to the status of the three APU's which supply the hydraulics for the control surface actuator, the landing gear, and the brakes. In the event that none of the three APU's are operating, the PRL automatically sets parameters and limits to correspond to one APU operating. The defined I-loads for two and one good APU's assume that the APU's are operating at overspeed.

The block diagram of the PRIO_RATE_LIMITING logic is shown in Figure 4.4-1.

The functional flow chart which functionally describes the priority rate limiting operation is shown in Figure 4.4-2.

- B. Processing Requirements – PRIO_RATE_LIMITING is processed at 25 Hz.
- C. Sequencing Requirements – The sequencing requirements for priority rate limiting may be inferred from Figure 4.4-1.
- D. Interface Requirements – The interface requirements for PRIO_RATE_LIMITING are shown in Table 4.4-1.
- E. I-Loads/Constants – The I-loads/constants for PRIO_RATE_LIMITING are shown in Table 4.4-2.
- F. Initialization Requirements – The initialization requirements for PRIO_RATE_LIMITING are shown in Table 4.4-3. First-pass initialization occurs either at MECO confirmed in MM 601 or immediately upon transition from MM 104 to MM 602 for GRTLS DAP. First-pass initialization for AEROJET DAP occurs upon transition from MM 303 to MM 304.

Table 4.4-1. Priority Rate Limiting Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DAC	Aileron deflection command	AILCMD (Roll channel)	F	deg	25
DECC	Elevator deflection command	DEC_LIM (Pitch channel)	F	deg	25
DELIBOFB	Comp LIB elevon pos	ELVN PFB SOP	F	deg	25
DELOBOFB	Comp LOB elevon pos	ELVN PFB SOP	F	deg	25
DEROBOFB	Comp ROB elevon pos	ELVN PFB SOP	F	deg	25
DERIBOFB	Comp RIB elevon pos	ELVN PFB SOP	F	deg	25
DOWNLOCK	Downlock flag	HYD SYS SOP	D	—	25
DRC	Rudder deflection command	RUDCMD (Yaw channel)	F	deg	25
DROFB	Comp rudder pos	RUD PFB SOP	F	deg	6.25
DSBC	Speed brake deflection command	SBCMD (Speed Brake channel)	F	deg	6.25
DSBOFB	Compensated speed brake feedback	SB PFB SOP	F	deg	6.25
GSENBL	Ground speed enable CMD-NWS	LANDING SOP	D	—	6.25
HYDRFAIL(1)	Hydraulic System 1 fail status (1 = fail)	HYD SYS SOP	D	—	25
HYDRFAIL(2)	Hydraulic System 2 fail status (1 = fail)	HYD SYS SOP	D	—	25
HYDRFAIL(3)	Hydraulic System 3 fail status (1 = fail)	HYD SYS SOP	D	—	25
N_HYDRAULIC_GOOD	Hydraulic system good status 0 = no system good 1 = one system good 2 = two systems good 3 = three systems good	HYD SYS SOP	I	—	25
PRLTVC_ISOL_VLV_OP	PRL TVC ISO VLV open flag (AEROJET DAP ONLY)	LDG GEAR VLV CNTL SEQUENCE	D	—	25
UPLOCK_REL	Uplock release flag	HYD SYS SOP	D	—	25
<u>Outputs</u>					
DACL_PP	Past value of rate-limited aileron deflection command	ESTIMATED_BETA	F	deg	25
DEL_DSBPC	Speed brake increment	SBXFEED	F	deg	25
DLIBPC	LIB elevon position command	AERO ACT SOP, TLM	F	deg	25

Table 4.4-1. Priority Rate Limiting Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
DLOBPC	LOB elevon position command	AERO ACT SOP, TLM	F	deg	25
DRIBPC	RIB elevon position command	AERO ACT SOP, TLM	F	deg	25
DROBPC	ROB elevon position command	AERO ACT SOP, TLM	F	deg	25
DSBPC	Rate-limited speed brake deflection command	AERO ACT SOP, TLM	F	deg	25
DRPC	Rate-limited rudder deflection command	AERO ACT SOP, TLM	F	deg	25
DRPC_PP	Past value of rate-limited rudder deflection command	ESTIMATED_BETA	F	deg	25
RS_AILERON	Aileron rate saturation flag	RCS ACT LT	D	—	25
RS_ELEVATOR	Elevator rate saturation flag	RCS ACT LT	D	—	25

Table 4.4-2. Priority Rate Limiting I-Loads/Constants

Name	Description	Type	MSID/Value	Units
BRAKE_FLOW	Hydraulic flow due to brakes	F	V97U1201C	gal/min
DACDOT_LIM1	Aileron rate limit for NGS = 1, pre GSENBL set	F	V97U1192C	deg/s
DACDOT_LIM2	Aileron rate limit for NGS = 2	F	V97U1193C	deg/s
DACDOT_LIM3	Aileron rate limit for NGS = 3	F	V97U1194C	deg/s
DACDOT_LIMW	Aileron rate limit for NGS=1, post GSENBL set	F	V97U1202C	deg/s
DBFL	Body flap flow coefficient	F	V97U0627C	gal/min
DECCDOT_LIM1	Elevator rate limit for NGS = 1, pre GSENBL set	F	V97U1189C	deg/s
DECCDOT_LIM2	Elevator rate limit for NGS = 2	F	V97U1190C	deg/s
DECCDOT_LIM3	Elevator rate limit for NGS = 3	F	V97U1191C	deg/s
DECCDOT_LIMW	Elevator rate limit for NGS = 1, post GSENBL set	F	V97U1203C	deg/s
DELVC_MAX	Elevon command maximum	F	V97U0639C	deg
DELVC_MIN	Elevon command minimum	F	V97U0640C	deg
DLIM	Summed rudder/speed brake position limit	F	V97U0651C	deg
DRDOT_LIM1	Rudder rate limit for NGS = 1	F	V97U1369C	deg/s
DRDOT_LIM2	Rudder rate limit for NGS = 2	F	V97U1370C	deg/s
DRDOT_LIM3	Rudder rate limit for NGS = 3	F	V97U1180C	deg/s

Table 4.4-2. Priority Rate Limiting I-Loads/Constants

Name	Description	Type	MSID/Value	Units
DRDOT_LIM_SLIM1	Rudder rate limit in SUMLIM for NGS = 1	F	V97U1376C	deg/s
DRDOT_LIM_SLIM2	Rudder rate limit in SUMLIM for NGS = 2	F	V97U1377C	deg/s
DRDOT_LIM_SLIM3	Rudder rate limit in SUMLIM for NGS = 3	F	V97U1378C	deg/s
DSBDOT_NLIM11	Speed brake negative rate limit, above soft stop, for NGS = 1	F	V97U1209C	deg/s
DSBDOT_NLIM12	Speed brake negative rate limit, above soft stop, for NGS = 2	F	V97U0678C	deg/s
DSBDOT_NLIM13	Speed brake negative rate limit, above soft stop, for NGS = 3	F	V97U0679C	deg/s
DSBDOT_NLIM2	Soft-stop speed brake negative rate limit	F	V97U0668C	deg/s
DSBDOT_NLIM_SLIM1	SPDBK negative rate limit in SUMLIM for NGS = 1	F	V97U1373C	deg/s
DSBDOT_NLIM_SLIM2	SPDBK negative rate limit in SUMLIM for NGS = 2	F	V97U1374C	deg/s
DSBDOT_NLIM_SLIM3	SPDBK negative rate limit in SUMLIM for NGS = 3	F	V97U1375C	deg/s
DSBDOT_PLIM1	Speed brake positive rate limit for NGS=1	F	V97U1210C	deg/s
DSBDOT_PLIM2	Speed brake positive rate limit for NGS=2	F	V97U0670C	deg/s
DSBDOT_PLIM3	Speed brake positive rate limit for NGS=3	F	V97U0671C	deg/s
FLOW_AVAIL	Available hydraulic flow	F	V97U1372C	gal/min
KEIO	Inboard elevon flow coefficient, optimum	F	V97U1167C	(gal/min)/(deg/s)
KEIS	Inboard plus outboard elevon flow coefficient, single APU	F	V97U1171C	(gal/min)/(deg/s)
KEOO	Outboard elevon flow coefficient, optimum	F	V97U1168C	(gal/min)/(deg/s)
KEOS	Outboard plus inboard elevon flow coefficient, single APU	F	V97U1172C	(gal/min)/(deg/s)
KQR	Rudder flow coefficient	F	V97U1371C	(gal/min)/(deg/s)
KQSB	Speed brake flow coefficient	F	V97U0809C	(gal/min)/(deg/s)
LEAKAGE1	Hydraulic flow leakage for NGS = 1	F	V97U1181C	gal/min
LEAKAGE2	Hydraulic flow leakage for NGS = 2	F	V97U1182C	gal/min
LEAKAGE3	Hydraulic flow leakage for NGS = 3	F	V97U1183C	gal/min
LIMPR_LA	Limit on panel rate – low altitude	F	V97U1367C	deg/s
LIMPR_HA	Limit on panel rate – high altitude	F	V97U1368C	deg/s

Table 4.4-2. Priority Rate Limiting I-Loads/Constants

Name	Description	Type	MSID/Value	Units
LNDG_GR_FLOW	Flow to landing gear during extension	F	V97U1174C	gal/min
LNDG_GR_LEAKAGE	Landing gear leakage following downlock	F	V97U1175C	gal/min
NWS_FLOW	Hydraulic flow due to NW steering	F	V97U1204C	gal/min
SB_SOFT_STOP	Speed brake soft stop	F	V97U1103C	deg
SLIMHYS	SUMLIM hysteresis angle	F	V97U1173C	deg
SSME_ISOL_VLV_LEAKAGE	SSME hydraulic flow leakage	F	V97U4274C	gal/min
TAS_SW	True airspeed switch for PRL constants	F	V97U1166C	ft/s
TF	Fast sample period	F	0.040	s
WONG_LEAKAGE	Post GSENBL set leakage	F	V97U1205C	gal/min

Table 4.4-3. Priority Rate Limiting Initialization Requirement

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Output (Previous value)		First pass	DSBPC_PAST	(1) 0.0 (2) DSBOFB
		First pass	DRPC_PAST	DROFB
		First pass	DECCL_PAST	(DELOBOFB + DELIBOFB + DEROBOFB + DERIBOFB)/4
		First pass	DACL_PAST	(DELOBOFB + DELIBOFB - DEROBOFB - DERIBOFB)/4
		First pass	SUMLIM FLAG	SUMLIM
	Landing gear	First pass	UPLOCK_REL	0
	Landing gear	First pass	DOWNLOCK	0
(1) Memory Configuration 01				
(2) Memory Configuration 03				

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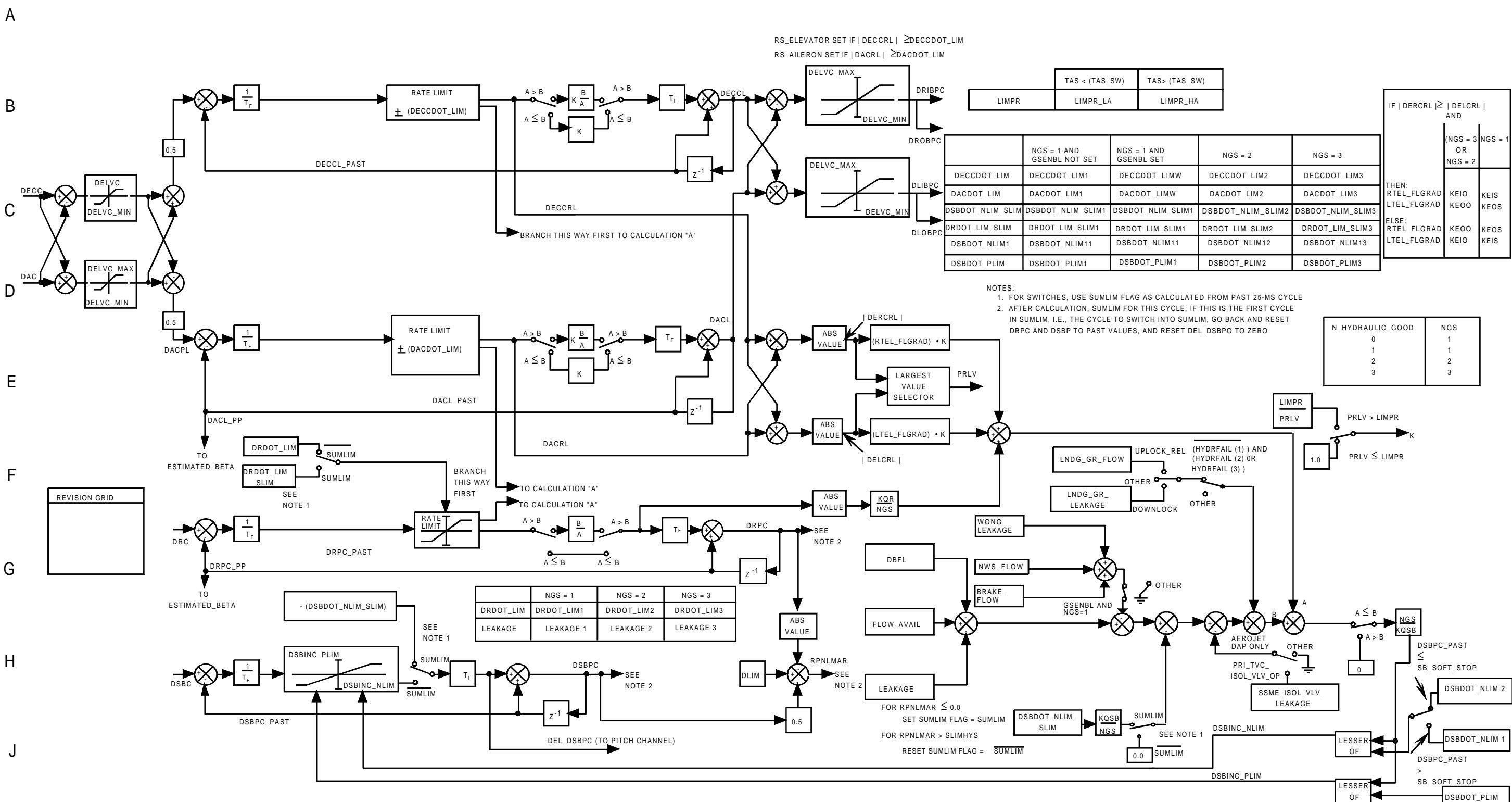


FIGURE 4.4-1. Prio_Rate_Limiting

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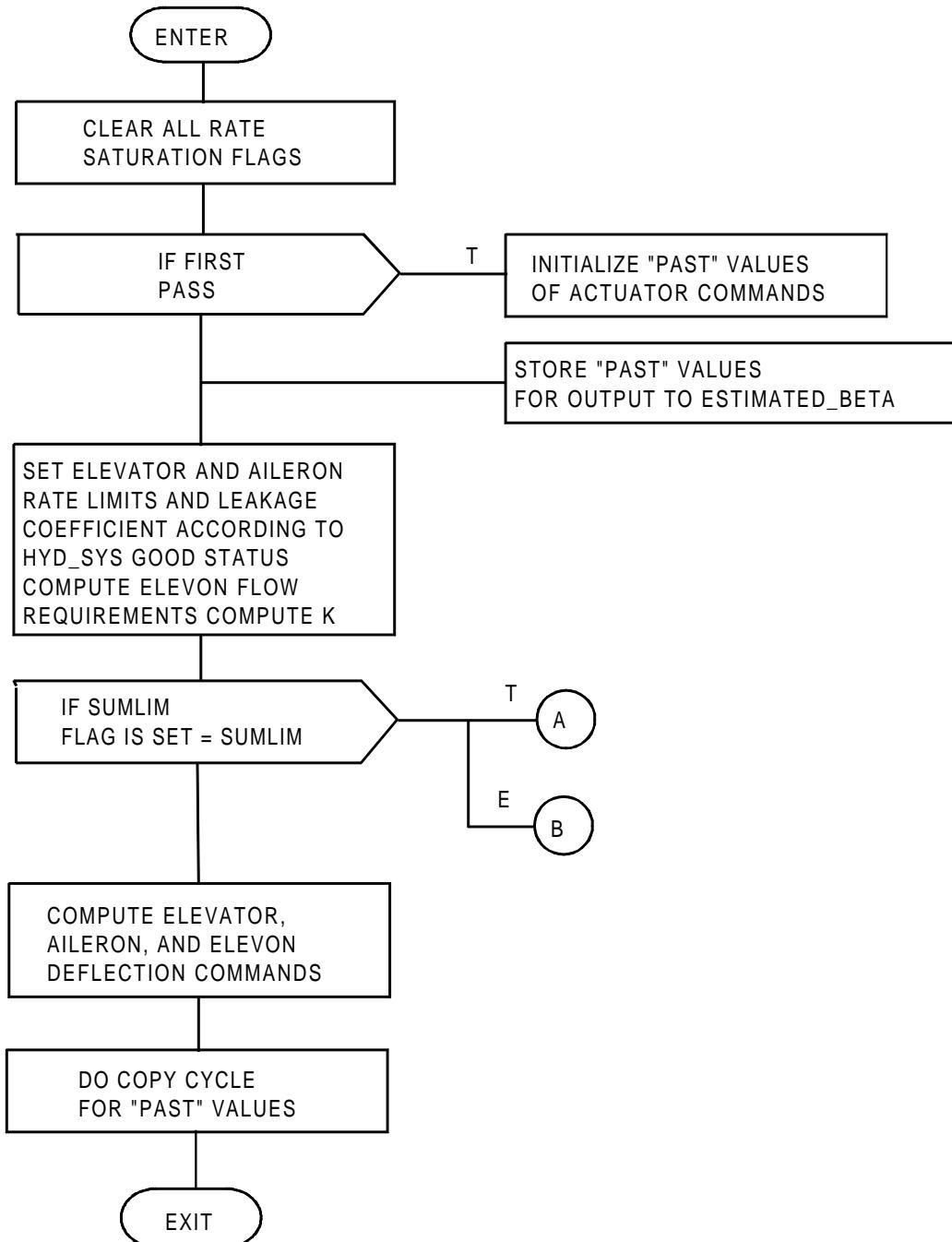


FIGURE 4.4-2.(1) Functional Flow Chart of PRIO_RATE_LIMITING (Sheet 1 of 3)

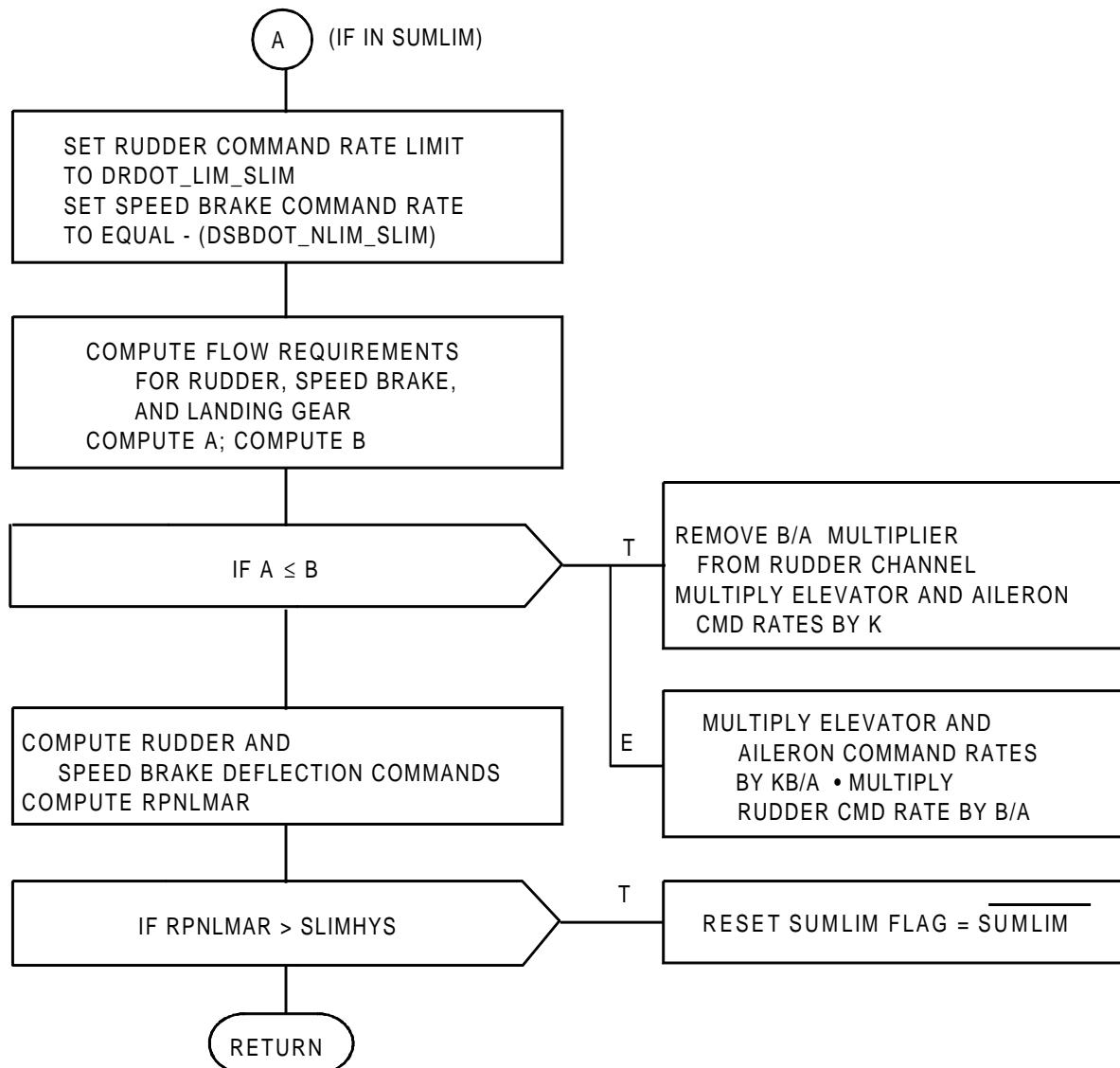


FIGURE 4.4-2.(2) Functional Flow Chart of PRIO_RATE_LIMITING (Sheet 2 of 3)

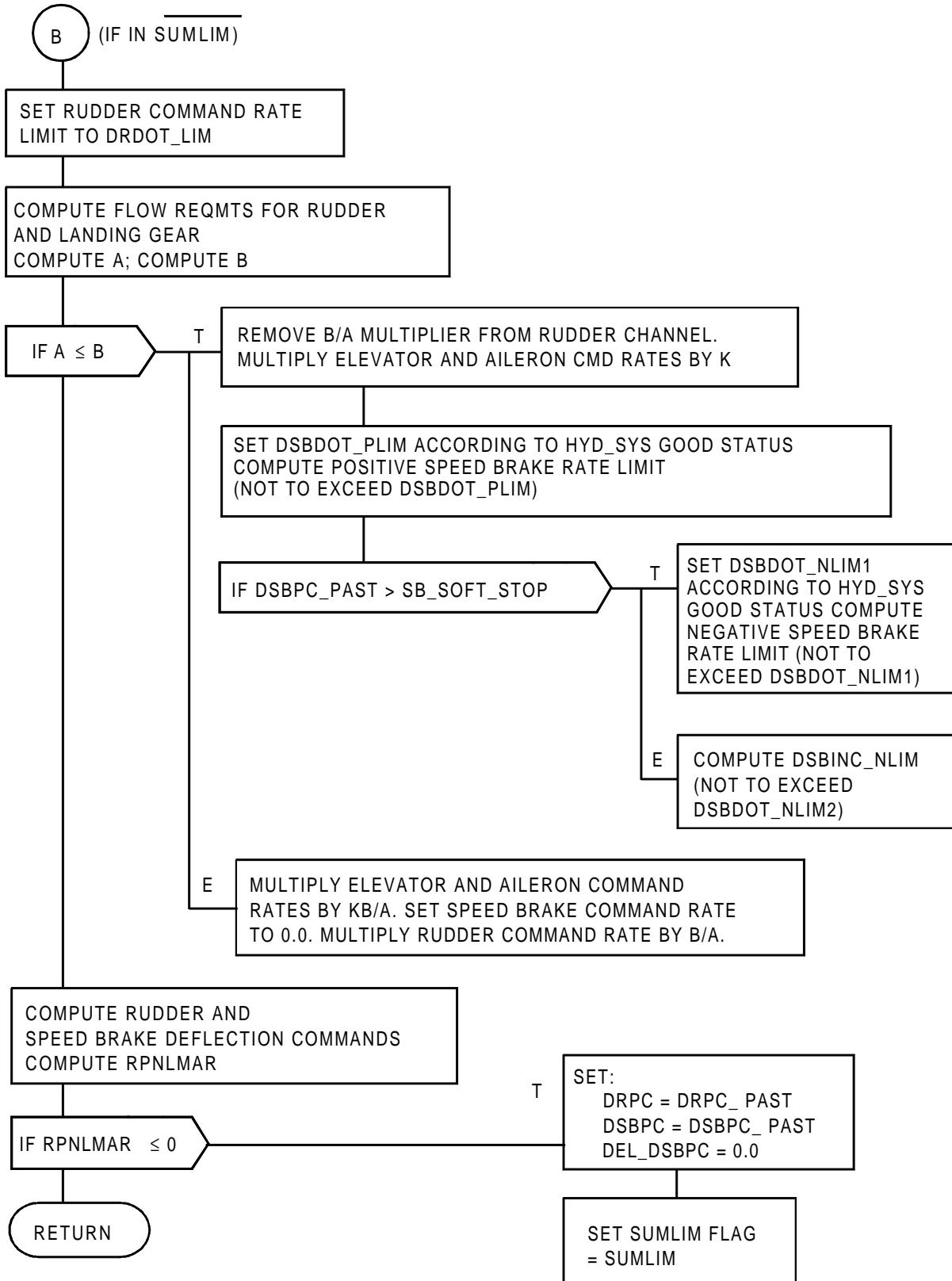


FIGURE 4.4-2.(3) Functional flow Chart of PRIO_RATE_LIMITING (Sheet 3 of 3)

4.5 SPEED BRAKE, BODY FLAP, AND NOSEWHEEL CHANNELS

4.5.1 Speed Brake Channel

- A. Functional Requirements – The speed brake channel provides speed control. If the speed brake is in AUTO mode, the speed brake commands are acquired from descent until MACH_SB becomes true wherein they are acquired from TAEM and AL guidance. For an Intact RTLS abort, in order to assist in the pitch up maneuver during ET-Sep, the speedbrake is deployed starting at MECO confirmed to increase the positive pitching moment on the Orbiter. Note: the GLIDE_RTLS_INHIBIT can be set to OFF for a late 2EO and 3EO contingency abort when the Vehicle is heading back to the launch site and the navigated velocity is greater than the decision velocity. This will cause the speed brake to be deployed for late 2EO and 3EO contingency aborts. The AUTO commands may be overridden manually when a speed brake takeover button is depressed by either the commander or pilot, at which time manual commands are used for control. The detailed block diagrams for Aerojet DAP and GRTLS DAP are presented in Figures 4.5.1–1 and 4.5.1–2, respectively.
- B. Function Modules – The function modules that make up the speed brake channel control laws are described in this subsection in the order given in Table 4.5.1–1.
- C. Sequencing Requirements – The sequencing requirements for the speed brake channel function modules may be inferred from Figures 4.5.1–1 and 4.5.1–2.
- D. Interface Requirements – The interface requirements for the speed brake channel are presented in Table 4.5.1–2.
- E. I-Loads/Constants – The I-Loads and constants for the speed brake channel are given in Table 4.5.1–3.
- F. Initialization Requirements – None.

Table 4.5.1-1. Speed Brake Channel Function Modules

Module	Subsection
ENT_SB_SCHED (Aerojet DAP)	4.5.1.1
GDSBMAN_MOD	4.5.1.2
SBCMD (Aerojet DAP)	4.5.1.3
SBCMD (GRTLS DAP)	4.5.1.4
SB_LIM_BIAS (Aerojet DAP)	4.5.1.5

Table 4.5.1-2.Speed Brake Channel Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
AL	Autoland discrete	RECON	D	—	6.25
DSBC	AUTO speed brake command	TAEM GUID, A/L GUID	F	deg	1.04
DSBC_AL	GRTLS autoland speed brake command	GRTLS A/L GUID	F	deg	6.25
DSBC_AT	Auto GRTLS TAEM speed brake command	GRTLS TAEM GUID	F	deg	1.04
DSBMAN	Manual speed brake command	SBTC SOP	F	deg	6.25
ETSEP	External tank separation flag	RECON	D	—	6.25
MACH_SB	Auto speed brake moding discrete	RECON	D	—	6.25
MC	Mated coast flag	RECON	D	—	6.25
MECO_CONFIRMED	MECO Confirmed Indicator	SSME OPS	D	—	6.25
GLIDE_RTLS_INHIBIT	RTLS Contingency flag	CONT 3E/O GUID, PW CONT GUID, PW RTLS GUID, MSC, GRTLS TAEM GUID	D	—	6.25
MODE_SB	Speed brake mode indicator	RECON	D	—	6.25
WOWLON	Weight on wheels indication	RECON	D	—	6.25
<u>Outputs</u>					
DSB_ENT_SCHED	Scheduled speed brake command	SPI PROC, E/L EV AN PROC	F	deg	1.04
DSBC	Speed brake command	PRIO_RATE_ LIMITING, E/L EV AN PROC, TLM	F	deg	6.25
ENTRY	Entry phase flag	RECON	D	—	6.25
TAEM	TAEM phase flag	RECON	D	—	6.25

Table 4.5.1-3.Speed Brake Channel I-Loads/Constants

Name	Description	Type	MSID/ Value	Units
DSB_CLOSED	Speed brake closed position command	K	V97U2425C/ -9.9 E+00	deg

Table 4.5.1-3.Speed Brake Channel I-Loads/Constants

Name	Description	Type	MSID/ Value	Units
DSB_DEFN_MC	Speed brake position command during MC and ETSEP starting at MECO Confirmed	F	V97U1509C	deg

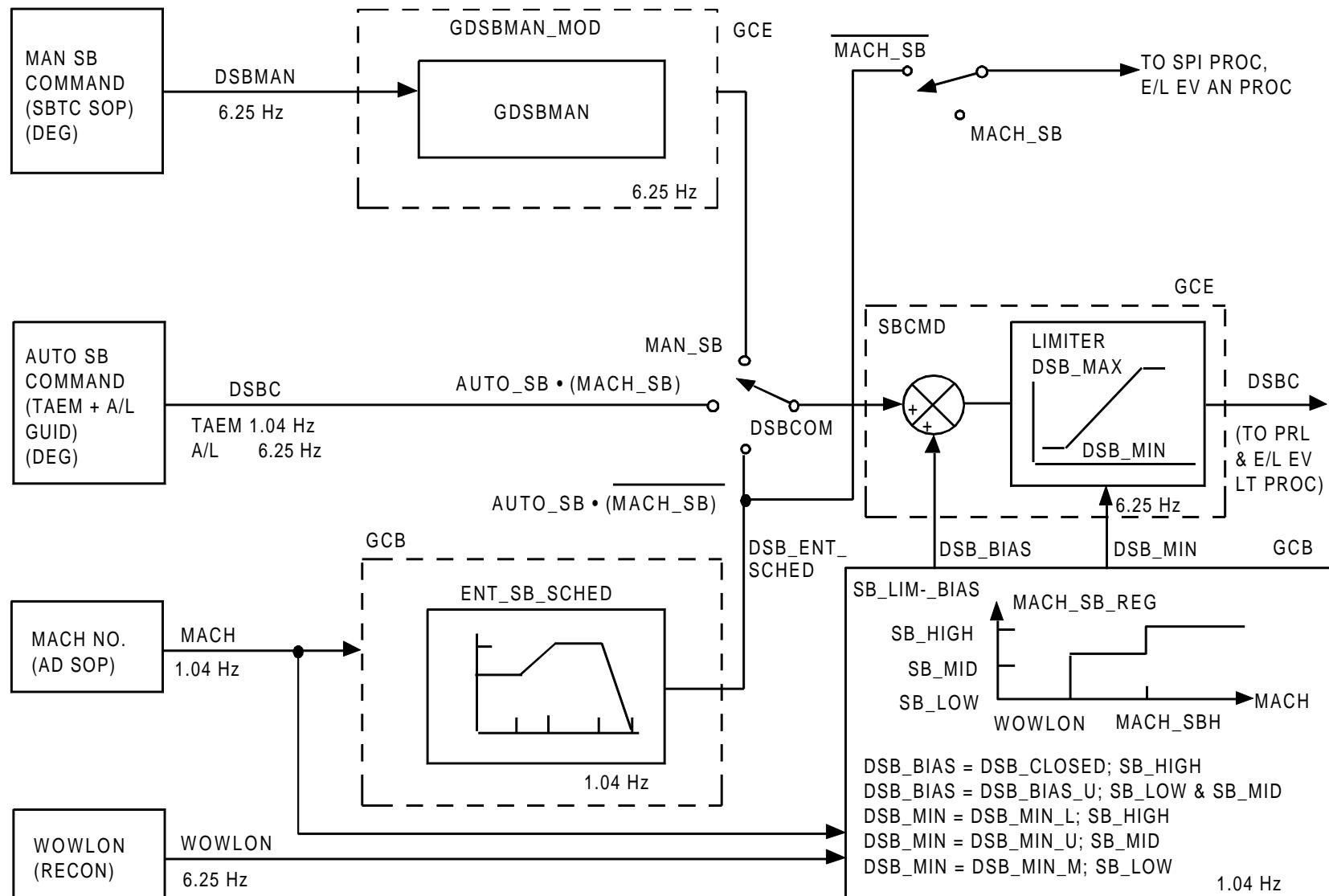


FIGURE 4.5.1-1. Speed Brake Channel Logic, Aerojet DAP

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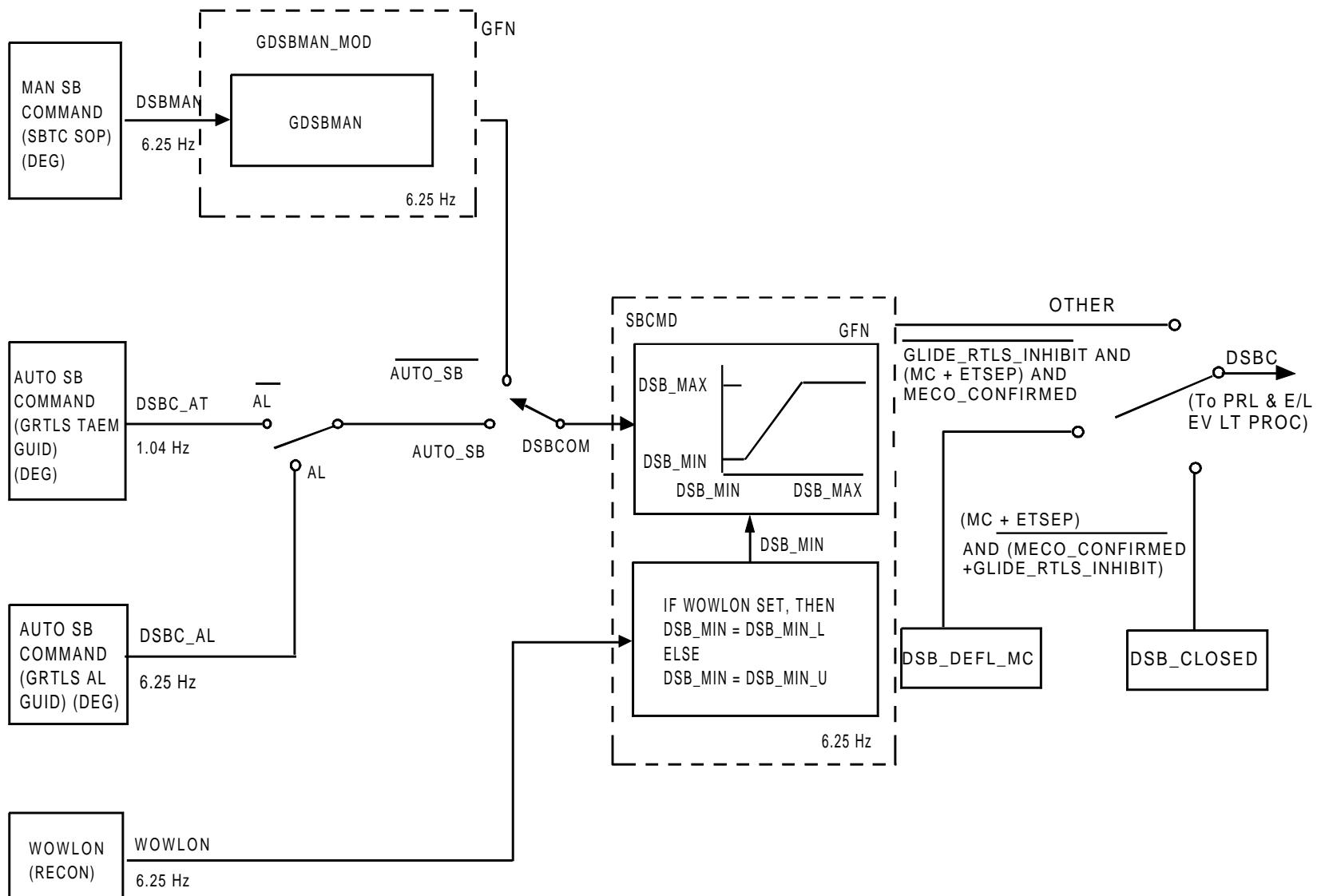


FIGURE 4.5.1-2. Speed Brake Channel Logic, GRTLS DAP

4.5.1.1 ENT_SB_SCHED (Aerojet DAP).

- A. Function – This function module schedules the speed brake deflection command as a function of Mach number during ENTRY. The detailed block diagram is presented in Figure 4.5.1.1–1.
- B. Processing Requirements – ENT_SB_SCHED is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for ENT_SB_SCHED are shown in Table 4.5.1.1–1.
- D. I-Loads – The I-loads for ENT_SB_SCHED are shown in Table 4.5.1.1–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Aerojet DAP unique.

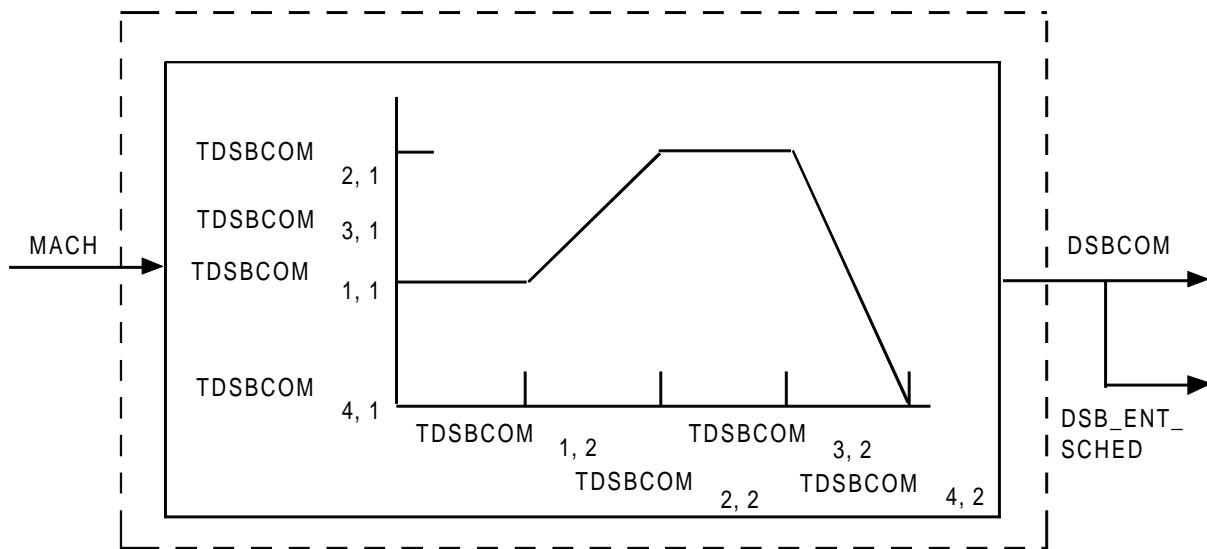


FIGURE 4.5.1.1-1. ENT_SB_SCHED (Aerojet DAP)

Table 4.5.1.1-1. ENT_SB_SCHED (Aerojet DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> MACH	Mach number	ADTA SOP	F	—	1.04
<u>Outputs</u> DSBCOM	Unlimited speed brake deflection command	SBCMD, E/L EV AN PROC	F	deg	1.04
DSB_ENT_SCHED	Scheduled speed brake command	E/L EV AN PROC, SPI PROC	F	deg	1.04

Table 4.5.1.1-2. ENT_SB_SCHED (Aerojet DAP) I-Loads				
Name	Description	Type	MSID	Units
TDSBCOM(1,1)	Tabulated DSBCOM	F	V97U0922C	deg
TDSBCOM(1,2)	Tabulated MACH	F	V97U0923C	—
TDSBCOM(2,1)	Tabulated DSBCOM	F	V97U0924C	deg
TDSBCOM(2,2)	Tabulated MACH	F	V97U0925C	—
TDSBCOM(3,1)	Tabulated DSBCOM	F	V97U0926C	deg
TDSBCOM(3,2)	Tabulated MACH	F	V97U0927C	—
TDSBCOM(4,1)	Tabulated DSBCOM	F	V97U0928C	deg
TDSBCOM(4,2)	Tabulated MACH	F	V97U0929C	—

4.5.1.2 GDSBMAN_MOD.

- A. Function – This function module, common to Aerojet DAP and GRTLS, scales the manual speed brake command. The detailed block diagram is presented in Figure 4.5.1.2-1.
- B. Processing Requirements – GDSBMAN_MOD is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for GDSBMAN_MOD are shown in Table 4.5.1.2-1.
- D. I-Loads – The I-loads for GDSBMAN_MOD are shown in Table 4.5.1.2-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

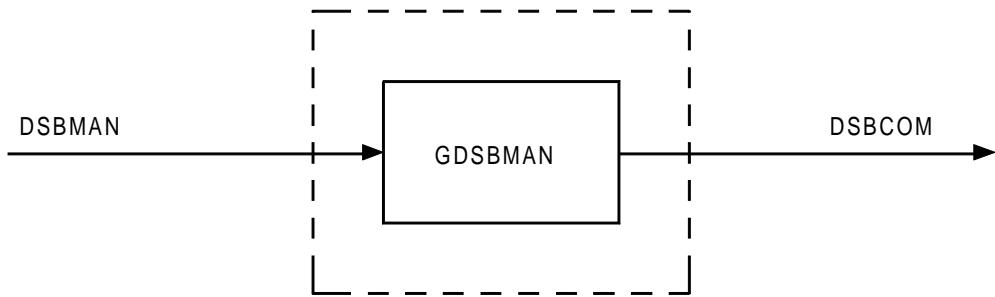


FIGURE 4.5.1.2-1. GDSBMAN_MOD

Table 4.5.1.2-1. GDSBMAN_MOD Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DSBMAN	Manual speed brake command	SBTC SOP	F	deg	6.25
<u>Outputs</u> DSBCOM	Unlimited speed brake deflection command	SBCMD	F	deg	6.25

Table 4.5.1.2-2. GDSBMAN_MOD I-Loads				
Name	Description	Type	MSID	Units
GDSBMAN	Gain to scale manual speed brake command	F	V97U0706C	deg/deg

4.5.1.3 SBCMD (Aerojet DAP).

- A. Function – This function module biases and limits the speed brake deflection command. The detailed block diagram is presented in Figure 4.5.1.3–1.
- B. Processing Requirements – SBCMD is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for SBCMD are shown in Table 4.5.1.3–1.
- D. I-Loads – The I-loads for SBCMD are shown in Table 4.5.1.3–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Aerojet DAP unique.

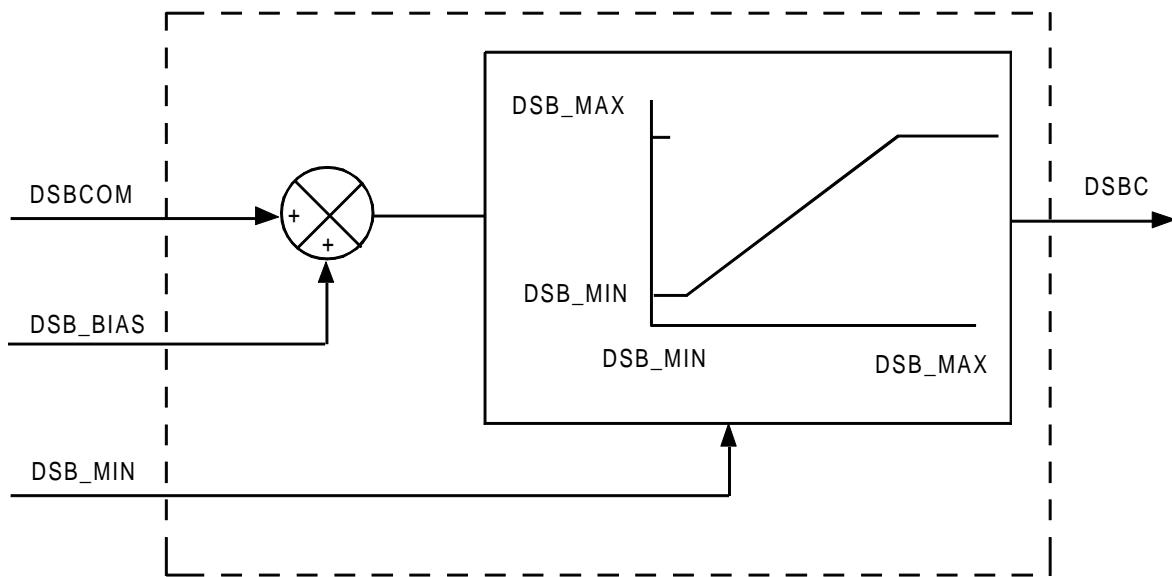


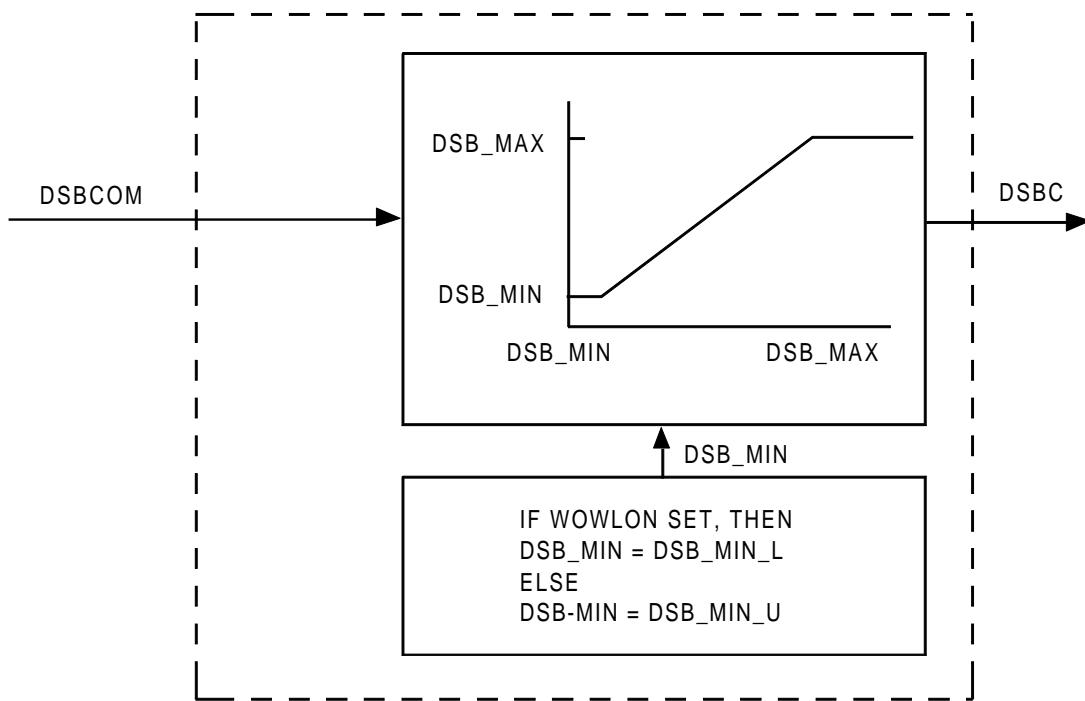
FIGURE 4.5.1.3-1. SBCMD (Aerojet DAP)

Table 4.5.1.3-1. SBCMD (Aerojet DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DSB_BIAS	Speed brake closing bias	SB_LIM_BIAS	F	deg	1.04
DSBCOM	Unlimited speed brake command	ENT SB SCHED, GDSBMAN_MOD	F	deg	1.04
DSB_MIN	Speed brake lower limit	SB_LIM_BIAS	F	deg	6.25
<u>Outputs</u>					
DSBC	Speed brake deflection command	PRIOR_RATE_LIMITING, TLM	F	deg	6.25

Table 4.5.1.3-2. SBCMD (Aerojet DAP) I-Loads				
Name	Description	Type	MSID	Units
DSB_MAX	Speed brake upper position limit	F	V97U0664C	deg

4.5.1.4 SBCMD (GRTLS DAP).

- A. Function – This function module biases and limits the speed brake deflection command. The detailed block diagram is presented in Figure 4.5.1.4–1.
- B. Processing Requirements – SBCMD is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for SBCMD are shown in Table 4.5.1.4–1.
- D. I-Loads/Constants – The I-loads/constants for SBCMD are shown in Table 4.5.1.4–2.
- E. Initialization Requirements – The requirements for SBCMD are given in Table 4.5.1.4–3.
- F. Software Configuration – GRTLS DAP unique.



NOTE:

In order to prevent mechanical interference between the RUDDER/SPEED BRAKE hinges and the rudder conical seal, the trailing panel of the RUDDER/SPEED BRAKE assembly must never be driven beyond 20°. Trailing panel position can be determined by the relation: TRAILING PANEL = RUDDER POS - 1/2 (SPEED BRAKE POS). Note: actuator tolerances and failures must also be taken into account.

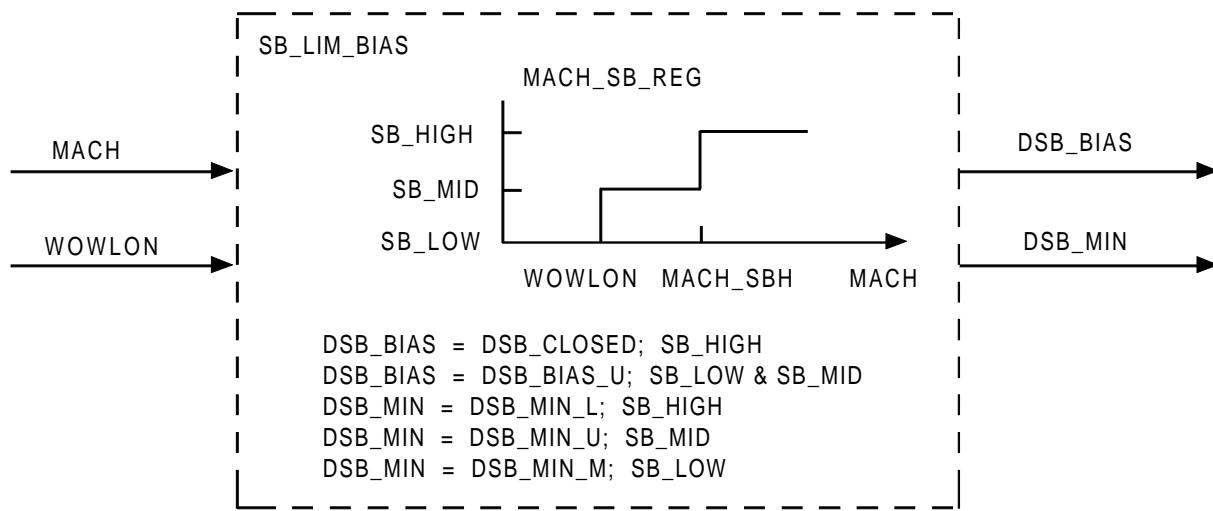
FIGURE 4.5.1.4-1. SBCMD (GRTLS DAP)

Table 4.5.1.4-1. SBCMD (GRTLS DAP) Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DSBCOM	Unlimited speed brake command	GDSBMAN_MOD	F	deg	6.25
		GRTLS TAEM GUID	F	deg	1.04
		GRTLS A/L GUID	F	deg	6.25
WOWLON <u>Outputs</u> DSBC	Weight on wheels indication	RECON	D	—	6.25
		PRIO_RATE_LIMITING, TLM	F	deg	6.25

Table 4.5.1.4-2. SBCMD (GRTLS DAP) I-Loads/Constants				
Name	Description	Type	MSID/Value	Units
DSB_MAX	Speed brake upper position limit	F	V97U0664C	deg
DSB_MIN_L	Speed brake lower position limit	K	V97U0665C/ (1) +1.5 E+01 (2) -9.9 E+00	deg
DSB_MIN_U	Speed brake lower position limit	K	V97U0666C/ +1.5 E+01	deg
(1) Memory Configuration 01 (2) Memory Configuration 03				

4.5.1.5 SB_LIM_BIAS (Aerojet DAP)

- A. Function – This function module computes the speed brake overdrive bias and lower position limit as functions of DSBCOM. The detailed block diagram is presented in Figure 4.5.1.5–1.
- B. Processing Requirements – SB_LIM_BIAS is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for SB_LIM_BIAS are shown in Table 4.5.1.5–1.
- D. Constants – The constants for SB_LIM_BIAS are shown in Table 4.5.1.5–2.
- E. Initialization Requirements – The initialization requirements for SB_LIM_BIAS are shown in Table 4.5.1.5–3.
- F. Software Configuration – Common.



NOTE:

In order to prevent mechanical interference between the RUDDER/SPEED BRAKE hinges and the rudder conical seal, the trailing panel of the RUDDER/SPEED BRAKE assembly must never be driven beyond 20°. Trailing panel position can be determined by the relation: TRAILING PANEL = RUDDER POS - 1/2 (SPEED BRAKE POS). Note: actuator tolerances and failures must also be taken into account.

FIGURE 4.5.1.5-1. SB_LIM_BIAS (Aerojet DAP)

Table 4.5.1.5-1. SB_LIM_BIAS (Aerojet DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
MACH	Mach number	ADTA SOP	F	ND	1.04
WOWLON	Weight on wheels indication	RECON	D	ND	6.25
<u>Outputs</u>					
DSB_BIAS	Speed brake position bias	SBCMD	F	deg	1.04
DSB_MIN	Speed brake lower position limit	SBCMD	F	deg	1.04

Table 4.5.1.5-2. SB_LIM_BIAS (Aerojet DAP) Constants

Name	Description	Type	MSID/Value	Units
DSB_BIAS_U	Speed brake bias for MACH_SB_REG at SB_MID and SB_LOW	K	V97U1142C/ 0.0 E+00	deg
DSB_CLOSED	Speed brake bias for MACH_SB_REG at SB_HIGH	K	V97U2425C/ -9.9 E+00	deg
DSB_MIN_L	Speed brake lower limit for MACH_SB_REG at SB_HIGH	K	V97U0665C/ (1) +1.5 E+01 (2) -9.9 E+00	deg
DSB_MIN_M	Speed brake lower limit for MACH_SB_REG at SB_LOW	K	V97U1143C/ +1.5 E+01	deg
DSB_MIN_U	Speed brake lower limit for MACH_SB_REG at SB_MID	K	V97U0666C/ +1.5 E+01	deg
MACH_SBH	MACH level to switch MACH_SB_REG from SB_HIGH to SB_MID	K	V97U1144C/ +1.0 E+01	ND

(1) Memory Configuration 01
(2) Memory Configuration 03

Table 4.5.1.5-3. SB_LIM_BIAS (Aerojet DAP) Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
MACH_SB_REG	—	First pass	MACH_SB_REG	SB_HIGH

4.5.2 Body Flap Channel

- A. Functional Requirements – The body flap channel provides additional trim for the longitudinal axis. The body flap channel receives commands directly from the crew or as a function of the elevator trim. During final orbiter approach to the runway, the body flap is retracted upon command from guidance if the body flap channel is in AUTO mode and the speed brake is within allowable limits. The body flap channel control laws are presented in block diagram form in Figure 4.5.2–1.
- B. Function Modules – The function modules that make up the body flap channel control laws are described in this subsection in the order shown in Table 4.5.2–1.
- C. Sequencing Requirements – The sequencing requirements for the body flap channel function modules may be inferred from Figure 4.5.2–1.
- D. Interface Requirements – The interface requirements for the body flap channel are presented in Table 4.5.2–2.
- E. I-Loads/Constants – The I-loads and constants for the body flap channel are shown in Table 4.5.2–3.
- F. Initialization Requirements – The initialization requirements for the body flap channel are shown in Table 4.5.2–4.

Table 4.5.2-1. Body Flap Channel Function Modules	
Module	Subsection
BF_DEF_CMD	4.5.2.1
BF_HYSTER	4.5.2.2
BF_LIM_SCHED	4.5.2.3
BF_RATE_CMD	4.5.2.4
CONT_BF_RATE_CMD	4.5.2.4a
DBFD_SCHED	4.5.2.5
DETD_SCHED	4.5.2.6
GBFAUTO_MOD	4.5.2.6a
GBFMACH_SCHED	4.5.2.6b
GBFMAN_MOD	4.5.2.7
GBFR_SCHED	4.5.2.8

Table 4.5.2-2. Body Flap Channel Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
ALT_ELV	Alternate elevon discrete	6.47	D	—	—
DBFMAN	Manual body flap command	BF SLEW SOP	F	—	6.25
DBFOFB	Body flap position feedback	BF PFB SOP	F	deg	6.25
DETRIM	Elevator trim command	ELFBK (pitch channel)	F	deg	25
DSBOFB	Speed brake position	SB PFB SOP	F	deg	6.25
ETSEP	ET separation flag	RECON	D	—	6.25
MACH	Mach number	ADTA SOP	F	—	1.04
MC	Mated coast flag	RECON	D	—	6.25
MODE_BF	Body flap mode indicator	RECON	D	—	6.25
RETRACT_BF	AL guidance retract body flap request	GRTLS A/L GUID A/L GUID	D	—	6.25
GLIDE_RTLS_INHIBIT	RTLS contingency flag	CONT 3E/O GUID, PW CONT GUID, PW RTLS GUID, MSC, GRTLS TAEM GUID	D	—	6.25
IPHASEB	Buffered IPHASE	RECON	I	—	6.25
QBAR_REGIME	Range of QBAR indicator	RECON	I	—	6.25
<u>Outputs</u>					
DBFPC	Body flap position command	E/L EV AN PROC, TLM	F	deg	6.25
DBFRC	Body flap command	AERO ACT SOP, BF CMD RM, TLM	I	—	6.25

Table 4.5.2-3. Body Flap Channel I-Loads/Constants

Name	Description	Type	MSID/ Value	Units
CTBFINT	Contingency body flap initial position	F	V97U9619C	deg
DBFRET	Body flap retracted position	K	V97U0629C/ +0.0 E+00	deg
DBFD	Initial body flap position	F	V97U1112C	deg

Table 4.5.2-4. Body Flap Channel Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
DBFPC	A	A	DBFRET	Body flap position command
DBFPC	—	First pass	DBFD*	Initialize body flap integrator to DBFD on first pass
DBFPC	—	First pass • GLIDE_RTLS_INHIBIT	DBFD**	Initialize body flap integrator to DBFD on first pass and no contingency abort
DBFPC	—	First pass • GLIDE_RTLS_INHIBIT	CTBFINT**	Initialize body flap integrator to CTBFINT on first pass and contingency abort

A = RETRACT_BF • AUTO_BF
* Aerojet DAP only
** GRTLS DAP only

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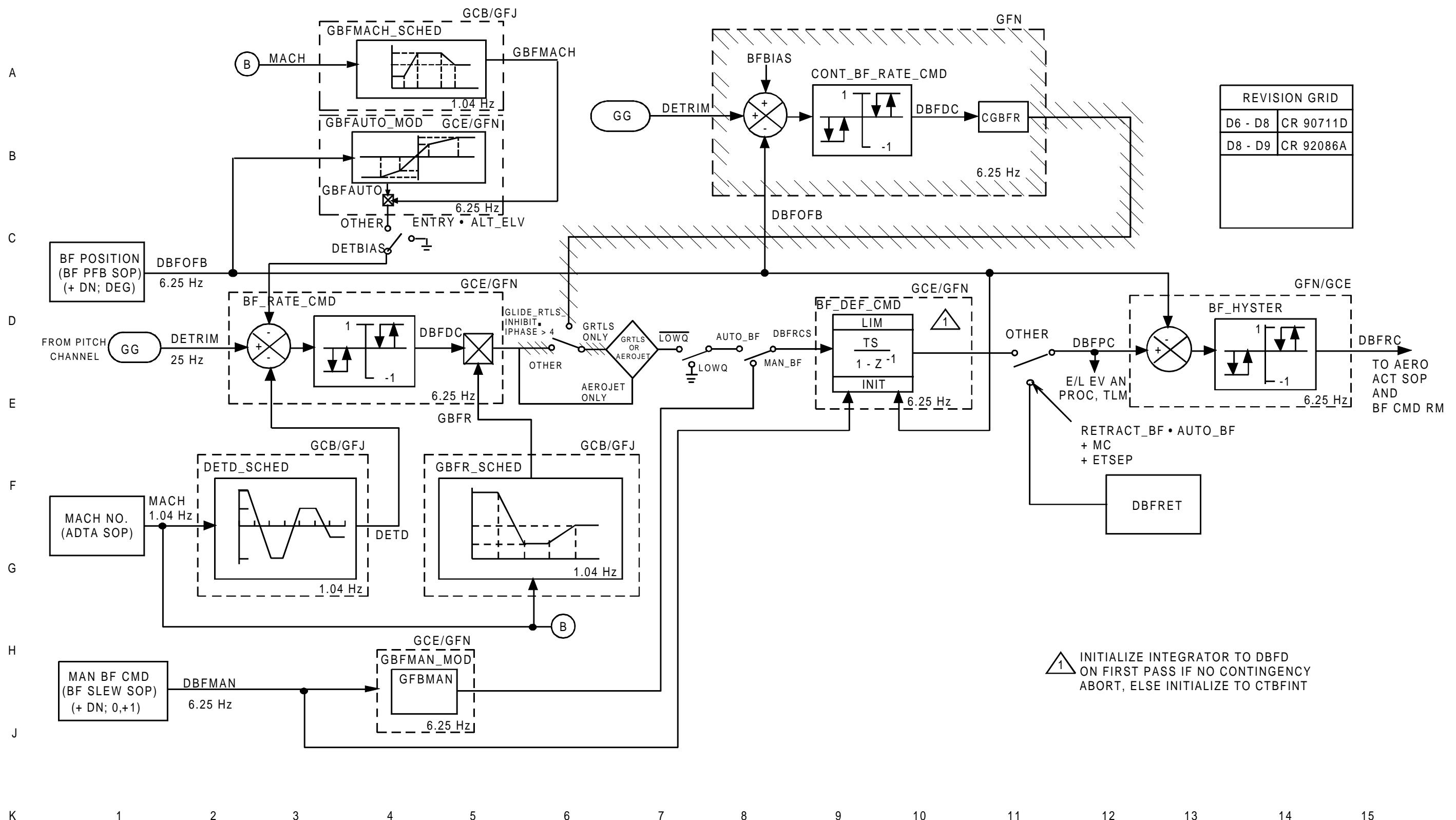


FIGURE 4.5.2-1. Body Flap Channel Logic

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4.5.2.1 BF_DEF_CMD.

- A. Function – This function module integrates and limits the body flap deflection rate command. The detailed block diagram is presented in Figure 4.5.2.1–1.
- B. Processing Requirements – BF_DEF_CMD is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for BF_DEF_CMD are shown in Table 4.5.2.1–1.
- D. Constants – The constants for BF_DEF_CMD are shown in Table 4.5.2.1–2.
- E. Initialization Requirements – The initialization requirements for BF_DEF_CMD are shown in Table 4.5.2.1–3.
- F. Software Configuration – Common.

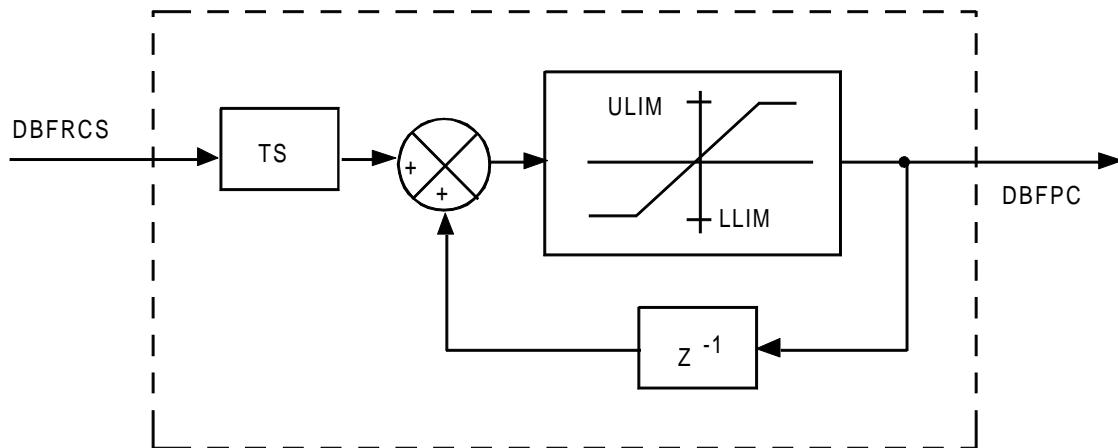


FIGURE 4.5.2.1-1. BF_DEF_CMD

Table 4.5.2.1-1. BF_DEF_CMD Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DBFOFB	Body flap feedback position	BF PFB SOP	F	deg	6.25
DBFRCS	Preliminary body flap rate command	BF_RATE_CMD GBFMAN_MOD	F	deg/s	6.25
<u>Outputs</u>					
DBFPC	Body flap position command	BF_HYSTER, E/L EV AN PROC, TLM	F	deg	6.25

Table 4.5.2.1-2. BF_DEF_CMD I-Loads/Constants

Name	Description	Type	MSID	Units
CTBFINT	Contingency body flap initial position	F	V97U9619C	deg
DBFD	Initial body flap position	F	V97U1112C	deg
LLIM	Lower limit on body flap command	F	V97U0819C	deg
TS	DAP slow cycle time	F	0.160	s
ULIM	Upper limit on body flap command	F	V97U0626C	deg

Table 4.5.2.1-3. BF_DEF_CMD Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Integrator	—	First pass	Output	DBFD
	—	First pass • GLIDE_RTLS_INHIBIT		DBFD**
	—	First pass • GLIDE_RTLS_INHIBIT		CTBFINT**
	AUTOBF	MANBF	Output	DBFOFB
	(DBFMAN≠0) • MAN_BF	(DBFMAN=0)• MAN_BF		DBFOFB
	MANBF	AUTOBF	Output	DBFOFB

* Aerojet DAP only

** GRTLS DAP only

4.5.2.2 BF_HYSTER.

- A. Function – This function module subtracts the body flap feedback position from the body flap position command. It then applies hysteresis to the body flap position error to determine a flap command. The detailed block diagram is presented in Figure 4.5.2.2–1.
- B. Processing Requirements – BF_HYSTER is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for BF_HYSTER are shown in Table 4.5.2.2–1.
- D. I-Loads – The I-loads for BF_HYSTER are shown in Table 4.5.2.2–2.
- E. Initialization Requirements – The initialization requirements for BF_HYSTER are shown in Table 4.5.2.2–3.
- F. Software Configuration – Common.

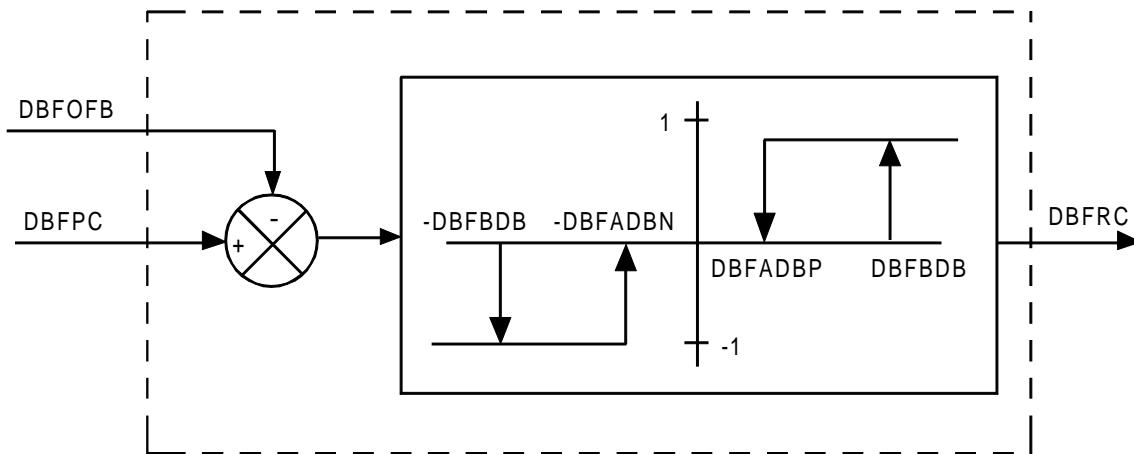


FIGURE 4.5.2.2-1. BF_HYSTER

Table 4.5.2.2-1. BF_HYSTER Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DBFOFB	Body flap position feedback	BF PFB SOP	F	deg	6.25
DBFPC	Body flap position command	BF_DEF_CMD	F	deg	6.25
<u>Outputs</u>					
DBFRC	Body flap rate command	AERO ACT SOP, BF CMD RM, TLM	I	—	6.25

Table 4.5.2.2-2. BF_HYSTER I-Loads				
Name	Description	Type	MSID	Units
DBFADBN	Inner deadband for negative value	F	V97U0623C	deg
DBFADBP	Inner deadband for positive value	F	V97U9620C	deg
DBFBDB	Outer deadband	F	V97U0624C	deg

Table 4.5.2.2-3. BF_HYSTER Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Hysteresis	—	First pass	*	*

*Refer to Section 4.9.5

4.5.2.3 DELETED

4.5.2.4 BF_RATE_CMD.

A. Function – This function module subtracts the scheduled elevon trim and the elevon bias command from the elevator trim command. It then applies hysteresis on this result to determine the direction of the body flap rate change. The direction of rate change is then scaled by a scheduled gain. The detailed block diagram is presented in Figure 4.5.2.4-1.

B. Processing Requirements – BF_RATE_CMD is processed at 6.25 Hz.

C. Interface Requirements – The interface requirements for BF_RATE_CMD are shown in Table 4.5.2.4-1.

D. I-Loads – The I-loads for BF_RATE_CMD are shown in Table 4.5.2.4-2.

E. Initialization Requirements – The initialization requirements for BF_RATE_CMD are shown in Table 4.5.2.4-3. This is for Aerojet DAP only. On the transition from HIGHQ to NOT HIGHQ the value for DETRIM shall come from ELF BK on first pass only. On the transition from NOT HIGHQ to HIGHQ the value for DETRIM shall come from ETRIM_INT on first pass only.

F. Software Configuration – Common.

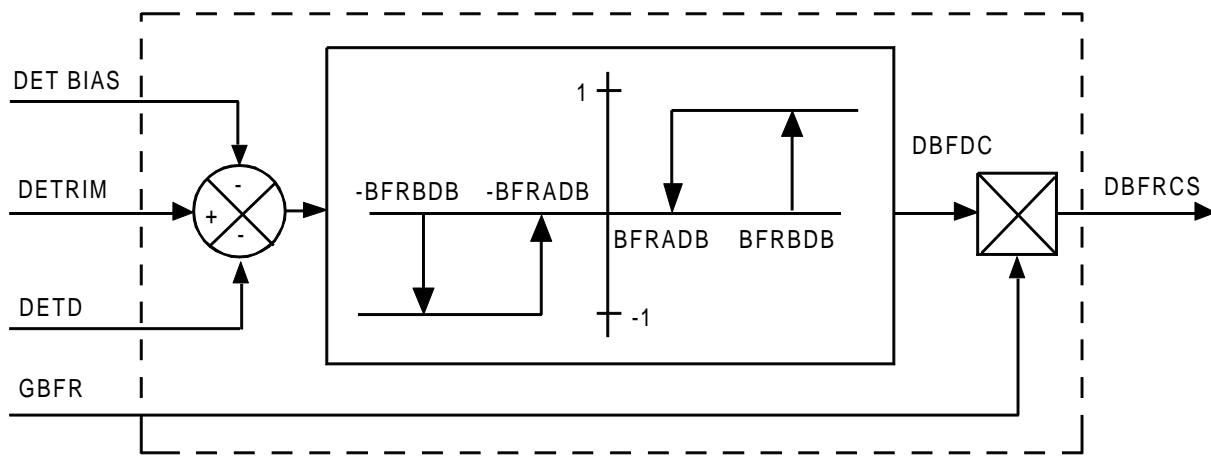


FIGURE 4.5.2.4-1. BF_RATE_CMD

Table 4.5.2.4-1. BF_RATE_CMD Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DETD	Trim elevon deflection schedule	DETD_SCHED	F	deg	1.04
DETBIAST	Elevon bias command	GBFAUTO_MOD	F	deg	6.25
DETRIM	Elevator trim command	ELFBK, ETRIM_INT (pitch channel)	F	deg	25
GBFR	Gain to scale body flap deflection rate	GBFR_SCHED	F	deg/s	1.04
<u>Outputs</u>					
DBFRCS	Body flap rate command	BF_DEF_CMD	F	deg/s	6.25

Table 4.5.2.4-2. BF_RATE_CMD I-Loads				
Name	Description	Type	MSID	Units
BFRADB	Inner deadband	F	V97U1147C	deg
BFRBDB	Outer deadband	F	V97U1148C	deg

Table 4.5.2.4-3. BF_RATE_CMD Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Hysteresis	X Y	X** Y***	*	*
*Refer to Section 4.9.5 X = $\overline{\text{LOWQ}} \bullet \text{AUTO_BF}$ Y = $\overline{\text{LOWQ}} \bullet \text{AUTO_BF} \bullet (\overline{\text{GLIDE_RTLS_INHIBIT}} \bullet \overline{\text{PHASEB}} > 4)$				
** Aerojet DAP only				
*** GRTLS DAP only				

4.5.2.4a CONT_BF_RATE_CMD (GRTLS DAP).

A. Function – This function module sums the elevator trim command with an I-loaded bias and then subtracts the body flap position feedback. It then applies a hysteresis on this result to determine the direction of the body flap rate change. The direction of rate change is then scaled by an I-loaded gain. The detailed block diagram is presented in Figure 4.5.2.4a-1.

4.5.2.4a-1.

B. Processing Requirements – CONT_BF_RATE_CMD is processed at 6.25 Hz.

C. Interface Requirements – The interface requirements for CONT_BF_RATE_CMD are shown in Table 4.5.2.4a-1.

D. I-Loads - The I-loads for CONT_BF_RATE_CMD are shown in Table 4.5.2.4a-2.

E. Initialization Requirements – The initialization requirements for CONT_BF_RATE_CMD are shown in Table 4.5.2.4a-3.

F. Software Configuration – GRTLS DAP Unique.

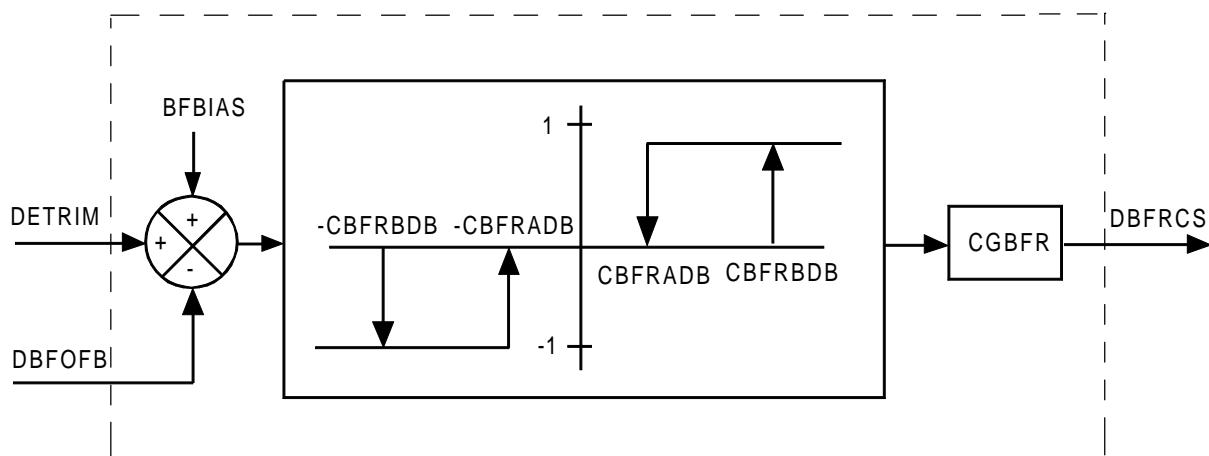


FIGURE 4.5.2.4a-1. CONT_BF_RATE_CMD (GRTLS DAP)

Table 4.5.2.4a-1. CONT_BF_RATE_CMD (GRTLS DAP) Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DETRIM	Elevon trim command	ELFBK	F	deg	25
DBFOFB	Body flap position feedback	BF PFB SOP	F	deg	6.25
<u>Outputs</u>					
DBFRCS	Body flap rate command	BF_DEF_CMD	F	deg/s	6.25

Table 4.5.2.4a-2. CONT_BF_RATE_CMD (GRTLS DAP) I-loads

Name	Description	Type	MSID	Units
BFBIAS	Contingency body flap bias	F	V97U9621C	deg
CBFRADB	Inner deadband	F	V97U9622C	deg
CBFRBDB	Outer deadband	F	V97U9623C	deg
CGBFR	Contingency body flap rate gain	F	V97U9624C	deg/s

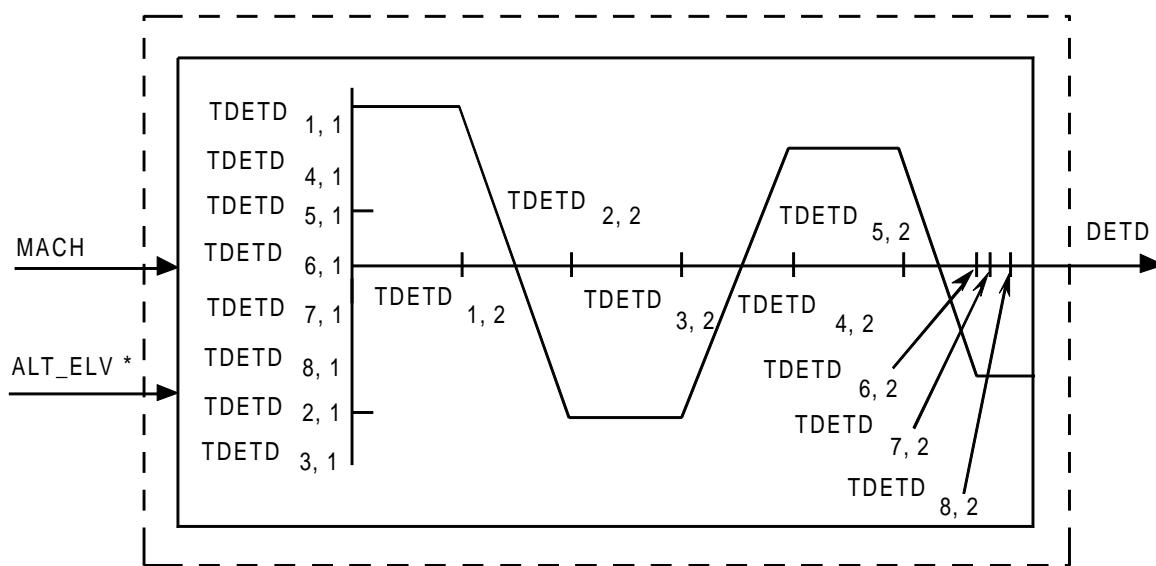
Table 4.5.2.4a-3. CONT_BF_RATE_CMD (GRTLS DAP) Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Hysteresis	X̄	X	*	*
* Refer to Section 4.9.5				
X = GLIDE_RTLS_INHIBIT • IPHASEB > 4 • LOWQ • AUTO_BF				

4.5.2.5 DELETED

4.5.2.6 DETD_SCHED.

- A. Function – This function module schedules an elevon trim deflection. The detailed block diagram is presented in Figure 4.5.2.6–1. The primary elevon schedule is selected unless the crew discrete, ALT_ELV, is on, at which time the alternate schedule is selected (TDETDA).
- B. Processing Requirements – DETD_SCHED is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for DETD_SCHED are shown in Table 4.5.2.6–1.
- D. I-Loads – The I-loads for DETD_SCHED are shown in Tables 4.5.2.6–2 and 4.5.2.6–3.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.



*NOTE: ALT_ELV IS AVAILABLE TO AEROJET DAP THROUGH ITEM ENTER (SPEC 051)

FIGURE 4.5.2.6-1. DETD_SCHED

Table 4.5.2.6-1. DETD_SCHED Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
ALT_ELV*	Alternate elevon discrete	OVERRIDE DISP	D	—	1.04
MACH	Mach number	ADTA SOP	F	—	1.04
<u>Outputs</u>					
DETD	Scheduled elevon trim deflection	BF_RATE_CMD	F	deg	1.04

*Aerojet DAP

Table 4.5.2.6-2. DETD_SCHED I-Loads, Aerojet DAP				
Name	Description	Type	MSID	Units
TDETD(1,1)	Tabulated DETD	F	V97U0906C	deg
TDETDA(1,1)	ALT TABULATED DETD		V97U1339C	deg
TDETD(1,2)	Tabulated MACH	F	V97U0907C	—
TDETDA(1,2)	ALT TABULATED MACH		V97U1340C	—
TDETD(2,1)	Tabulated DETD	F	V97U0908C	deg
TDETDA(2,1)	ALT TABULATED DETD		V97U1341C	deg
TDETD(2,2)	Tabulated MACH	F	V97U0909C	—
TDETDA(2,2)	ALT TABULATED MACH		V97U1342C	—
TDETD(3,1)	Tabulated DETD	F	V97U0910C	deg
TDETDA(3,1)	ALT TABULATED DETD		V97U1343C	deg
TDETD(3,2)	Tabulated MACH	F	V97U0911C	—
TDETDA(3,2)	ALT TABULATED MACH		V97U1344C	—
TDETD(4,1)	Tabulated DETD	F	V97U0912C	deg
TDETDA(4,1)	ALT TABULATED DETD		V97U1196C	deg
TDETD(4,2)	Tabulated MACH	F	V97U0913C	—
TDETDA(4,2)	ALT TABULATED MACH		V97U1197C	—
TDETD(5,1)	Tabulated DETD	F	V97U0914C	deg
TDETDA(5,1)	ALT TABULATED DETD		V97U1198C	deg
TDETD(5,2)	Tabulated MACH	F	V97U0915C	—
TDETDA(5,2)	ALT TABULATED MACH		V97U1199C	—
TDETD(6,1)	Tabulated DETD	F	V97U0916C	deg
TDETDA(6,1)	ALT TABULATED DETD		V97U1333C	deg
TDETD(6,2)	Tabulated MACH	F	V97U0917C	—
TDETDA(6,2)	ALT TABULATED MACH		V97U1334C	—
TDETD(7,1)	Tabulated DETD	F	V97U0918C	deg
TDETDA(7,1)	ALT TABULATED DETD		V97U1335C	deg
TDETD(7,2)	Tabulated MACH	F	V97U0919C	—
TDETDA(7,2)	ALT TABULATED MACH		V97U1336C	—
TDETD(8,1)	Tabulated DETD	F	V97U0920C	deg
TDETDA(8,1)	ALT TABULATED DETD		V97U1337C	deg
TDETD(8,2)	Tabulated MACH	F	V97U0921C	—
TDETDA(8,2)	ALT TABULATED MACH		V97U1338C	—

Table 4.5.2.6-3. DETD_SCHED I-Loads, GRTLS DAP

Name	Description	Type	MSID	Units
TDETDA(1,1)	ALT Tabulated DETD	F	V97U1339C	deg
TDETDA(1,2)	ALT Tabulated MACH	F	V97U1340C	—
TDETDA(2,1)	ALT Tabulated DETD	F	V97U1341C	deg
TDETDA(2,2)	ALT Tabulated MACH	F	V97U1342C	—
TDETDA(3,1)	ALT Tabulated DETD	F	V97U1343C	deg
TDETDA(3,2)	ALT Tabulated MACH	F	V97U1344C	—
TDETDA(4,1)	ALT Tabulated DETD	F	V97U1196C	deg
TDETDA(4,2)	ALT Tabulated MACH	F	V97U1197C	—
TDETDA(5,1)	ALT Tabulated DETD	F	V97U1198C	deg
TDETDA(5,2)	ALT Tabulated MACH	F	V97U1199C	—
TDETDA(6,1)	ALT Tabulated DETD	F	V97U1333C	deg
TDETDA(6,2)	ALT Tabulated MACH	F	V97U1334C	—
TDETDA(7,1)	ALT Tabulated DETD	F	V97U1335C	deg
TDETDA(7,2)	ALT Tabulated MACH	F	V97U1336C	—
TDETDA(8,1)	ALT Tabulated DETD	F	V97U1337C	deg
TDETDA(8,2)	ALT Tabulated MACH	F	V97U1338C	—

4.5.2.6a GBFAUTO_MOD

- A. Function – This function module generates the elevon trim bias command and scales it by a scheduled gain. The detailed block diagram is presented in Figure 4.5.2.6a–1.
- B. Processing Requirements – GBFAUTO_MOD is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for GBFAUTO_MOD are shown in Table 4.5.2.6a–1.
- D. I-Loads – The I-loads for GBFAUTO_MOD are shown in Table 4.5.2.6a–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

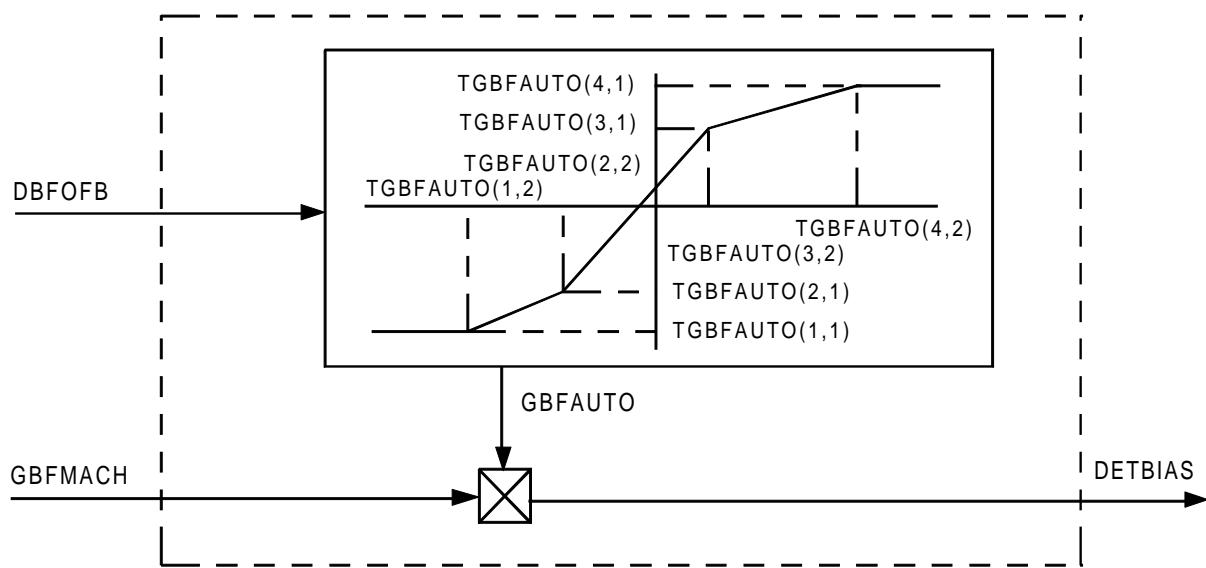


FIGURE 4.5.2.6a-1. GBFAUTO_MOD

Table 4.5.2.6a-1. GBFAUTO_MOD Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DBFOFB	Body flap position feedback	BF PFB SOP	F	deg	6.25
GBFMACH	Gain to scale elevon bias command	GBFMACH_SCHED	F	—	1.04
<u>Outputs</u>					
DETBIAST	Elevon bias command	BF_RATE_CMD	F	deg	6.25

Table 4.5.2.6a-2. GBFAUTO_MOD I-Loads				
Name	Description	Type	MSID	Units
TGBFAUTO(1,1)	Tabulated GBFAUTO	F	V97U1388C	deg
TGBFAUTO(1,2)	Tabulated DBFOFB	F	V97U1389C	deg
TGBFAUTO(2,1)	Tabulated GBFAUTO	F	V97U1390C	deg
TGBFAUTO(2,2)	Tabulated DBFOFB	F	V97U1391C	deg
TGBFAUTO(3,1)	Tabulated GBFAUTO	F	V97U1392C	deg
TGBFAUTO(3,2)	Tabulated DBFOFB	F	V97U1393C	deg
TGBFAUTO(4,1)	Tabulated GBFAUTO	F	V97U1394C	deg
TGBFAUTO(4,2)	Tabulated DBFOFB	F	V97U1395C	deg

4.5.2.6b GBFMACH_SCHED

- A. Function – This function module schedules a gain for the elevon bias command as a function of Mach. The detailed block diagram is presented in Figure 4.5.2.6b-1.
- B. Processing Requirements – GBFMACH_SCHED is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for GBFMACH_SCHED are shown in Table 4.5.2.6b-1.
- D. I-Loads – The I-loads for GBFMACH_SCHED are shown in Table 4.5.2.6b-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

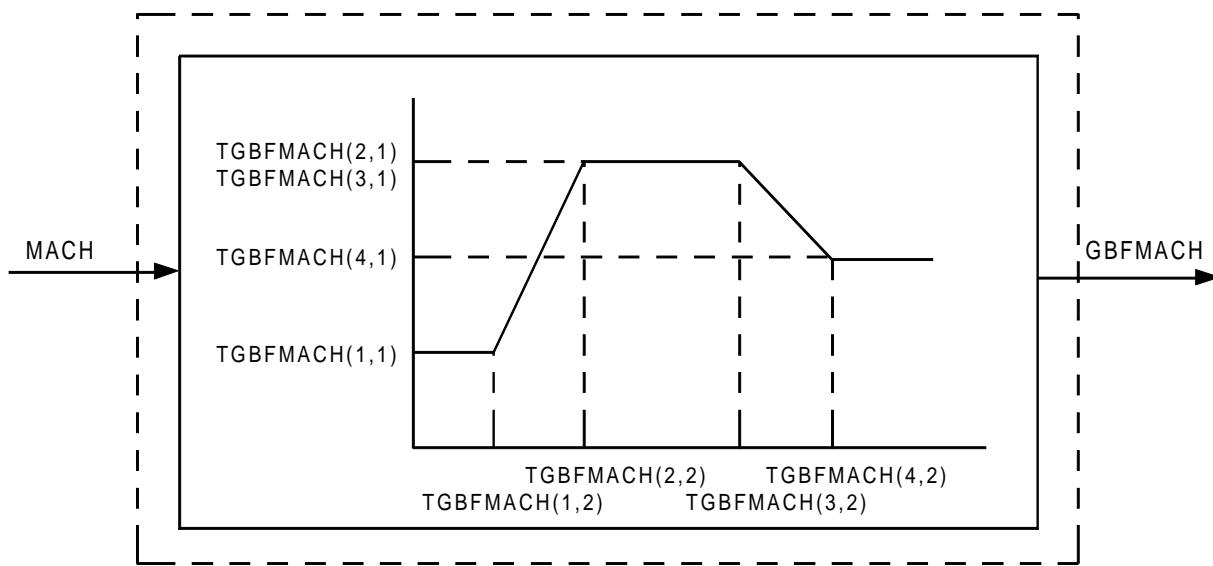


FIGURE 4.5.2.6b-1. GBFMACH_SCHED

Table 4.5.2.6b-1. GBFMACH_SCHED Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> MACH	Mach Number	ADTA SOP	F	—	1.04
<u>Outputs</u> GBFMACH	Gain to scale elevon bias command	GBFAUTO_MOD	F	—	1.04

Table 4.5.2.6b-2. GBFMACH_SCHED I-Loads

Name	Description	Type	MSID	Units
TGBFMACH(1,1)	Tabulated GBFMACH	F	V97U1380C	—
TGBFMACH(1,2)	Tabulated MACH	F	V97U1381C	—
TGBFMACH(2,1)	Tabulated GBFMACH	F	V97U1382C	—
TGBFMACH(2,2)	Tabulated MACH	F	V97U1383C	—
TGBFMACH(3,1)	Tabulated GBFMACH	F	V97U1384C	—
TGBFMACH(3,2)	Tabulated MACH	F	V97U1385C	—
TGBFMACH(4,1)	Tabulated GBFMACH	F	V97U1386C	—
TGBFMACH(4,2)	Tabulated MACH	F	V97U1387C	—

4.5.2.7 GBFMAN_MOD.*

- A. Function – GBFMAN_MOD converts the manual body flap command into a flap position error to determine a flap command. The detailed block diagram is presented in Figure 4.5.2.7-1.
- B. Processing Requirements – GBFMAN_MOD is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for GBFMAN_MOD are shown in Table 4.5.2.7-1.
- D. Constants – The constants for GBFMAN_MOD are listed in Table 4.5.2.7-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

*BF_MAN_MOD is an acceptable alternate designation.

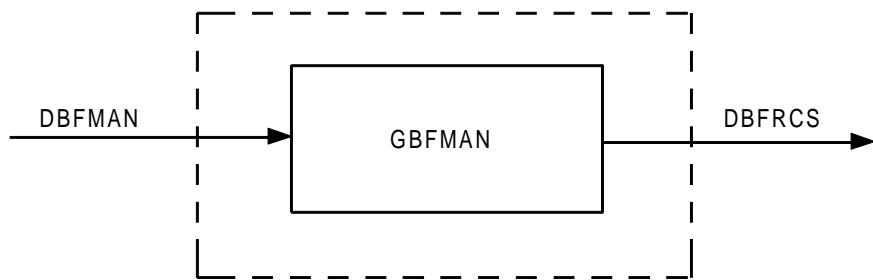


FIGURE 4.5.2.7-1. GBFMAN_MOD

Table 4.5.2.7-1. GBFMAN_MOD Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DBFMAN	Manual body flap command	BF SLEW SOP	I	—	6.25
<u>Outputs</u> DBFRCS	Body flap rate command	BF_DEF_CMD	F	deg/s	6.25

Table 4.5.2.7-2. GBFMAN_MOD Constants

Name	Description	Type	MSID/Value	Units
GBFMAN	Manual body flap gain	K	V97U1088C/ +1.0 E+03	deg/s

4.5.2.8 GBFR_SCHED.

- A. Function – This function module schedules a body flap rate gain. The detailed block diagram is presented in Figure 4.5.2.8–1.
- B. Processing Requirements – GBFR_SCHED is processed at 1.04 Hz.
- C. Interface Requirements – The interface requirements for GBFR_SCHED are shown in Table 4.5.2.8–1.
- D. I-Loads – The I-loads for GBFR_SCHED are shown in Table 4.5.2.8–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

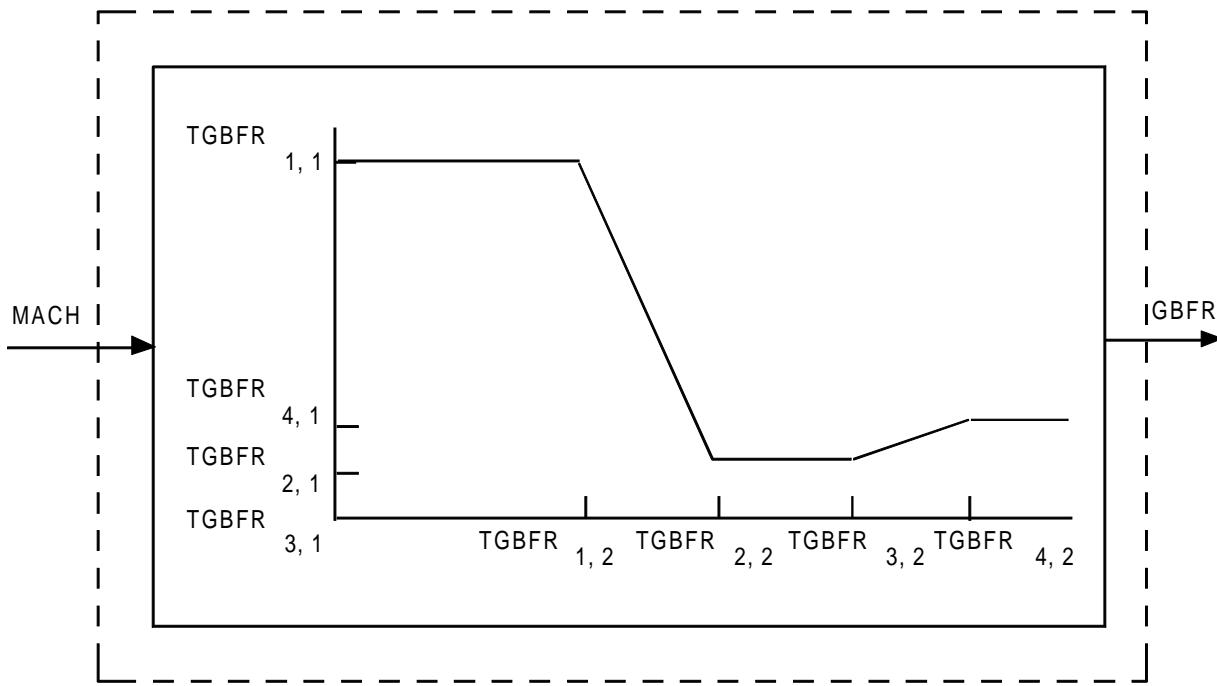


FIGURE 4.5.2.8-1. GBFR_SCHED

Table 4.5.2.8-1. GBFR_SCHED Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> MACH	Mach number	ADTA SOP	F	—	1.04
<u>Outputs</u> GBFR	Gain to scale body flap deflection rate	BF_RATE_CMD	F	deg/s	1.04

Table 4.5.2.8-2. GBFR_SCHED I-Loads				
Name	Description	Type	MSID	Units
TGBFR(1,1)	Tabulated GBFR	F	V97U0940C	deg/s
TGBFR(1,2)	Tabulated MACH	F	V97U0941C	—
TGBFR(2,1)	Tabulated GBFR	F	V97U0942C	deg/s
TGBFR(2,2)	Tabulated MACH	F	V97U0943C	—
TGBFR(3,1)	Tabulated GBFR	F	V97U0944C	deg/s
TGBFR(3,2)	Tabulated MACH	F	V97U9945C	—
TGBFR(4,1)	Tabulated GBFR	F	V97U0946C	deg/s
TGBFR(4,2)	Tabulated MACH	F	V97U0947C	—

4.5.3 Nosewheel Channel

- A. Functional Requirements – The nosewheel channel provides yaw control during rollout maneuvers. The nosewheel channel control laws are presented in block diagram form in Figure 4.5.3–1.
- B. Function Modules – The function modules that make up the nosewheel channel control laws are described in this subsection in the order shown in Table 4.5.3–1.
- C. Sequencing Requirements – The sequencing requirements for the nosewheel channel function modules may be inferred from Figure 4.5.3–1.
- D. Interface Requirements – The interface requirements for the nosewheel channel are presented in Table 4.5.3–2.
- E. Constants – None.
- F. Initialization Requirements – None.

Table 4.5.3-1. Nosewheel Channel Function Modules	
Module	Subsection
AUTONW	4.5.3.1
DRG_COMP	4.5.3.2
DR_LIM	4.5.3.3
MANNW	4.5.3.4
NWCMD	4.5.3.5
NYFB_NWS	4.5.3.6
NYFB_BBF	4.5.3.7

Table 4.5.3-2.Nosewheel Channel Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
AL	Autoland flag	RECON	D	—	6.25
DRMAN	Rudder pedal command	RPTA SOP	F	deg	6.25
MODE_BANK	Bank mode indicator	RECON	D	—	6.25
GSENBL	Nosewheel steering enable indicator	LANDING SOP	D	—	12.5
R	Yaw rate	SF	F	deg/s	25
RC	Yaw rate command	GRTLS A/L GUID A/L GUID	F	deg/s	6.25
NY	Lateral acceleration feedback	SF	F	g	25
COMP_NW_POSN	Compensated nosewheel position	NW_POSITION_SOP	F	deg	25
ENTRY	Entry phase flag	RECON	D	—	6.25
TAEM	TAEM phase flag	RECON	D	—	6.25
<u>Outputs</u>					
DNWC	Nosewheel deflection command	AERO ACT SOP, NW POSN SOP, TLM	F	deg	25
RCP		NYCOSALF			6.25

Table 4.5.3-3.Nosewheel Channel Initialization Requirements

Variable	Initialize on Transition		Initial Variable	Description
	From	To		
DNWCP	—	First pass	0.0	Preliminary nosewheel command angle
DNWCP	—	GSENBL	COMP_NW_POSN	
DNWCP	<u>GSENBL • NWS1_MODE_FLAG</u>	GSENBL • NWS1_MODE_FLAG	COMP_NW_POSN	
DNWCP	<u>GSENBL • NWS2_MODE_FLAG</u>	GSENBL • NWS2_MODE_FLAG	COMP_NW_POSN	

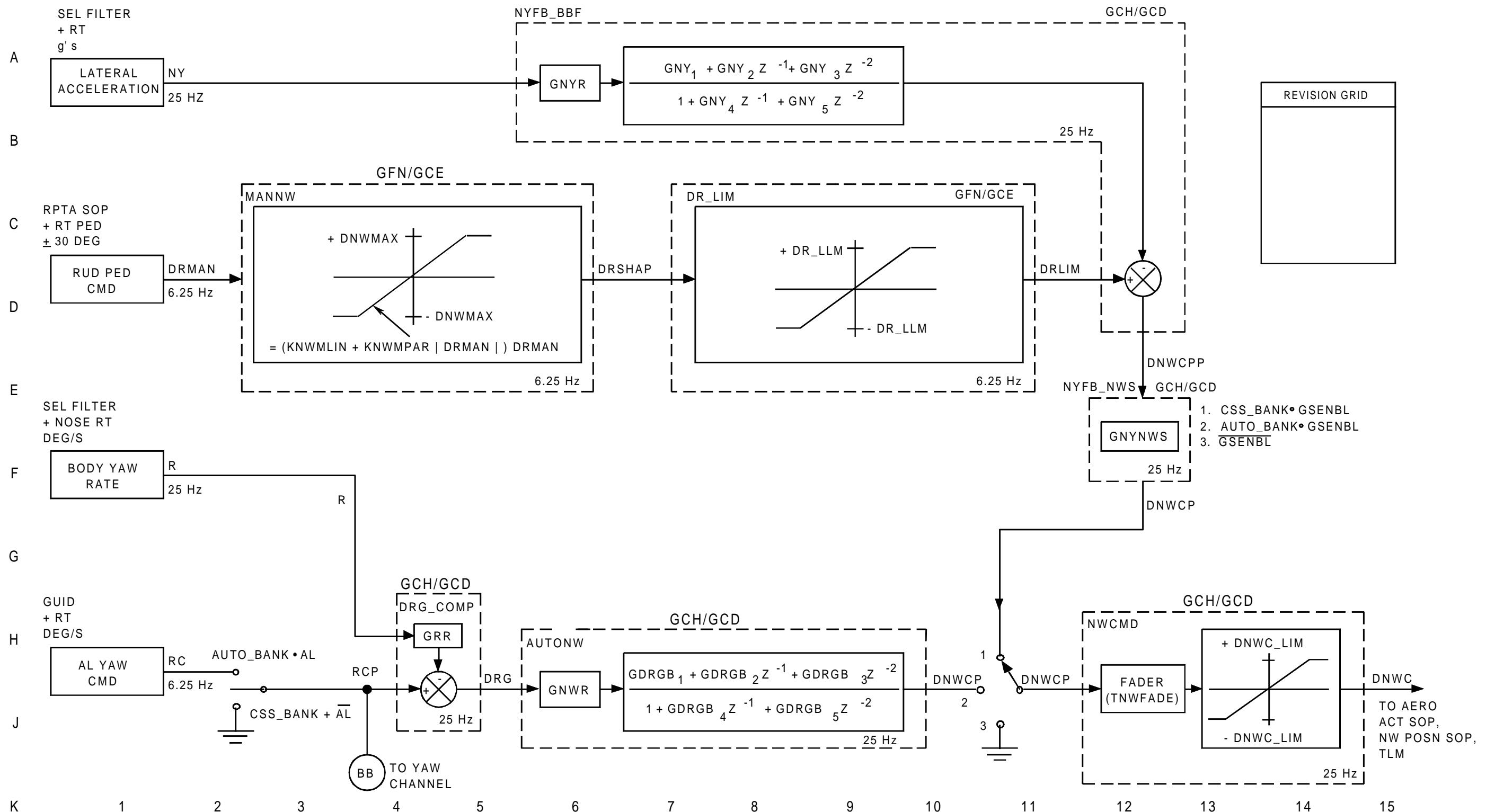


FIGURE 4.5.3-1. Nosewheel Channel Function Modules

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4.5.3.1 AUTONW.

- A. Function – This function module scales and filters yaw rate error from the rudder channel to generate a preliminary nosewheel command. The detailed block diagram is presented in Figure 4.5.3.1-1.
- B. Processing Requirements – AUTONW is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for AUTONW are shown in Table 4.5.3.1-1.
- D. I-Loads – The I-loads for AUTONW are shown in Table 4.5.3.1-2.
- E. Initialization Requirements – The initialization requirements for AUTONW are shown in Table 4.5.3.1-3.
- F. Software Configuration – Common.



FIGURE 4.5.3.1-1. AUTONW

Table 4.5.3.1-1. AUTONW Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DRG	Yaw rate error	DRG_COMP	F	deg/s	25
<u>Outputs</u> DNWCP	Preliminary nosewheel angle signal before fading and limiting	NWCMD	F	deg	25

Table 4.5.3.1-2. AUTONW I-Loads				
Name	Description	Type	MSID	Units
GDRGB(1)	Filter coefficient	F	V97U0700C	—
GDRGB(2)	Filter coefficient	F	V97U0701C	—
GDRGB(3)	Filter coefficient	F	V97U0702C	—
GDRGB(4)	Filter coefficient	F	V97U0703C	—
GDRGB(5)	Filter coefficient	F	V97U0704C	—
GNWR	Nose wheel yaw rate error gain	F	V97U0723C	s

Table 4.5.3.1-3. AUTONW Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Second-order filter	\bar{X}	X	node	*

*See Subsection 4.9.2
X = GSENBL • AUTO_BANK

4.5.3.2 DRG_COMP.

- A. Function – This function module computes the yaw rate error which is used to drive the nosewheel. The detailed block diagram is presented in Figure 4.5.3.2-1.
- B. Processing Requirements – DRG_COMP is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for DRG_COMP are shown in Table 4.5.3.2-1.
- D. I-Loads – The I-loads for DRG_COMP are shown in Table 4.5.3.2-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

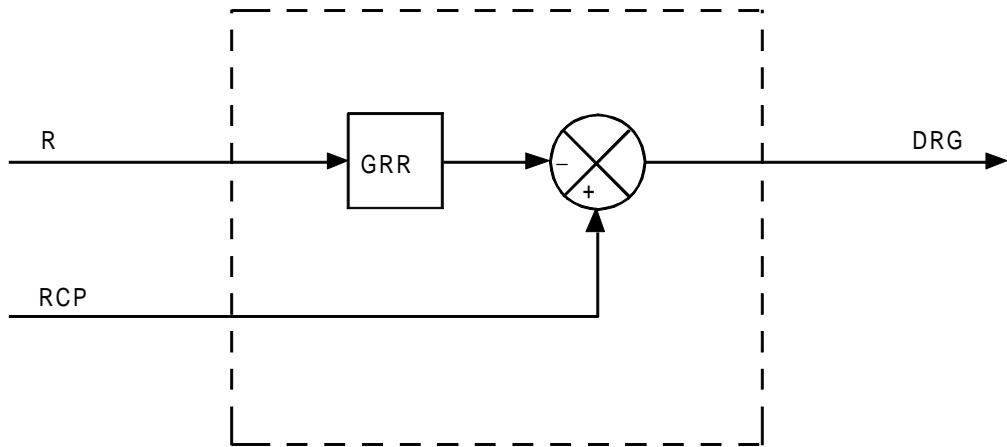


FIGURE 4.5.3.2-1. DRG_COMP

Table 4.5.3.2-1. DRG_COMP Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
R	Yaw rate	SF	F	deg/s	25
RCP	Buffered yaw rate command	A/L GUID	F	deg/s	6.25
<u>Outputs</u>					
DRG	Yaw rate error	AUTONW	F	deg/s	25

Table 4.5.3.2-2. DRG_COMP I-Loads				
Name	Description	Type	MSID	Units
GRR	Gain to scale yaw rate	F	V97U0765C	(deg/s)/(deg/s)

4.5.3.3 DR_LIM

- A. Function – This function module limits the shaped and scaled rudder pedal command. The detailed block diagram is presented in Figure 4.5.3.3-1.
- B. Processing Requirements – DR_LIM is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for DR_LIM are shown in Table 4.5.3.3-1.
- D. I-Loads – The I-loads for DR_LIM are shown in Table 4.5.3.3-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

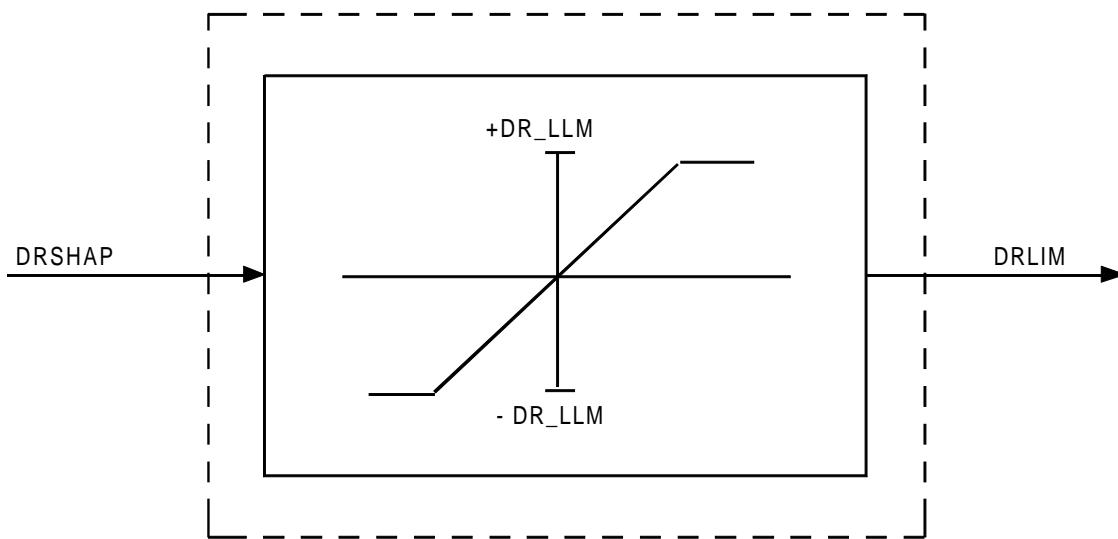


FIGURE 4.5.3.3-1. DR_LIM

Table 4.5.3.3-1. DR_LIM Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DRSHAP	Shaped and scaled rudder pedal command	MANNW	F	deg	6.25
<u>Outputs</u> DRLIM	Limited rudder pedal command	NYFB_BBF	F	deg	6.25

Table 4.5.3.3-2. DR_LIM I-Loads				
Name	Description	Type	MSID	Units
DR_LLM	Limit on rudder pedal command	F	V99U9683C	deg

4.5.3.4 MANNW.

- A. Function – This function module applies parabolic shaping and limiting to the manual yaw command (rudder pedal signal). The RPTA SOP has previously applied a deadband. The detailed block diagram is presented in Figure 4.5.3.4-1.
- B. Processing Requirements – MANNW is processed at 6.25 Hz.
- C. Interface Requirements – The interface requirements for MANNW are shown in Table 4.5.3.4-1.
- D. I-Loads – The I-loads for MANNW are shown in Table 4.5.3.4-2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

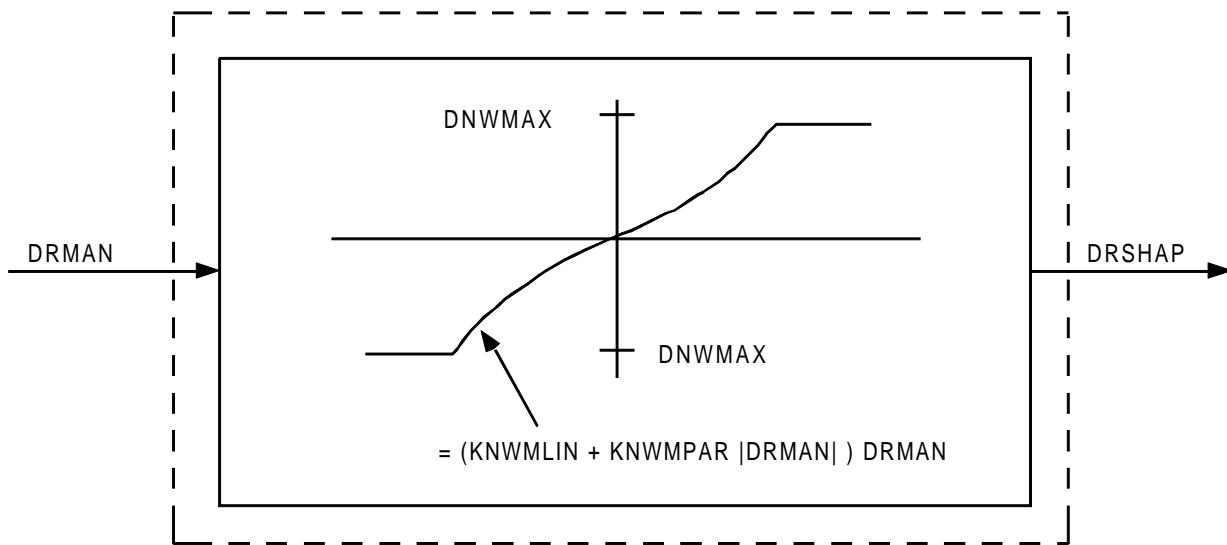


FIGURE 4.5.3.4-1. MANNW

Table 4.5.3.4-1. MANNW Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DRMAN	Manual yaw command (rudder pedal input)	RPTA SOP	F	deg	6.25
<u>Outputs</u> DRSHAP	Shaped and scaled rudder pedal command	DR_LIM	F	deg	6.25

Table 4.5.3.4-2. MANNW I-Loads				
Name	Description	Type	MSID	Units
DNWMAX	Maximum value of shaped pedal output	F	V97U0653C	deg
KNWMLIN	Linear coefficient for parabolic shaping	F	V97U0806C	deg/deg
KNWMPAR	Square-term coefficient for parabolic shaping	F	V97U0807C	deg/deg**2

4.5.3.5 NWCMD.

A. Function – This function module provides fading when nosewheel steering is initially enabled, and it limits the magnitude of the nosewheel command. It also provides fading from the nose wheel position to the command when the alternate nose wheel channel is engaged. The detailed block diagram is presented in Figure 4.5.3.5–1.

- B. Processing Requirements – NWCMD is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for NWCMD are shown in Table 4.5.3.5–1.
- D. I-Loads – The I-loads for NWCMD are shown in Table 4.5.3.5–2.
- E. Initialization Requirements – The initialization requirements for NWCMD are shown in Table 4.5.3.5–3.
- F. Software Configuration – Common.

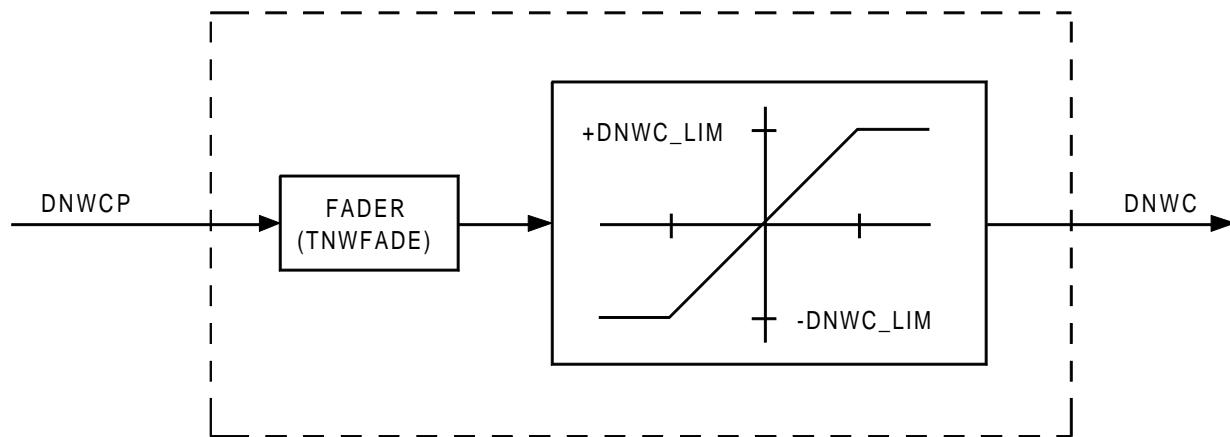


FIGURE 4.5.3.5-1. NWCMD

Table 4.5.3.5-1. NWCMD Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DNWCP	Preliminary nosewheel command angle before fading and limiting	AUTONW, NYFB_NWS	F F	deg deg	25 25
<u>Outputs</u> DNWC	Nosewheel deflection command	AERO ACT SOP, NW POSN SOP, TLM	F	deg	25

Table 4.5.3.5-2. NWCMD I-Loads				
Name	Description	Type	MSID	Units
DNWC_LIM	Nosewheel command limit	F	V97U0652C	deg
TNWFADE	Nosewheel fade time	F	V97U1036C	s

Table 4.5.3.5-3. NWCMD Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Fader Input	— <u>GSENBL</u>	*** GSENBL	* DNWCP	Trigger COMP_NW_POSN
Fader Input	— <u>GSENBL • NWS1_MODE_FLAG</u>	** GSENBL • NWS1_MODE_FLAG	* DNWCP	Trigger COMP_NW_POSN
Fader Input	— <u>GSENBL • NWS2_MODE_FLAG</u>	** GSENBL • NWS2_MODE_FLAG	* DNWCP	Trigger COMP_NW_POSN

* See Subsection 4.9.4
 ** Fader triggering shall occur one minor cycle following the transition from GSENBL • NWS1_MODE_FLAG to GSENBL • NWS1_MODE_FLAG or from GSENBL • NWS2_MODE_FLAG to GSENBL • NWS2_MODE_FLAG.
 *** Fader triggering shall occur one minor cycle following the transition from GSENBL to GSENBL.

4.5.3.6 NYFB_NWS.

- A. Function – This function module applies a gain to the preliminary nosewheel command angle. The detailed block diagram is presented in Figure 4.5.3.6–1.
- B. Processing Requirements – NYFB_NWS is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for NYFB_NWS are shown in Table 4.5.3.6–1.
- D. I-Loads – The I-loads for NYFB_NWS are shown in Table 4.5.3.6–2.
- E. Initialization Requirements – None.
- F. Software Configuration – Common.

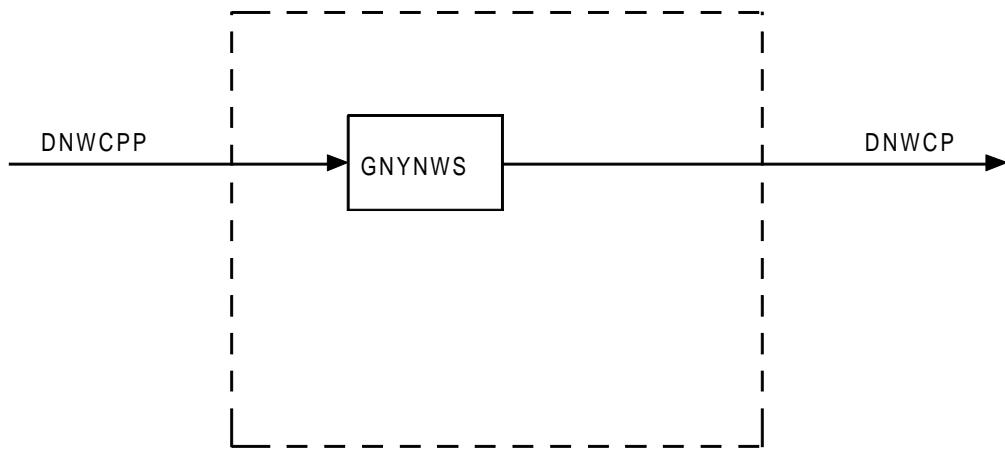


FIGURE 4.5.3.6-1. NYFB_NWS

Table 4.5.3.6-1. NYFB_NWS Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u> DNWCPP	Preliminary nosewheel command angle before gain multiplication	NYFB_BBF	F	deg	25
<u>Outputs</u> DNWCP	Preliminary nosewheel command angle before fading and limiting	NWCMD	F	deg	25

Table 4.5.3.6-2. NYFB_NWS I-Loads				
Name	Description	Type	MSID	Units
GNYNWS	Gain to scale preliminary nosewheel command angle	F	V99U9676C	ND

4.5.3.7 NYFB_BBF

- A. Function – This function module computes the preliminary nosewheel command based on the error signal between the lateral acceleration and the rudder pedal command. The detailed block diagram is presented in Figure 4.5.3.7–1.
- B. Processing Requirements – NYFB_BBF is processed at 25 Hz.
- C. Interface Requirements – The interface requirements for NYFB_BBF are shown in Table 4.5.3.7–1.
- D. I-Loads – The I-loads for NYFB_BBF are shown in Table 4.5.3.7–2.
- E. Initialization Requirements – The initialization requirements for NYFB_BBF are shown in Table 4.5.3.7–3.
- F. Software Configuration – Common.

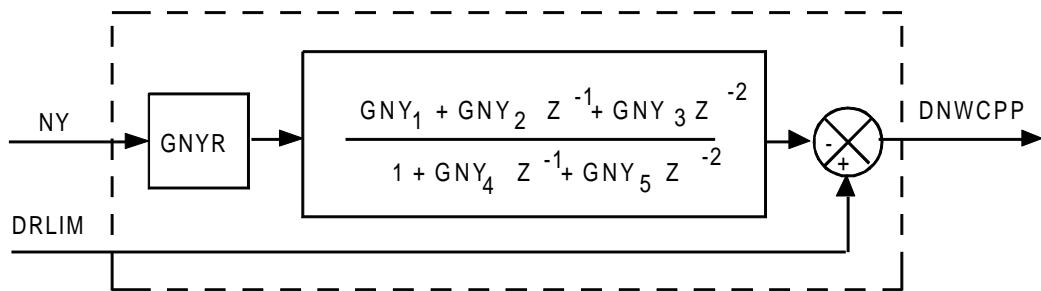


FIGURE 4.5.3.7-1. NYFB_BBF

Table 4.5.3.7-1. NYFB_BBF Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
NY	Lateral acceleration feedback	SF	F	g	25
DRLIM	Limited rudder pedal command	DR_LIM	F	deg	6.25
<u>Outputs</u>					
DNWCPP	Preliminary nosewheel command angle before application	NYFB_NWS	F	deg	25

Table 4.5.3.7-2. NYFB_BBF I_Loads				
Name	Description	Type	MSID	Units
GNY(1)	Filter coefficient	F	V99U9677C	—
GNY(2)	Filter coefficient	F	V99U9678C	—
GNY(3)	Filter coefficient	F	V99U9679C	—
GNY(4)	Filter coefficient	F	V99U9680C	—
GNY(5)	Filter coefficient	F	V99U9681C	—
GNYR	Nosewheel lateral acceleration gain	F	V99U9682C	deg/g

Table 4.5.3.7-3. NYFB_BBF Initialization Requirements				
Component	Initialize on Transition		Variable	Initial Value
	From	To		
Second-order filter	X̄	X	Node	*

*See Section 4.9.2
X = GSENBL • CSS_BANK

4.6 JET SELECT LOGIC

4.6.1 Jet Select Logic, AEROJET DAP

A. Function – The JET_SELECT_LOGIC (JSL) module determines which individual RCS jets are to be turned on in response to the pitch, roll, and yaw jet commands generated by the flight control algorithms. The following constraints are taken into account in the JSL. Only the 8 Y-axis and the 12 Z-axis jets of the aft RCS pods (Figure 4.6.1–1) may be used during entry (i.e., no X-axis jets and no vernier jets are used); only jets designated as available for use by discretes sent from Redundancy Management may be commanded on; no more than 4 jets per pod may be fired simultaneously, with pitch and roll jets taking priority over yaw jets when this constraint applies. When reconfiguration is in progress or when the crossfeed is open, the total number of jets, left plus right, is limited to a maximum of four. The result of this limiting is that during some pitch and roll maneuvers there may be only one yaw jet available for yaw control.

All roll and pitch jet commands are set to zero by JET_SELECT_LOGIC before it computes the roll and pitch jet-on commands; thus, the minimum firing time for any roll and pitch jet combination is one JSL minor cycle period. The minimum firing time for any yaw jet combination is one JSL minor cycle period until YAW_RCS_FLAG becomes true. If YAW_RCS_FLAG is true, the minimum firing time for the yaw jets is IYAW_CYCLE times the JSL minor cycle period. If RCS RM changes the jet status from available to failed or inhibited while the jet is being fired, the command will be set to zero on the next JSL cycle. It should be noted that this may result in a firing of less duration than the desired minimum on-time (if the jets have been on for less than IYAW CYCLES). A firing of less duration than the desired minimum on-time may also result if an aft yaw jet is firing when YAW_RCS_FLAG becomes true. The HAL logic for the JET_SELECT_LOGIC is shown in Figure 4.6.1–2.

An alternative for accomplishing duty cycle balancing of jets is to prioritize the jets within groups and make these priorities mission-dependent RCS RM I-loads. The priorities are in turn controlled by the translation table JET_MAP, which is an RCS RM output. It is initialized via I-loads in OPS 1, but can be modified via crew inputs on the RCS display in OPS 2, 3, and 8. Table 4.6.1–1 clarifies the possible values that the RCS RM output JET_MAP can take.

B. Processing Requirements – JET_SELECT_LOGIC module is processed at 12.5 Hz.

C. Interface Requirements – The interface requirements for JET_SELECT_LOGIC are shown in Table 4.6.1–3.

D. I-Loads – The I-Loads for JET_SELECT_LOGIC are shown in Table 4.6.1–4.

E. Initialization Requirements – The initialization requirements for JET_SELECT_LOGIC are shown in Table 4.6.1–5.

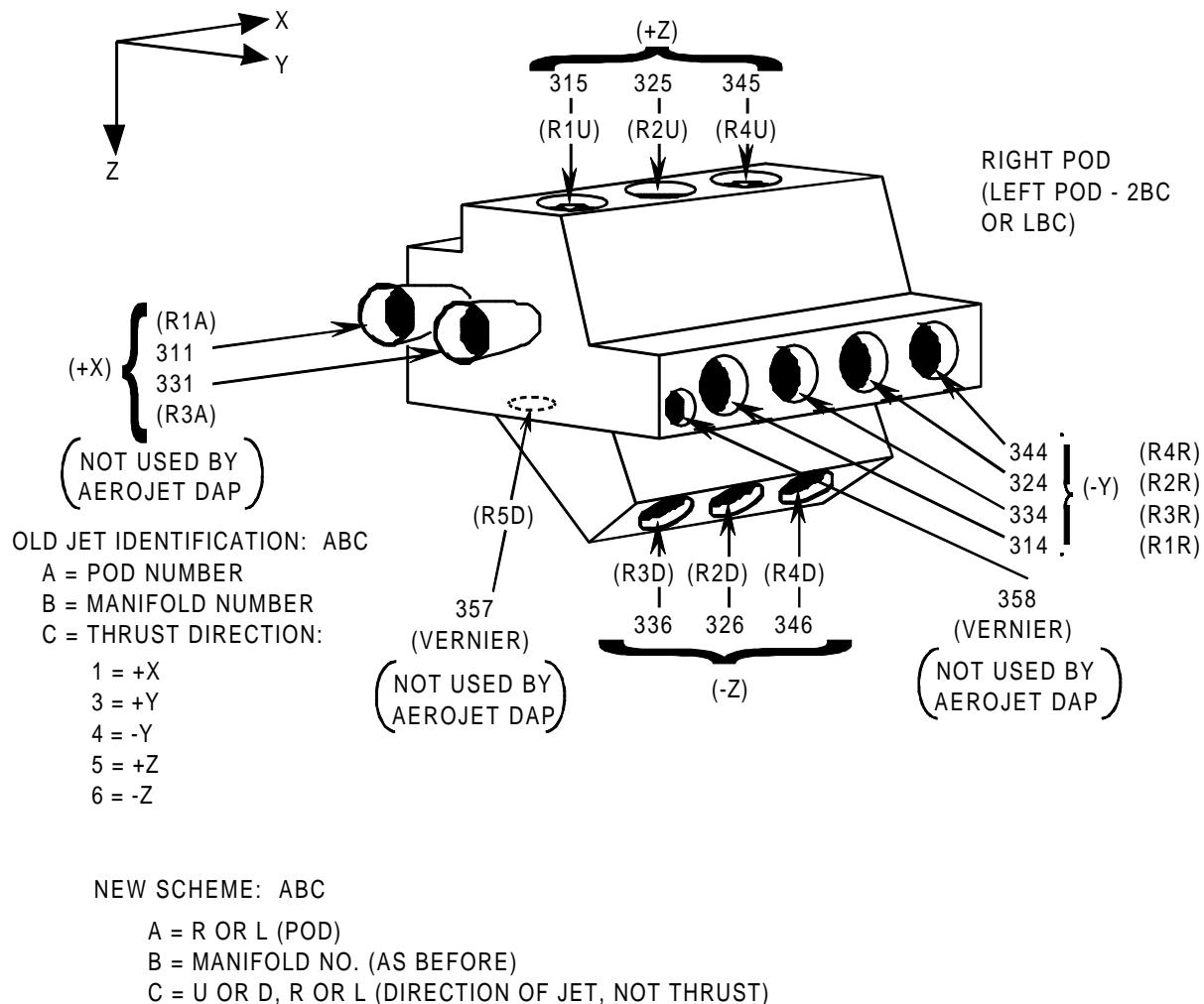


FIGURE 4.6.1-1. Aft Reaction Jet Arrangement

Table 4.6.1-1.JET_SELECT Variable Definition*

Term	Definition
NJETPV	Past value of number of yaw jets commanded
UXCMD	Roll RCS jet command from GRTLS or Aerojet DAP
UYCMD	Pitch RCS jet command from GRTLS or Aerojet DAP
UZCMD	Yaw RCS jet command from GRTLS or Aerojet DAP
NRPJR	Number of right-side roll and pitch jets on
NRPJL	Number of left-side roll and pitch jets on
NRIGHT	Maximum number of right yaw jets that can be fired
NLEFT	Maximum number of left yaw jets that can be fired
RECONFIG_CMPL	Reconfiguration discrete
CROSSFEED_OPEN	Crossfeed open discrete
JET(I)	Jet on/off array 1-on 0-off
JET(1) through JET(3)	Aft up-firing jets – right side
JET(4) through JET(6)	Aft down-firing jets – right side
JET(7) through JET(9)	Aft up-firing jets – left side
JET(10) through JET(12)	Aft down-firing jets – left side
JET(13) through JET(16)	Aft side-firing jets – right side
JET(17) through JET(20)	Aft side-firing jets – left side
JETFP(I)	First pass flag for JET(I)
JETPV(I)	Past value of JET(I)
JETGD(I)	Jet-good discrete array
JDUTY(I)	Counter for duty cycle on each jet
NCYCLE(I)	Cycle counter for minimum on time
JETON	Counter for number of jets turned on each pass
NRJ	Counter for number of right jets that must remain on
NLJ	Counter for number of left jets that must remain on
JS	Starting location in JET(I) array
JSE	Ending location in JET(I) array
NRJETS	Number of required jets each pass for right or left side
NGJ	Number of good jets on the left or right side each pass
JMIN	Minimum duty cycle of left or right jets
NRCYC	Number of required cycles a jet must stay on
INDEX	Location of jet with minimum duty cycle that is not firing
INIT DO LOOP	Zeros JET(I) and JDUTY(I) arrays on first pass only
AA DO LOOP	Saves and zeros Jet(1) through Jet(12) every pass
BB DO LOOP	Executive do loop which controls roll, pitch, and yaw JSL
CC DO LOOP	Keeps yaw jets on for required number of cycles
DD DO LOOP	If possible, satisfies FCS jet commands with jets that are currently firing
EE and FF DO LOOP	Do loops EE and FF in combination with one another satisfy remaining FCS jet commands with the good jets in the order of minimum duty cycle.

*Note: This page included for clarification only.

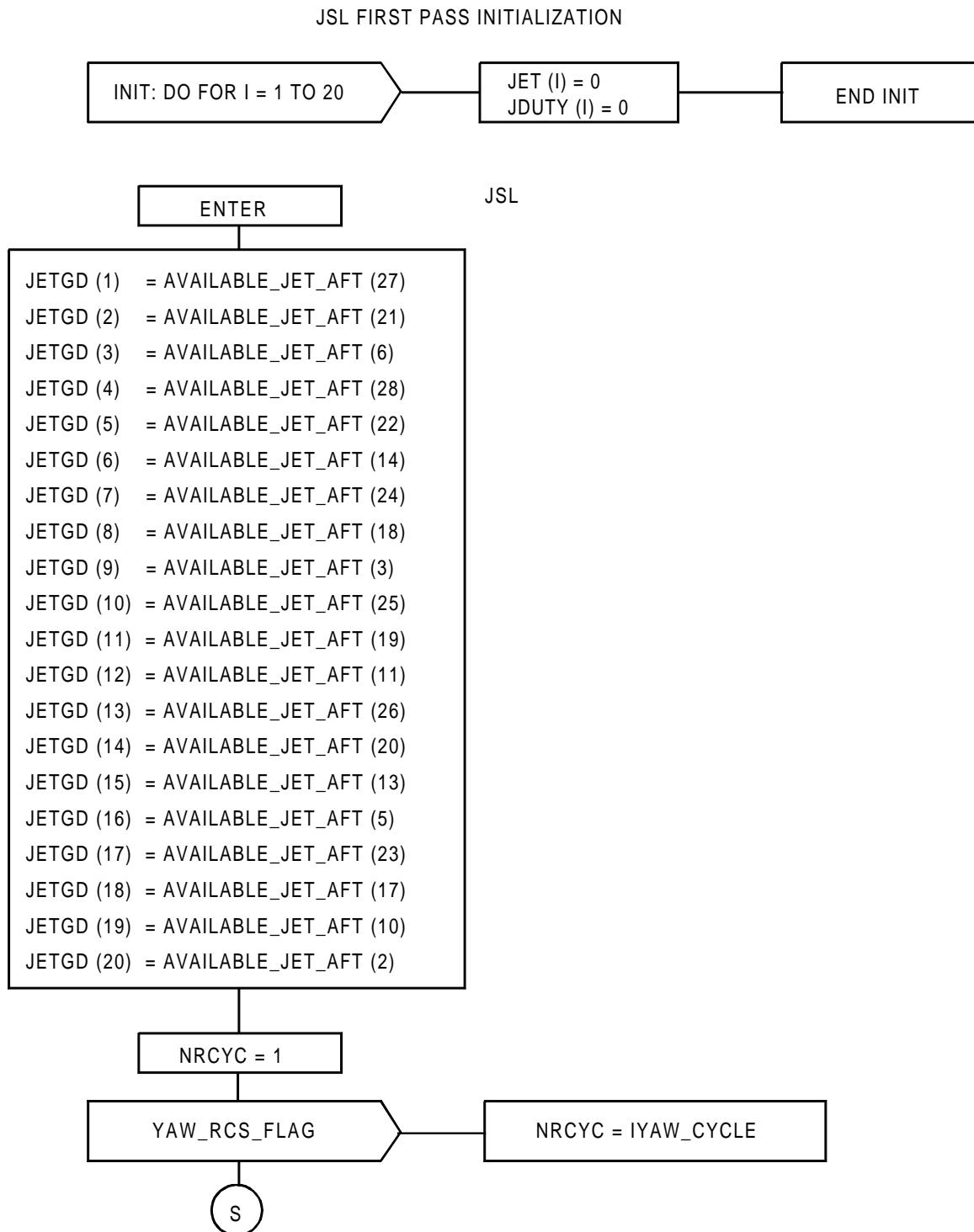


FIGURE 4.6.1-2.(1) JSL (Sheet 1 of 6)

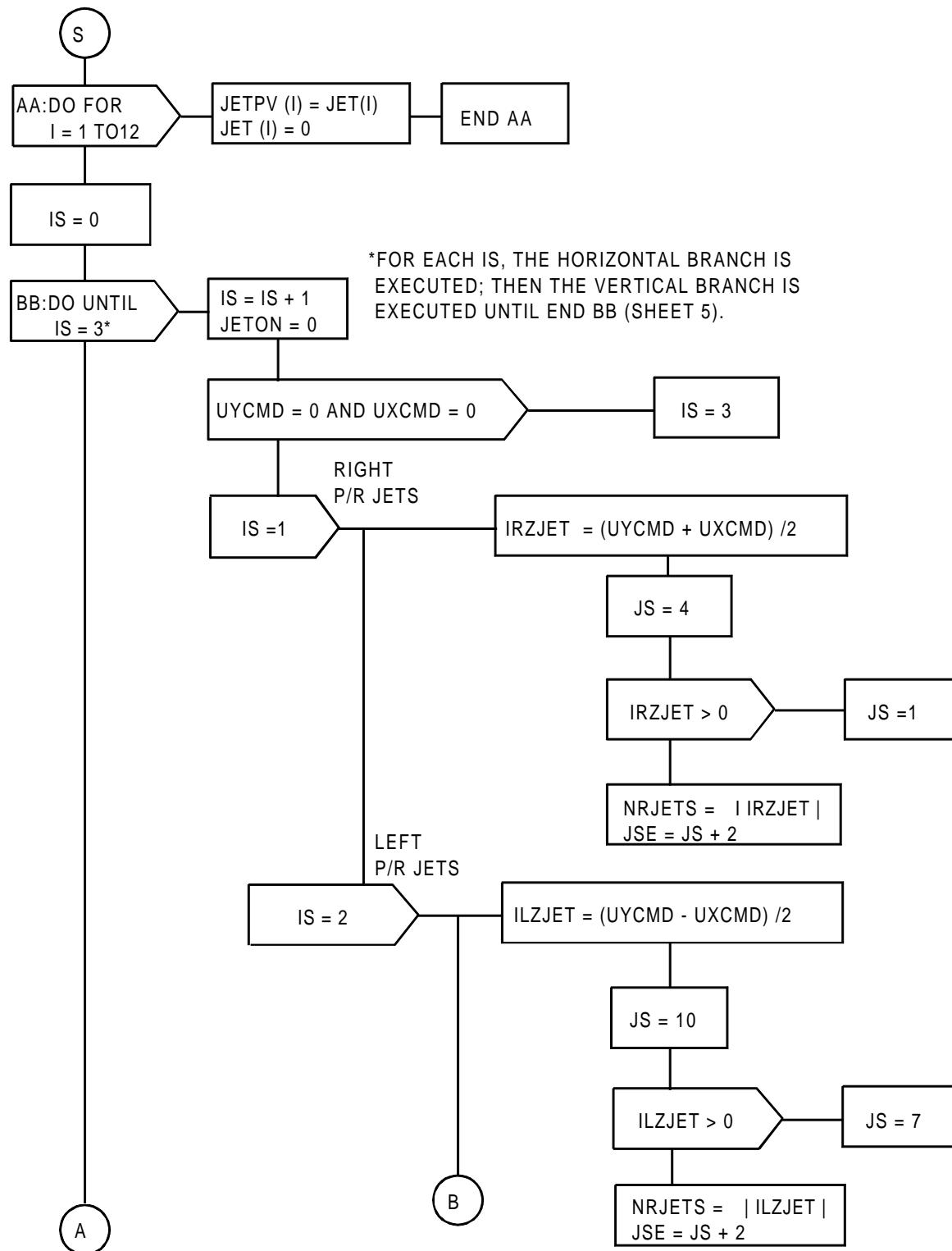


FIGURE 4.6.1-2.(2) JSL (Sheet 2 of 6)

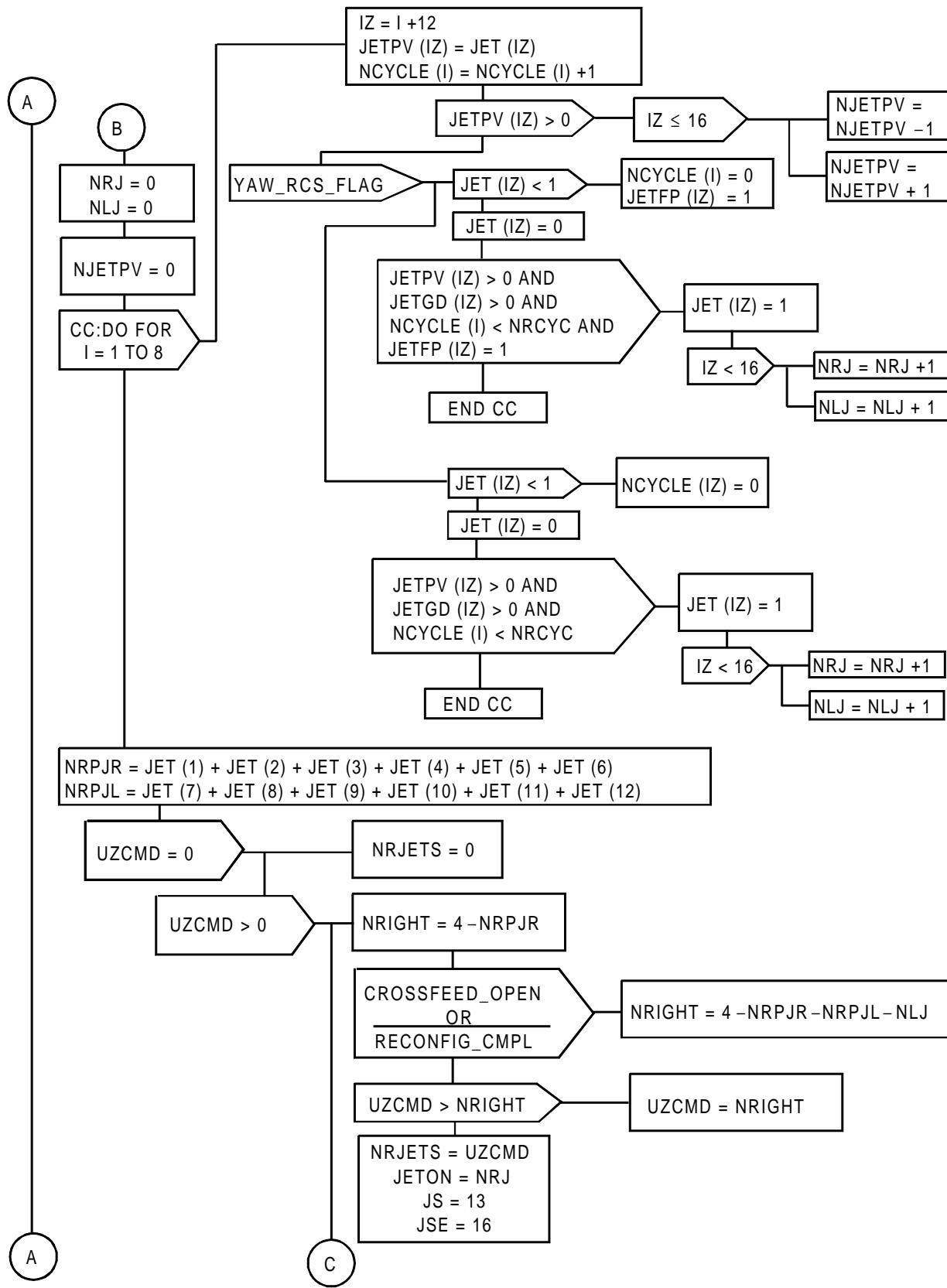


FIGURE 4.6.1-2.(3) JSL (Sheet 3 of 6)

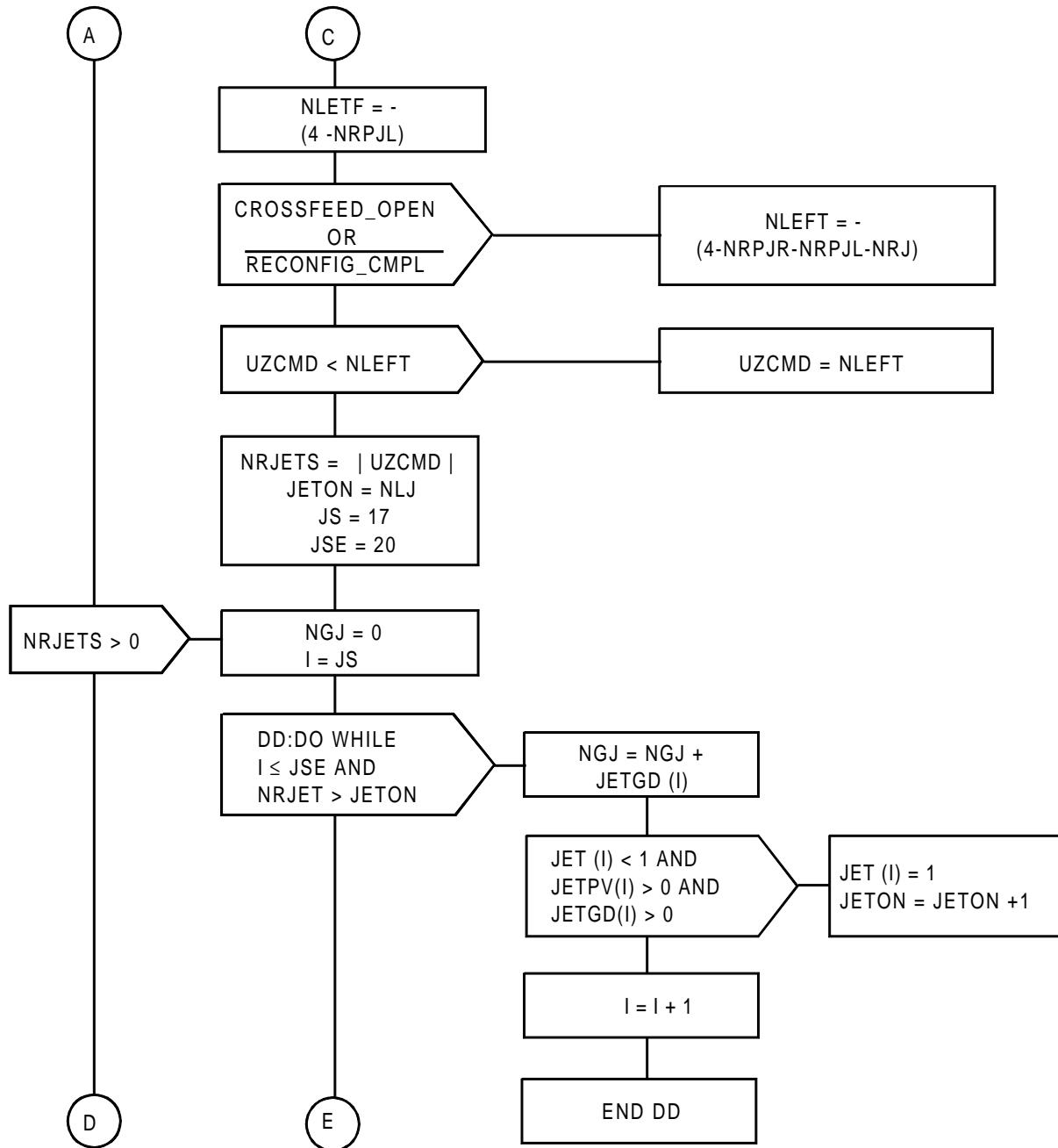


FIGURE 4.6.1-2.(4) JSL (Sheet 4 of 6)

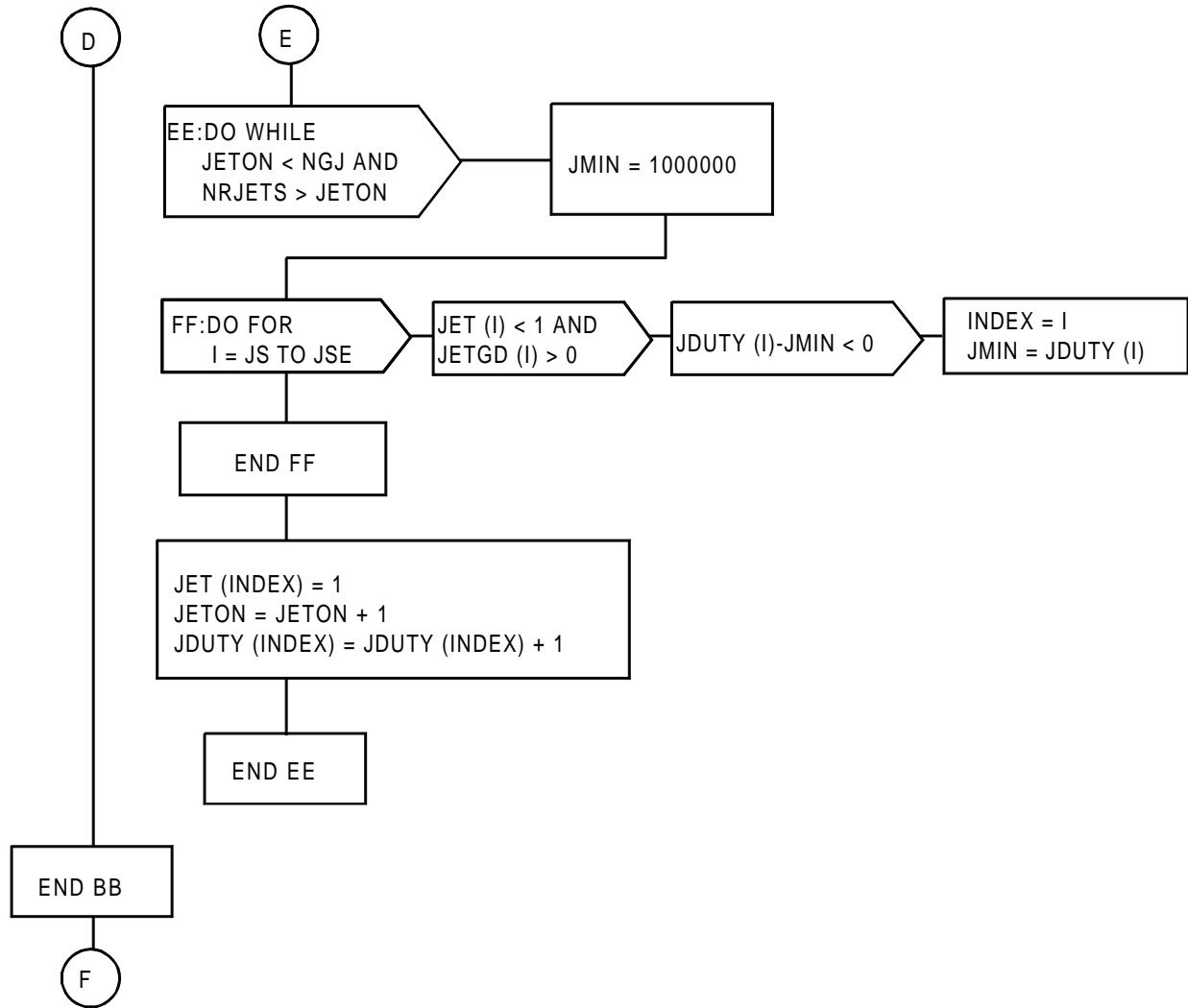


FIGURE 4.6.1-2.(5) JSL (Sheet 5 of 6)

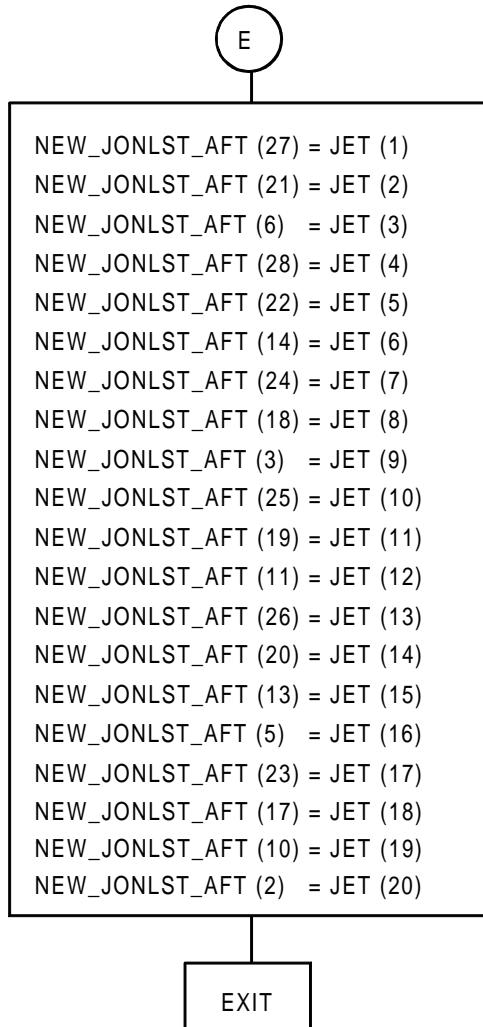


FIGURE 4.6.1-2.(6) JSL (Sheet 6 of 6)

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Table 4.6.1-2.RCS Jet Grouping

RCS RM Output MSID	JET_MAP_ELEMENT	Jet Group	Priority of RCS Jet Within Group	Principal Thrust Direction	Associated JET_MAP_ELEMENT Values (Each MSID in a Group Will Have one of These Values, Mapping That MSID To a Particular Jet)
V90J5727C	1	1*	1	-X	
V90J5728C	2		2		1(F1F), 5(F2F), 13(F3F)
V90J5729C	3		3		
V90J5730C	4	2*	1	+Y	2(F1L), 14(F3L)
V90J5731C	5		2		
V90J5732C	6	3*	1	-Y	6(F2R), 9(F4R)
V90J5733C	7		2		
V90J5734C	8	4*	1	+Z	
V90J5735C	9		2		3(F1U), 7(F2U), 15(F3U)
V90J5736C	10		3		
V90J5737C	11	5*	1	-Z	8(F2D), 10(F4D)
V90J5738C	12		2		
V90J5739C	13	6*	1	-Z	4(F1D), 16(F3D)
V90J5740C	14		2		
V90J5741C	15	7*	1	+X	4(R1A), 12(R3A)
V90J5742C	16		2		
V90J5743C	17	8*	1	+X	1(L1A), 9(L3A)
V90J5744C	18		2		
V90J5745C	19	9	1	+Y	
V90J5746C	20		2		2(L1L), 17(L2L), 10(L3L), 23(L4L)
V90J5747C	21		3		
V90J5748C	22		4		
V90J5749C	23	10	1	-Y	
V90J5750C	24		2		5(R1R), 20(R2R), 13(R3R), 26(R4R)
V90J5751C	25		3		
V90J5752C	26		4		
V90J5753C	27	11	1	+Z	
V90J5754C	28		2		3(L1U), 18(L2U), 24(L4U)
V90J5755C	29		3		
V90J5756C	30	12	1	+Z	
V90J5757C	31		2		6(R1U), 21(R2U), 27(R4U)
V90J5758C	32		3		
V90J5759C	33	13	1	-Z	
V90J5760C	34		2		19(L2D), 11(L3D), 25(L4D)
V90J5761C	35		3		
V90J5762C	36	14	1	-Z	

Table 4.6.1-2.RCS Jet Grouping

RCS RM Output MSID	JET_MAP_ELEMENT	Jet Group	Priority of RCS Jet Within Group	Principal Thrust Direction	Associated JET_MAP_ELEMENT Values (Each MSID in a Group Will Have one of These Values, Mapping That MSID To a Particular Jet)
V90J5763C	37		2		22(R2D), 14(R3D), 28(R4D)
V90J5764C	38		3		
*Note: These jet groups are not used during entry for flight control					

Table 4.6.1-3.JET_SELECT_LOGIC Interface Requirements, Aerojet Dap

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
CROSSFEED_OPEN	RCS XFD seq complete flag	RCS/RCS XFEED	D	—	12.5
JET_MAP	Mapping of jet use preference within group	RCS RM or carry over from previous OPS	A(38)I	—	12.5
AVAILABLE_JET_AFT(24)	Jet-good discrete for (+) Z-axis jet on RCS aft left pod (L4U, L2U, L1U)	RCS RM	D	—	12.5
AVAILABLE_JET_AFT(18)		RCS RM	D	—	12.5
AVAILABLE_JET_AFT(3)		RCS RM	D	—	12.5
AVAILABLE_JET_AFT(25)		RCS RM	D	—	12.5
AVAILABLE_JET_AFT(19)		RCS RM	D	—	12.5
AVAILABLE_JET_AFT(11)	Jet-good discrete for (-) (Z-axis jets on RCS aft left pod (L4D, L2D, L3D)	RCS RM	D	—	12.5
AVAILABLE_JET_AFT(23)		RCS RM	D	—	12.5
AVAILABLE_JET_AFT(17)		RCS RM	D	—	12.5
AVAILABLE_JET_AFT(10)		RCS RM	D	—	12.5
AVAILABLE_JET_AFT(2)		RCS RM	D	—	12.5
RECONFIG_CMPL	RCS XFD reconfig seq complete flag	RCS/RCS XFEED	D	—	12.5
AVAILABLE_JET_AFT(27)	Jet-good discrete for (+) Z-axis jets on RCS aft right pod (R4U, R2U, R1U)	RCS RM	D	—	12.5
AVAILABLE_JET_AFT(21)		RCS RM	D	—	12.5
AVAILABLE_JET_AFT(6)		RCS RM	D	—	12.5

Table 4.6.1-3.JET_SELECT_LOGIC Interface Requirements, Aerojet Dap

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
AVAILABLE_JET_AFT(28)	Jet-good discrete for (-) Z-axis jets on RCS aft right pod (R4D, R2D, R3D)	RCS RM	D	—	12.5
AVAILABLE_JET_AFT(22)		RCS RM	D	—	12.5
AVAILABLE_JET_AFT(14)		RCS RM	D	—	12.5
AVAILABLE_JET_AFT(26)		RCS RM	D	—	12.5
AVAILABLE_JET_AFT(20)	Jet-good discrete for (-) Y-axis jets on RCS aft right pod (R4R, R2R, R3R, R1R)	RCS RM	D	—	12.5
AVAILABLE_JET_AFT(13)		RCS RM	D	—	12.5
AVAILABLE_JET_AFT(5)		RCS RM	D	—	12.5
UXCMD		ROLL_HYST	I	—	12.5
UYCMD	Pitch jet command	PITCH_HYST	I	—	12.5
UZCMD	Yaw jet command	YAW_HYST, WRAP_QUANT	I	—	12.5
YAW_RCS_FLAG	Yaw-RCS logic discrete	RECON	D	—	6.25
<u>Outputs</u>					
NEW_JONLST_AFT(19)	Jet-ON discrete for (-) Z-axis jets on RCS aft left pod (L2D, L3D, L4D)	E/L RCS CMD	D	—	12.5
NEW_JONLST_AFT(11)		SOP, TLM	D	—	12.5
NEW_JONLST_AFT(25)		E/L RCS CMD	D	—	12.5
NEW_JONLST_AFT(2)		SOP, TLM	D	—	12.5
NEW_JONLST_AFT(17)	Jet-ON discrete for (+) Y-axis jets on RCS aft left pod (L1L, L2L, L3L, L4L)	E/L RCS CMD	D	—	12.5
NEW_JONLST_AFT(10)		SOP, TLM	D	—	12.5
NEW_JONLST_AFT(23)		E/L RCS CMD	D	—	12.5
NEW_JONLST_AFT(3)		SOP, TLM	D	—	12.5
NEW_JONLST_AFT(18)	Jet-ON discrete for (+) Z-axis jets on RCS aft left pod (L1U, L2U, L4U)	E/L RCS CMD	D	—	12.5
NEW_JONLST_AFT(24)		SOP, TLM	D	—	12.5
NJETPV	Past value of number of yaw jets	ESTIMATED_BETA	I	—	12.5

Table 4.6.1-3.JET_SELECT_LOGIC Interface Requirements, Aerojet Dap

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
NEW_JONLST_AFT(22)	Jet-ON discretes for (-) Z-axis jets on RCS aft right pod (R2D, R3D, R4D)	E/L RCS CMD SOP, TLM	D	—	12.5
NEW_JONLST_AFT(14)		E/L RCS CMD SOP, TLM	D	—	12.5
NEW_JONLST_AFT(28)		E/L RCS CMD SOP, TLM	D	—	12.5
NEW_JONLST_AFT(5)		E/L RCS CMD SOP, TLM	D	—	12.5
NEW_JONLST_AFT(20)		E/L RCS CMD SOP, TLM	D	—	12.5
NEW_JONLST_AFT(13)		E/L RCS CMD SOP, TLM	D	—	12.5
NEW_JONLST_AFT(26)		E/L RCS CMD SOP, TLM	D	—	12.5
NEW_JONLST_AFT(6)		E/L RCS CMD SOP, TLM	D	—	12.5
NEW_JONLST_AFT(21)		E/L RCS CMD SOP, TLM	D	—	12.5
NEW_JONLST_AFT(27)		E/L RCS CMD SOP, TLM	D	—	12.5

Table 4.6.1-4.JET_SELECT_LOGIC I-Loads, Aerojet DAP

Name	Description	Type	MSID	Units
IYAW_CYCLE	Minimum number of JSL cycles yaw jets must be on below YAW_RCS_ALT	I	V97U1146C	—

Table 4.6.1-5.JET_SELECT_LOGIC Initialization Requirements, Aerojet DAP

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Jet on/off array	—	First pass	JET(1) through JET(20)	0
First pass flag for JET(IZ)	—	First pass	JETFP(13) through JETFP(20)	0
RCS duty cycle array	—	First pass	JDUTY(1) through JDUTY(20)	0

4.6.2 Jet Select Logic, GRTLS DAP

A. Functional Requirements – JET_LOGIC determines which RCS jets are to be commanded ON in response to the quantized error signals from the pitch, roll, and yaw channels.

During mated coast (MC) and external tank separation (ETSEP), the $\pm Y$ and $\pm Z$ jets of the aft RCS pods, and the $\pm Y$ and $-Z$ jets of the forward RCS module, are used. During external tank separation (ETSEP) the $\pm Y$ and $-Z$ forward and aft jets, and $+Z$ aft jets are used. During the pitch & roll open-loop period of ETSEP, if any $-Z$ jet fails the $-Z$ jet configuration downmodes to 2 fwd and 4 aft jets. During this period, the yaw jets also downmode to 1 fwd and 1 aft jet. After, the expiration of the pitch & roll open-loop period, the yaw channel will again downmode to 1 fwd, 1 aft in any situation that the yaw jets would introduce adverse roll. After completion of ETSEP, only the $\pm Y$ and $\pm Z$ aft RCS jets are used.

A maximum of seven jets on each aft pod and six jets of the forward RCS module will be fired simultaneously. No X jets, $+Z$ forward jets, or vernier jets are used during regular (intact abort) GRTLS.

During contingency abort scenarios (CONT_3EO_START = ON), the $\pm Y$ and $\pm Z$ jets of the forward and aft RCS pods are used during both MC and ETSEP. The $+X$ jets on the aft RCS pods are used during MC in order to provide an axial settling acceleration on the MPS propellants remaining in the external tank. These jets are turned off as necessary in order to ensure that no more than seven jets are active on one pod at a given time. In this situation, half of the $+X$ jets are shut off in such a way that the remaining $+X$ jets assist in controlling the yaw axis. During ETSEP an open loop period occurs when $-Z$ jets are used. For contingency aborts near RTLS "VREL=0", the RCS $+X$ jets will also be fired at the start of the open-loop period to effect a $+X$ separation burn that improves ET separation clearances. Two of the $-Z$ jets are shut off during this period to reduce the total pitch moment on the orbiter to an acceptable level. This $+X$ burn, which is a continuation of the contingency MC MPS settling burn, occurs for an I-loaded duration. The $+X$ burn will be inhibited upon CSS engage (auto guidance mode flag from ASC DAP indicates the OFF state (AUTO = OFF)). No downmoding for jet failures occurs during contingency aborts (CONT_3EO_START = ON).

During GRTLS MM602/603 intact and contingency operations, the following constraints apply. Only the eight Y-axis and the twelve Z-axis jets of the aft RCS pods may be used; only jets designated as available for use by the RCS RM can be commanded on; the number of jets per pod that may be fired simultaneously shall not exceed the I-Load "RCSJ_LIM". When reconfiguration is in progress or when the crossfeed is open, the total number of jets, left plus right, is limited to a maximum of four.

At the start of each computation cycle, all JET_ON commands from the previous cycle are turned off, and a new set of JET_ON commands is computed, with the exception of the aft yaw jets when YAW_RCS_FLAG is true. The minimum firing time for any jet is one minor cycle period (80 ms) until YAW_RCS_FLAG is true. The minimum firing time is then IYAW_CYCLE* 80 ms. If an aft yaw jet is firing when YAW_RCS_FLAG becomes true, then this may result in a firing of less duration than the minimum firing time.

If the THC $-Z$ command is activated during ETSEP, all available $-Z$ jets are commanded ON except those downmoded for $-Z$ RCS jet failures during the roll and pitch open loop period. The roll and pitch control loops are inoperative as long as the THC $-Z$ command is present.

The reaction control subsystem (RCS) is described in Section 2.4.1 of the Flight Control System Data Book, SD 73-SH-0097-2E.

B. Function Modules – JET_LOGIC is partitioned into the following modules:

1. JET_CMD_LOGIC (Section 4.6.2.1) – This module is used during normal GRTLS situations and the entry portion of contingency aborts (CONT_3EO_START = ON). This module converts the quantized error signals generated in PITCH_QUANT, ROLL_QUANT, and YAW_QUANT, into commands that specify how many RCS jets of each group are to be turned on.
2. CONT_JET_CMD_LOGIC (Section 4.6.2.3) – This module is only used during the MC and ETSEP portions of contingency aborts ((CONT_3EO_START = ON) AND (MC = ON OR ETSEP = ON)). During the entry portion of contingency aborts ((CONT_3EO_START = ON) AND (MC = OFF and ETSEP = OFF)), the normal GRTLS JET_CMD_LOGIC is used rather than this module. This module uses the outputs of CONT_PITCH_QUANT, CONT_ROLL_QUANT, and CONT_YAW_QUANT and forms the commands that specify how many RCS jets of each group are to be turned on.
3. JET_SEL_LOGIC (Section 4.6.2.2) – This module converts the jet commands from either of the above modules (JET_CMD_LOGIC or CONT_JET_CMD_LOGIC) into individual JET_ON commands after taking into account the jet-available discretes from RCS FDI.

Figure 4.6.2–1 shows the functional flow for these modules.

C. Sequencing Requirements – JET_LOGIC is processed after the pitch/roll/yaw channels and before the E/L RCS CMD SOP. CONT_JET_CMD_LOGIC or JET_CMD_LOGIC is processed before JET_SEL_LOGIC. Processing rate is 12.5 Hz. (Variable definitions for jet command logic and jet select logic are presented in Table 4.6.2–1.)

D. Interface Requirements – Inputs and outputs of JET_LOGIC are listed in Table 4.6.2–2, which includes variables sent from the JET_CMD_LOGIC module and the CONT_JET_CMD_LOGIC to the JET_SEL_LOGIC module.

E. Constants – None.

F. Initialization Requirements – For JET_LOGIC initialization requirements, refer to module descriptions.

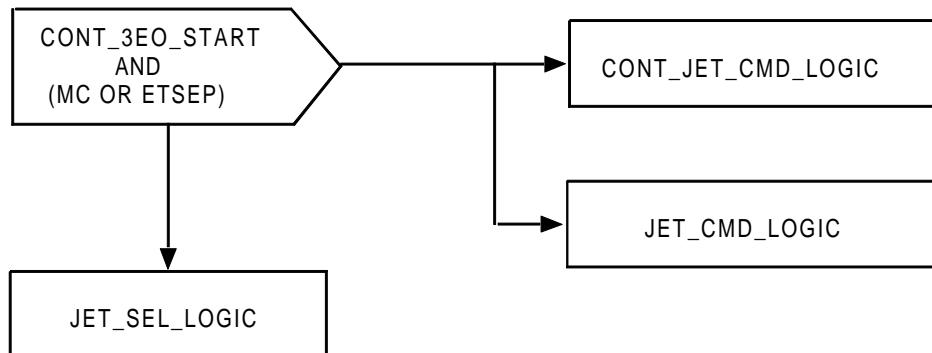


FIGURE 4.6.2-1. JET_LOGIC (GRTLS DAP) Execution Order

Table 4.6.2-1.Jet Select Logic, Contingency Jet Select Logic, and Jet Command Logic Variable Definition*

Term	Definition
DPJT_LIM	Pitch error redline limit
JSI(I)	Starting index of jets for each jet group
JEI(I)	Ending index of jets for each jet group
IZ	Index for AA DO loop
NRCYC	Number of required cycles a jet must stay on
YAW_RCS_FLAG	Flag to designate when jets must stay on for NRCYC
IYAW_CYCLE	Constant to designate number of required cycles a jet must stay on
I	Index for AA and BB DO loops
JET (I)	Jet on/off array 1-on 0-off
JETGD(I)	Jet good array 1-good 0-bad
NRJETS (I)	Number of required jets from each jet group
YRF	Forward yaw jets right side jet group 1 command
YLF	Forward yaw jets left side jet group 2 command
NZRF	Down-firing forward jets right side jet group 3 command
NZLF	Down-firing forward jets left side jet group 4 command
PITCH_ERR_RATIO	Interpolated pitch error ratio from X_INTERP table lookup function
PITCH_ERR_INDEX	Pitch error table array index from X_INTERP table lookup function
PZF	Forward up-firing jets jet group 5 command
PXRA	Aft-firing jets on aft right pod, jet group 6 command
PXLA	Aft-firing jets on aft left pod, jet group 7 command
PZRA	Up-firing jets on aft right pod, jet group 8 command
NZRA	Down-firing jets on aft right pod, jet group 9 command
PZLA	Up-firing jets on aft left pod, jet group 10 command
NZLA	Down-firing jets on aft left pod, jet group 11 command
YRA	Right-firing yaw jets on aft right pod, jet group 12 command
YLA	Left-firing yaw jets on aft left pod, jet group 13 command
IS	Index for BB DO loop
JS	Starting index of jet group
JSE	Ending index of jet group
NGJ	Number of good jets in a jet group
JETON	Counter for number of jets turned on from each group
NRJ	Number of aft yaw jets right side that must remain on
NLJ	Number of aft yaw jets left side that must remain on
K	Index for DD DO loop
L	Index within DD DO loop
JETFP(L)	First pass flag for jet (21) through jet (28) aft yaw jets
JETPV(L)	Past value of jet (21) through jet (28) aft yaw jets
NCYCLE(L)	Cycle counter for minimum on-time aft yaw jets

Table 4.6.2-1.Jet Select Logic, Contingency Jet Select Logic, and Jet Command Logic Variable Definition*

Term	Definition
NRPJL	Number of right side roll and pitch jets on during entry
NRPJR	Number of left side roll and pitch jets on during entry
NRIGHT	Maximum number of aft right yaw jets that can be fired during entry
NLEFT	Maximum number of aft left yaw jets that can be fired during entry
CROSSFEED_OPEN	Crossfeed open discrete
RECONFIG_CMPL	Reconfiguration discrete
IX	Index within EE DO loop
MC	Mated coast flight phase if MC=1
ETSEP	External tank separation flight phase if ETSEP=1
THC_NEGZ_CMD	Trans hand controller -Z translation CMD flag
AA LOOP	Zeroes jet (I)
BB LOOP	Executive DO loop for JSL
CC LOOP	Determine number of good jets within each group
DD LOOP	Keeps yaw jets on for NRCYC if required
EE LOOP	Turns on required number of jets
UXCMD	Roll RCS jet command from GRTLS DAP
UYCMD	Pitch RCS jet command from GRTLS DAP
UZCMD	Yaw RCS jet command from GRTLS DAP

*Note: This page included for clarification only.

Table 4.6.2-2.JET LOGIC Interface Requirements, GRTLS DAP

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
THC_NEGZ_CMD	Trans hand controller -Z command	GN&C SW RM	D	—	12.5
UXCMD	Quantized roll error signal	ROLL_QUANT	I	—	12.5
UYCMD	Quantized pitch error signal	PITCH_QUANT	I	—	12.5
UZCMD	Quantized yaw error signal	YAW_QUANT	I	—	12.5
AVAILABLE_JET_AFT(27)	Jet-good discrete for (+) Z-axis jets on RCS aft right pod (R4U, R2U, R1U)	RCS RM	D	—	25
AVAILABLE_JET_AFT(21)		RCS RM	D	—	25
AVAILABLE_JET_AFT(6)		RCS RM	D	—	25
AVAILABLE_JET_AFT(28)		RCS RM	D	—	25
AVAILABLE_JET_AFT(22)		RCS RM	D	—	25
AVAILABLE_JET_AFT(14)	Jet-good discrete for (-) Z-axis jets on RCS aft right pod (R4D, R2D, R3D)	RCS RM	D	—	25
AVAILABLE_JET_AFT(26)		RCS RM	D	—	25
AVAILABLE_JET_AFT(20)		RCS RM	D	—	25
AVAILABLE_JET_AFT(13)		RCS RM	D	—	25
AVAILABLE_JET_AFT(5)		RCS RM	D	—	25
AVAILABLE_JET_AFT(24)	Jet-good discrete for (+) Z-axis jets on RCS aft left pod (L4U, L2U, L1U)	RCS RM	D	—	25
AVAILABLE_JET_AFT(18)		RCS RM	D	—	25
AVAILABLE_JET_AFT(3)		RCS RM	D	—	25
AVAILABLE_JET_AFT(25)		RCS RM	D	—	25
AVAILABLE_JET_AFT(19)		RCS RM	D	—	25
AVAILABLE_JET_AFT(11)	Jet-good discrete for (-) Z-axis jets on RCS aft left pod (L4D, L2D, L3D)	RCS RM	D	—	25
AVAILABLE_JET_AFT(23)		RCS RM	D	—	25
AVAILABLE_JET_AFT(17)		RCS RM	D	—	25
AVAILABLE_JET_AFT(10)		RCS RM	D	—	25
AVAILABLE_JET_AFT(2)		RCS RM	D	—	25

Table 4.6.2-2.JET LOGIC Interface Requirements, GRTLS DAP

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
AVAILABLE_JET_AFT(4)	Jet-good discrete for (+) X-axis jets on RCS aft right side (R1A, R3A)	RCS RM	D	—	25
AVAILABLE_JET_AFT(12)		RCS RM	D	—	25
AVAILABLE_JET_AFT(1)	Jet-good discrete for (+) X-axis jets on RCS aft left side (L1A, L3A)	RCS RM	D	—	25
AVAILABLE_JET_AFT(9)		RCS RM	D	—	25
AVAILABLE_JET_FWD(4)	Jet-good discrete for (-) Z-axis jets on RCS forward left side (F1D, F3D)	RCS RM	D	—	25
AVAILABLE_JET_FWD(16)		RCS RM	D	—	25
AVAILABLE_JET_FWD(8)	Jet-good discrete for (-) Z-axis jets on RCS forward right side (F2D, F4D)	RCS RM	D	—	25
AVAILABLE_JET_FWD(10)		RCS RM	D	—	25
AVAILABLE_JET_FWD(6)	Jet-good discrete for (-) Y-axis jets on RCS forward right side (F2R, F4R)	RCS RM	D	—	25
AVAILABLE_JET_FWD(9)		RCS RM	D	—	25
AVAILABLE_JET_FWD(2)	Jet-good discrete for (+) Y-axis jets on RCS forward left side (F1L, F3L)	RCS RM	D	—	25
AVAILABLE_JET_FWD(14)		RCS RM	D	—	25
AVAILABLE_JET_FWD(3)	Jet-good discrete for (+) Z-axis jets on RCS forward pod (F1U, F2U, F3U)	RCS RM	D	—	25
AVAILABLE_JET_FWD(7)		RCS RM	D	—	25
AVAILABLE_JET_FWD(15)					
CONT_EXT_MINUSZ_ENA	Discrete that enables extended minus Z translation for contingency aborts	CONT_3EO_GUID	D	—	6.25
CONT_RCS_PLUSX_ON	Discrete that commands the +X jets on for contingency abort mated coast MPS settling burn	CONT_3EO_GUID	D	—	6.25
JET_MAP	Mapping of jet use preference within group	RCS RM or carryover from previous OPS	A(38)I	—	12.5
MC	Mated coast flag	RECON	D	—	6.25
ETSEP	External tank separation flag	RECON	D	—	6.25
YAW_RCS_FLAG	Yaw RCS discrete	RECON	D	—	6.25
ETSEP_P_ENABLE	Flag to enable pitch control during ET SEP	RECON	D	—	6.25

Table 4.6.2-2.JET LOGIC Interface Requirements, GRTLS DAP

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
ETSEP_R_ENABLE	Flag to enable roll control during ET SEP using pitch jets	RECON	D	—	6.25
PITCH_ERRT	Difference between the pitch error signal (DPJET_SEP) and the Pitch attitude Error (EBFB2)	ETSEP_PITCH_CHAN	F	deg/sec	12.5
DT_ETSEP	Elapsed Time from ET_SEP_CMD set True, Event 34 (Nom. ETSEP) or Event A37 (RTLS ETSEP)	RECON	F	sec	6.25
AUTO	AUTO Guidance Mode Flag	ASC DAP	D	—	12.5
CONT_3EO_START	Contingency 3 engines out start flag	CONT 3E/O GUID	D	—	6.25
PE_MC	Roll error signal, MC	CONT_MC_ROLL_CHAN	F	deg/sec	12.5
DRJET_MC	Yaw error signal, MC	CONT_MC_YAW_CHAN	F	deg/sec	12.5
HIROLL	High roll command level	CONT_ROLL_QUANT	I	—	12.5
CONT_MINUS_Z_COMPL	Discrete to indicate the contingency minus Z maneuver is complete	RECON	D	—	6.25
<u>Outputs</u>					
ETSEP_P_ENABLE	Flag to enable pitch control during ET SEP	RECON	D	—	6.25
NEW_JONLST_AFT (27)	Jet-ON discretes for (+) Z-axis jets on RCS aft right pod (R4U, R2U, R1U)	TLM, ASC RCS CMD SOP	D	—	12.5
NEW_JONLST_AFT (21)			D	—	12.5
NEW_JONLST_AFT(6)			D	—	12.5
NEW_JONLST_AFT (28)	Jet-ON discretes for (-) Z-axis jets on RCS aft right pod (R4D, R2D, R3D)	TLM, ASC RCS CMD SOP	D	—	12.5
NEW_JONLST_AFT (22)			D	—	12.5
NEW_JONLST_AFT (14)			D	—	12.5
NEW_JONLST_AFT (24)	Jet-ON discretes for (+) Z-axis jets on RCS aft left pod (L4U, L2U, L1U)	TLM, ASC RCS CMD SOP	D	—	12.5
NEW_JONLST_AFT (18)			D	—	12.5
NEW_JONLST_AFT(3)			D	—	12.5

Table 4.6.2-2.JET LOGIC Interface Requirements, GRTLS DAP

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
NEW_JONLST_AFT (25)	Jet-ON discretes for (-) Z-axis jets on RCS aft left pod (L4D, L2D, L3D)	TLM, ASC RCS CMD SOP	D	—	12.5
NEW_JONLST_AFT (19)			D	—	12.5
NEW_JONLST_AFT (11)			D	—	12.5
NEW_JONLST_AFT (26)			D	—	12.5
NEW_JONLST_AFT (20)	Jet-ON discretes for (-) Y-axis jets on RCS aft right pod (R4R, R2R, R3R, R1R)	TLM, ASC RCS CMD SOP	D	—	12.5
NEW_JONLST_AFT (13)			D	—	12.5
NEW_JONLST_AFT (5)			D	—	12.5
NEW_JONLST_AFT (23)			D	—	12.5
NEW_JONLST_AFT (17)	Jet-ON discretes for (+) Y-axis jets on RCS aft left pod (L4L, L2L, L3L, L1L)	TLM, ASC RCS CMD SOP	D	—	12.5
NEW_JONLST_AFT (10)			D	—	12.5
NEW_JONLST_AFT (2)			D	—	12.5
NEW_JONLST_AFT (4)			D	—	12.5
NEW_JONLST_AFT (12)	Jet-ON discretes for (+) X-axis jets on RCS aft right pod (R1A, R3A)	TLM, ASC RCS CMD SOP	D	—	12.5
NEW_JONLST_AFT (1)			D	—	12.5
NEW_JONLST_AFT (9)			D	—	12.5
NJETPV	Past value of number of yaw jets commanded	ESTIMATED BETA	D	—	12.5
NEW_JONLST_FWD (4)	RCS jet F1D ON/OFF cmd	-Z force forward left side	D	—	12.5
NEW_JONLST_FWD (16)	RCS jet F3D ON/OFF cmd		D	—	12.5
NEW_JONLST_FWD (8)	RCS jet F2D ON/OFF cmd	-Z force forward right side	D	—	12.5
NEW_JONLST_FWD (10)	RCS jet F4D ON/OFF cmd		D	—	12.5
NEW_JONLST_FWD (6)	RCS jet F2R ON/OFF cmd	-Y force forward right side	D	—	12.5
NEW_JONLST_FWD (9)	RCS jet F4R ON/OFF cmd		D	—	12.5

Table 4.6.2-2.JET LOGIC Interface Requirements, GRTLS DAP

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
NEW_JONLST_FWD (2) NEW_JONLST_FWD (14)	RCS jet F1L ON/OFF cmd RCS jet F3L ON/OFF cmd	+Y force forward left side	ASC RCS CMD SOP	D	— 12.5
NEW_JONLST_FWD (3) NEW_JONLST_FWD (7) NEW_JONLST_FWD (15)	RCS jet F1U ON/OFF cmd RCS jet F2U ON/OFF cmd RCS jet F3U ON/OFF cmd	Forward +Z force	ASC RCS CMD SOP	D	— 12.5
Interface between JET_CMD_LOGIC and CONT_JET_CMD_LOGIC and JET_SEL_LOGIC					
NZLA	Number of -Z left aft jets to fire		I	—	12.5
NZRA	Number of -Z right aft jets to fire		I	—	12.5
PZLA	Number of +Z left aft jets to fire	FROM	I	—	12.5
PZRA	Number of +Z right aft jets to fire	JET_CMD_	I	—	12.5
PZF	Number of +Z fwd jets to fire	LOGIC AND	I	—	12.5
NZLF	Number of -Z left fwd jets to fire	CONT_JET_	I	—	12.5
NZRF	Number of -Z right fwd jets to fire	CMD_LOGIC	I	—	12.5
YLA	Number of left aft yaw jets to fire	TO JET_SEL_	I	—	12.5
YRA	Number of right aft yaw jets to fire	LOGIC	I	—	12.5
YLF	Number of left fwd yaw jets to fire		I	—	12.5
YRF	Number of right fwd yaw jets to fire		I	—	12.5
PXRA	Number of +X aft right jets to fire		I	—	12.5
PXLA	Number of +X aft left jets to fire		I	—	12.5

4.6.2.1 JET_CMD_LOGIC.

A. Function – JET_CMD_LOGIC converts quantized error signals into integers specifying the number of RCS jets of each group that should be fired. The module is partitioned into:

1. Jet command executive (Figure 4.6.2.1–1).
2. Pitch/roll and yaw command generation, mated coast (Figure 4.6.2.1–2). Table 4.6.2.1–1 also presents desired pitch/roll and yaw commands in tabular form.
3. Pitch/roll and yaw command generation, ETSEP (Figure 4.6.2.1–3). Table 4.6.2.1–2 presents in tabular form the ETSEP desired pitch/roll and yaw RCS number of jets commanded for the jet groups in which ETSEP_Y_ENABLE is set ON and ETSEP_P_ENABLE and ETSEP_R_ENABLE are turned OFF. Table 4.6.2.1–3 presents in tabular form the ETSEP desired pitch/roll and yaw RCS number of jets commanded for the jet group for the condition where ETSEP_P_ENABLE, ETSEP_R_ENABLE and ETSEP_Y_ENABLE are all turned ON.
4. Pitch/roll and yaw command generation, ENTRY (Figure 4.6.2.1–4).

The requirements for the commanding of the RCS jets are in the logic flows and not in the tables.

B. Processing Requirements – Processing is at 12.5 Hz.

C. Interface Requirements – The interface requirements for JET_CMD_LOGIC are shown in Table 4.6.2–2.

D. Constants – None.

E. Initialization Requirements – None.

Table 4.6.2.1-1. Pitch/Roll and Yaw Commands Generation for Mated Coast (GRTLS DAP)

UYCMD	UXCMD	UZCMD	NZLA	PZLA	NZRA	PZRA	NZLF	NZRF	YLF	YRF	YLA	YRA
10	2	2	0	3	0	3	2	2	2	0	0	3
10	2	1	0	3	0	3	2	2	2	0	0	1
10	2	0	0	3	0	3	2	2	2	0	2	0
10	2	-1	0	3	0	3	2	2	0	2	1	0
10	2	-2	0	3	0	3	2	2	0	2	3	0
10	0	2	0	3	0	3	2	2	2	0	0	3
10	0	1	0	3	0	3	2	2	2	0	0	1
10	0	0	0	3	0	3	2	2	0	0	0	0
10	0	-1	0	3	0	3	2	2	0	2	1	0
10	0	-2	0	3	0	3	2	2	0	2	3	0
10	-2	2	0	3	0	3	2	2	2	0	0	3
10	-2	1	0	3	0	3	2	2	2	0	0	1
10	-2	0	0	3	0	3	2	2	0	2	0	2
10	-2	-1	0	3	0	3	2	2	0	2	1	0
10	-2	-2	0	3	0	3	2	2	0	2	3	0
5	2	2	3	0	0	3	2	2	2	0	0	3
5	2	1	3	0	0	3	2	2	2	0	0	1
5	2	0	3	0	0	3	2	2	2	0	2	0
5	2	-1	3	0	0	3	2	2	0	2	1	0
5	2	-2	3	0	0	3	2	2	0	2	3	0
5	0	2	0	3	0	3	2	2	2	0	0	3
5	0	1	0	3	0	3	2	2	2	0	0	1
5	0	0	0	3	0	3	2	2	0	0	0	0
5	0	-1	0	3	0	3	2	2	0	2	1	0
5	0	-2	0	3	0	3	2	2	0	2	3	0
5	-2	2	0	3	3	0	2	2	2	0	0	3

Table 4.6.2.1-1. Pitch/Roll and Yaw Commands Generation for Mated Coast (GRTLS DAP)

UYCMD	UXCMD	UZCMD	NZLA	PZLA	NZRA	PZRA	NZLF	NZRF	YLF	YRF	YLA	YRA
5	-2	1	0	3	3	0	2	2	2	0	0	1
5	-2	0	0	3	3	0	2	2	0	2	0	2
5	-2	-1	0	3	3	0	2	2	0	2	1	0
5	-2	-2	0	3	3	0	2	2	0	2	3	0
0	2	2	3	0	0	3	0	0	2	0	0	3
0	2	1	3	0	0	3	0	0	2	0	0	1
0	2	0	3	0	0	3	0	0	2	0	2	0
0	2	-1	3	0	0	3	0	0	0	2	1	0
0	2	-2	3	0	0	3	0	0	0	2	3	0
0	0	2	0	0	0	0	0	0	2	0	0	3
0	0	1	0	0	0	0	0	0	2	0	0	1
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	-1	0	0	0	0	0	0	0	2	1	0
0	0	-2	0	0	0	0	0	0	0	2	3	0
0	-2	2	0	3	3	0	0	0	2	0	0	3
0	-2	1	0	3	3	0	0	0	2	0	0	1
0	-2	0	0	3	3	0	0	0	0	2	0	2
0	-2	-1	0	3	3	0	0	0	0	2	1	0
0	-2	-2	0	3	3	0	0	0	0	2	3	0
-3	2	2	3	0	3	0	0	0	2	0	0	3
-3	2	1	3	0	3	0	0	0	2	0	0	1
-3	2	0	3	0	3	0	0	0	2	0	2	0
-3	2	-1	3	0	3	0	0	0	0	2	1	0
-3	2	-2	3	0	3	0	0	0	0	2	3	0
-3	0	2	3	0	3	0	0	0	2	0	0	3

Table 4.6.2.1-1. Pitch/Roll and Yaw Commands Generation for Mated Coast (GRTLS DAP)

UYCMD	UXCMD	UZCMD	NZLA	PZLA	NZRA	PZRA	NZLF	NZRF	YLF	YRF	YLA	YRA
-3	0	1	3	0	3	0	0	0	2	0	0	1
-3	0	0	3	0	3	0	0	0	0	0	0	0
-3	0	-1	3	0	3	0	0	0	0	2	1	0
-3	0	-2	3	0	3	0	0	0	0	2	3	0
-3	-2	2	3	0	3	0	0	0	2	0	0	3
-3	-2	1	3	0	3	0	0	0	2	0	0	1
-3	-2	0	3	0	3	0	0	0	0	2	0	2
-3	-2	-1	3	0	3	0	0	0	0	2	1	0
-3	-2	-2	3	0	3	0	0	0	0	2	3	0

Table 4.6.2.1-2. Pitch/Roll and Yaw Commands Generation for ET Separation - ETSEP_Y_ENABLE = ON,
ETSEP_P_ENABLE and ETSEP_R_ENABLE = OFF

UYCMD	UXCMD	UZCMD	NZLA	PZLA	NZRA	PZRA	NZLF	NZRF	YLF	YRF	YLA	YRA	Note or Exception
0	5	4	3	0	3	0	2	2	1	0	0	1	
			2	0	2	0	1	1	1	0	0	1	Downfiring Fwd or Aft RCS Jet failure
0	3	4	3	0	3	0	2	2	1	0	0	1	
			2	0	2	0	1	1	1	0	0	1	Downfiring Fwd or Aft RCS Jet failure
0	0	4	3	0	3	0	2	2	1	0	0	1	
			2	0	2	0	1	1	1	0	0	1	Downfiring Fwd or Aft RCS Jet failure
0	-3	4	3	0	3	0	2	2	1	0	0	1	
			2	0	2	0	1	1	1	0	0	1	Downfiring Fwd or Aft RCS Jet failure
0	-5	4	3	0	3	0	2	2	1	0	0	1	
			2	0	2	0	1	1	1	0	0	1	Downfiring Fwd or Aft RCS Jet failure
0	5	0	3	0	3	0	2	2	1	0	2	0	
			2	0	2	0	1	1	1	0	2	0	Downfiring Fwd or Aft RCS Jet failure
0	3	0	3	0	3	0	2	2	1	0	2	0	
			2	0	2	0	1	1	1	0	2	0	Downfiring Fwd or Aft RCS Jet failure
0	0	0	3	0	3	0	2	2	0	0	0	0	Values for All ENABLEs turned off as well
			2	0	2	0	1	1	0	0	0	0	Downfiring Fwd or Aft RCS Jet failure

Table 4.6.2.1-2. Pitch/Roll and Yaw Commands Generation for ET Separation - ETSEP_Y_ENABLE = ON,
ETSEP_P_ENABLE and ETSEP_R_ENABLE = OFF

UYCMD	UXCMD	UZCMD	NZLA	PZLA	NZRA	PZRA	NZLF	NZRF	YLF	YRF	YLA	YRA	Note or Exception
0	-3	0	3	0	3	0	2	2	0	1	0	2	
			2	0	2	0	1	1	0	1	0	2	Downfiring Fwd or Aft RCS Jet failure
0	-5	0	3	0	3	0	2	2	0	1	0	2	
			2	0	2	0	1	1	0	1	0	2	Downfiring Fwd or Aft RCS Jet failure
0	5	-4	3	0	3	0	2	2	0	1	1	0	
			2	0	2	0	1	1	0	1	1	0	Downfiring Fwd or Aft RCS Jet failure
0	3	-4	3	0	3	0	2	2	0	1	1	0	
			2	0	2	0	1	1	0	1	1	0	Downfiring Fwd or Aft RCS Jet failure
0	0	-4	3	0	3	0	2	2	0	1	1	0	
			2	0	2	0	1	1	0	1	1	0	Downfiring Fwd or Aft RCS Jet failure
0	-3	-4	3	0	3	0	2	2	0	1	1	0	
			2	0	2	0	1	1	0	1	1	0	Downfiring Fwd or Aft RCS Jet failure
0	-5	-4	3	0	3	0	2	2	0	1	1	0	
			2	0	2	0	1	1	0	1	1	0	Downfiring Fwd or Aft RCS Jet failure

Note: There are no pitch commands since in this table ETSEP_P_ENABLE is not turned on. On the other hand even though ETSEP_R_ENABLE is also not turned on, it will be considered since the ROLL_QUANT is running when ETSEP_Y_ENABLE is on.

Table 4.6.2.1-3. Pitch/Roll and Yaw Commands Generation for ET Separation - ETSEP_P_ENABLE,
ETSEP_Y_ENABLE, ETSEP_R_ENABLE = ON

UYCMD	UXCMD	UZCMD	NZLA	PZLA	NZRA	PZRA	NZLF	NZRF	YLF	YRF	YLA	YRA	Note or Exception
3	5	4	3	0	0	2	2	2	1	0	0	1	
3	3	4	2	0	0	1	2	2	1	0	0	1	
			2	0	0	2	2	2	1	0	0	1	PITCH_ERRT ≥ DPJT_LIM
3	0	4	0	0	0	0	2	2	1	0	0	2	
3	-3	4	0	1	2	0	2	2	1	0	0	2	
			0	2	2	0	2	2	1	0	0	2	PITCH_ERRT ≥ DPJT_LIM
3	-5	4	0	2	3	0	2	2	1	0	0	2	
0	5	4	3	0	0	2	2	2	1	0	0	1	
0	3	4	2	0	0	1	2	2	1	0	0	1	
0	0	4	3	0	3	0	2	2	1	0	0	2	
0	-3	4	0	1	2	0	2	2	1	0	0	2	
0	-5	4	0	2	3	0	2	2	1	0	0	2	
-2	5	4	3	0	0	2	0	0	1	0	0	1	
			2	0	0	1	0	0	1	0	0	1	Downfiring Aft Left RCS Jet failure and PITCH_ERRT < PITCH_ERR_LIM
-2	3	4	2	0	0	1	0	0	1	0	0	1	
-2	0	4	3	0	3	0	0	0	1	0	0	2	
-2	-3	4	0	1	2	0	0	0	1	0	0	2	

Table 4.6.2.1-3. Pitch/Roll and Yaw Commands Generation for ET Separation - ETSEP_P_ENABLE,
ETSEP_Y_ENABLE, ETSEP_R_ENABLE = ON

UYCMD	UXCMD	UZCMD	NZLA	PZLA	NZRA	PZRA	NZLF	NZRF	YLF	YRF	YLA	YRA	Note or Exception
-2	-5	4	0	2	3	0	0	0	1	0	0	2	
			0	1	2	0	0	0	1	0	0	2	Downfiring Aft Right RCS Jet failure and PITCH_ERRT < PITCH_ERR_LIM
3	5	0	3	0	0	2	2	2	1	0	2	0	
3	3	0	2	0	0	1	2	2	1	0	2	0	
			2	0	0	2	2	2	1	0	2	0	PITCH_ERRT ≥ DPJT_LIM
3	0	0	0	0	0	0	2	2	0	0	0	0	
3	-3	0	0	1	2	0	2	2	0	1	0	2	
			0	2	2	0	2	2	0	1	0	2	PITCH_ERRT ≥ DPJT_LIM
3	-5	0	0	2	3	0	2	2	0	1	0	2	
0	5	0	3	0	0	2	2	2	1	0	2	0	
0	3	0	2	0	0	1	2	2	1	0	2	0	
0	0	0	3	0	3	0	2	2	0	0	0	0	
0	-3	0	0	1	2	0	2	2	0	1	0	2	
0	-5	0	0	2	3	0	2	2	0	1	0	2	
-2	5	0	3	0	0	2	0	0	1	0	2	0	
			2	0	0	1	0	0	1	0	2	0	Downfiring Aft Left RCS Jet failure and PITCH_ERRT < PITCH_ERR_LIM
-2	3	0	2	0	0	1	0	0	1	0	2	0	
-2	0	0	3	0	3	0	0	0	0	0	0	0	

Table 4.6.2.1-3. Pitch/Roll and Yaw Commands Generation for ET Separation - ETSEP_P_ENABLE,
ETSEP_Y_ENABLE, ETSEP_R_ENABLE = ON

UYCMD	UXCMD	UZCMD	NZLA	PZLA	NZRA	PZRA	NZLF	NZRF	YLF	YRF	YLA	YRA	Note or Exception
-2	-3	0	0	1	2	0	0	0	0	1	0	2	
-2	-5	0	0	2	3	0	0	0	0	1	0	2	
			0	1	2	0	0	0	0	1	0	2	Downfiring Aft Right RCS Jet failure and PITCH_ERRT < PITCH_ERR_LIM
3	5	-4	3	0	0	2	2	2	0	1	2	0	
3	3	-4	2	0	0	1	2	2	0	1	2	0	
			2	0	0	2	2	2	0	1	2	0	PITCH_ERRT ≥ DPJT_LIM
3	0	-4	0	0	0	0	2	2	0	1	2	0	
3	-3	-4	0	1	2	0	2	2	0	1	1	0	
			0	2	2	0	2	2	0	1	1	0	PITCH_ERRT ≥ DPJT_LIM
3	-5	-4	0	2	3	0	2	2	0	1	1	0	
0	5	-4	3	0	0	2	2	2	0	1	2	0	
0	3	-4	2	0	0	1	2	2	0	1	2	0	
0	0	-4	3	0	3	0	2	2	0	1	2	0	
0	-3	-4	0	1	2	0	2	2	0	1	1	0	
0	-5	-4	0	2	3	0	2	2	0	1	1	0	
-2	5	-4	3	0	0	2	0	0	0	1	2	0	
			2	0	0	1	0	0	0	1	2	0	Downfiring Aft Left RCS Jet failure and PITCH_ERRT < PITCH_ERR_LIM
-2	3	-4	2	0	0	1	0	0	0	1	2	0	

Table 4.6.2.1-3. Pitch/Roll and Yaw Commands Generation for ET Separation - ETSEP_P_ENABLE,
ETSEP_Y_ENABLE, ETSEP_R_ENABLE = ON

UYCMD	UXCMD	UZCMD	NZLA	PZLA	NZRA	PZRA	NZLF	NZRF	YLF	YRF	YLA	YRA	Note or Exception
-2	0	-4	3	0	3	0	0	0	0	1	2	0	
-2	-3	-4	0	1	2	0	0	0	0	1	1	0	
-2	-5	-4	0	2	3	0	0	0	0	1	1	0	
			0	1	2	0	0	0	0	1	1	0	Downfiring Aft Right RCS Jet failure and PITCH_ERRT < PITCH_ERR_LIM

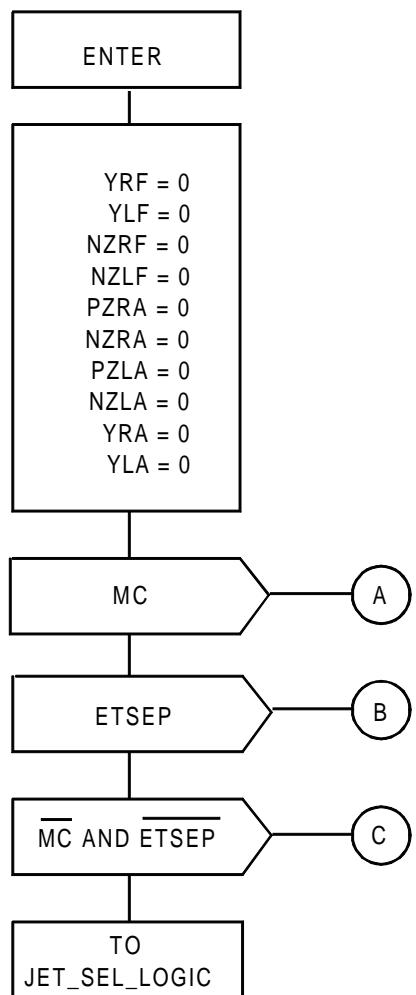


FIGURE 4.6.2.1-1. Jet Command Executive

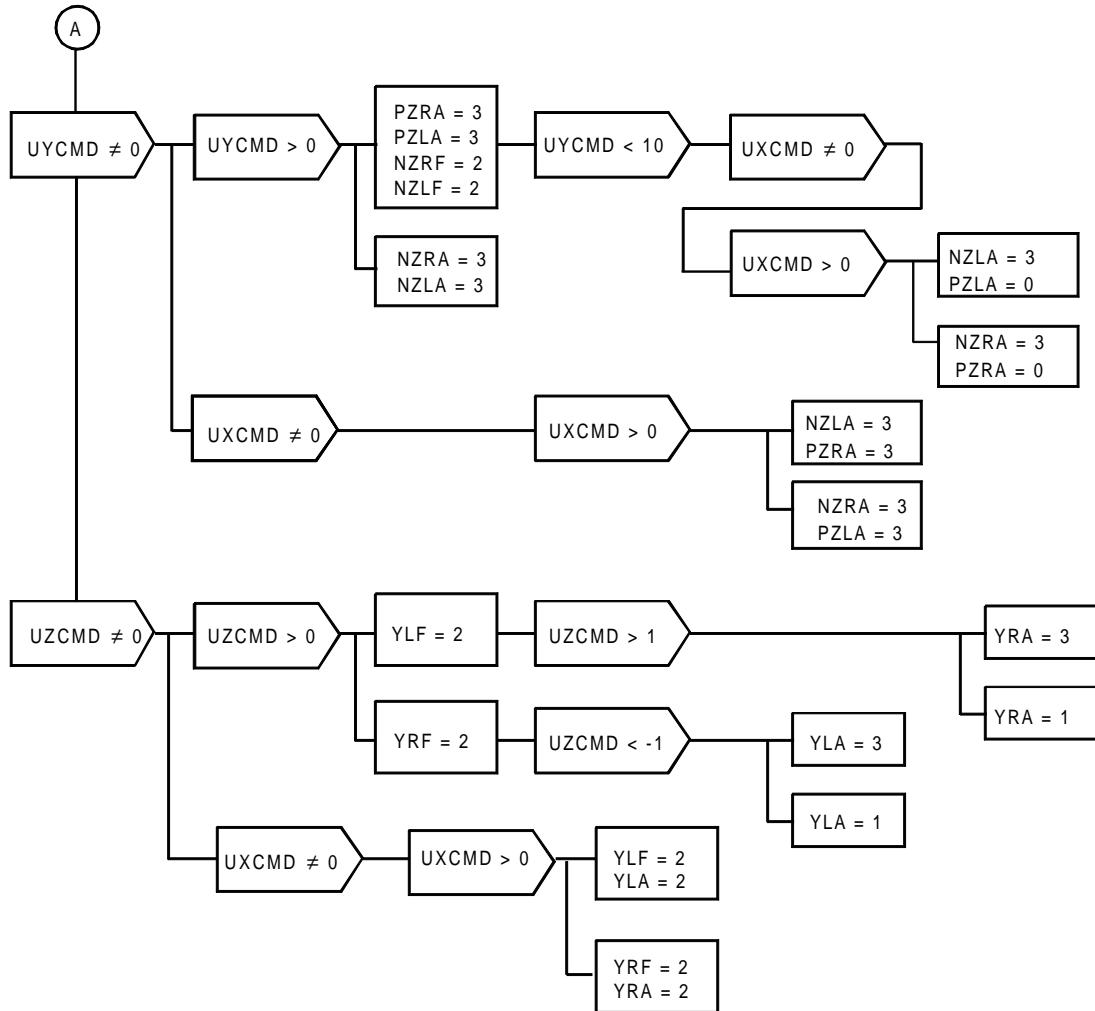


FIGURE 4.6.2.1-2. Pitch/Roll and Yaw Command Generation For Mated Coast (GRTLS DAP)

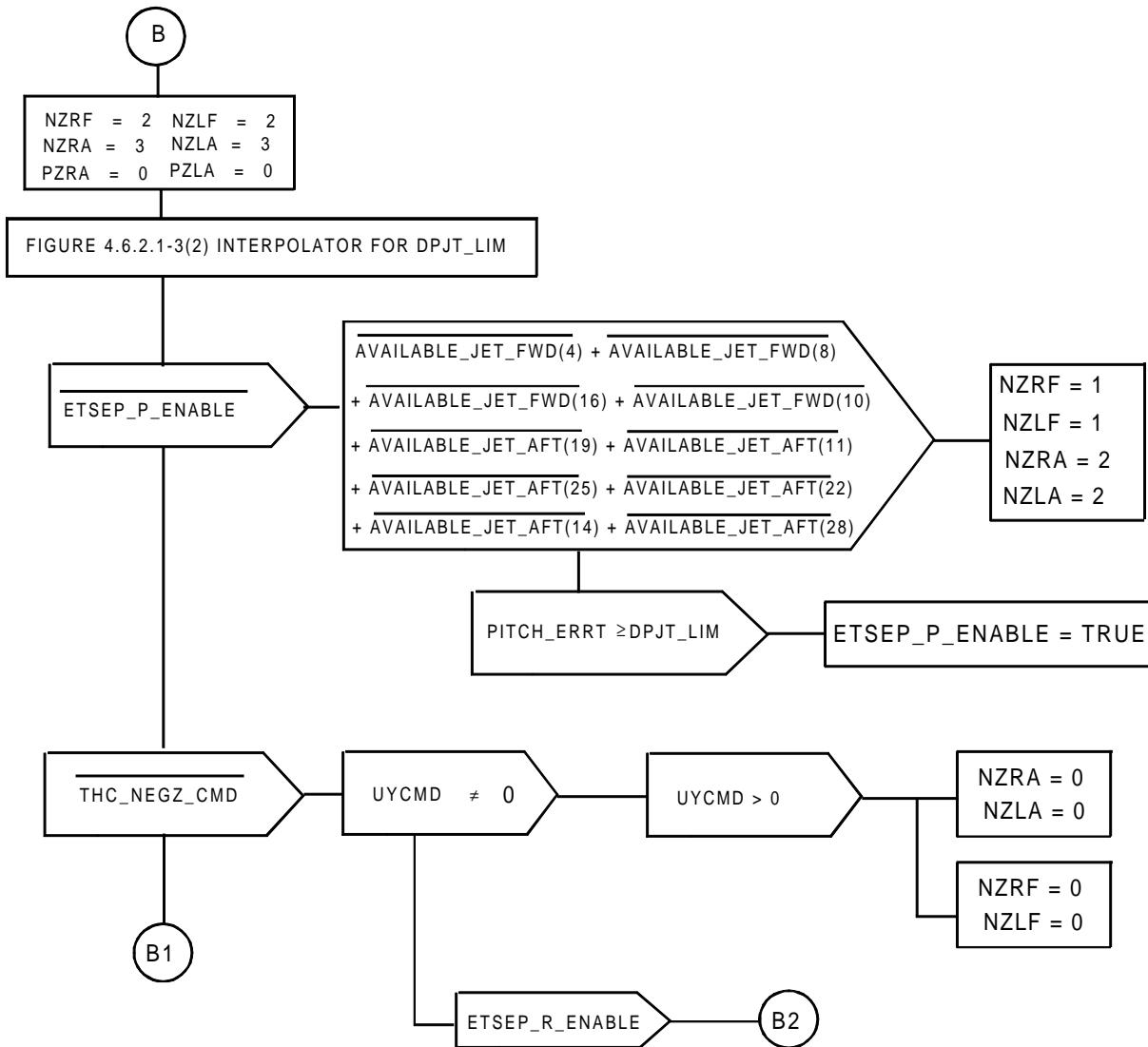


FIGURE 4.6.2.1-3.(1) Pitch/Roll and Yaw Command Generation for ETSEP (Sheet 1 of 4)

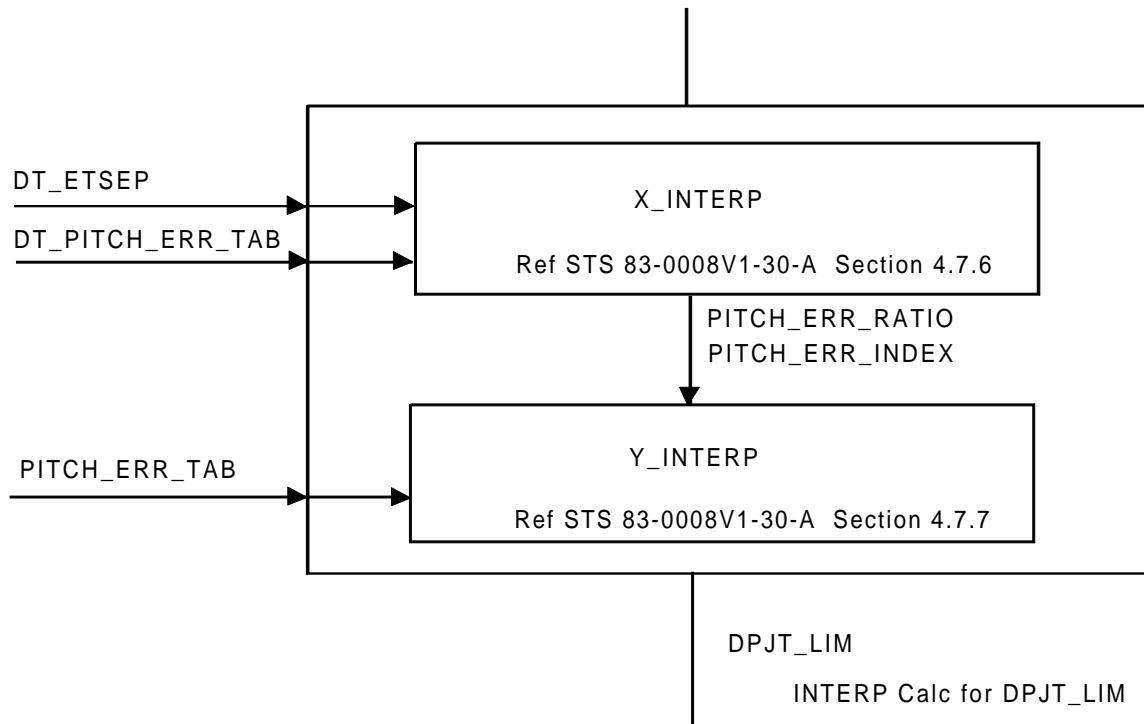


FIGURE 4.6.2.1-3.(2) Pitch/Roll and Yaw Command Generation for ETSEP (Sheet 2 of 4)

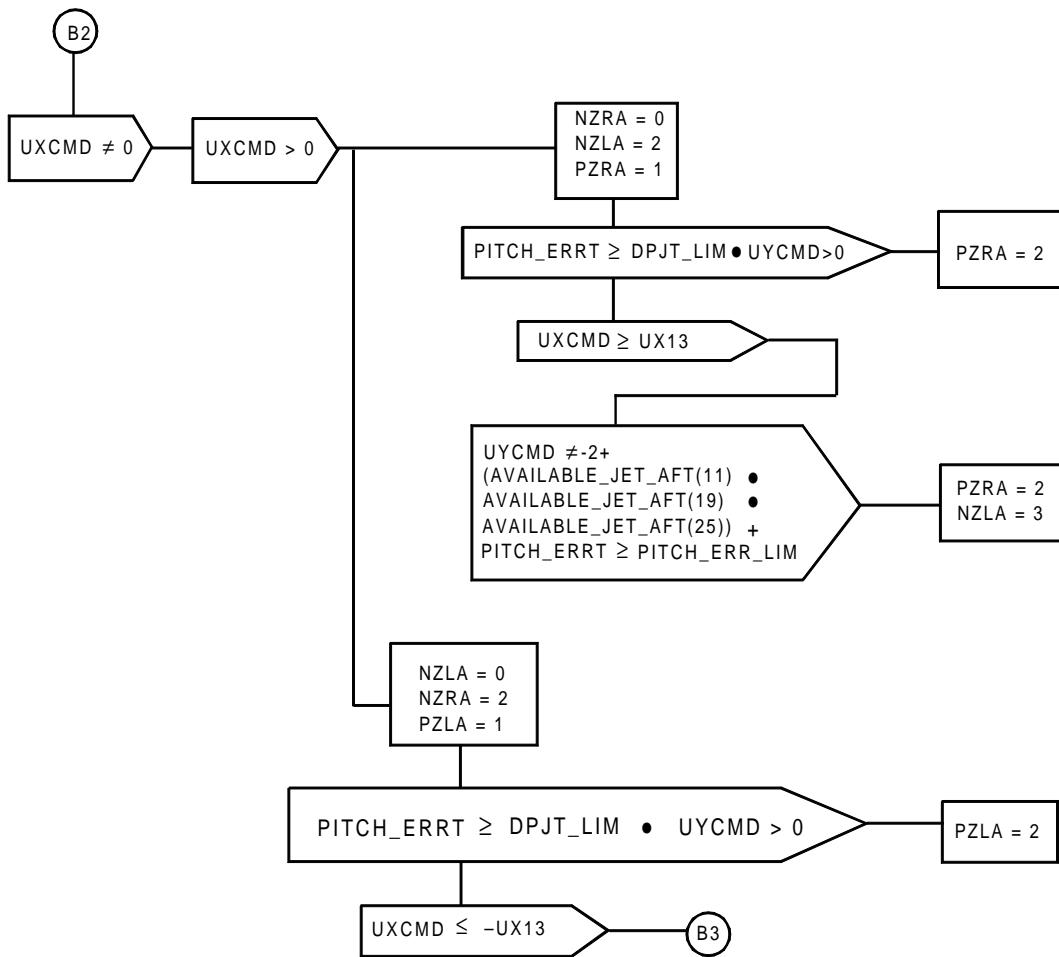


FIGURE 4.6.2.1-3.(3) Pitch/Roll and Yaw Command Generation for ETSEP (Sheet 3 of 4)

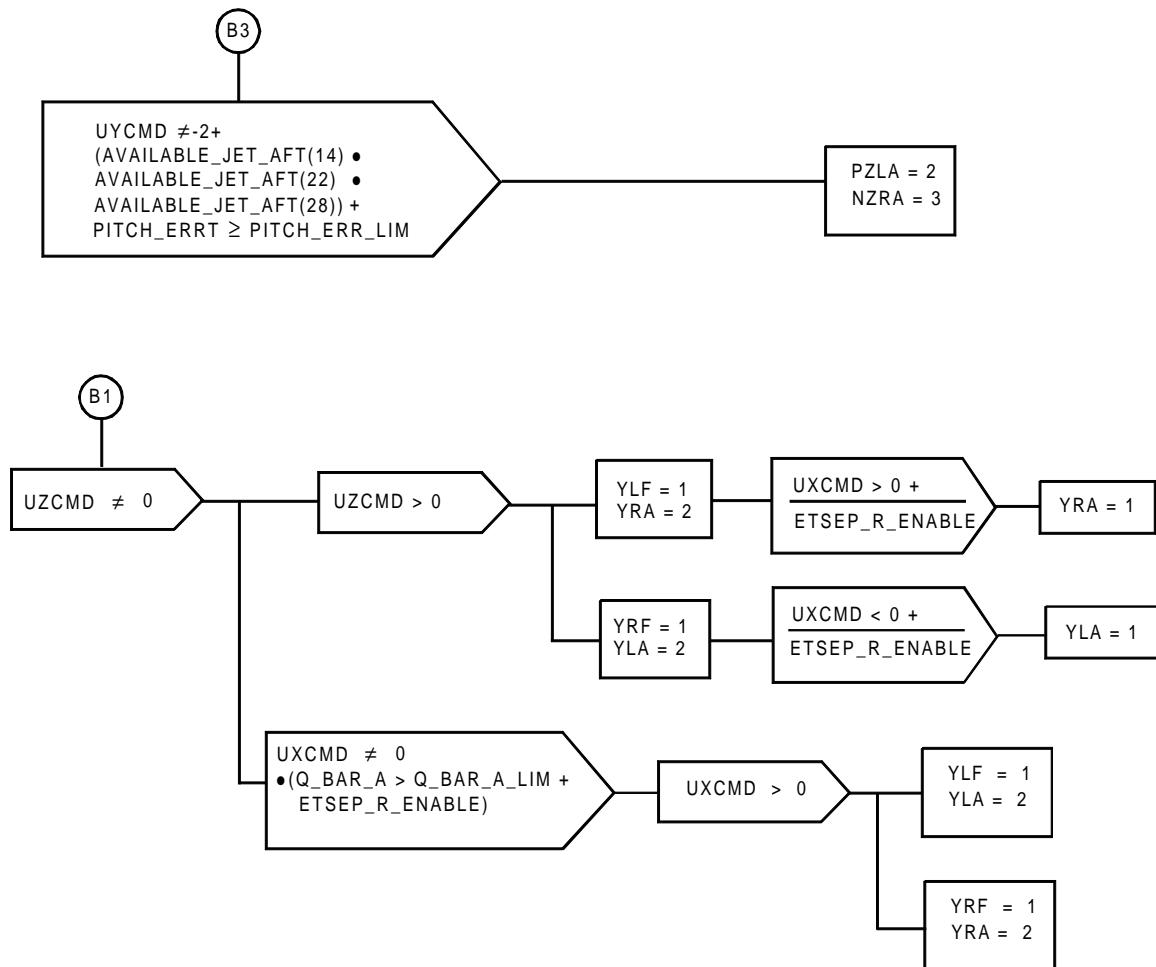


FIGURE 4.6.2.1-3.(4) Pitch/Roll and Yaw Command Generation for ETSEP (Sheet 4 of 4)

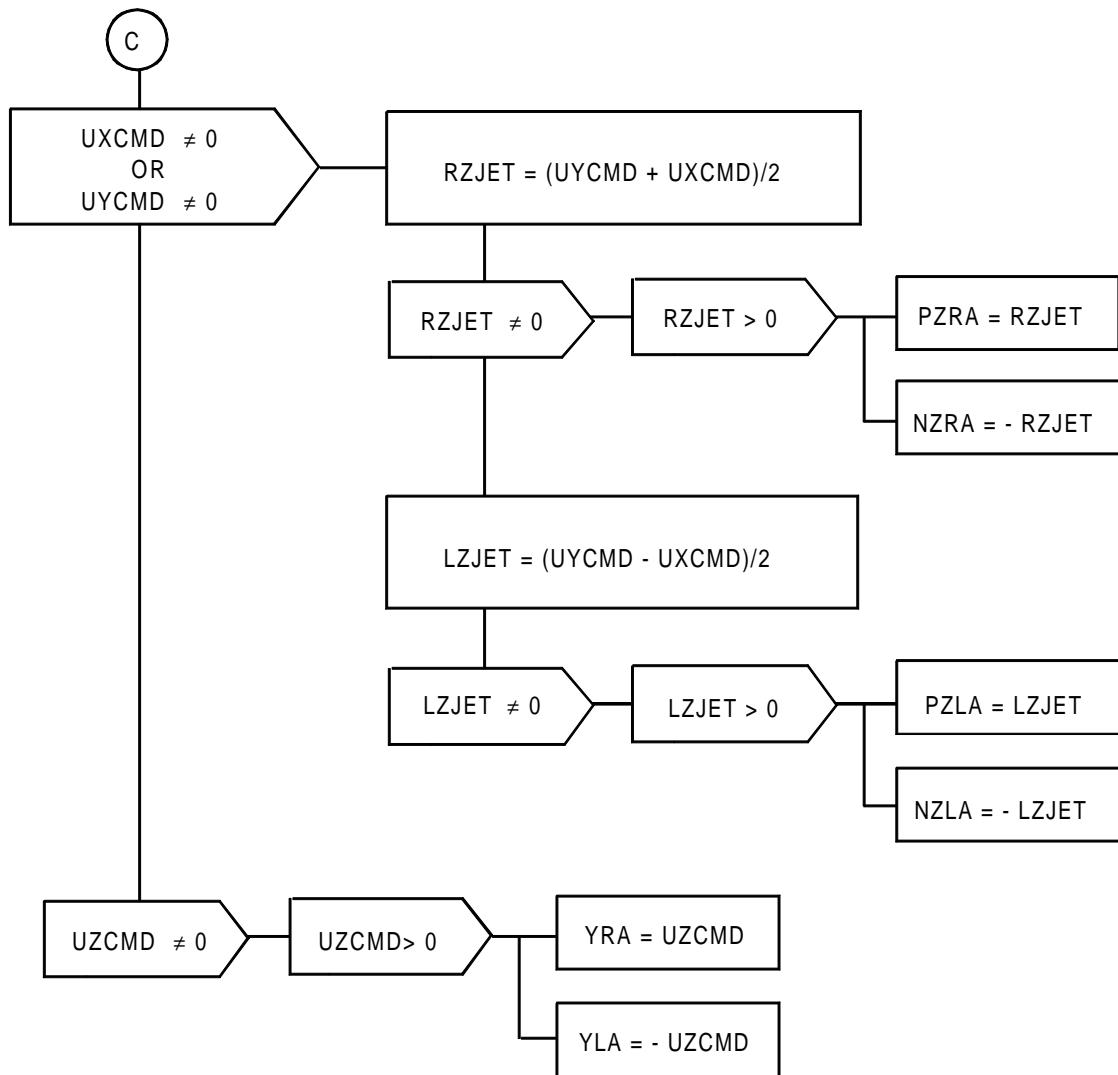


FIGURE 4.6.2.1-4. Pitch/Roll and Yaw Command Generation for ENTRY (GRTLS DAP)

4.6.2.2 JET_SEL_LOGIC.

A. Function – JET_SEL_LOGIC converts the jet group integers into specific jet-on commands. In so doing, it takes the jet available discretes from RCS FDI into account. The detailed HAL logic for JET_SEL_LOGIC is shown in Figure 4.6.2.2–1 for information only and may be interpreted as an acceptable implementation of the JSL requirements.

If RCS RM changes the jet status from available to failed while the jet is being fired, the command will be set to zero on the next JSL cycle.

Note: This may result in a firing of less duration than the desired minimum on-time (if the jets have been on for less than IYAW-CYCLES).

Another alternative for accomplishing duty cycle balancing of jets is to prioritize the jets within groups and make these priorities mission-dependent RCS RM I-loads. The priorities are in turn controlled by the translation table, JET_MAP, which is an RM output. It is initialized via I-loads in OPS 1, but can be modified via crew inputs on the RCS display in OPS 2, 3, and 8. Table 4.6.2.2–1 clarifies the possible values that the RCS RM output JET_MAP can take.

B. Processing Requirements – JET_SEL_LOGIC is processed at 12.5 Hz.

C. Interface Requirements – The interface requirements for JET_SEL_LOGIC are shown in Table 4.6.2.2–1.

D. I-Loads – The I-loads for JET_SEL_LOGIC are shown in Table 4.6.2.2–2.

E. Initialization Requirements – The initialization requirements for JET_SEL_LOGIC are shown in Table 4.6.2.2–3.

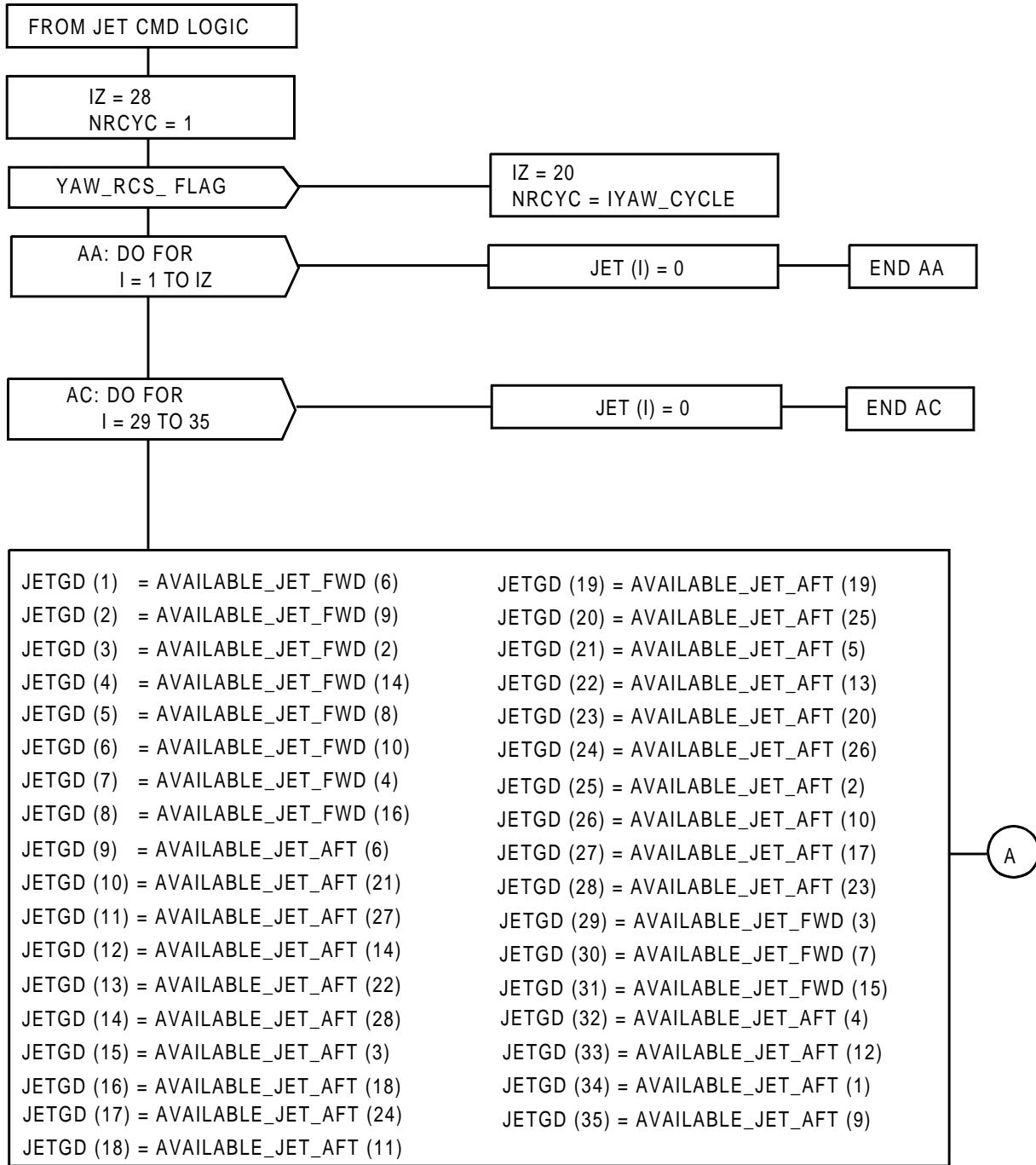


FIGURE 4.6.2.2-1.(1) Jet Select Logic (GRTLS DAP) (Sheet 1 of 5)

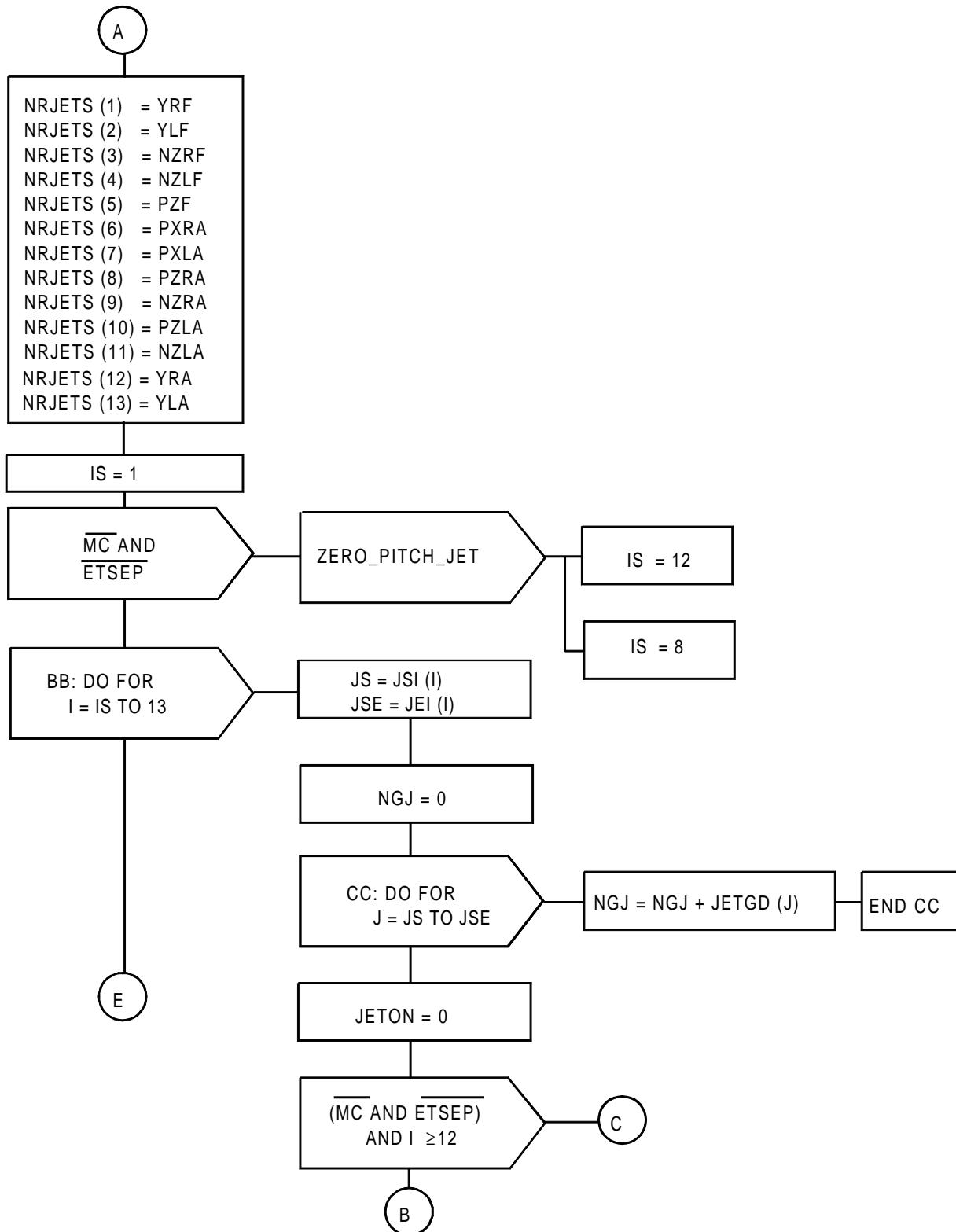


FIGURE 4.6.2.2-1.(2) Jet Select Logic (GRTLS DAP) (Sheet 2 of 5)

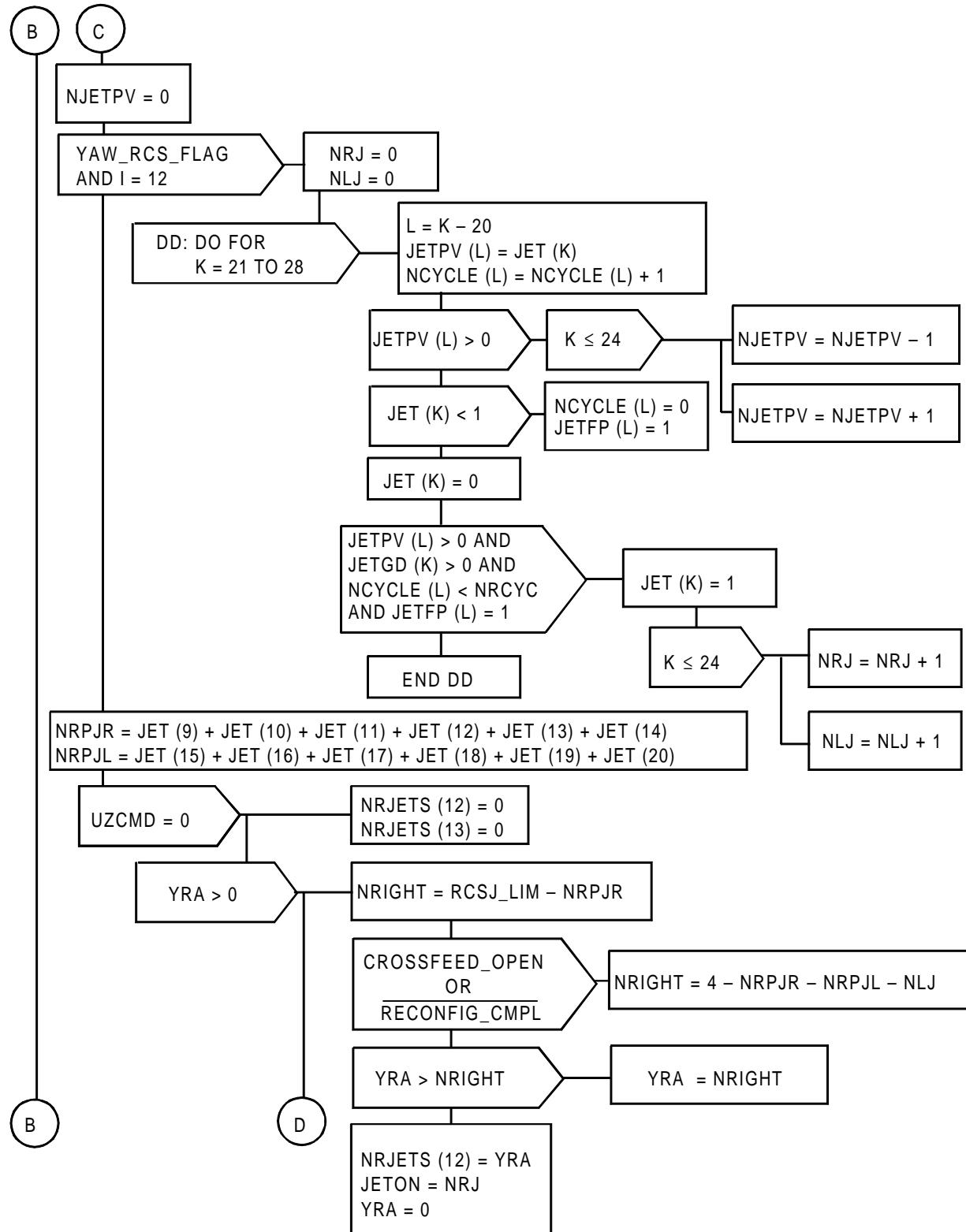


FIGURE 4.6.2.2-1.(3) Jet Select Logic (GRTLS DAP) (Sheet 3 of 5)

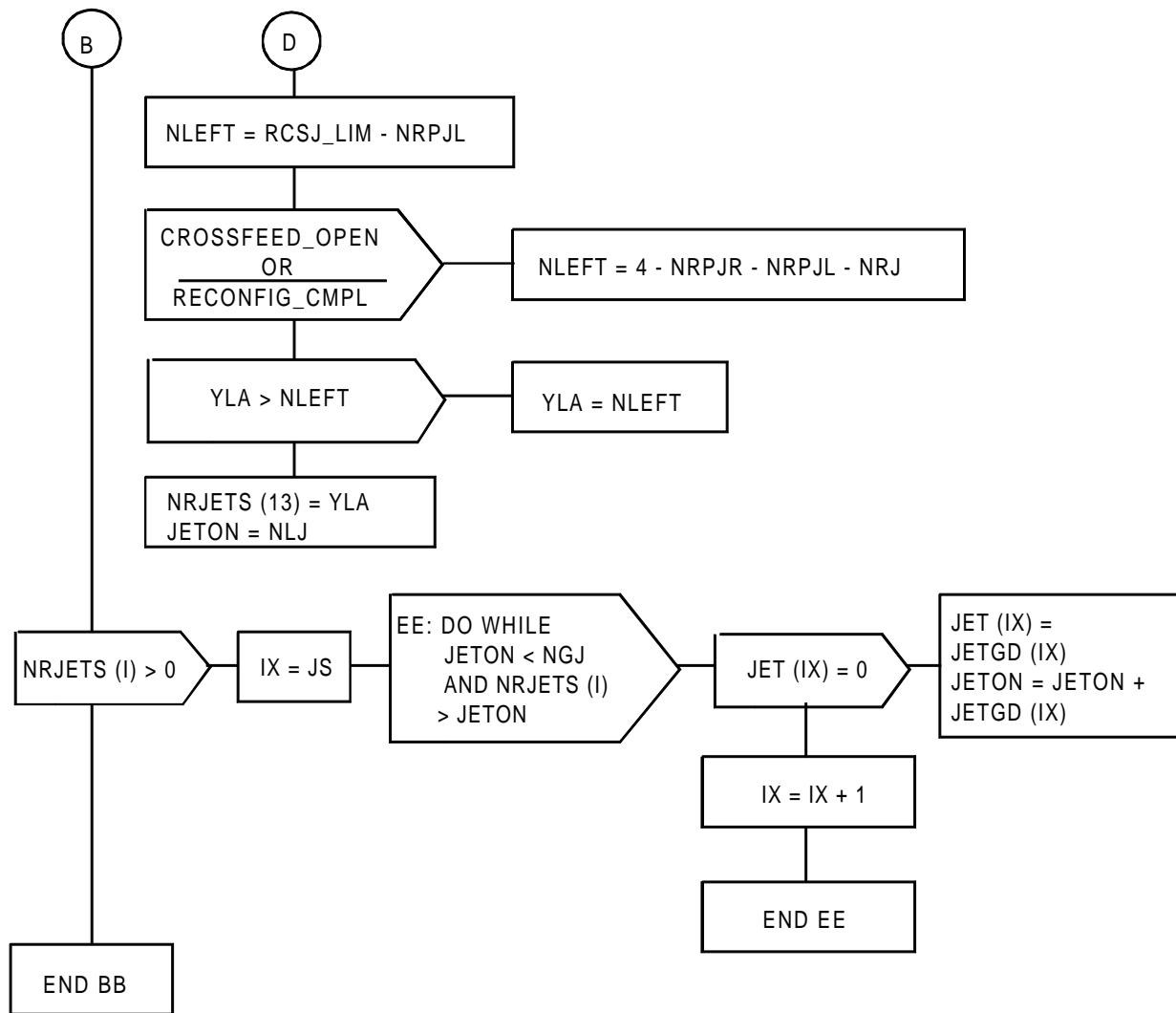


FIGURE 4.6.2.2-1.(4) Jet Select Logic (GRTLS DAP) (Sheet 4 of 5)

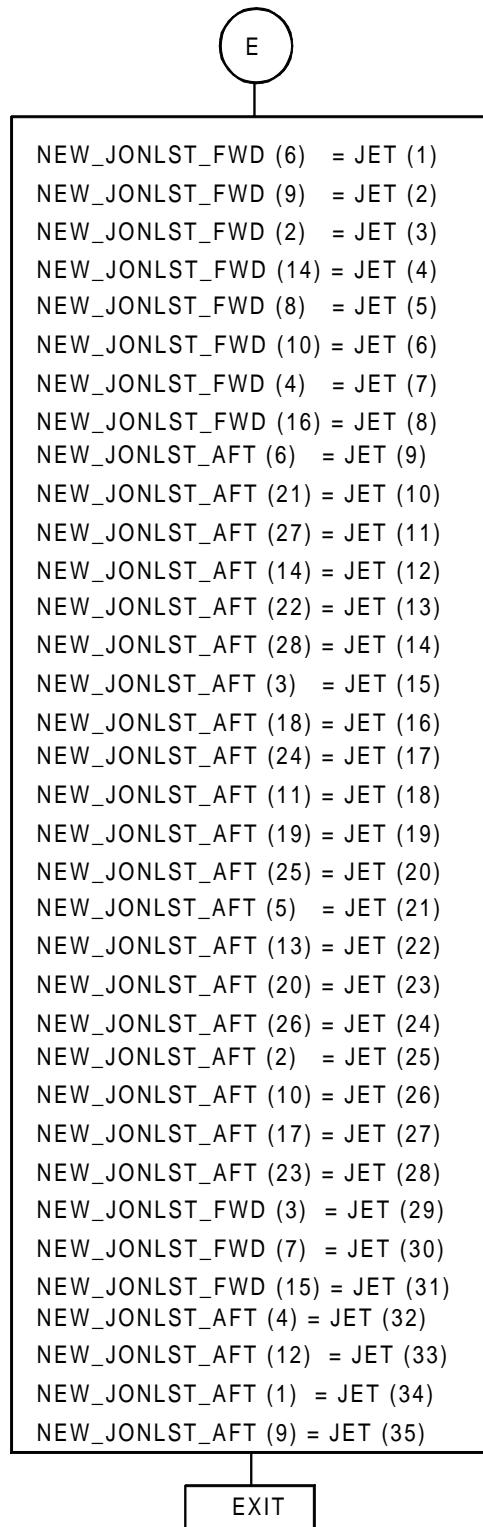


FIGURE 4.6.2.2-1(5) Jet Select Logic (GRTLS DAP) (Sheet 5 of 5)

Table 4.6.2.2-1. RCS Jet Grouping

RCS RM Output MSID	JET_MAP_ELEMENT	Jet Group	Priority of RCS Jet Within Group	Principal Thrust Direction	Associated JET_MAP_ELEMENT Values (Each MSID in a Group Will Have One of These Values, Mapping That MSID To a Particular Jet)
V90J5727C	1	1*	1	-X	
V90J5728C	2		2		1(F1F), 5(F2F), 13(F3F)
V90J5729C	3		3		
V90J5730C	4	2	1	+Y	2(F1L), 14(F3L)
V90J5731C	5		2		
V90J5732C	6	3	1	-Y	6(F2R), 9(F4R)
V90J5733C	7		2		
V90J5734C	8	4**	1	+Z	
V90J5735C	9		2		3(F1U), 7(F2U), 15(F3U)
V90J5736C	10		3		
V90J5737C	11	5	1	-Z	8(F2D), 10(F4D)
V90J5738C	12		2		
V90J5739C	13	6	1	-Z	4(F1D), 16(F3D)
V90J5740C	14		2		
V90J5741C	15	7**	1	+X	4(R1A), 12(R3A)
V90J5742C	16		2		
V90J5743C	17	8**	1	+X	1(L1A), 9(L3A)
V90J5744C	18		2		
V90J5745C	19	9	1	+Y	
V90J5746C	20		2		2(L1L), 17(L2L), 10(L3L), 23(L4L)
V90J5747C	21		3		
V90J5748C	22		4		
V90J5749C	23	10	1	-Y	
V90J5750C	24		2		5(R1R), 20(R2R), 13(R3R), 26(R4R)
V90J5751C	25		3		
V90J5752C	26		4		
V90J5753C	27	11	1	+Z	
V90J5754C	28		2		3(L1U), 18(L2U), 24(L4U)
V90J5755C	29		3		
V90J5756C	30	12	1	+Z	
V90J5757C	31		2		6(R1U), 21(R2U), 27(R4U)
V90J5758C	32		3		
V90J5759C	33	13	1	-Z	
V90J5760C	34		2		19(L2D), 11(L3D), 25(L4D)
V90J5761C	35		3		
V90J5762C	36	14	1	-Z	

Table 4.6.2.2-1. RCS Jet Grouping					
RCS RM Output MSID	JET_MAP_ELEMENT	Jet Group	Priority of RCS Jet Within Group	Principal Thrust Direction	Associated JET_MAP_ELEMENT Values (Each MSID in a Group Will Have One of These Values, Mapping That MSID To a Particular Jet)
V90J5763C	37		2		22(R2D), 14(R3D), 28(R4D)
V90J5764C	38		3		
* Note: These jet groups are not used during GRTLS for flight control. **Note: This jet group is used during contingency abort but not during regular GRTLS.					

Table 4.6.2.2-2. JET_SEL_LOGIC I-Loads					
Name	Description		Type	MSID	Units
IYAW_CYCLE	Minimum number of JSL cycles yaw jets must be on below YAW_RCS_ALT		I	V97U1146C	—
RCSJ_LIM	Limit on number of jets per pod the JSL can command ON		I	V97U1298C	ND
DT_PITCH_ERR_TAB	Time table for time vs. pitch error used to override ET SEP open loop timer		F	V97U1490C to V97U1499C	sec
PITCH_ERR_TAB	Pitch error table for time vs. pitch error used to override ET SEP open loop timer		F	V97U1553C to V97U1557C and V97U1563C to V97U1567C	deg/sec
PITCH_ERR_LIM	Pitch error threshold where roll command is down-moded to the low level value to allow at least one aft +z pitch jet to generate negative pitch moment		F	V97U1568C	deg/sec

Table 4.6.2.2-3. JET_SEL_LOGIC Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Jet group starting and ending index	—	First pass	JSI(1) JEI(1) JSI(2) JEI(2) JSI(3) JEI(3) JSI(4) JEI(4) JSI(5) JEI(5) JSI(6) JEI(6) JSI(7) JEI(7) JSI(8) JEI(8) JSI(9) JEI(9) JSI(10) JEI(10) JSI(11) JEI(11) JSI(12) JEI(12) JSI(13) JEI(13)	1 2 3 4 5 6 7 8 29 31 32 33 34 35 9 11 12 14 15 17 18 20 21 24 25 28
First pass flag for JET(K)	—	First pass	JETFP(1) through JETFP(8)	0
Right and left yaw jet counter	—	First pass	NRJ NLJ	0 0
Yaw jet on-time cycle counter	—	First pass	NCYCLE(1) thru NCYCLE(8)	0

4.6.2.3 CONT_JET_CMD_LOGIC.

A. Function – CONT_JET_CMD_LOGIC converts outputs of the contingency mini DAP modules (Subsections 4.7.12–18) into integers specifying the number of RCS jets of each group that should be fired. The modules is partitioned into:

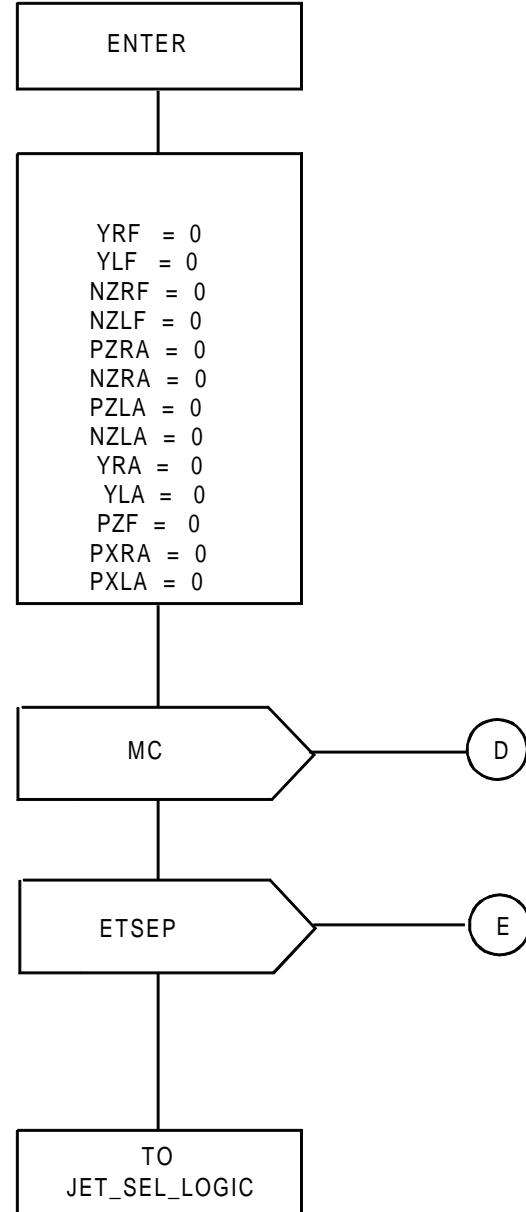
1. Jet command executive (Figure 4.6.2.3–1).
2. Roll, pitch, and yaw command generation, mated coast (Figure 4.6.2.3–2).
3. Roll, pitch, and yaw command generation, ETSEP (Figure 4.6.2.3–3).

B. Processing Requirements – Processing is at 12.5 Hz.

C. Interface Requirements – The interface requirements for CONT_JET_CMD_LOGIC are shown in Table 4.6.2–2.

D. Constants – None.

E. Initialization Requirements – None.



NOTE: When MC = OFF and ETSEP = OFF, the normal GRTLS JET_CMD_LOGIC is used. See Section 4.6.2.1.

FIGURE 4.6.2.3-1. Jet Command Executive

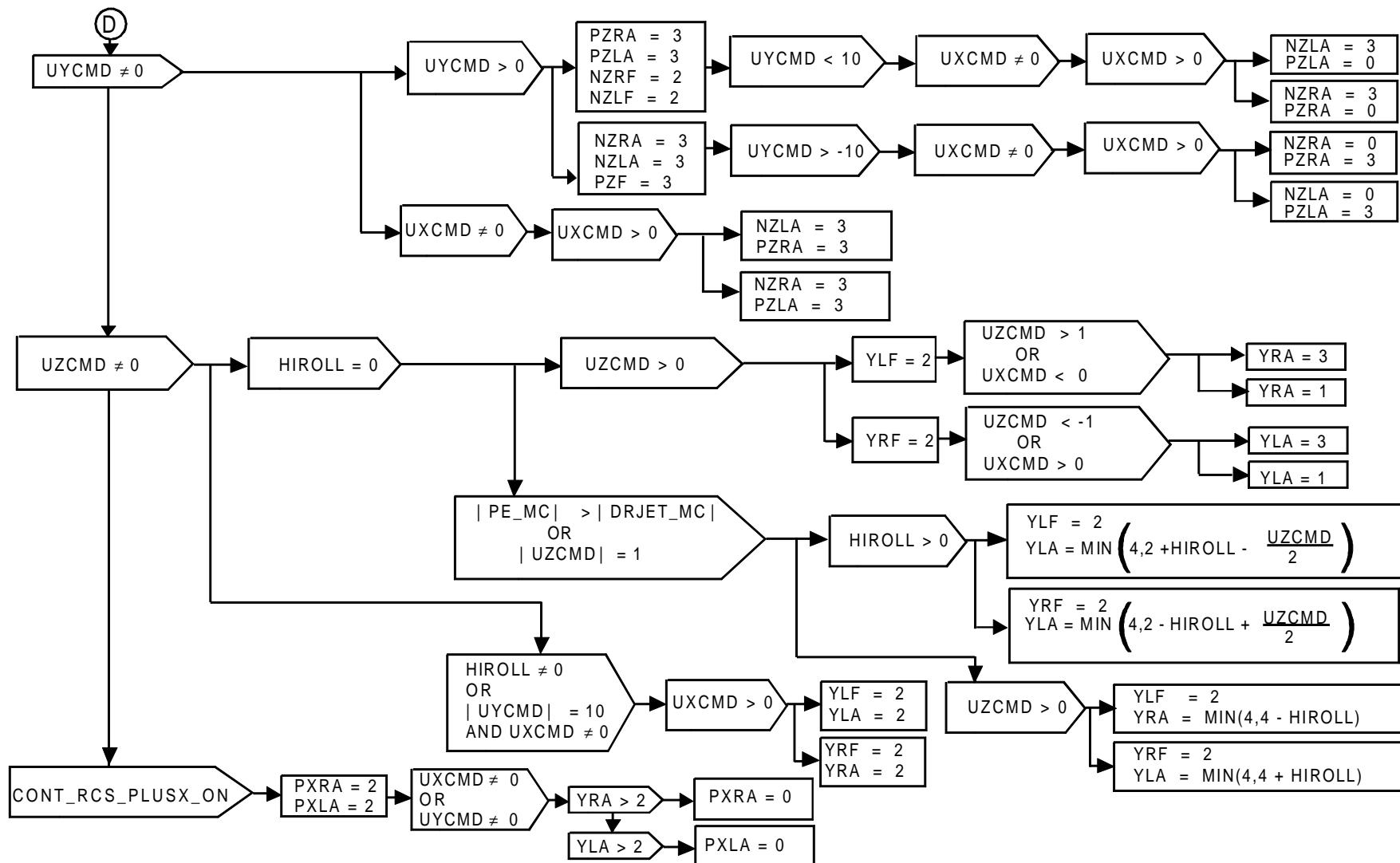


FIGURE 4.6.2.3-2. Pitch/Roll and Yaw Command Generation for Mated Coast (Contingency Abort)

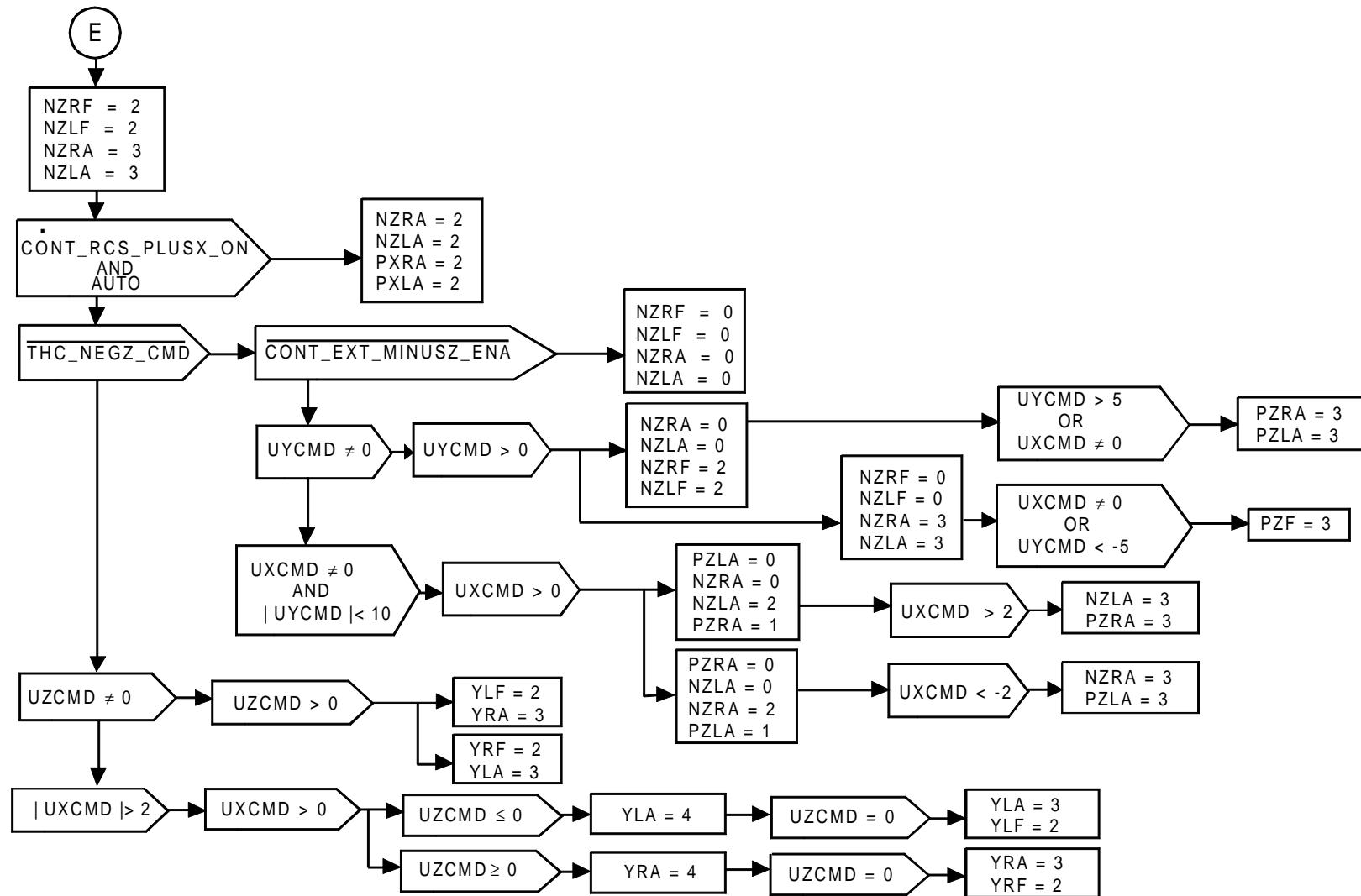


FIGURE 4.6.2.3-3. Pitch/Roll and Yaw Command Generation for ETSEP (Contingency Abort)

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4.7 MINI-DAP MODULES

The functional modules that make up the MINI-DAP are described in this subsection in the order given in Table 4.7-1.

Table 4.7-1. MINI-DAP Function Modules	
Module	Subsection
ETSEP_PITCH_CHAN	4.7.1
ETSEP_ROLL_CHAN	4.7.2
ETSEP_YAW_CHAN	4.7.3
MC_PITCH_CHAN	4.7.4
MC_ROLL_CHAN	4.7.5
MC_YAW_CHAN	4.7.6
PITCH_QUANT	4.7.7
ROLL_QUANT	4.7.8
YAW_QUANT	4.7.9
MCBB_FILTER	4.7.10
ETBB_FILTER	4.7.11
CONT_ETSEP_PITCH_CHAN	4.7.12
CONT_ETSEP_ROLL_CHAN	4.7.13
CONT_ETSEP_YAW_CHAN	4.7.14
CONT_MC_PITCH_CHAN	4.7.15
CONT_MC_ROLL_CHAN	4.7.16
CONT_MC_YAW_CHAN	4.7.17
CONT_YAW_QUANT	4.7.18
CONT_ROLL_QUANT	4.7.19
CONT_PITCH_QUANT	4.7.20

4.7.1 ETSEP_PITCH_CHAN

- A. Function – This function module generates a pitch rate error signal (DPJET_SEP) using measured pitch rate (Q) and the pitch rate command signal from GC_STEER (WFBI_FB₂) and computes a difference (PITCH_ERRT) between the pitch rate error signal (DPJET_SEP) and the pitch attitude error (EBFB₂) during the external tank separation maneuver (ETSEP). The detailed block diagram is presented in Figure 4.7.1–1.
- B. Processing Requirements – ETSEP_PITCH_CHAN is processed at 12.5 Hz. when ETSEP = ON and CONT_3EO_START = OFF.
- C. Interface Requirements – The interface requirements for ETSEP_PITCH_CHAN are shown in Table 4.7.1–1.
- D. Constants – None.
- E. Initialization Requirements – None.

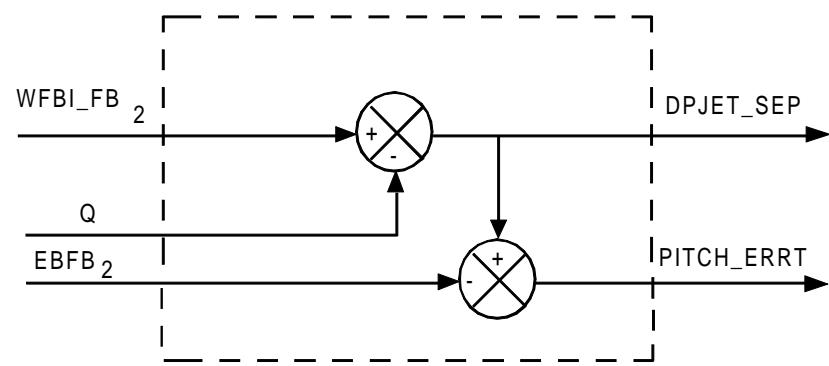


FIGURE 4.7.1-1. ETSEP_PITCH_CHAN, GRTLS DAP

Table 4.7.1-1.ETSEP_PITCH_CHAN Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
Q	Pitch rate feedback	SF	F	deg/s	25
WFBI_FB ₂	Pitch rate command component of angular rate command vector (WFBI_FB)	G/C_STEER	F	deg/s	12.5
EBFB ₂	Pitch Attitude Error component of Attitude Error Vector (EBFB)	G/C_STEER	F	deg*	12.5
<u>Outputs</u>					
DPJET_SEP	Pitch error signal, ETSEP	MCBB_FILTER	F	deg/s	12.5
PITCH_ERRT	Difference between the Pitch Error Signal (DPJET_SEP) and the Pitch Attitude Error (EBFB ₂)	JSL	F	deg/s	12.5

* There is an implied gain of 1 deg/sec/deg in this input

4.7.2 ETSEP_ROLL_CHAN

A. Function – This function module generates a roll error signal (PE_SEP) using roll rate command signal (WFBI_FB₁), the roll attitude error (EBFB₁) both from GC_STEER along with measured roll rate (P), roll error deadband (P_ERROR_DBAND), and roll attitude error gain (KRB_ETSEP) during the external tank separation maneuver (ETSEP). The detailed block diagram is presented in Figure 4.7.2–1.

- B. Processing Requirements – ETSEP_ROLL_CHAN is processed at 12.5 Hz.
- C. Interface Requirements – The interface requirements for ETSEP_ROLL_CHAN are shown in Table 4.7.2–1.
- D. I-Loads – The I-loads for ETSEP_ROLL_CHAN are shown in Table 4.7.2–2.
- E. Initialization Requirements – None.

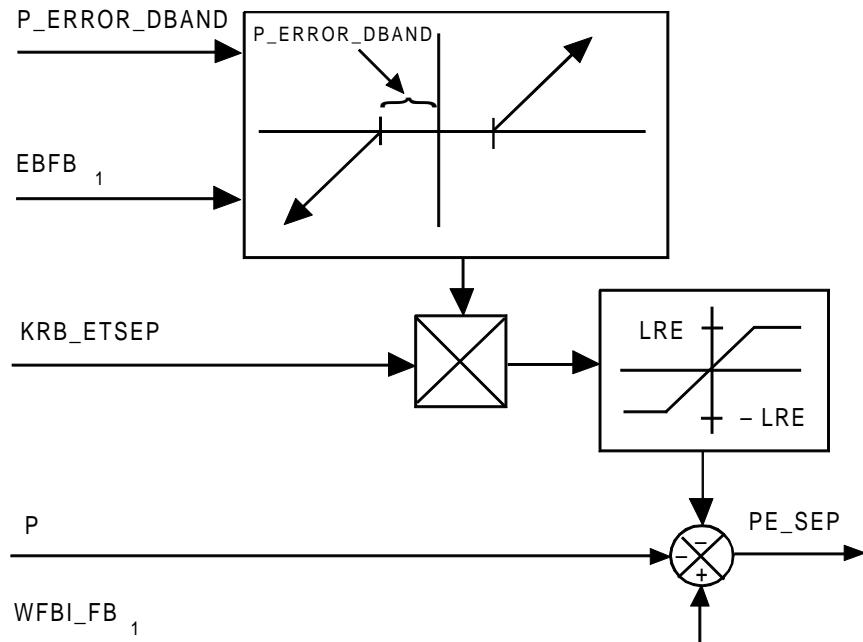


FIGURE 4.7.2-1. ETSEP_ROLL_CHAN, GRTLS DAP

Table 4.7.2-1.ETSEP_ROLL_CHAN Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
EBFB ₁	Roll attitude error component of attitude error vector (EBFB) (PHI-PHI REF)	G/C_STEER	F	deg*	12.5
P	Roll rate feedback	SF	F	deg/s	25
WFBI_FB ₁	Roll rate command component of angular rate command vector (WFBI_FB)	G/C_STEER	F	deg/s	12.5
<u>Outputs</u>					
PE_SEP	Roll error signal, ETSEP	ETBB_FILTER	F	deg/s	12.5

*There is an implied gain of 1 deg/sec/deg in this input.

Table 4.7.2-2.ETSEP_ROLL_CHAN I-Loads

Name	Description	Type	MSID	Units
LRE	Roll attitude error limit	F	V97U1238C	deg/s
P_ERROR_DBAND	Roll error deadband	F	V97U1569C	deg
KRB_ETSEP	Roll attitude error gain	F	V97U1510C	deg/s/deg

4.7.3 ETSEP_YAW_CHAN

A. Function – This function module generates a yaw error signal to command the yaw jets during the external tank separation maneuver (ETSEP). It uses measured yaw and roll rates, and the yaw and roll attitude error and yaw rate command signals from GC_STEER as inputs. The detailed block diagram is presented in Figure 4.7.3-1.

B. Processing Requirements – ETSEP_YAW_CHAN is processed at 12.5 Hz.

C. Interface Requirements – The interface requirements for ETSEP_YAW_CHAN are shown in Table 4.7.3-1.

D. I-Loads – The I-loads for ETSEP_YAW_CHAN are shown in Table 4.7.3-2.

E. Initialization Requirements – The initialization requirements for ETSEP_YAW_CHAN are shown in Table 4.7.3-3.

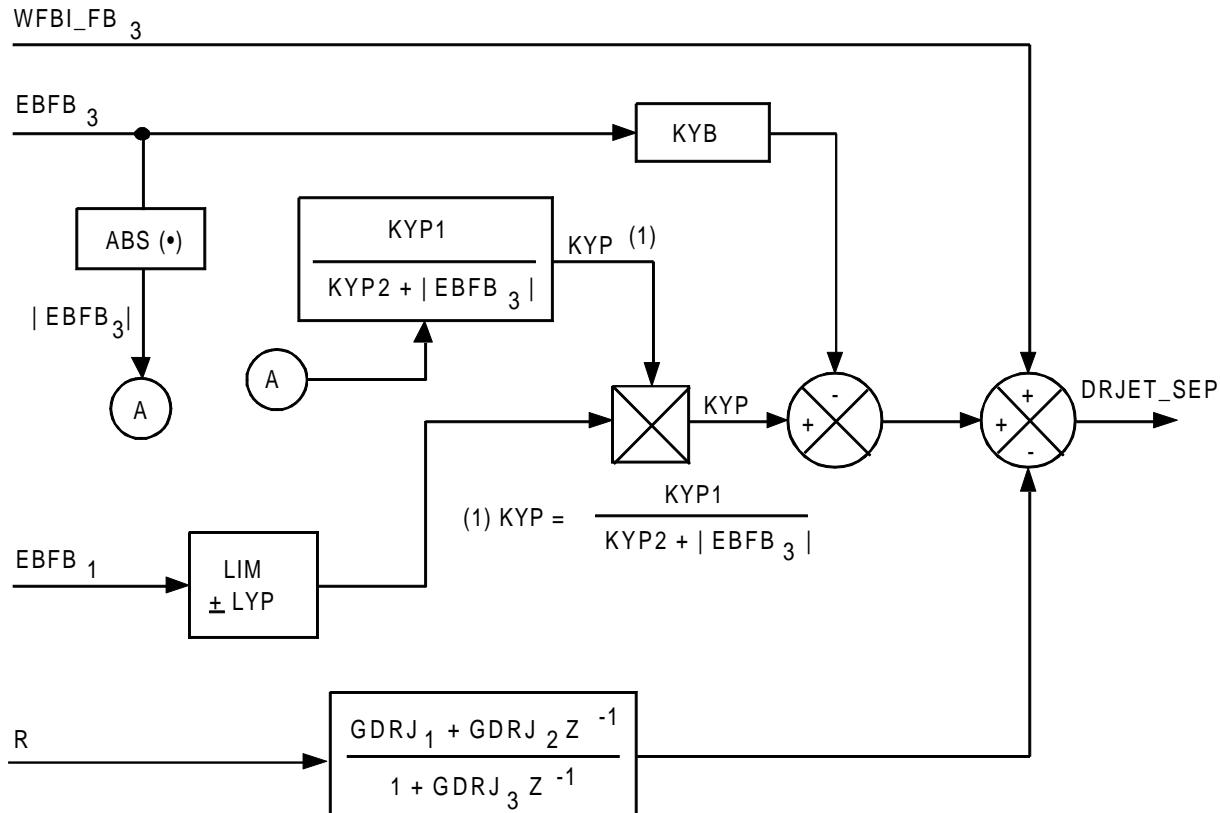


FIGURE 4.7.3-1. ETSEP_YAW_CHAN, GRTLS DAP

Table 4.7.3-1.ETSEP_YAW_CHAN Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
EBFB ₁	Roll attitude error component of attitude error vector (EBFB) (PHI-PHI_REF)	G/C_STEER	F	deg*	12.5
EBFB ₃	Yaw attitude error component of attitude error vector (EBFB) (PSI-PSI-REF)	G/C_STEER	F	deg	12.5
R	Yaw rate feedback	SF	F	deg/s	25
WFBI_FB ₃	Yaw rate command component of angular rate command vector (WFBI_FB) G/C_STEER	SF G/C_STEER	F	deg/s	12.5
<u>Outputs</u>					
DRJET_SEP	Yaw error signal to RCS jets, ETSEP	YAW_QUANT	F	deg/s	12..5

*There is an implied gain of 1 deg/s/deg on this input.

Table 4.7.3-2.ETSEP_YAW_CHAN I-Loads

Name	Description	Type	MSID	Units
GDRJ(1)		F	V97U1206C	—
GDRJ(2)		F	V97U1207C	—
GDRJ(3)		F	V97U1208C	—
LYP	Roll attitude error limit	F	V97U1241C	deg/s
KYB	Yaw error to yaw jets gain	F	V97U1232C	(deg/s)/deg
KYP(1)		F	V97U1234C	deg
KYP(2)		F	V97U1235C	deg

Table 4.7.3-3.ETSEP_YAW_CHAN Initialization Requirement

Component	Initialize on Transition		Variable	Initial Value
	From	To		
First-order filter	—	First Pass	Node	*

*See Section 4.9.1

4.7.4 MC_PITCH_CHAN

A. Function – This function module generates a pitch error signal during mated coast (MC) using measured pitch rate and the pitch attitude error and pitch rate command signals from GC_STEER. The detailed block diagram is presented in Figure 4.7.4–1.

B. Processing Requirements – MC_PITCH_CHAN is processed at 12.5–Hz.

C. Interface Requirements – The interface requirements for MC_PITCH_CHAN are shown in Table 4.7.4–1.

D. I-Loads – The I-loads for MC_PITCH_CHAN are shown in Table 4.7.4–2.

E. Initialization Requirements – None.

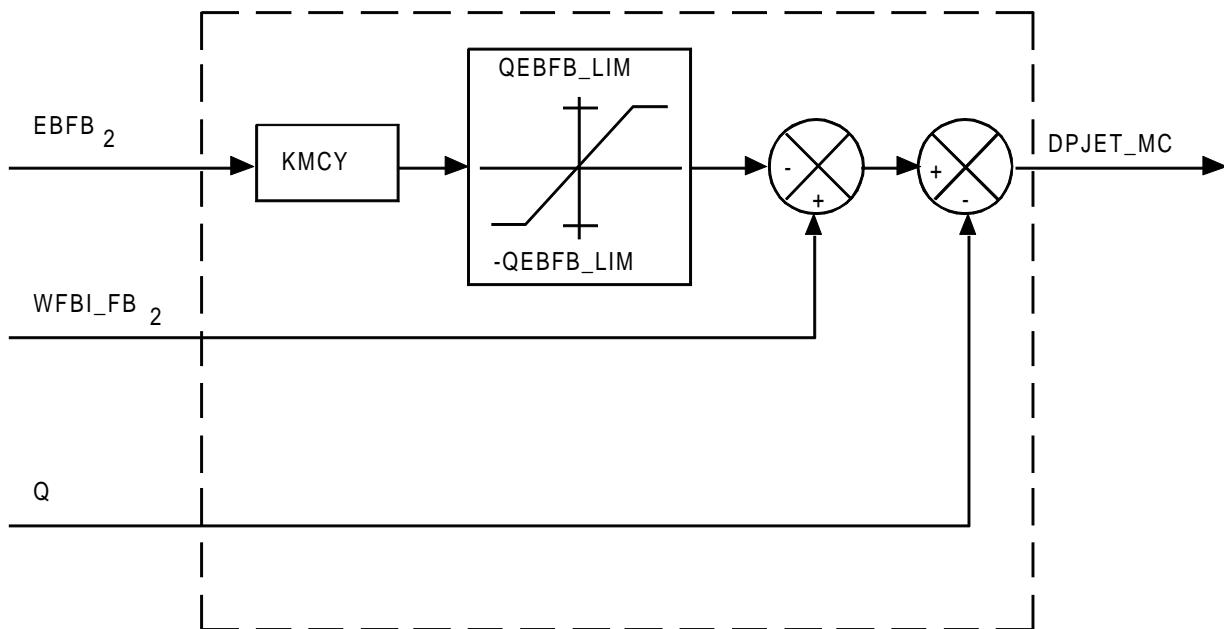


FIGURE 4.7.4-1. MC_Pitch_Chан, GRTLS DAP

Table 4.7.4-1.MC_PITCH_CHAN Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
EBFB ₂	Pitch attitude error component of attitude error vector (EBFB) (THETA-THETA_REF)	G/C_STEER	F	deg	12.5
Q	Pitch rate feedback	SF	F	deg/s	25
WFBI_FB ₂	Pitch rate command component of angular rate command vector (WFBI_FB)	G/C_STEER	F	deg/s	12.5
<u>Outputs</u>					
DPJET_MC	Pitch error signal, MC	MCBB_FILTER, TLM	F	deg/s	12.5

Table 4.7.4-2.MC_PITCH_CHAN I-Loads				
Name	Description	Type	MSID	Units
KMCY	Pitch attitude error gain	F	V97U1225C	<u>deg / s</u> deg
QE_BFB_LIM	Pitch attitude error limit	F	V98U9966C	deg/s

4.7.5 MC_ROLL_CHAN

A. Function – This function module generates a roll error signal during mated coast (MC) using measured roll rate and the roll attitude error and pitch rate command signals from GC_STEER. The detailed block diagram is presented in Figure 4.7.5–1.

B. Processing Requirements – MC_ROLL_CHAN is processed at 12.5 Hz.

C. Interface Requirements – The interface requirements for MC_ROLL_CHAN are shown in Table 4.7.5–1.

D. I-Loads – The I-loads for MC_ROLL_CHAN are shown in Table 4.7.5–2.

E. Initialization Requirements – None.

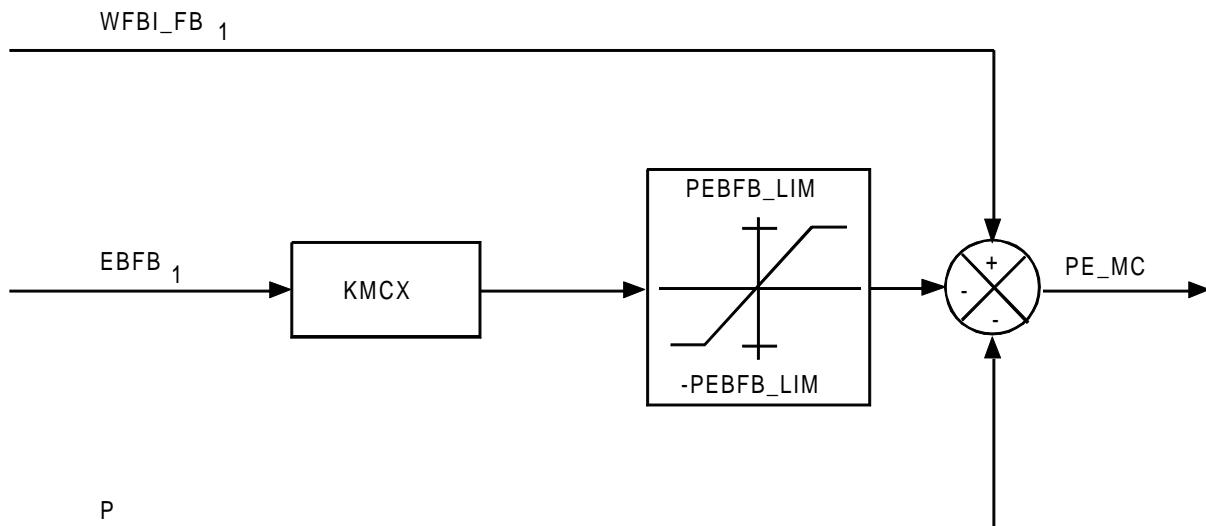


FIGURE 4.7.5-1. MC_Roll_Chан, GRTLS DAP

Table 4.7.5-1.MC_ROLL_CHAN Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
Inputs					
EBFB ₁	Roll attitude error component of attitude error vector (EBFB) (PHI-PHI_REF)	G/C_STEER	F	deg	12.5
P	Roll rate feedback	SF	F	deg/s	25
WFBI_FB ₁	Roll rate command component of angular rate command vector (WFBI_FB)	G/C_STEER	F	deg/s	12.5
Outputs					
PE_MC	Roll error signal, MC	ETBB_FILTER	F	deg/s	12.5

Table 4.7.5-2.MC_ROLL_CHAN I-Loads

Name	Description	Type	MSID	Units
KMCX	Roll attitude error gain	F	V97U1224C	<u>deg / s</u> deg
PEBFB_LIM	Roll attitude error limit	F	V98U9976C	deg/s

4.7.6 MC_YAW_CHAN

A. Function – This function module generates a yaw error signal during mated coast (MC) using measured yaw rate and the yaw attitude error and YAW rate command signals from GC_STEER. The detailed block diagram is presented in Figure 4.7.6–1.

B. Processing Requirements – MC_YAW_CHAN is processed at 12.5–Hz.

C. Interface Requirements – The interface requirements for MC_YAW_CHAN are shown in Table 4.7.6–1.

D. I-Loads – The I-loads for MC_YAW_CHAN are shown in Table 4.7.6–2.

E. Initialization Requirements – None.

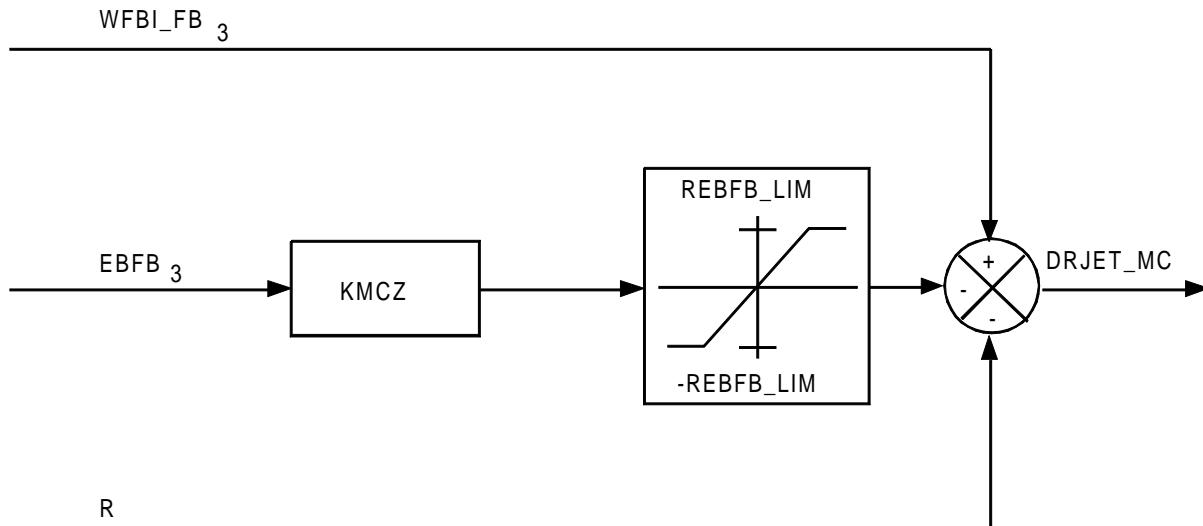


FIGURE 4.7.6-1. MC_Yaw_Chan, GRTLS DAP

Table 4.7.6-1.MC_YAW_CHAN Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
EBFB ₃	Yaw attitude error component of attitude error vector (EBFB) (PSI-PSI-REF)	G/C_STEER	F	deg	12.5
R	Yaw rate feedback	SF	F	deg/s	25
WFBI_FB ₃	Yaw rate command component of angular rate command vector (WFBI_FB)	G/C_STEER	F	deg/s	12.5
<u>Outputs</u>					
DRJET_MC	Yaw error signal, MC	YAW_QUANT	F	deg/s	12.5

Table 4.7.6-2.MC_YAW_CHAN I-Loads

Name	Description	Type	MSID	Units
KMCZ	Yaw attitude error gain	F	V97U1226C	<u>deg / s</u> deg
REBFB_LIM	Yaw attitude error limit	F	V98U9999C	deg/s

4.7.7 PITCH_QUANT

- A. Function – PITCH_QUANT accepts the pitch error signal generated during mated coast (MC), external tank separation (ETSEP), and entry, respectively, and transforms it into an integer that specifies how many pairs of RCS pitch jets are to be turned on. Block diagrams of the pitch error quantizer for MC, ETSEP, and entry are shown in Figure 4.7.7–1 (a), (b), and (c), respectively.
- B. Processing Requirements – PITCH_QUANT is processed at 12.5 Hz.
- C. Interface Requirements – The interface requirements for PITCH_QUANT are shown in Table 4.7.7–1.
- D. I-Loads/Constants – The I-loads and constants for PITCH_QUANT are shown in Table 4.7.7–2.
- E. Initialization Requirements – The initialization requirements for PITCH_QUANT are shown in Table 4.7.7–3.

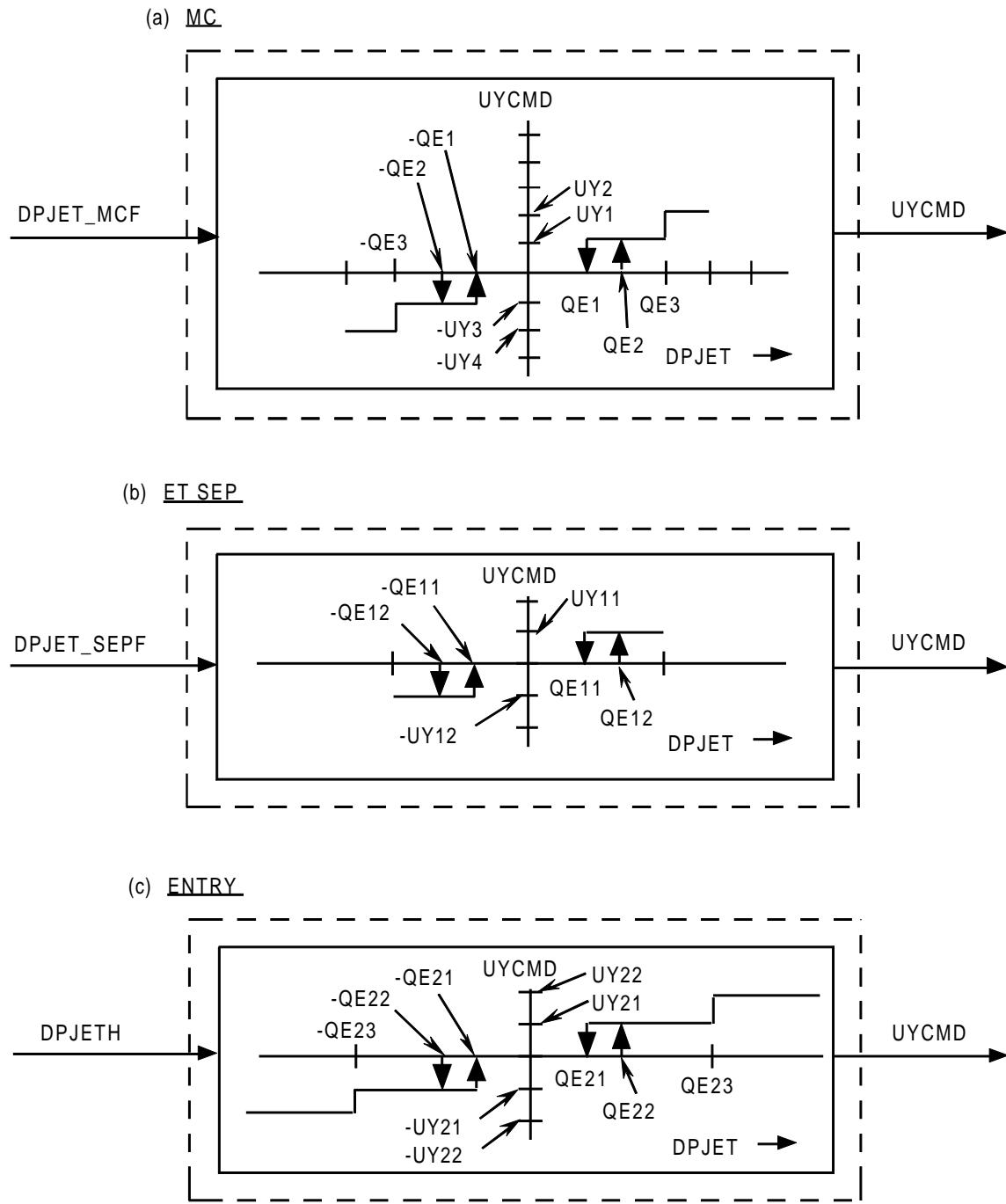


FIGURE 4.7.7-1. Pitch Error Quantizer, GRTLS DAP (PITCH_QUANT)

Table 4.7.7-1.PITCH_QUANT Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DPJET_MCF	Pitch error signal, MC	MCBB_FILTER	F	deg/s	12.5
DPJET_SEPF	Pitch error signal, ETSEP	MCBB_FILTER	F	deg/s	12.5
DPJETH	Pitch error signal, ENTRY	UYBB_FILTER	F	deg/s	25
<u>Outputs</u>					
UYCMD	Quantized pitch error signal	JET_LOGIC, RCS ACT LT	I	—	12.5

Table 4.7.7-2.PITCH_QUANT I-Loads/Constants

Name	Description	Type	MSID/Values	Units
QE1	Mated coast pitch	F	V97U1252C	deg/s
QE2	Error quantizer	F	V97U1253C	deg/s
QE3	Switching level	F	V97U1254C	deg/s
UY1		I	V98U9967C	—
UY2	Mated coast pitch	I	V98U9968C	—
UY3	Jet command	I	V98U9969C	—
UY4		I	V98U9970C	—
QE11	ET sep pitch error	F	V97U1261C	deg/s
QE12	Quantizer switch level	F	V97U1262C	deg/s
UY11	ET sep pitch jet command	I	V98U9971C	—
UY12		I	V98U9972C	—
QE21	Entry pitch error	K	V97U1268C/ +2.95 E-01	deg/s
QE22	Quantizer switch level	K	V97U1269C/ +3.0 E-01	deg/s
QE23		K	V97U1270C/ +1.0 E+00	deg/s
UY21	Entry pitch jet command	K	V98U9973C/ +2	—
UY22		K	V98U9974C/ +4	—

Table 4.7.7-3.PITCH_QUANT Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
ENTRY hysteresis	—	X	*	0
ETSEP hysteresis	—	ETSEP_P_ENABLE	*	0
MC hysteresis	—	First Pass	*	0

*See Section 4.9.5
X = $\overline{MC} \bullet \overline{ETSEP} \bullet \overline{ZERO_PITCH_JET}$

4.7.8 ROLL_QUANT

- A. Function – ROLL_QUANT accepts the roll error signal generated during mated coast (MC), external tank separation (ETSEP), and entry, respectively, and transforms it into an integer that specifies how many pairs of RCS ROLL jets are to be turned on. Block diagrams of the roll error quantizer for MC, ETSEP, and entry are shown in Figure 4.7.8–1 (a), (b), and (c), respectively.
- B. Processing Requirements – ROLL_QUANT is processed at 12.5 Hz.
- C. Interface Requirements – The interface requirements for ROLL_QUANT are shown in Table 4.7.8–1.
- D. I-Loads/Constants – The I-loads/constants for ROLL_QUANT are shown in Table 4.7.8–2.
- E. Initialization Requirements – The initialization requirements for ROLL_QUANT are shown in Table 4.7.8–3.

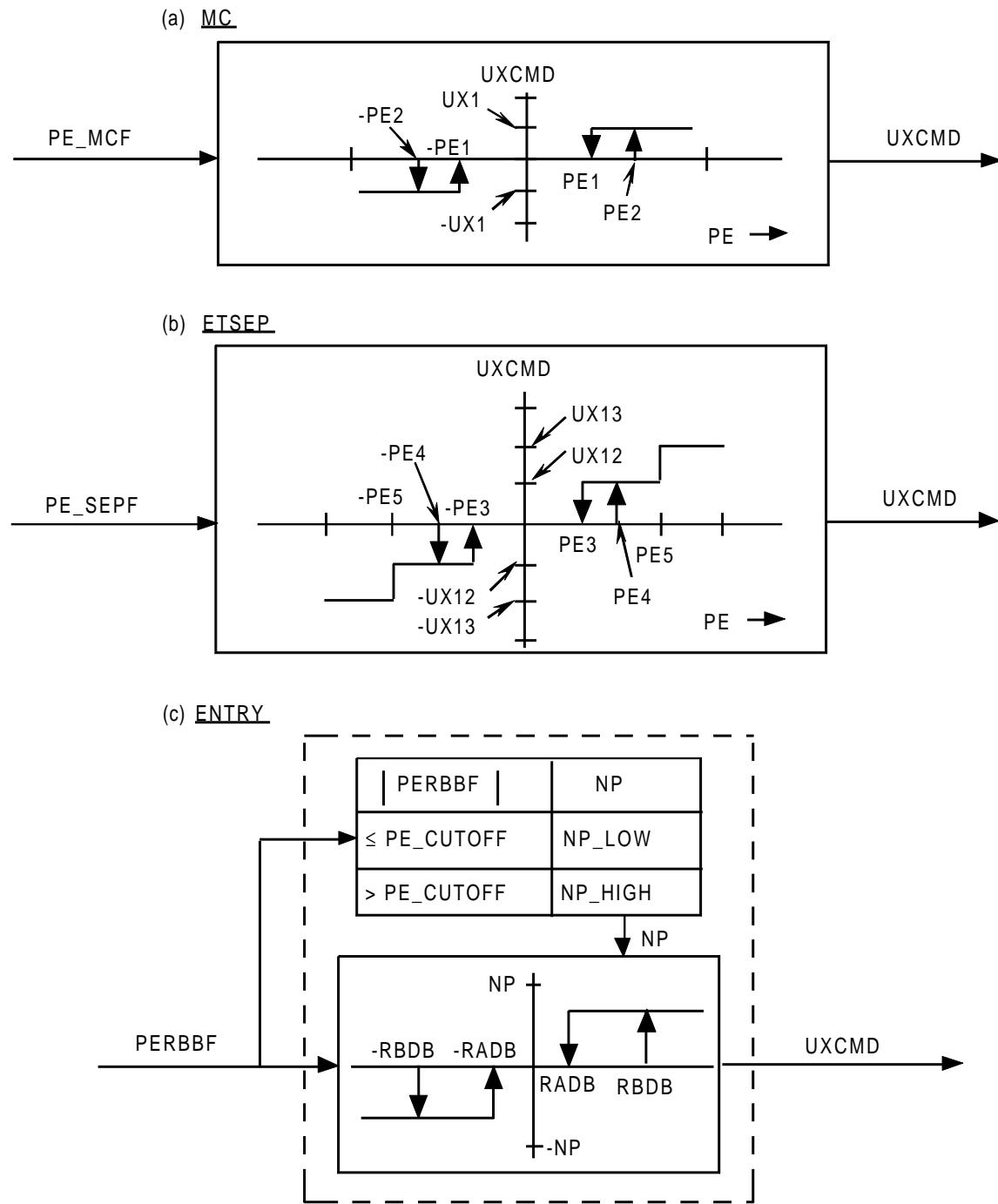


FIGURE 4.7.8-1. Roll Error Quantizer, GRTLS DAP (ROLL_QUANT)

Table 4.7.8-1.ROLL_QUANT Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
PE_MCF	Roll error signal, MC	ETBB_FILTER	F	deg/s	12.5
PE_SEPF	Roll error signal, ETSEP	ETBB_FILTER	F	deg/s	12.5
PERRBF	Roll error signal, ENTRY	ROLLJET_BBF	F	deg/s	25
<u>Outputs</u>					
UXCMD	Quantized roll error signal	JET_LOGIC, RCS ACT LT	F	—	12.5

Table 4.7.8-2.ROLL_QUANT I-Loads/Constants

Name	Description	Type	MSID/Value	Units
NP_LOW	Lower number of roll RCS jets selectable	I	V97U0833C	—
NP_HIGH	Higher number of roll RCS jets selectable	I	V97U0832C	—
PE_CUTOFF	Magnitude of PERBBF at which the number of roll RCS jets selected changes	K	V97U0855C/+ .5	deg/s
PE1	MC roll error quantizer switching level	F	V97U1242C	deg/s
PE2		F	V97U1243C	deg/s
PE3	ETSEP roll error quantizer switching level	F	V97U1244C	deg/s
PE4		F	V97U1245C	deg/s
PE5		F	V97U1246C	deg/s
RADB	Inner deadband	K	V97U1090C/+ .33	deg/s
RBDB	Outer deadband	K	V97U1091C/+ .35	deg/s
UX1	MC roll jet command	I	V98U9977C	—
UX12	ETSEP roll jet command	I	V98U9980C	—
UX13		I	V98U9981C	—

Table 4.7.8-3.ROLL_QUANT Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
ENTRY hysteresis	—	X	*	0
ETSEP hysteresis	—	ETSEP_Y_ENABLE	*	0
MC hysteresis	—	First pass	*	0

*See Section 4.9.5
X = $\overline{MC} \bullet \overline{ETSEP} \bullet (\overline{HIGHMIDQ} \bullet \overline{HIGHQ})$

4.7.9 YAW_QUANT

- A. Function – YAW_QUANT accepts the yaw error signal generated during mated coast (MC), external tank separation (ETSEP), and entry, respectively, and transforms it into an integer that specifies how many yaw jets are to be turned on. Block diagrams of the yaw error quantizer for MC, ETSEP, and entry are shown in Figure 4.7.9–1 (a), (b), and (c), respectively.
- B. Processing Requirements – YAW_QUANT is processed at 12.5 Hz.
- C. Interface Requirements – The interface requirements for YAW_QUANT are shown in Table 4.7.9–1.
- D. I-Loads – The I-loads for YAW_QUANT are shown in Table 4.7.9–2.
- E. Initialization Requirements – The initialization requirements for YAW_QUANT are shown in Table 4.7.9–3.

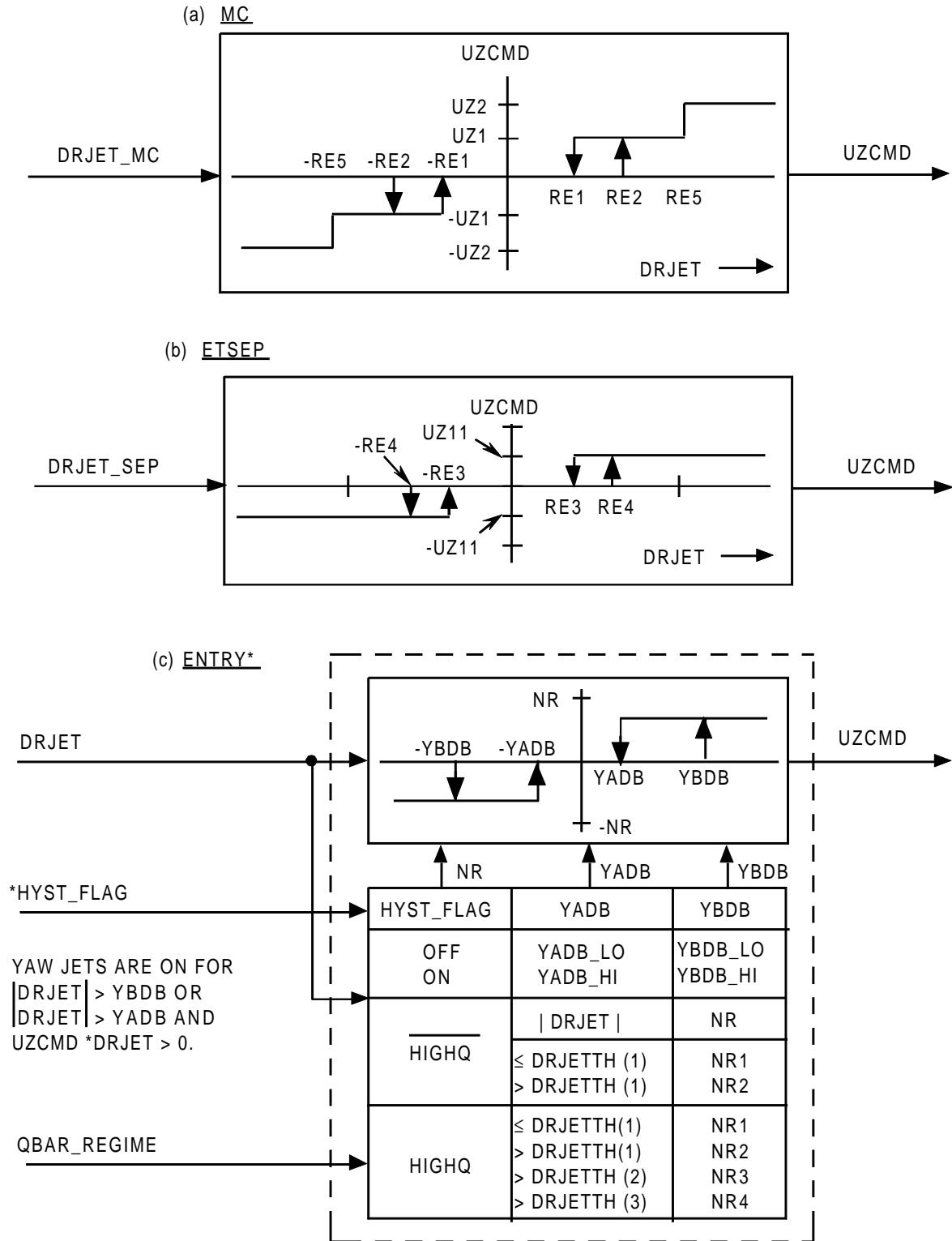


FIGURE 4.7.9-1. Yaw Error Quantizer, GRTLS DAP (YAW_QUANT)

Table 4.7.9-1. YAW_QUANT Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DRJET	Yaw error signal, ENTRY	GRCSA_MOD	F	deg/s	12.5
DRJET_MC	Yaw error signal, MC	MC_YAW_CHAN	F	deg/s	12.5
DRJET_SEP	Yaw error signal, ETSEP	ETSEP_YAW_CHAN	F	deg/s	12.5
HYST_FLAG	Yaw hysteresis flag	RECON	D	—	6.25
QBAR_REGIME	Range of QBAR indicator	RECON	I	—	6.25
<u>Outputs</u>					
UZCMD	Quantized yaw error signal	JET_LOGIC, RCS ACT LT, TLM*	F	—	12.5

*Valid only in Major Modes 602 and 603.

Table 4.7.9-2. YAW_QUANT I-Loads

Name	Description	Type	MSID	Units
DRJETTH(1)	Threshold of DRJET	F	V97U0658C	deg/s
DRJETTH(2)	Threshold of DRJET	F	V97U0659C	deg/s
DRJETTH(3)	Threshold of DRJET	F	V97U0660C	deg/s
NR(1)	Low number of yaw jets	I	V97U0836C	—
NR(2)	Low-mid number yaw jets	I	V97U0837C	—
NR(3)	High-mid number of yaw jets	I	V97U0838C	—
NR(4)	High number of yaw jets	I	V97U0839C	—
RE1	MC yaw error quantizer switching levels	F	V97U1271C	deg/s
RE2		F	V97U1272C	deg/s
RE3	ETSEP yaw error quantizer switching levels	F	V97U1273C	deg/s
RE4		F	V97U1274C	deg/s
RE5	MC yaw error quantizer switching levels	F	V96U7896C	deg/s
UZ1	MC yaw jet command	I	V98U7386C	—
UZ2	MC yaw jet command	I	V96U7895C	—
UZ11	ETSEP yaw jet command	I	V98U7387C	—
YADB_LO	Initial inner deadband	F	V97U1082C	deg/s
YADB_HI	Final inner deadband	F	V97U1081C	deg/s
YBDB_LO	Initial outer deadband	F	V97U1084C	deg/s
YBDB_HI	Final outer deadband	F	V97U1083C	deg/s

Table 4.7.9-3. YAW_QUANT Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
ENTRY hysteresis	—	X	*	0
ETSEP hysteresis	—	ETSEP_Y_ENABLE	*	0
MC hysteresis	—	First pass	*	0

*See Section 4.9.5
 $X = \overline{MC} \bullet \overline{ETSEP} \bullet \overline{ALT_ZERO_YAWJET}$

4.7.10 MCBB_FILTER

- A. Function – This function module applies a second-order bending filter to the preliminary pitch jet command. The detailed block diagram is presented in Figure 4.7.10–1.
- B. Processing Requirements – MCBB_FILTER is processed at 12.5–Hz.
- C. Interface Requirements – The interface requirements for the MCBB_FILTER are shown in Table 4.7.10–1.
- D. I-Loads – The I-loads for the MCBB_FILTER are shown in Table 4.7.10–2.
- E. Initialization Requirements – The initialization requirement for MCBB_FILTER are shown in Table 4.7.10–3.

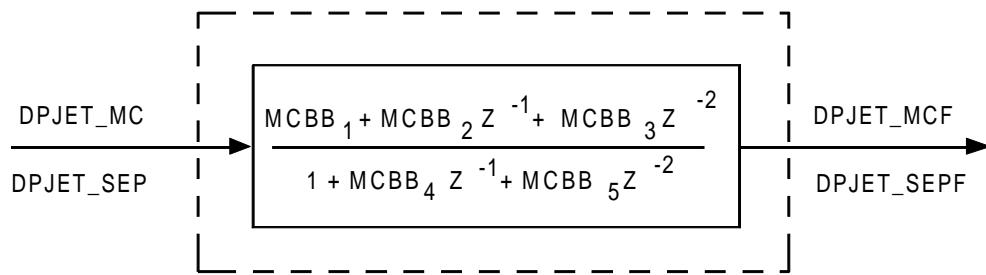


FIGURE 4.7.10-1.MCBB_FILTER

Table 4.7.10-1. MCBB_FILTER Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DPJET_MC	Preliminary pitch jet command	MC_PITCH_CHAN	F	deg	12.5
DPJET_SEP	Preliminary pitch jet command	ETSEP_PITCH_CHAN	F	deg	12.5
<u>Outputs</u>					
DPJET_MCF	Filtered preliminary pitch jet command	PITCH_QUANT	F	deg	12.5
DPJET_SEPF	Filtered preliminary pitch jet command	PITCH_QUANT	F	deg	12.5

Table 4.7.10-2. MCBB_FILTER I-Loads

Name	Description	Type	MSID	Units
MCBB(1)	Filter coefficient	F	V96U9803C	
MCBB(2)	Filter coefficient	F	V96U9804C	
MCBB(3)	Filter coefficient	F	V96U9805C	
MCBB(4)	Filter coefficient	F	V96U9806C	
MCBB(5)	Filter coefficient	F	V96U9807C	

Table 4.7.10-3. MCBB_FILTER Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Second-order filter	—	First pass	Node	*
*See Section 4.9.2				

4.7.11 ETBB_FILTER

- A. Function – This function module applies a second-order bending filter to the preliminary roll jet command. The detailed block diagram is presented in Figure 4.7.11–1.
- B. Processing Requirements – ETBB_FILTER is processed at 12.5-Hz.
- C. Interface Requirements – The interface requirements for the ETBB_FILTER are shown in Table 4.7.11–1.
- D. I-Loads – The I-loads for the ETBB_FILTER are shown in Table 4.7.11–2.
- E. Initialization Requirements – The initialization requirement for ETBB_FILTER are shown in Table 4.7.11–3.

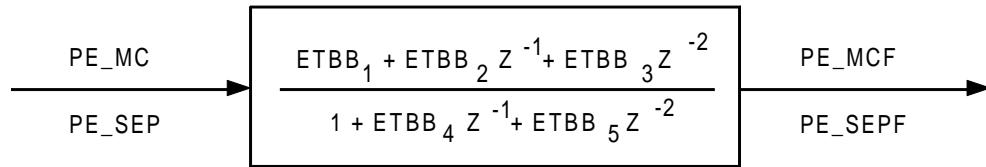


FIGURE 4.7.11-1.ETBB_FILTER

Table 4.7.11-1. ETBB_FILTER Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
PE_SEP	Preliminary roll jet command	ETSEP_ROLL_CHAN	F	deg	12.5
PE_MC	Preliminary roll jet command	MC_ROLL_CHAN	F	deg	12.5
<u>Outputs</u>					
PE_SEPF	Filtered preliminary roll jet command	ROLL_QUANT	F	deg	12.5
PE_MCF	Filtered preliminary roll jet command	ROLL_QUANT	F	deg	12.5

Table 4.7.11-2. ETBB_FILTER I-Loads

Name	Description	Type	MSID	Units
ETBB ₁	Filter coefficient	F	V99U7207C	ND
ETBB ₂	Filter coefficient	F	V99U7208C	ND
ETBB ₃	Filter coefficient	F	V99U7209C	ND
ETBB ₄	Filter coefficient	F	V99U7210C	ND
ETBB ₅	Filter coefficient	F	V99U7211C	ND

Table 4.7.11-3. ETBB_FILTER Initialization Requirements

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Second-order filter	—	First pass	Node	*
*See Section 4.9.2				

4.7.12 CONT_ETSEP_PITCH_CHAN

- A. Function – This function module generates a pitch error signal during post–external tank separation contingency abort maneuvers using measured pitch rate, the pitch attitude error and pitch rate command signals from GC_STEER. The detailed block diagram is presented in Figure 4.7.12–1.
- B. Processing Requirements – CONT_ETSEP_PITCH_CHAN is processed at 12.5 Hz.
- C. Interface Requirements – The interface requirements for CONT_ETSEP_PITCH_CHAN are shown in Table 4.7.12–1.
- D. I-Loads – The I-loads for CONT_ETSEP_PITCH_CHAN are shown in Table 4.7.12–2.
- E. Initialization Requirements – None.

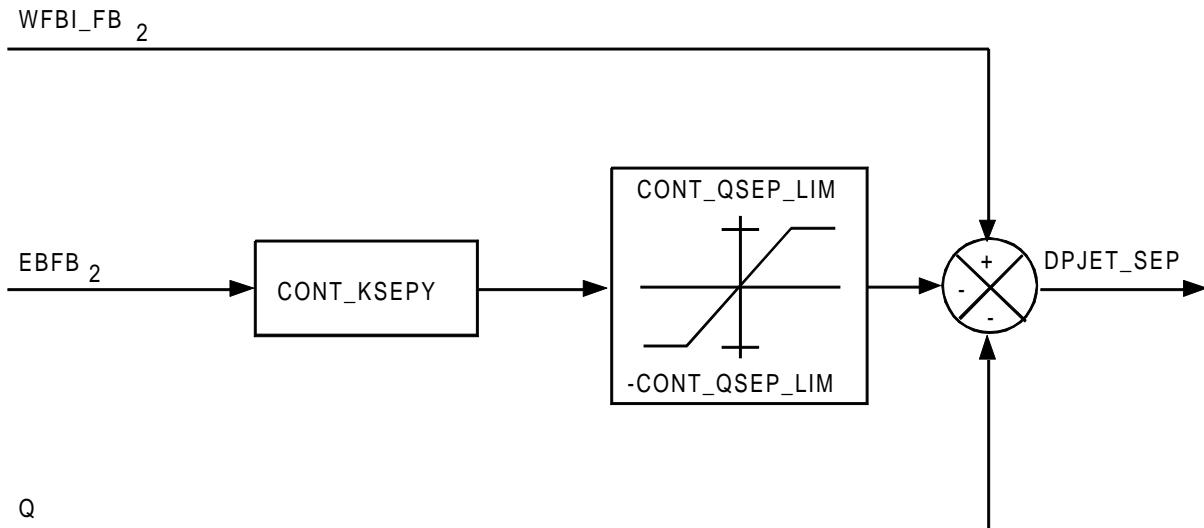


FIGURE 4.7.12-1.CONT_ETSEP_PITCH_CHAN, GRTLS DAP

Table 4.7.12-1. CONT_ETSEP_PITCH_CHAN Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
EBFB ₂	Pitch attitude error component of attitude error vector (EBFB) (THETA – THETA_REF)	G/C_STEER	F	deg	12.5
Q	Pitch rate feedback	SF	F	deg/sec	25
WFBI_FB ₂	Pitch rate command component of angular rate command vector (WFBI_FB)	G/C_STEER	F	deg/sec	12.5
<u>Outputs</u>					
DPJET_SEP	Pitch error signal, ETSEP	CONT_PITCH_QUANT	F	deg/sec	12.5

Table 4.7.12-2. CONT_ETSEP_PITCH_CHAN I-Loads

Name	Description	Type	MSID	Units
CONT_KSEPY	Pitch attitude error gain	F	V97U8583C	deg/s/deg
CONT_QSEP_LIM	Pitch attitude error limit	F	V97U8582C	deg/sec

4.7.13 CONT_ETSEP_ROLL_CHAN

- A. Function – This function module generates a roll error signal during post-external tank separation contingency abort maneuvers using measured roll rate, the roll attitude error and roll rate command signals from GC_STEER. The detailed block diagram is presented in Figure 4.7.13-1.
- B. Processing Requirements – CONT_ETSEP_ROLL_CHAN is processed at 12.5 Hz.
- C. Interface Requirements – The interface requirements for CONT_ETSEP_ROLL_CHAN are shown in Table 4.7.13-1.
- D. I-Loads – The I-loads for CONT_ETSEP_ROLL_CHAN are shown in Table 4.7.13-2.
- E. Initialization Requirements – None.

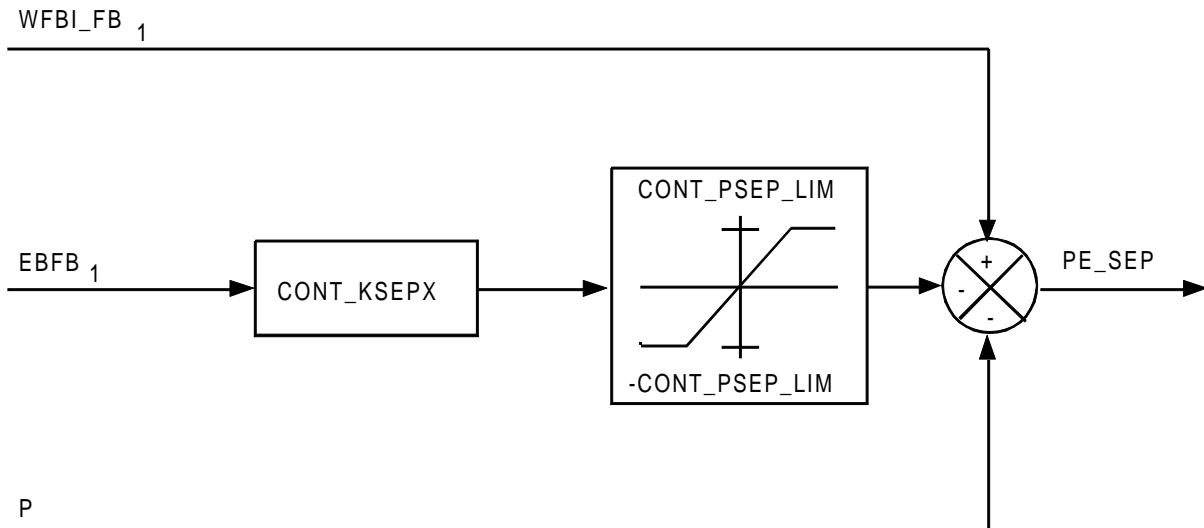


FIGURE 4.7.13-1.CONT_ETSEP_ROLL_CHAN, GRTLS DAP

Table 4.7.13-1. CONT_ETSEP_ROLL_CHAN Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
EBFB ₁	Roll attitude error component of attitude error vector (EBFB) (PHI – PHI_REF)	G/C_STEER	F	deg	12.5
P	Roll rate feedback	SF	F	deg/sec	25
WFBI_FB ₁	Roll rate command component of angular rate command vector (WFBI_FB)	G/C_STEER	F	deg/sec	12.5
<u>Outputs</u>					
PE_SEP	Roll error signal ETSEP	CONT_ROLL_QUANT	F	deg/sec	12.5

Table 4.7.13-2. CONT_ETSEP_ROLL_CHAN I-Loads

Name	Description	Type	MSID	Units
CONT_KSEPX	Roll attitude error gain	F	V97U8581C	deg/s/deg
CONT_PSEP_LIM	Roll attitude error limit	F	V97U8580C	deg/sec

4.7.14 CONT_ETSEP_YAW_CHAN

- A. Function – This function module generates a yaw error signal during post-external tank separation contingency abort maneuvers using measured yaw rate, the yaw attitude error and yaw rate command signals from GC_STEER. The detailed block diagram is presented in Figure 4.7.14-1.
- B. Processing Requirements – CONT_ETSEP_YAW_CHAN is processed at 12.5 Hz.
- C. Interface Requirements – The interface requirements for CONT_ETSEP_YAW_CHAN are shown in Table 4.7.14-1.
- D. I-Loads – The I-loads for CONT_ETSEP_YAW_CHAN are shown in Table 4.7.14-2.
- E. Initialization Requirements – None.

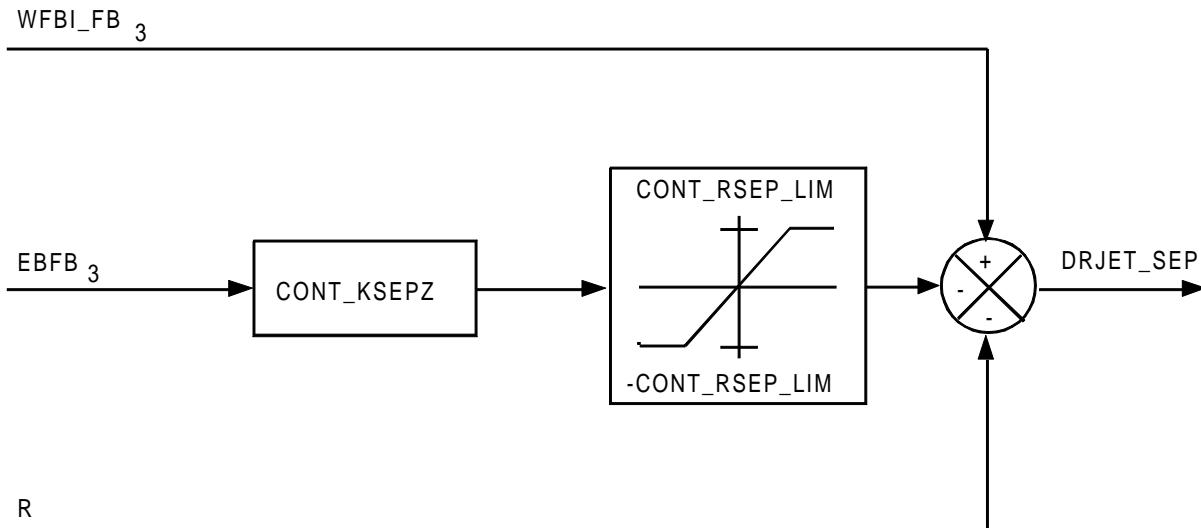


FIGURE 4.7.14-1.CONT_ETSEP_YAW_CHAN, GRTLS DAP

Table 4.7.14-1. CONT_ETSEP_YAW_CHAN Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
EBFB ₃	Yaw attitude error component of attitude error vector (EBFB) (PSI – PSI_REF)	G/C_STEER	F	deg	12.5
R	Yaw rate feedback	SF	F	deg/sec	25
WFBI_FB ₃	Yaw rate command component of angular rate command vector (WFBI_FB)	G/C_STEER	F	deg/sec	12.5
<u>Outputs</u>					
DRJET_SEP	Yaw error signal, ETSEP	CONT_YAW_QUANT	F	deg/sec	12.5

Table 4.7.14-2. CONT_ETSEP_YAW_CHAN I-Loads

Name	Description	Type	MSID	Units
CONT_KSEPZ	Yaw attitude error gain	F	V97U8579C	deg/s/deg
CONT_RSEP_LIM	Yaw attitude error limit	F	V97U8578C	deg/sec

4.7.15 CONT_MC_PITCH_CHAN

- A. Function – This function module generates a pitch error signal during mated coast (MC) contingency abort maneuvers using measured pitch rate, the pitch attitude error and pitch rate command signals from GC_STEER. The detailed block diagram is presented in Figure 4.7.15–1.
- B. Processing Requirements – CONT_MC_PITCH_CHAN is processed at 12.5 Hz.
- C. Interface Requirements – The interface requirements for CONT_MC_PITCH_CHAN are shown in Table 4.7.15–1.
- D. I-Loads – The I-loads for CONT_MC_PITCH_CHAN are shown in Table 4.7.15–2.
- E. Initialization Requirements – None.

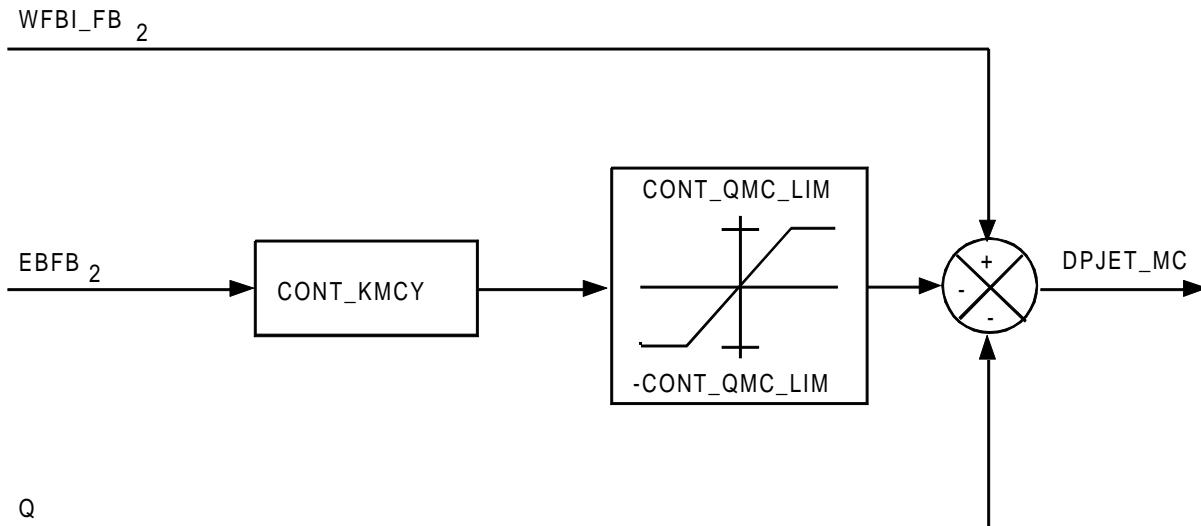


FIGURE 4.7.15-1.CONT_MC_PITCH_CHAN, GRTLS DAP

Table 4.7.15-1. CONT_MC_PITCH_CHAN Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
Inputs					
EBFB ₂	Pitch attitude error component of attitude error vector (EBFB) (THETA – THETA_REF)	G/C_STEER	F	deg	12.5
Q	Pitch rate feedback	SF	F	deg/sec	25
WFBI_FB ₂	Pitch rate command component of angular rate command vector (WFBI_FB)	G/C_STEER	F	deg/sec	12.5
Outputs					
DRJET_MC	Pitch error signal, MC	CONT_PITCH_QUANT, CONT 3E/O GUID	F	deg/sec	12.5

Table 4.7.15-2. CONT_MC_PITCH_CHAN I-Loads

Name	Description	Type	MSID	Units
CONT_KMCY	Pitch attitude error gain	F	V97U8577C	deg/s/deg
CONT_QMC_LIM	Pitch attitude error limit	F	V97U8576C	deg/sec

4.7.16 CONT_MC_ROLL_CHAN

A. Function – This function module generates a roll error signal during mated coast (MC) contingency abort maneuvers using measured roll rate, the roll attitude error and roll rate command signals from GC_STEER. The detailed block diagram is presented in Figure 4.7.16–1.

B. Processing Requirements – CONT_MC_ROLL_CHAN is processed at 12.5 Hz.

C. Interface Requirements – The interface requirements for CONT_MC_ROLL_CHAN are shown in Table 4.7.16–1.

D. I-Loads – The I-loads for CONT_MC_ROLL_CHAN are shown in Table 4.7.16–2.

E. Initialization Requirements – None.

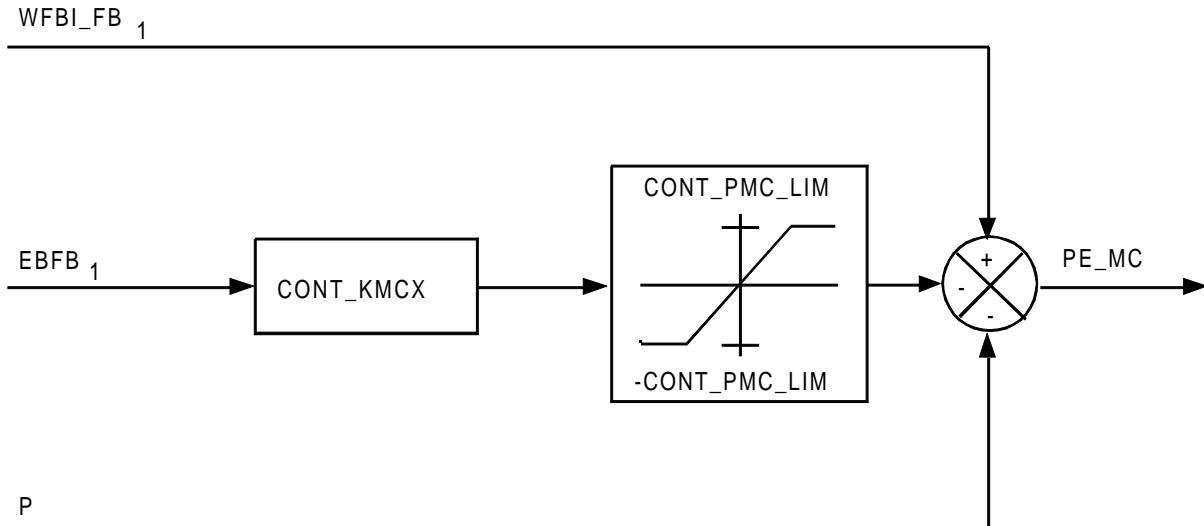


FIGURE 4.7.16-1.CONT_MC_ROLL_CHAN, GRTLS DAP

Table 4.7.16-1. CONT_MC_ROLL_CHAN Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
EBFB ₁	Roll attitude error component of attitude error vector (EBFB) (PHI – PHI_REF)	G/C_STEER	F	deg	12.5
P	Pitch rate feedback	SF	F	deg/sec	25
WFBI_FB ₁	Roll rate command component of angular rate command vector (WFBI_FB)	G/C_STEER	F	deg/sec	12.5
<u>Outputs</u>					
PE_MC	Roll error signal, MC	CONT_ROLL_QUANT	F	deg/sec	12.5

Table 4.7.16-2. CONT_MC_ROLL_CHAN I-Loads

Name	Description	Type	MSID	Units
CONT_KMCX	Roll attitude error gain	F	V97U8575C	deg/s/deg
CONT_PMC_LIM	Roll attitude error limit	F	V97U8574C	deg/sec

4.7.17 CONT_MC_YAW_CHAN

A. Function – This function module generates a yaw error signal during mated coast (MC) contingency abort maneuvers using measured yaw rate, the yaw attitude error and yaw rate command signals from GC_STEER. The detailed block diagram is presented in Figure 4.7.17–1.

B. Processing Requirements – CONT_MC_YAW_CHAN is processed at 12.5 Hz.

C. Interface Requirements – The interface requirements for CONT_MC_YAW_CHAN are shown in Table 4.7.17–1.

D. I-Loads – The I-loads for CONT_MC_YAW_CHAN are shown in Table 4.7.17–2.

E. Initialization Requirements – None.

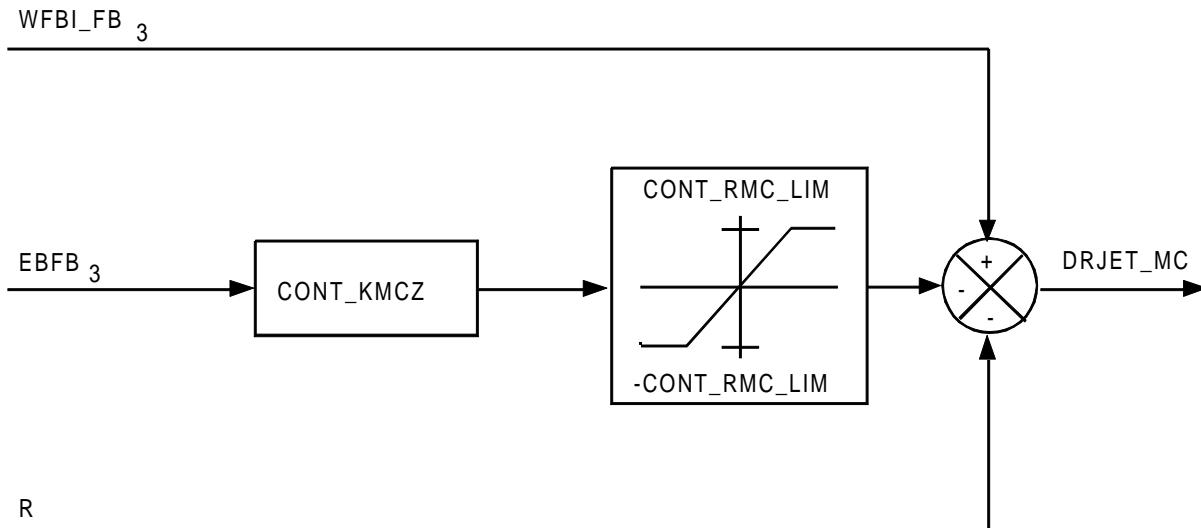


FIGURE 4.7.17-1.CONT_MC_YAW_CHAN, GRTLS DAP

Table 4.7.17-1. CONT_MC_YAW_CHAN Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
Inputs					
EBFB ₃	Yaw attitude error component of attitude error vector (EBFB) (PSI – PSI_REF)	G/C_STEER	F	deg	12.5
R	Yaw rate feedback	SF	F	deg/sec	25
WFBI_FB ₃	Yaw rate command component of angular rate command vector (WFBI_FB)	G/C_STEER	F	deg/sec	12.5
Outputs					
DRJET_MC	Yaw error signal, MC	CONT_YAW_QUANT	F	deg/sec	12.5

Table 4.7.17-2. CONT_MC_YAW_CHAN I-Loads

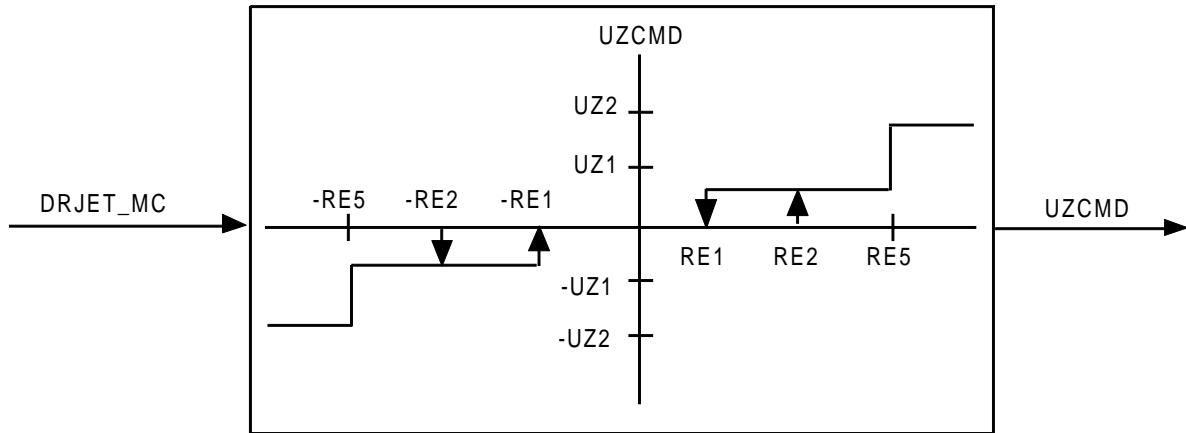
Name	Description	Type	MSID	Units
CONT_KMCZ	Yaw attitude error gain	F	V97U8573C	deg/s/deg
CONT_RMC_LIM	Yaw attitude error limit	F	V97U8572C	deg/sec

4.7.18 CONT_YAW_QUANT

- A. Function – CONT_YAW_QUANT accepts the yaw error signal generated during contingency mated-coast (MC) and external tank separation (ETSEP) and transforms it into an integer that specifies how many yaw jets are to be turned on. Block diagrams of the contingency yaw error quantizer for contingency MC and ETSEP are shown in Figure 4.7.18–1 (a) and (b), respectively.
- B. Processing Requirements – CONT_YAW_QUANT is processed at 12.5 Hz.
- C. Interface Requirements – The interface requirements for CONT_YAW_QUANT are shown in Table 4.7.18–1.
- D. I-Loads – The I-loads for CONT_YAW_QUANT are shown in Table 4.7.18–2.
- E. Initialization Requirements – The initialization requirements for CONT_YAW_QUANT are shown in Table 4.7.18–3 and the definition of the yaw command null state for CONT_YAW_QUANT is shown in Table 4.7.18–4.

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(a) MC



(b) ETSEP

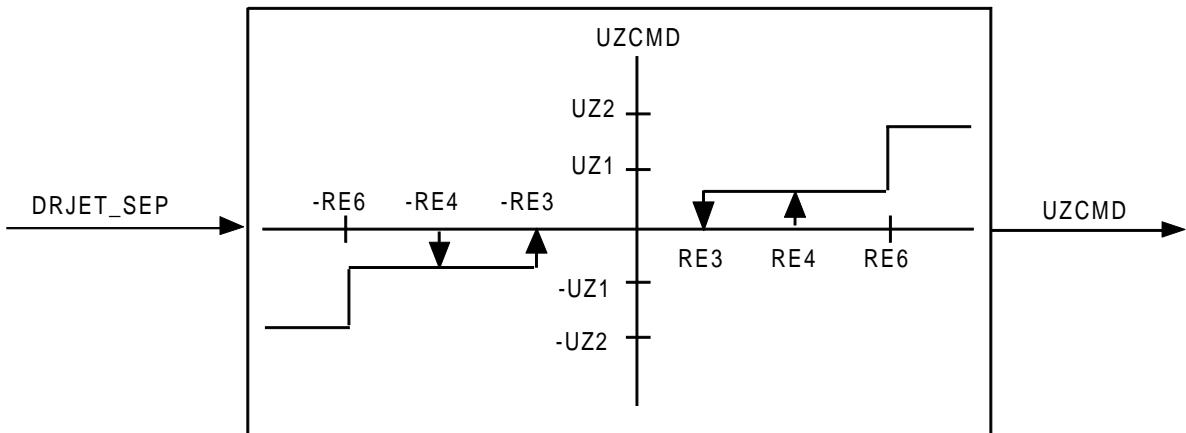


FIGURE 4.7.18-1. Contingency Yaw Error Quantizer, GRTLS DAP (CONT_YAW_QUANT)

Table 4.7.18-1. CONT_YAW_QUANT Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
DRJET_MC	Yaw error signal, MC	CONT_MC_YAW_CHAN	F	deg/sec	12.5
DRJET_SEP	Yaw error signal, ETSEP	CONT_ETSEP_YAW_CHAN	F	deg/sec	12.5
<u>Outputs</u>					
UZCMD	Quantized yaw error signal	JET_LOGIC, RCS ACT LT, TLM	F	—	12.5

Table 4.7.18-2. CONT_YAW_QUANT I-Loads

Name	Description	Type	MSID	Units
RE1	MC yaw error quantizer switching levels	F	V97U1271C	deg/sec
RE2			V97U1272C	deg/sec
RE5			V96U7896C	deg/sec
RE3	ETSEP yaw error quantizer switching levels	F	V97U1273C	deg/sec
RE4		F	V97U1274C	deg/sec
RE6		F	V97U8568C	deg/sec
UZ1	MC/ETSEP yaw jet command	I	V98U7386C	—
UZ2		I	V96U7895C	—

Table 4.7.18-3. CONT_YAW_QUANT Initialization Requirements

Component	Initialization		Variable	Initial Value
	From	To		
MC hysteresis	—	First pass	UZCMD *	0

*See Section 4.9.5

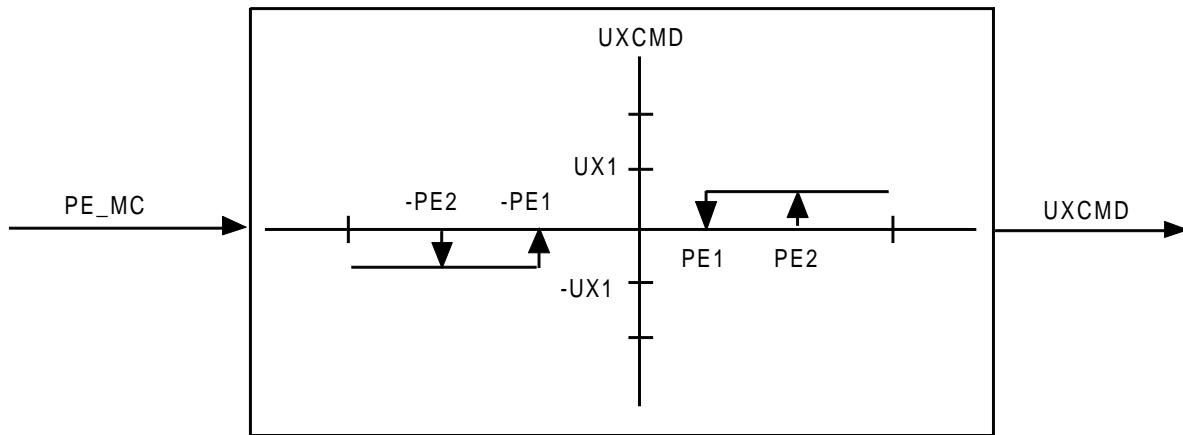
Table 4.7.18-4. Definition of Yaw Command Null State

Variable	Integer Value	From	To
UZCMD	0	ETSEP	ETSEP_Y_ENABLE

4.7.19 CONT_ROLL_QUANT

- A. Function – CONT_ROLL_QUANT accepts the roll error signal generated during contingency mated-coast (MC) and external tank separation (ETSEP) and transforms it into an integer that specifies how many roll jets are to be turned on. Block diagrams of the contingency roll error quantizer for contingency MC and ETSEP are shown in Figure 4.7.19–1 (a) and (b), respectively. Additional MC and ETSEP requirements are shown in flow chart form in Figure 4.7.19–2.
- B. Processing Requirements – CONT_ROLL_QUANT is processed at 12.5 Hz.
- C. Interface Requirements – The interface requirements for CONT_ROLL_QUANT are shown in Table 4.7.19–1.
- D. I-Loads – The I-loads for CONT_ROLL_QUANT are shown in Table 4.7.19–2.
- E. Initialization Requirements – The initialization requirements for CONT_ROLL_QUANT are shown in Table 4.7.19–3 and the definition of the roll command null state for CONT_ROLL_QUANT is shown in Table 4.7.19–4.

(a) MC



(b) ETSEP

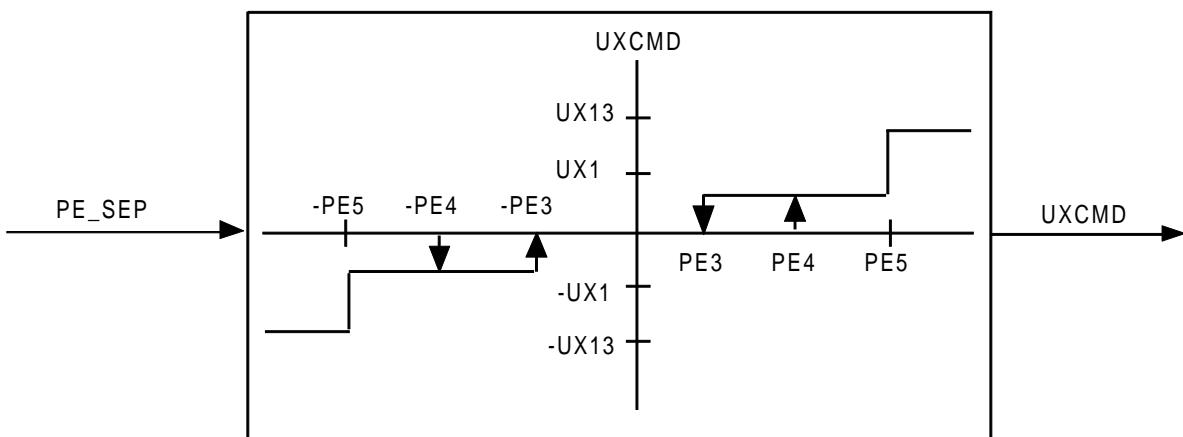


FIGURE 4.7.19-1. Contingency Roll Error Quantizer, GRTLS DAP (CONT_ROLL_QUANT)

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During MC and ETSEP, each pass through CONT_ROLL_QUANT, perform the following:

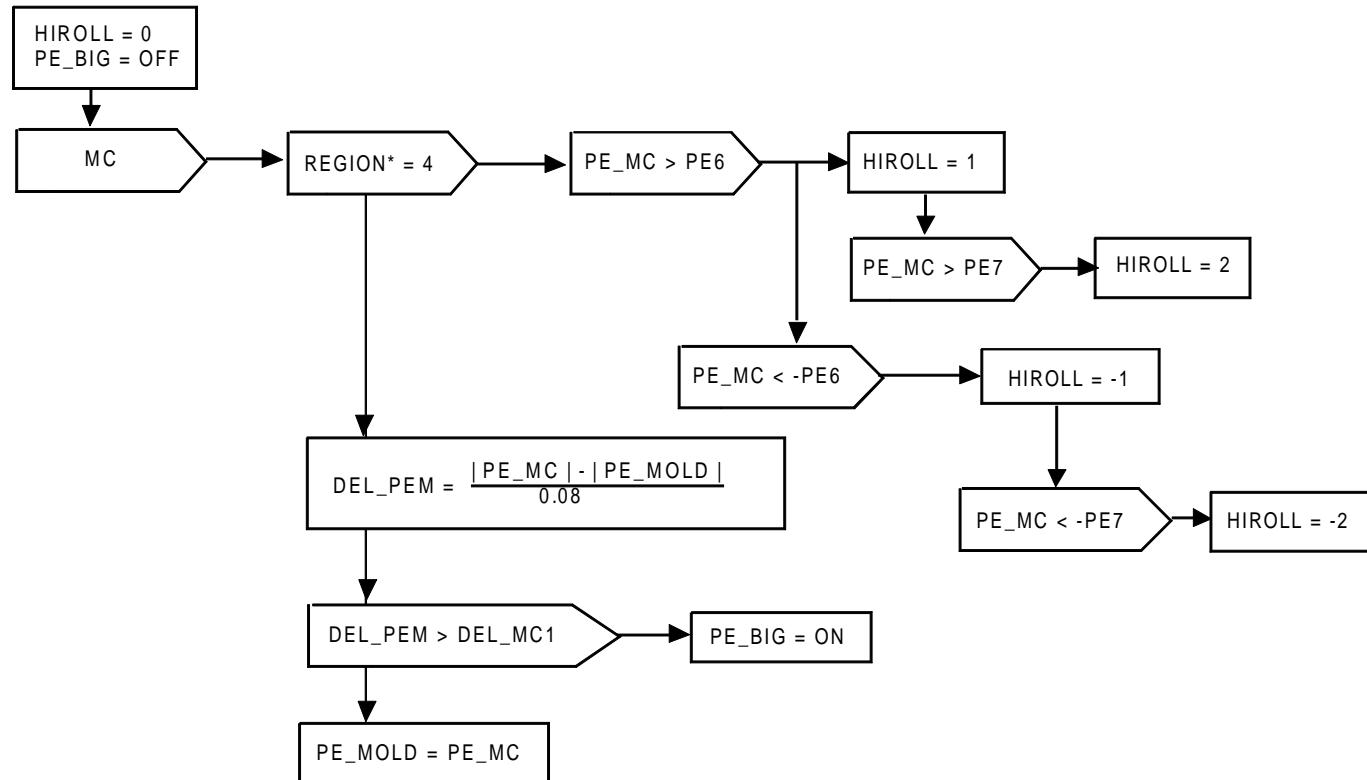


FIGURE 4.7.19-2. Contingency Roll Error Quantizer, GRTLS DAP (CONT_ROLL_QUANT)

Table 4.7.19-1. CONT_ROLL_QUANT Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
MC	Mated coast flag	RECON	D	–	6.25
PE_MC	Roll error signal, MC	CONT_MC_ROLL_CHAN	F	deg/ sec	12.5
PE_SEP	Roll error signal, ETSEP	CONT_ETSEP_ROLL_CHAN	F	deg/ sec	12.5
REGION	Contingency 3 engine out region index	CONT 3EO GUIDANCE	I	–	6.25
<u>Outputs</u>					
HIROLL	High roll command level	CONT_JET_CMD_LOGIC	I	–	12.5
PE_BIG	Large roll error signal discrete	CONT_PITCH_QUANT	D	–	12.5
UXCMD	Quantized roll error signal	JET_LOGIC, RCS ACT LT	F	–	12.5

Table 4.7.19-2. CONT_ROLL_QUANT I-Loads

Name	Description	Type	MSID	Units
PE1	Contingency MC roll error quantizer switching levels	F	V97U1242C	deg/sec
PE2		F	V97U1243C	deg/sec
PE6		F	V97U8570C	deg/sec
PE7		F	V97U8571C	deg/sec
PE3	Contingency ETSEP roll error quantizer switching levels	F	V97U1244C	deg/sec
PE4		F	V97U1245C	deg/sec
PE5		F	V97U1246C	deg/sec
DEL_MC1	Maximum MC roll error signal change to set high roll discrete	F	V97U8567C	deg/sec
UX1	MC/ETSEP roll jet command	I	V98U9977C	–
UX13		I	V98U9981C	–

Table 4.7.19-3. CONT_ROLL_QUANT Initialization Requirements				
Component	Initialization		Variable	Initial Value
	From	To		
MC hysteresis	–	First pass	UXCMD*	0
MC hysteresis	–	First pass	PE_MOLD	PE_MC

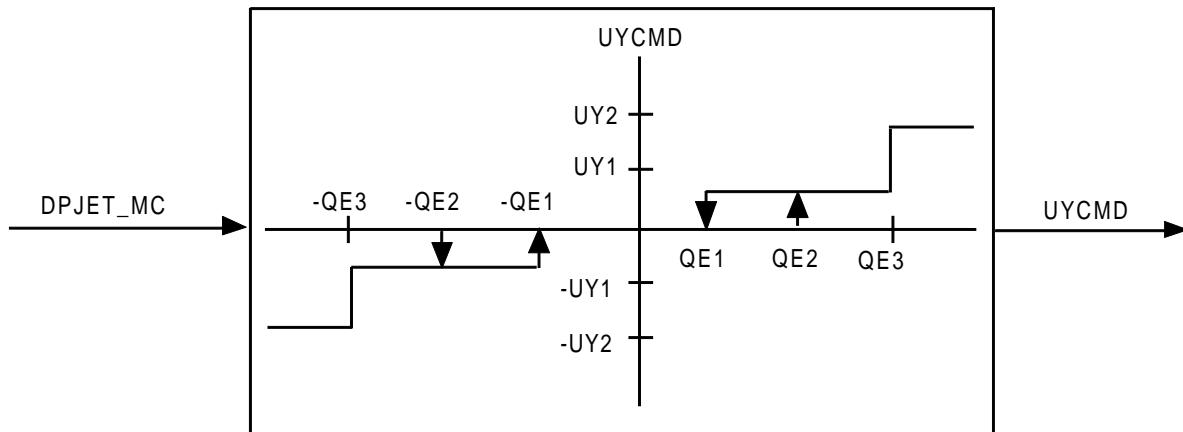
*See Section 4.9.5

Table 4.7.19-4. Definition of Roll Command Null State				
Variable	Integer Value	From	To	
UXCMD	0	ETSEP	ETSEP_PR_ENABLE	

4.7.20 CONT_PITCH_QUANT

- A. Function – CONT_PITCH_QUANT accepts the pitch error signal generated during contingency mated-coast (MC) and external tank separation (ETSEP) and transforms it into an integer that specifies how many pitch jets are to be turned on. Block diagrams of the contingency pitch error quantizer for contingency MC and ETSEP are shown in Figure 4.7.20–1 (a) and (b), respectively. Additional MC and ETSEP requirements are shown in flow chart form in Figure 4.7.20–2.
- B. Processing Requirements – CONT_PITCH_QUANT is processed at 12.5 Hz.
- C. Interface Requirements – The interface requirements for CONT_PITCH_QUANT are shown in Table 4.7.20–1.
- D. I-Loads – The I-loads for CONT_PITCH_QUANT are shown in Table 4.7.20–2.
- E. Initialization Requirements – The initialization requirements for CONT_PITCH_QUANT are shown in Table 4.7.20–3 and the definition of the pitch command null state for CONT_PITCH_QUANT is shown in Table 4.7.20–4.

(a) MC



(b) ETSEP

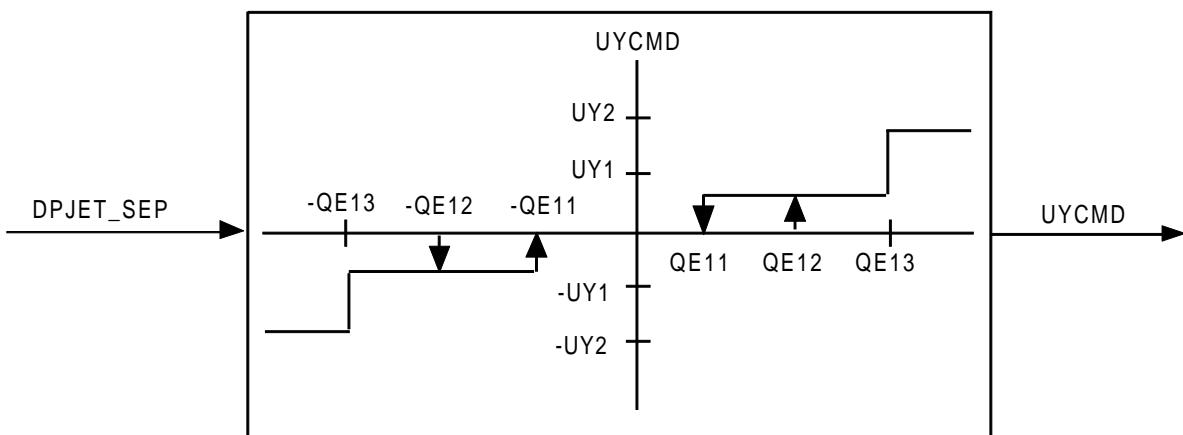
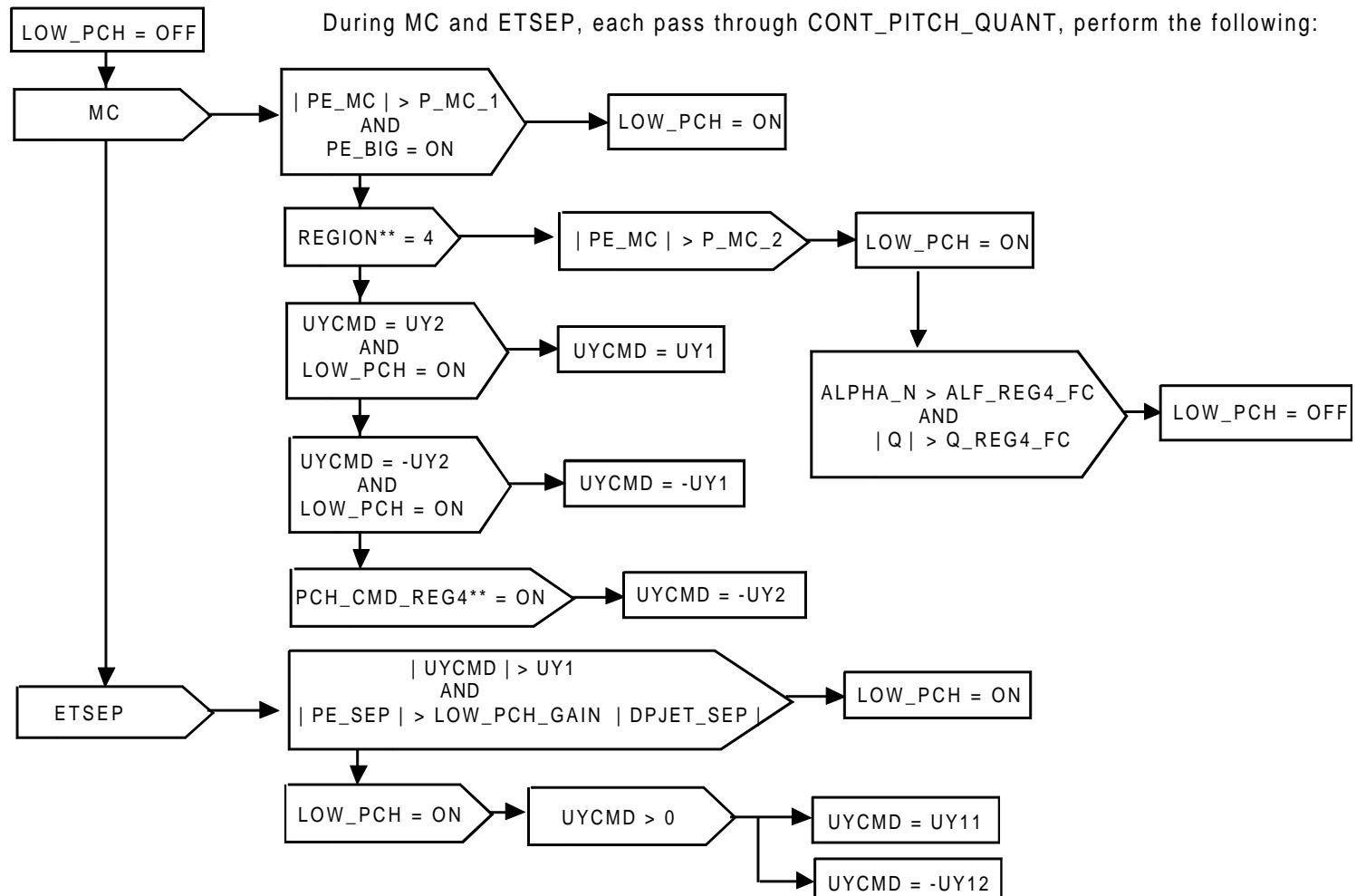


FIGURE 4.7.20-1. Contingency Pitch Error Quantizer, GRTLS DAP (CONT_PITCH_QUANT)

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** from CONT 3 E/O GUIDANCE

* Perform this logic each pass, but after Contingency Pitch Error Quantizer (Figure 4.7.20-1) has been performed.
Also, perform Contingency Roll Error Quantizer before Contingency Pitch Error Quantizer.

FIGURE 4.7.20-2. Contingency Pitch Error Quantizer, GRTLS DAP (CONT_PITCH_QUANT)

Table 4.7.20-1. CONT_PITCH_QUANT Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
ETSEP	External tank separation flag	RECON	D	–	6.25
MC	Mated coast flag	RECON	D	–	6.25
DPJET_MC	Pitch error signal, MC	CONT_MC_PITCH_CHAN	F	deg/sec	12.5
DPJET_SEP	Pitch error signal, ETSEP	CONT_ETSEP_PITCH_CHAN	F	deg/sec	12.5
PE_MC	Roll error signal, MC	CONT_MC_ROLL_CHAN	F	deg/sec	12.5
PE_BIG	Large roll error signal discrete	CONT_ROLL_QUANT	D	–	12.5
PE_SEP	Roll error signal, ETSEP	CONT_ETSEP_ROLL_CHAN	F	deg/sec	12.5
Q	Pitch rate, orbiter rate gyro	SF (ORB RGA)	SP	deg/sec	
ALPHA_N	NAV angle of attack	A/E ATT PROC	SP	deg	
PCH_CMD_REG4	Region 4 negative pitch rate phase discrete	CONT 3EO GUIDANCE	D	N/A	6.25
REGION	Contingency 3 engine out region index	CONT 3EO GUIDANCE	I	–	6.25
<u>Outputs</u>					
UYCMD	Quantized pitch error signal	JET_LOGIC, RCS ACT LT	F	–	12.5

Table 4.7.20-2. CONT_PITCH_QUANT I-Loads				
Name	Description	Type	MSID	Units
QE1	Contingency MC pitch error quantizer switching levels	F	V97U1252C	deg/sec
QE2		F	V97U1253C	deg/sec
QE3		F	V97U1254C	deg/sec
QE11	Contingency ETSEP pitch error quantizer switching levels	F	V97U1261C	deg/sec
QE13		F	V97U8569C	deg/sec
QE12		F	V97U1262C	deg/sec
Q_REG4_FC	Minimum pitch rate to turn off LOW_PCH	F	V97U8565C	deg/sec
LOW_PCH_GAIN	Pitch error signal gain for LOW_PCH	F	V97U8566C	(sec/deg) ²
ALF_REG4_FC	Minimum angle of attack to turn off LOW_PCH	F	V97U8564C	deg
P_MC_2	Minimum MC roll error signal to set LOW_PCH in Region 4	F	V97U8563C	deg/sec
P_MC_1	Minimum MC roll error signal to set LOW_PCH	F	V97U8562C	deg/sec
UY1	MC/ETSEP yaw jet command	I	V98U9967C	–
UY11		I	V98U9971C	–
UY12		I	V98U9972C	–
UY2		I	V98U9968C	–

Table 4.7.20-3. CONT_PITCH_QUANT Initialization Requirements				
Component	Initialization		Variable	Initial Value
	From	To		
MC hysteresis	–	First pass	UYCMD*	0

*See Section 4.9.5

Table 4.7.20-4. Definition of Pitch Command Null State			
Variable	Integer Value	From	To
UYCMD	0	ETSEP	ETSEP_PR_ENABLE

4.8 PROGRAM TEST INPUT (PTI)

4.8.1 Program Test Input (PTI) Driver Module (PF 4.248) (Aerojet DAP).

A. Functional Description.

1. The PTI driver must be able to drive the various flight control effectors required during entry. The elements of the effector array shall be limited to a set of three-digit numbers listed below. The ones digit shall define the active PTI effector (except for forward RCS yaw jets) and shall be limited to the following values:

xx0 — No effector of aft jet PTI

xx1 — Aileron

xx2 — Elevator

xx3 — Rudder

xx4 — Aft roll jets

xx5 — Aft pitch jets

xx6 — Aft yaw jets

xx7 — Roll rate command

The tens digit shall define the number of forward yaw RCS jets to be commanded on as opposing pairs of jets and shall be limited to the following values:

x0x – No forward yaw RCS jets

x1x – 1 forward yaw RCS jet per side

x2x – 2 forward yaw RCS jets per side

The hundreds digit shall define the Aerojet DAP mode and shall be limited to the following values:

0xx – Baseline DAP (PTI_WRAP flag set false)

1xx – Wraparound flight control mode (PTI_WRAP flag set true)

2. Each PTI is a sequence of doublets or pulses that are executed in the same order in which they are stored in the I-load arrays. The doublets and pulses are defined in a set of definition arrays. The start and stop points in the arrays for each PTI sequence shall be stored in an array in the same order as the PTI windows. The values stored in the doublet and pulse definition arrays and the array of start and stop points shall be I-loads.
3. A forward yaw jet pulse may be active at the same time as an aft jet or surface PTI (for example, an aileron doublet, rudder doublet, aft yaw jet doublet, or elevator doublet may be executed while the yaw jets are firing.)

4. Each PTI doublet executed through the Aerojet DAP shall be defined by five parameters: (a) amplitude, (b) doublet width (cycles), (c) interval between doublet pulses (cycles), (d) damp time for each doublet (cycles), and (e) effector which is to be driven. A forward yaw jet PTI pulse shall be defined by the use of the tens digit in the effector array. The tens digit shall indicate the number of forward yaw jets to command on each side. The hundreds digit shall specify the mode of the Aerojet DAP. For example:
 - a. An effector array entry of 21 or 021 shall indicate that a standard aileron doublet shall be executed with two forward yaw jets firing on each side for the duration of the pulse, including the damp time.
 - b. An effector array entry of 10 or 010 shall indicate a forward yaw jet pulse of one jet per side and no aft jet/surface or roll rate command PTI.
 - c. An effector array entry of 121 shall indicate that a standard aileron doublet shall be executed with two forward yaw jets firing on each side for the duration of the pulse, including the damp time. In addition the Aerojet DAP shall be moded to the wraparound flight control system configuration (PTI_WRAP flag set) for the duration of the pulse, including the damp time.
- All of the doublet and pulse defining parameters are I-loads, and the same PTI may include both Aerojet-executed doublets and forward RCS pulses.
5. This module shall provide the following signals when the selected doublet effector array contains a value of 1 through 7 in the ones digit:
 - a. A flag, PTI_ACT, is set true when a PTI is in progress.
 - b. A flag, PTI_ACT_D, is set true when a PTI is in progress. This flag shall be supplied to the PTI_SEQUENCER, AEROJET DAP RECON, and the display processor.
 - c. Seven signals which are the values the Aerojet DAP will integrate and add to the normal effector signals.
6. This module shall provide the following signals when the selected pulse effector array contains a nonzero value in the tens digit.
 - a. A flag, PTI_ACT_D, is set true when a PTI is in progress. This flag shall be supplied to the PTI_SEQUENCER, AEROJET DAP RECON, and the display processor.
 - b. Seven signals which are the values the Aerojet DAP will integrate and add to the normal effector signals shall be zeroed (if the ones digit is zero).
 - c. Set the outputs required to command the desired forward RCS jets to ON. Provision shall also be included to reduce the number of jets firing on either side to ensure a balanced firing.

If two jets per side are commanded ON and a left jet is removed from the availability table, the right jet with the lowest priority will be commanded OFF to maintain a balanced firing. See Figure 4.8.1-2 for the forward yaw jet PTI priorities.

- d. The forward RCS yaw jet with the highest priority will fire if only one jet per side is required. See Figure 4.8.1–2 for the forward yaw jet PTI priorities.
 - e. If no forward jets are available on one side, then no forward RCS yaw jets will be commanded to fire for the duration of that forward RCS yaw jet PTI.
 - f. A flag, PTI_ACT, is set false when a forward RCS PTI is in progress and the ones digit in the effector I-load is zero.
7. This module shall provide the following signal when the hundreds digit is set to one (in addition to the appropriate signals produced by the ones and tens digits):
- a. A flag, PTI_WRAP, is set true when a PTI is in progress. This flag shall be supplied to the Aerojet DAP.
8. PTI's shall begin execution upon receipt of the PTI_EXECUTE command from the PTI SEQUENCER.
9. The driver shall stop execution of a PTI that is in progress if any of the following occurs: (a) pilot modes to CSS, (b) pilot inhibits PTI's via keyboard entry on HSD, (c) ADTA data are not being used in flight control when Mach is below an I-load limit, or (d) any vehicle body rate exceeds an I-loaded limit. These limits are found in the last three elements in the WINDOW_LE array; i.e., WINDOW_LE(11)—maximum absolute roll rate allowed, WINDOW_LE(12)—maximum absolute yaw rate allowed (units of deg/sec should be assumed for the I-loads.) If a PTI is stopped for reasons a, b, or d., the PTI_INHIBIT flag shall be set true and the PTI_ACT and PTI_ACT_D flags shall be set false. In addition, the forward yaw jets shall be commanded OFF, the PTI_WRAP flag shall be set to false, and the signals to the Aerojet DAP shall be zeroed. (The pilot must reenable PTIs before another maneuver can be executed.) If a PTI is stopped for reason c, then the PTI_INHIBIT flag should not be set, but all other steps should be taken.
10. When the PTI is completed, the PTI_ACT and PTI_ACT_D flags shall be set to false, the seven output signals to the Aerojet DAP shall be zeroed, the forward yaw jets shall be commanded OFF, and the PTI_WRAP flag shall be set to false.
11. The seven PTI signal integrators in the AEROJET DAP should be reinitialized to zero when the PTI_ACT flag goes to false from true.

- B. Processing Requirements – The PTI_DRIVER module shall execute at 12.5 Hz.
- C. Interface Requirements – The interface requirements for PTI_DRIVER are shown in Table 4.8.1–1
- D. I-Loads – The I-loads for PTI_DRIVER are shown in Table 4.8.1–2.
- E. Initialization Requirements – The initialization requirements for PTI_DRIVER are shown in Table 4.8.1–3
- F. Software Configuration – Aerojet DAP unique.

The modules that appear only in the AEROJET DAP are described in this subsection in the order given in Table 4.8.1–1.

Table 4.8.1-1.PTI_DRIVER Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
M	Mach number	ADTA SOP	F	—	1.04
P_ORB	Vehicle roll rate	SF	F	deg/s	12.5
Q_ORB	Vehicle pitch rate	SF	F	deg/s	12.5
R_ORB	Vehicle yaw rate	SF	F	deg/s	12.5
AD_TO_GC	Flag indicating ADTA air data to FCS	ADTA SOP	D	—	12.5
AVAILABLE_JET_FWD(2)	Jet F1L available flag	RCS RM	D	—	12.5
AVAILABLE_JET_FWD(14)	Jet F3L available flag	RCS RM	D	—	12.5
AVAILABLE_JET_FWD(6)	Jet F2R available flag	RCS RM	D	—	12.5
AVAILABLE_JET_FWD(9)	Jet F4R available flag	RCS RM	D	—	12.5
MODE_PITCH	Flag indicating CSS is engaged in pitch	AEROJET DAP	D	—	12.5
MODE_BANK	Flag indicating CSS is engaged in bank	AEROJET DAP	D	—	6.25
PTI_NUMBER	Number of PTI to be executed	PTI_SEQUENCER	I	—	6.25
PTI_INHIBIT	Flag which inhibits PTI execution	HORIZ SIT DISP PTI_SEQUENCER	D	—	12.5
PTI_EXECUTE	Flag which commands PTI execution to begin	PTI_SEQUENCER	D	—	12.5
<u>Outputs</u>					
PTI_ACT	Flag indicating PTI is in progress	AEROJET DAP, TLM	D	—	12.5
PTI_ACT_D	Flag indicating a PTI is in progress	PTI_SEQUENCER, TLM, ENTRY DIP, HORIZ SIT DISP AEROJET DAP	D	—	12.5
PTI_INHIBIT	Flag which inhibits PTI execution	PTI_SEQUENCER, 6.21, TLM	D	—	12.5
PTI_AIL	PTI aileron command	AEROJET DAP	F	deg/s	12.5
PTI_ELV	PTI elevator command	AEROJET DAP	F	deg/s	12.5
PTI_RHC	PTI roll rate command	AEROJET DAP	F	deg/s	12.5
PTI_RUD	PTI rudder command	AEROJET DAP	F	deg/s	12.5
PTI_ROLL	PTI roll jets command	AEROJET DAP	F	deg/ s**2	12.5
PTI_PIT	PTI pitch jets command	AEROJET DAP	F	deg/ s**2	12.5

Table 4.8.1-1.PTI_DRIVER Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
PTI_WRAP	PTI wraparound mode flag	AEROJET DAP	D	—	12.5
PIT_YAW	PTI yaw jets command	AEROJET DAP	F	deg/ s**2	12.5
NEW_JONLST_FWD(2)	RCS jet F1L on/off command	E/L RCS CMD SOP	D	—	12.5
NEW_JONLST_FWD(14)	RCS jet F3L on/off command	E/L RCS CMD SOP	D	—	12.5
NEW_JONLST_FWD(6)	RCS jet F2R on/off command	E/L RCS CMD SOP	D	—	12.5
NEW_JONLST_FWD(9)	RCS jet F4R on/off command	E/L RCS CMD SOP	D	—	12.5

Table 4.8.1-2.PTI_DRIVER I-Loads

Name	Description	Type	MSID	Units
DBLET_PAMP_N N = 1 – 30	Doublet pulse amplitude (magnitude of input)	F	See Appendix B, I-Loads	ND
DBLET_PWIDTH_N N = 1 – 30	Doublet pulse width (80 msec cycles) duration of pulse	I	See Appendix B, I-Loads	ND
DBLET_PINT_N N = 1 – 30	Interval between doublet pulses (80 msec cycles)	I	See Appendix B, I-Loads	ND
DBLET_PDAMP_N N = 1 – 30	Damp time to allow for each doublet (80 msec cycles)	I	See Appendix B, I-Loads	ND
DBLET_PEFFT_N N = 1 – 30	Effector which the doublet is to drive	I	See Appendix B, I-Loads	ND
PTI_START_N N = 1 – 10	Starting doublet of PTI number N	I	V99U6100C to V99U6109C	ND
PTI_STOP_N N = 1 – 10	Final doublet of PTI number N	I	V99U6125C to V99U6134C	ND
MACH_ADTA	Mach number below which PTI's may not be executed without ADTA air data	F	V99U6210C	ND
WINDOW_LE(N) N = 11 – 13	Elements 11, 12, and 13 are body rates above which the PTI's are terminated	F	V99U6160C to V99U6162C	deg/s

Table 4.8.1-3.PTI_DRIVER Initialization Requirements

Variable	Initialize on Transition		Value
	From	To	
PTI_ACT	—	First pass	False
PTI_ACT_D	—	First pass	False
PTI_INHIBIT	—	First pass	True
PTI_AIL	—	First pass + $\overline{\text{PTI_ACT}}$	0
PTI_ELV	—	First pass + $\overline{\text{PTI_ACT}}$	0
PTI_RHC	—	First pass + $\overline{\text{PTI_ACT}}$	0
PTI_RUD	—	First pass + $\overline{\text{PTI_ACT}}$	0
PTI_ROLL	—	First pass + $\overline{\text{PTI_ACT}}$	0
PTI_PIT	—	First pass + $\overline{\text{PTI_ACT}}$	0
PTI_WRAP	—	First pass	False
PTI_YAW	—	First pass + $\overline{\text{PTI_ACT}}$	0
NEW_JONLST_FWD(2)	—	First pass + $\overline{\text{PTI_ACT_D}}$	0
NEW_JONLST_FWD(6)	—	First pass + $\overline{\text{PTI_ACT_D}}$	0
NEW_JONLST_FWD(14)	—	First pass + $\overline{\text{PTI_ACT_D}}$	0
NEW_JONLST_FWD(9)	—	First pass + $\overline{\text{PTI_ACT_D}}$	0

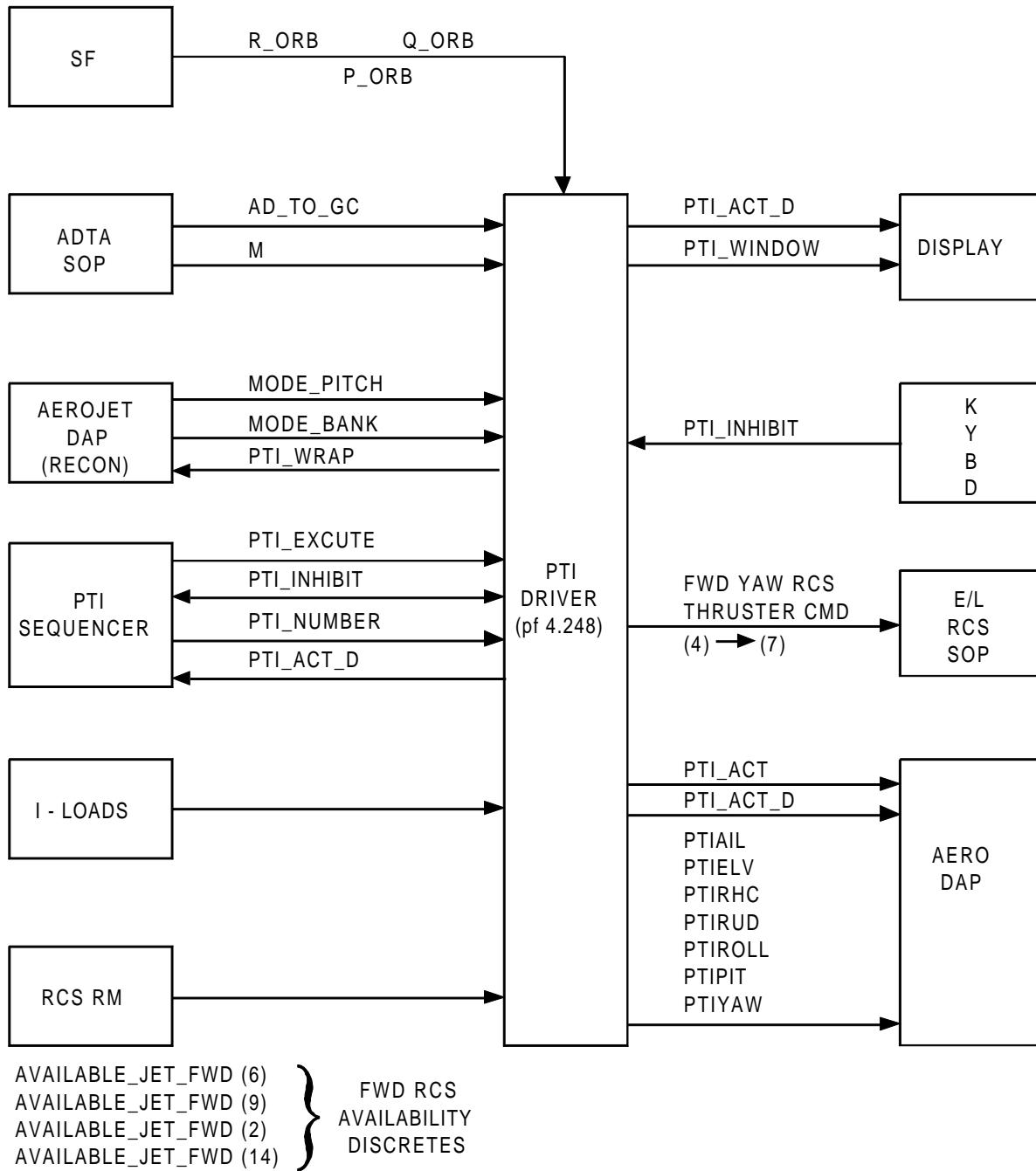


FIGURE 4.8.1-1. PTI_Driver Block Diagram

JET	PRIORITY
F1L	1
	2
F2R	1
	2

FIGURE 4.8.1-2. Forward Yaw Jet PTI Priority Table

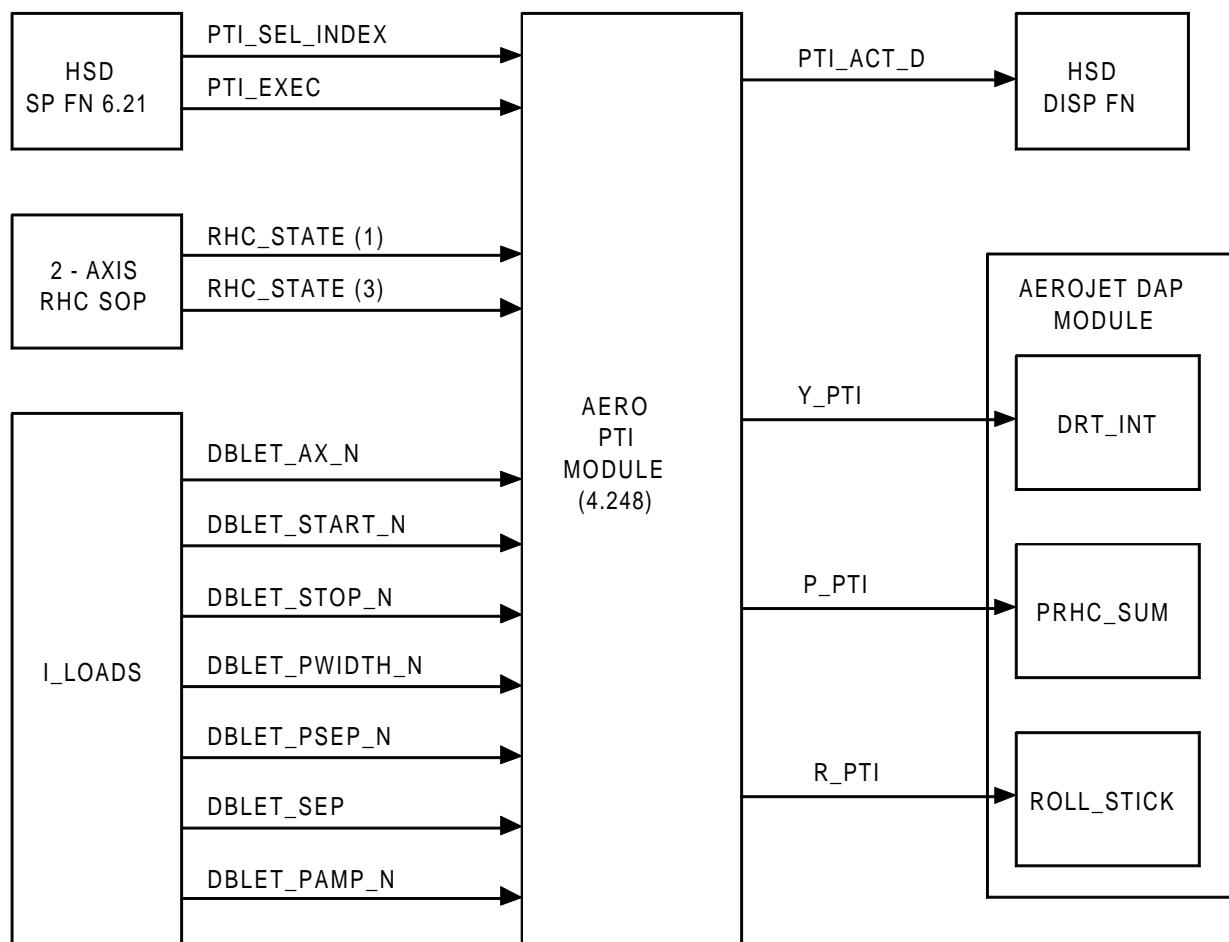


FIGURE 4.8.1-3. Aero PTI Module Functional Block Diagram

4.248 PTI MODULE

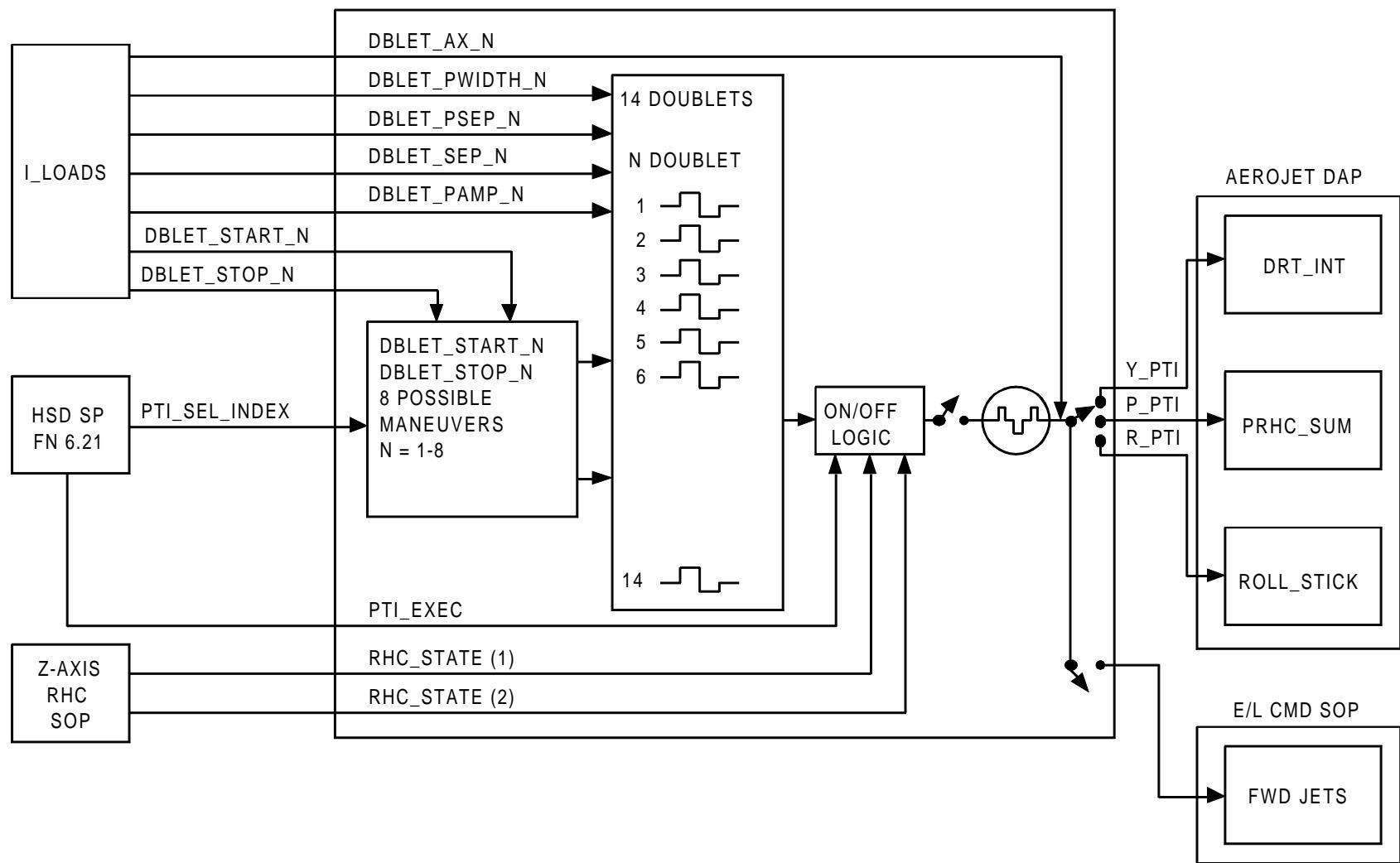


FIGURE 4.8.1-4. PTI Detailed View

4.8.1.1 Program Test Input (PTI) Sequencer Module (Aerojet DAP).

A. Functional Description

1. The PTI sequencer module shall monitor the vehicle trajectory and automatically select maneuvers for execution based on dynamic pressure (early part of entry) or Mach number (remainder of entry). The software shall provide for 10 “PTI WINDOWS” which define the allowed segment of the trajectory during which each maneuver can legally be selected. The windows shall be defined by I-loads which specify the leading edge and trailing edge of each window. (For example, a leading edge of 4 psf and a trailing edge of 6 psf allow the corresponding maneuver to be selected only when the dynamic pressure is greater than 4 psf and less than 6 psf; or for a leading edge of $m = 2.4$ and a trailing edge of $M = 2.0$, allow the corresponding maneuver to be selected only when Mach is less than 2.4 and greater than 2.0)
2. The number of windows defined by dynamic pressure and the number of windows defined by Mach number should be I-loads. The only limit is that the total number may not exceed 10. Also, the windows must be defined in the order in which they will be executed during entry because the PTI_SEQUENCER shall only sequence forward in the table.
3. A counter, PTI_NUMBER, shall be set up to track the current PTI. This counter shall sequence forward only, and shall increment only when the limits of the current window are passed, or when the PTI_ACT_D signal from the PTI_DRIVER changes from true to false. The number of the current PTI is used to determine which window to examine and is provided to the display and to the PTI_DRIVER.
4. When the pilot engages CSS in either axis, the sequencer shall set the PTI inhibit flag, and no PTI's shall be executed until the pilot has reenabled the maneuvers.
5. The sequencer shall require that constraints are met for four consecutive passes. The constraints are as follows: (a) vehicle rates are below I-loaded values, (b) ADTA data are used by Flight Control if Mach number is less than an I-loaded value, (c) pitch and roll/yaw axis are in auto, (d) pilot has enabled PTIs via keyboard entry on HSD display, and (e) guidance constraints checked in guidance modules are all met.
6. When all constraints have been met for four consecutive passes, the PTI_EXECUTE flag shall be set to true and sent to the PTI_DRIVER. Once the PTI begins, the PTI_ACT_D flag will be received from the PTI_DRIVER. When the PTI_ACT_D flag modes from true to false, the PTI_EXECUTE flag is set to false, the counter (PTI_NUMBER) is advanced by one, and the four-pass counter is reset to zero.

B. Processing Requirements – PTI_SEQUENCER is processed at 1.04 Hz.

C. Interface Requirements – The interface requirements for PTI_SEQUENCER are shown in Table 4.8.1.1–1.

D. I-Loads – The I-loads for PTI_SEQUENCER are shown in Table 4.8.1.1–2.

E. Initialization Requirements – The initialization requirements for PTI_SEQUENCER are shown in Table 4.8.1.1–3

F. Software Configuration – Aerojet DAP unique.

Table 4.8.1.1-1. PTI_SEQUENCER Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Inputs</u>					
GUID_ACCEP	Flag indicating guidance constraints are met	ENT GUID, TAEM GUID	D	—	1.04
AD_TO_GC	Flag indicating ADTA air data to FCS	ADTA SOP	D	—	1.04
QBAR	Dynamic pressure	ADTA SOP	F	lb/ft ²	1.04
M	Mach number	ADTA SOP	F	—	1.04
P_ORB	Vehicle roll rate	SF	F	deg/s	1.04
Q_ORB	Vehicle pitch rate	SF	F	deg/s	1.04
R_ORB	Vehicle yaw rate	SF	F	deg/s	1.04
MODE_PITCH	Flag indicating pitch is in CSS	AEROJET DAP	D	—	6.25
MODE_BANK	Flag indicating bank is in CSS	AEROJET DAP	D	—	6.25
PTI_INHIBIT	Flag indicating PTI's are inhibited	PTI_DRIVER, HORIZ SIT DISP	D	—	1.04
PTI_ACT_D	Flag indicating PTI is in progress	PTI_DRIVER	D	—	12.5
<u>Outputs</u>					
PTI_EXECUTE	Flag which commands PTI execution to begin	PTI_DRIVER	D	—	1.04
PTI_NUMBER	Number of PTI to be executed	PTI_DRIVER, TLM, HORIZ SIT DISP	I	—	1.04
PTI_WINDOW	Flag which indicates vehicle is in a PTI "window"	ENTRY DIP, HORIZ SIT SPEC	D	—	1.04
PTI_INHIBIT	Flag which inhibits PTI execution	PTI_DRIVER, TLM, HORIZ SIT DISP	D	—	1.04

Table 4.8.1.1-2. PTI_SEQUENCER I-Loads				
Name	Description	Type	MSID	Units
WINDOW_LE(N) N = 1 – 10	Leading edge of PTI window (may be Qbar or Mach)	F	V99U6150C to V99U6159C	ND
WINDOW_TE(N) N = 1 – 10	Trailing edge of PTI window (may be Qbar or Mach)	F	V99U6175C to V99U6184C	ND
QBAR_WINDOWS	Number of windows defined by dynamic pressure	I	V99U6200C	ND
MACH_WINDOWS	Number of windows defined by Mach number	I	V99U6201C	ND
MACH_ADTA	The Mach number below which PTI's may not be executed without ADTA air data	F	V99U6210C	ND
RATE_LIMIT(N) N = 1 – 3	Maximum roll, pitch, yaw rate at which PTI's may be performed	F	V99U6207C V99U6208C V99U6209C	deg/s

Table 4.8.1.1-3. PTI_SEQUENCER Initialization Requirements			
Variable	Initialize on Transition		Value
	From	To	
PTI_INHIBIT	—	First pass	True
PTI_WINDOW	—	First pass	False
PTI_NUMBER	—	First pass	1
PTI_EXECUTE	—	First pass	False
GUID_ACCEPT	PTI_ACT_D	PTI_ACT_D	True
	—	First pass	

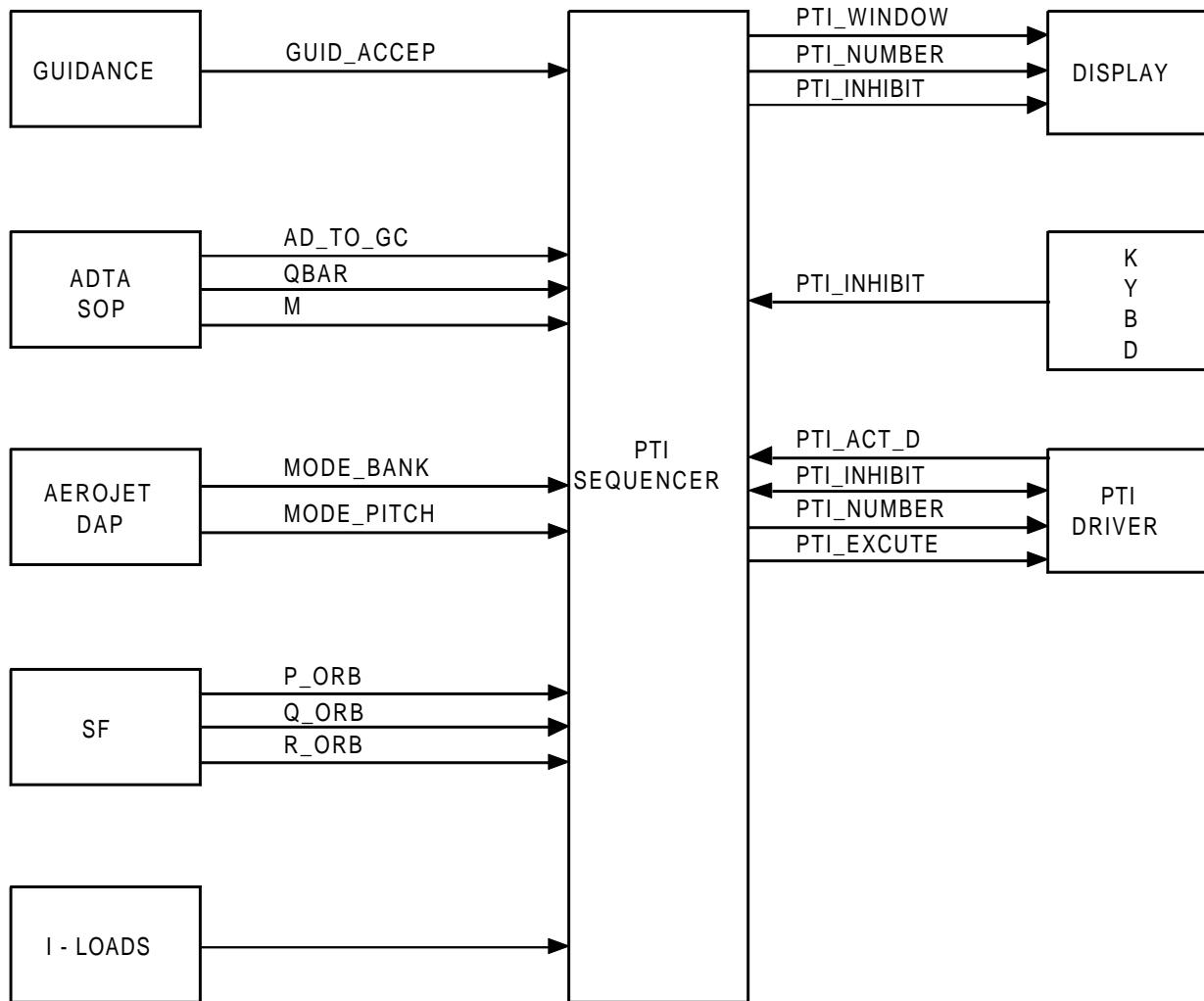


FIGURE 4.8.1.1-1. PTI_Sequencer Block Diagram

4.9 UTILITY FUNCTIONS

For proper descriptions of these functions, which appear as part of the specification in other parts of this document, particular implementation forms are presented (e.g., the nodal form for filters). These implementations should not be construed as design constraints. Also, it should not be inferred that these functions must be used as subroutines, since in-line coding may be simpler. The utility functions listed in Table 4.9-1 are discussed in the subsection indicated.

Table 4.9-1. UTILITY FUNCTIONS Module Cross-Reference

Functions	Subsection
FIRST_ORDER_FILTER	4.9.1
SECOND_ORDER_FILTER	4.9.2
FOURTH_ORDER_FILTER	4.9.3
FADER	4.9.4
HYSTER	4.9.5
SMOOTHER	4.9.6

4.9.1 FIRST_ORDER_FILTER

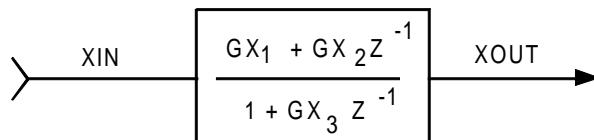
A. Function – This function is a generalized first-order filter which, with the appropriate coefficients, can represent any nonintegral (low pass, high pass, washout) first-order function. The steady-state gain need not be unity. The detailed block diagram for FIRST_ORDER_FILTER is presented in Figure 4.9.1-1. For illustrative purposes, the nodal implementation has been chosen.

B. Processing Requirements – The FIRST_ORDER_FILTER is processed at the rate specified by the particular application.

C. Interface Requirements – The interface requirements for FIRST_ORDER_FILTER are shown in Table 4.9.1-1.

D. Internal Variables – The internal variables for FIRST_ORDER_FILTER are shown in Table 4.9.1-2.

E. Initialization Requirements – The requirement for local dynamic initialization (establishing the steady-state response to the present input) for a nodal implementation of a first-order filter is presented in Table 4.9.1-3. (NOTE: If the output must be initialized to some value other than the steady-state response to the present input, the initialization provisions of Table 4.9.1-3 may have to be modified.)



NODAL IMPLEMENTATION, SIGNAL FLOW, AND OPERATING EQUATIONS:

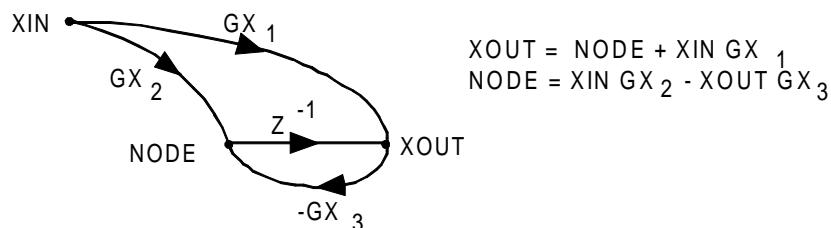


FIGURE 4.9.1-1. FIRST_ORDER_FILTER

Table 4.9.1-1.FIRST_ORDER_FILTER Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Input</u> XIN	Filter input	—	F	—	—
<u>Output</u> XOUT	Filter output	—	F	—	—

Table 4.9.1-2.FIRST_ORDER_FILTER Internal Variables

Name	Description	Type	Value	Units
$\left. \begin{array}{l} \text{GX}_1 \\ \text{GX}_2 \\ \text{GX}_3 \end{array} \right\}$	Filter coefficients	F	—	—

Note: If the filter is implemented as a subroutine, then the filter coefficients will be passed in an argument list from the calling statement, along with the present input and the node value.

Table 4.9.1-3.FIRST_ORDER_FILTER Initialization Requirements.

Component	Initial Initialize on Transition		Variable	Initial Value
	From	To		
First-order filter		As specified in the particular application	Node	*
$*\text{temp} = \left(\frac{\text{GX}_1 + \text{GX}_2}{1 + \text{GX}_3} \right) \text{XIN}$ $\text{NODE} = \text{XIN GX}_2 - \text{temp GX}_3$				

4.9.2 SECOND_ORDER_FILTER

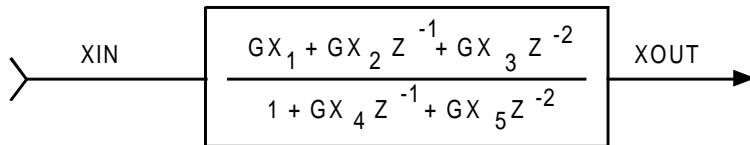
A. Function – This function is a generalized second-order filter whose coefficients can represent washouts, notches, rolloffs, or even pairs of first-order functions, as well as any specified gain. The detailed block diagram is presented in Figure 4.9.2–1. This may not be required for flight code.

B. Processing Requirements – SECOND_ORDER_FILTER is processed at the rate specified by the particular application.

C. Interface Requirements – The interface requirements for SECOND_ORDER_FILTER are shown in Table 4.9.2–1.

D. Internal Variables – The internal variables for SECOND_ORDER_FILTER are shown in Table 4.9.2–2.

E. Initialization Requirements – The initialization requirements for SECOND_ORDER_FILTER are shown in Table 4.9.2–3. (NOTE: If the filter must be initialized to some value other than the steady-state response to the present input, the initialization provisions of Table 4.9.2–3 may have to be modified.)



NODAL IMPLEMENTATION, SIGNAL FLOW, AND OPERATING EQUATIONS:

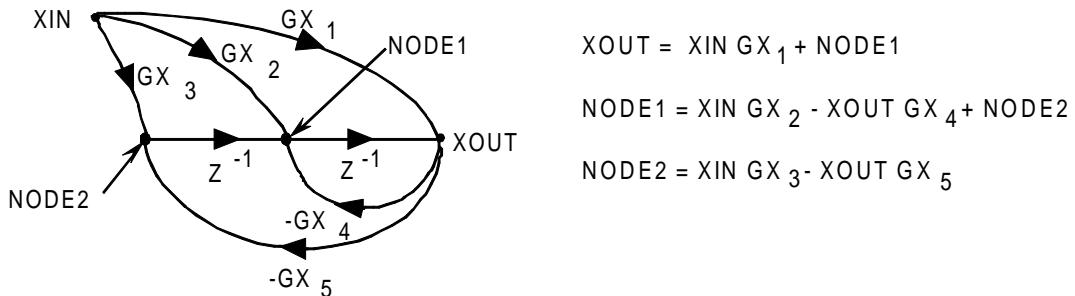


FIGURE 4.9.2-1. SECOND_ORDER_FILTER

Table 4.9.2-1.SECOND_ORDER_FILTER Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Input</u> XIN	Filter input	—	F	—	—
<u>Output</u> XOUT	Filter output	—	F	—	—

Table 4.9.2-2.SECOND_ORDER_FILTER Internal Variables

Name	Description	Type	Value	Units
$\left. \begin{array}{l} \text{GX}_1 \\ \text{GX}_2 \\ \text{GX}_3 \\ \text{GX}_4 \\ \text{GX}_5 \end{array} \right\}$	Filter coefficients	F	—	—

Note: If the filter is implemented as a subroutine, then the filter coefficients will be passed in an argument list from the calling statement, along with the present input and the two node values.

Table 4.9.2-3.SECOND_ORDER_FILTER Initialization Requirements.

Component	Initialize on Transition		Initial Value
	From	To	
Second-order filter	As specified in the particular application		Node 1 Node 2
$*(\text{GX}_6 - \text{GX}_1) \text{ XIN}$ $**(\text{GX}_3 - \text{GX}_6 \text{ GX}_5) \text{ XIN}$ where $\text{GX}_6 = \left(\frac{\text{GX}_1 + \text{GX}_2 + \text{GX}_3}{1 + \text{GX}_4 + \text{GX}_5} \right)$			

4.9.3 FOURTH_ORDER_FILTER

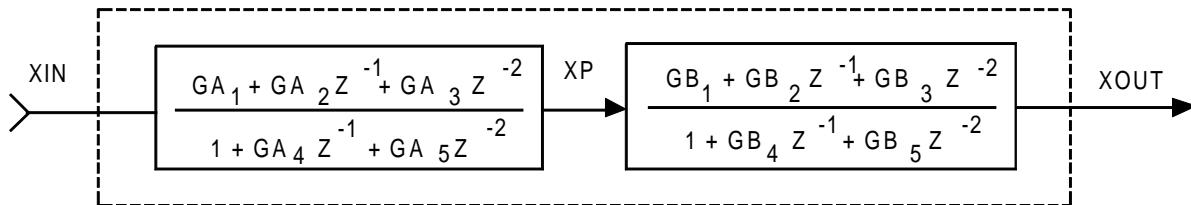
A. Function – This function applies fourth-order filtering to the pitch, roll, and yaw channels to stabilize structural resonance modes. It is implemented in the form of two cascaded second-order filters. (If a polynomial implementation were to be used instead, double precision might be necessary.) The detailed block diagram is shown in Figure 4.9.3-1.

B. Processing Requirements – FOURTH_ORDER_FILTER is processed at the rate specified by the particular application.

C. Interface Requirements – The interface requirements for FOURTH_ORDER_FILTER are shown in Table 4.9.3-1.

D. Internal Variables – The internal variables for FOURTH_ORDER_FILTER are shown in Table 4.9.3-2.

E. Initialization Requirements – The initialization requirements for FOURTH_ORDER_FILTER are shown in Table 4.9.3-3. (NOTE: If the filter must be initialized to some value other than the steady-state response to the present input, the initialization provisions of Table 4.9.3-3 may have to be modified.)



NODAL IMPLEMENTATION, SIGNAL FLOW, AND OPERATING EQUATIONS:

$$XP = XIN \cdot GA_1 + NODEA1$$

$$XOUT = XP \cdot GB_1 + NODEB1$$

$$NODEB1 = XP \cdot GB_2 - XOUT \cdot GB_4 + NODEB2$$

$$NODEB2 = XP \cdot GB_3 - XOUT \cdot GB_5$$

$$NODEA1 = XIN \cdot GA_2 - XP \cdot GA_4 + NODEA2$$

$$NODEA2 = XIN \cdot GA_3 - XP \cdot GA_5$$

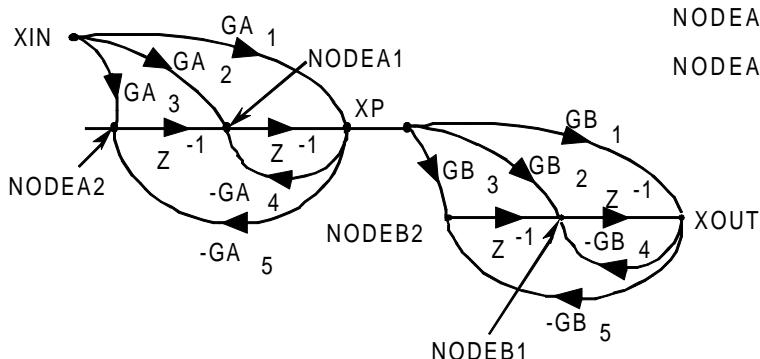


FIGURE 4.9.3-1. FOURTH_ORDER_FILTER

Table 4.9.3-1.FOURTH_ORDER_FILTER Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Input</u> XIN	Filter input	—	F	—	—
<u>Output</u> XOUT	Filter output	—	F	—	—

Table 4.9.3-2.FOURTH_ORDER_FILTER Internal Variables

Name	Description	Type	Value	Units
GA ₁	Filter coefficients	F	—	—
GA ₂				
GA ₃				
GA ₄				
GA ₅				
GB ₁				
GB ₂				
GB ₃				
GB ₄				
GB ₅				

Note: If the filter is implemented as a subroutine, then the filter coefficients will be passed in an argument list from the calling statement, along with the present input and the four node values.

Table 4.9.3-3.FOURTH_ORDER_FILTER Initialization Requirements.

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Fourth-order filter	As specified in the particular application		Node A1 Node A2 Node B3 Node B4	* ** *** ****
<p>*GA₇ XIN **(GA₃ – GA₆ GA₅) XIN ***GB₇ XP ****(GB₃ – GB₆ GB₅) XP where</p> $GA_7 = GA_6 - GA_1$ $GA_6 = \frac{GA_1 + GA_2 + GA_3}{1 + GA_4 + GA_5}$ $GB_7 = GB_6 - GB_1$ $GB_6 = \frac{GB_1 + GB_2 + GB_3}{1 + GB_4 + GB_5}$ <p>XP = GA₆ XIN (on initialization)</p>				

4.9.4 FADER

A. Function – This routine permits transient-free switching from one input to another. When the input is switched and the FADER triggered, any difference between the old and new inputs is stored and subsequently decreased linearly to zero in a fixed number of computation cycles. Thus, the output will not change discontinuously when switching occurs. The block diagram is presented in Figure 4.9.4-1.

- B. Processing Requirements – FADER is processed as required.
- C. Interface Requirements – The interface requirements for FADER are shown in Table 4.9.4-1.
- D. Internal Variables – The internal variables for FADER are shown in Table 4.9.4-2.
- E. Initialization Requirements – The initialization requirements for FADER are shown in Table 4.9.4-3.

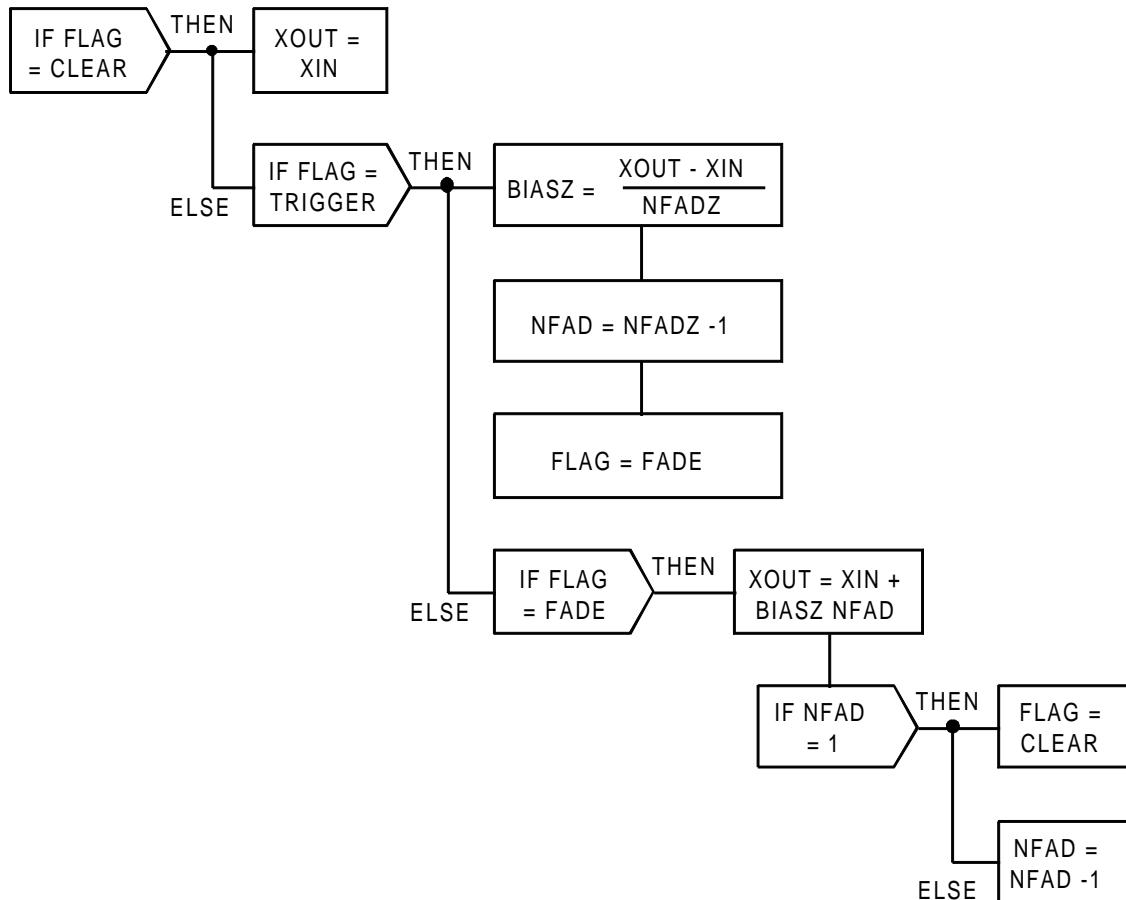


FIGURE 4.9.4-1. FADER

Table 4.9.4-1.FADER Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Input</u> XIN	Input to fader	—	F	—	—
<u>Output</u> XOUT	Output of fader	—	F	—	—

Table 4.9.4-2.FADER Internal Variables

Name	Description	Type	Value	Units
NFADZ	Number of cycles over which the bias is to be faded out	I	*	ND

Table 4.9.4-3.FADER Initialization Requirements.

Component	Initialize on Transition		Variable	Initial Value
	From	To		
Fader	—	First pass	FLAG	CLEAR

4.9.5 HYSTER

- A. Function – This routine applies a deadband and hysteresis to the input signal. The detailed block diagram is presented in Figure 4.9.5–1.
- B. Processing Requirements – HYSTER is processed at the rate specified by the particular application.
- C. Interface Requirements – The interface requirements for HYSTER are shown in Table 4.9.5–1.
- D. Internal Variables – The internal variables for HYSTER are shown in Table 4.9.5–2.
- E. Initialization Requirements – The initialization requirements for HYSTER are shown in Table 4.9.5–3.

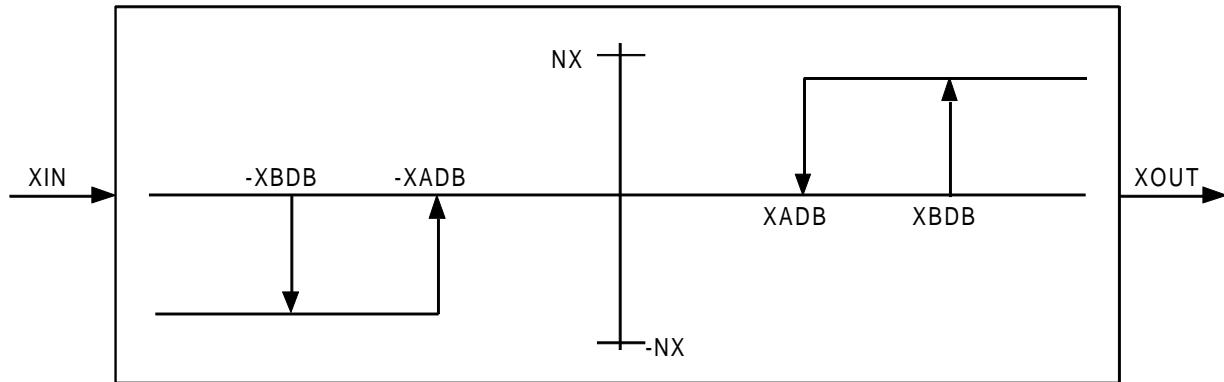


FIGURE 4.9.5-1. HYSTER

Table 4.9.5-1.HYSTER Interface Requirements

Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Input</u> XIN (past XOUT)	Input to deadbanded hysteresis Previous value of output	—	F	*	*
<u>Output</u> XOUT	Output of deadbanded hysteresis	—	F	*	*

Table 4.9.5-2.HYSTER Internal Variables

Name	Description	Type	Value	Units
XADB	Inner deadband	F	*	*
XBDB	Outer deadband	F	*	*
NX	Magnitude of output	F	*	*

Table 4.9.5-3.HYSTER Initialization Requirements.

Component	Initialize on Transition		Variable	Initial Value
	From	To		
	*	*	Past XOUT	0.0

*As specified in the particular application for pitch, roll, or yaw

4.9.6 SMOOTH

- A. Function – This routine provides a smoothed, high-rate output between samples of a low-rate input signal.
- B. Processing Requirements – SMOOTH is processed at the high rate specified by the particular application.
- C. Interface Requirements – The interface requirements for SMOOTH are shown in Table 4.9.6–1.
- D. Internal Variables – The internal variables for SMOOTH are shown in Table 4.9.6–2.
- E. Initialization Requirements – The initialization requirements for SMOOTH are shown in Table 4.9.6–3.
- F. Detailed Technical Description – A detailed description in terms of a logic flow diagram is presented in Figure 4.9.6–1.

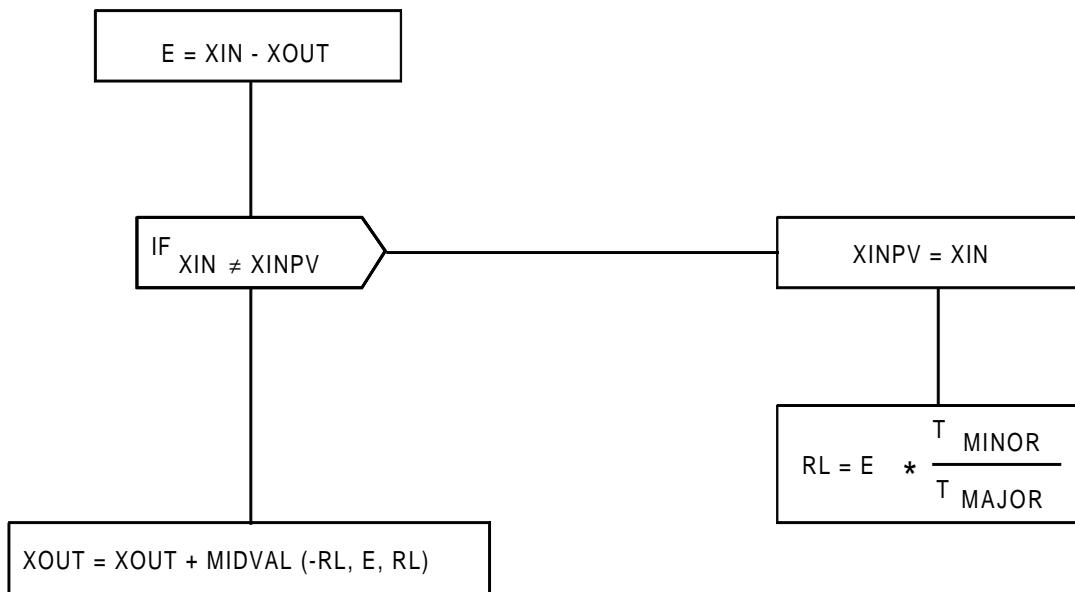


FIGURE 4.9.6-1. SMOOTH

Table 4.9.6-1.SMOOTHHER Interface Requirements					
Name	Description	Source or Destination	Type	Units	Sample Rate (Hz)
<u>Input</u> XIN	Smoother input	—	F	*	*
<u>Output</u> XOUT	Smoother output	—	F	*	*

Table 4.9.6-2.SMOOTHHER Internal Variables					
Name	Description	Type	Value	Units	
TMAJOR	Guidance cycle period	F	*	sec	
TMINOR	Period at which the output signal is updated	F	*	sec	
*As specified in the particular application					

Table 4.9.6-3.SMOOTHHER Initialization Requirements.					
Component	Initialize on Transition		Variable	Initial Value	
	From	To			
Smoothen	As specified in the particular application		*	*	

4.10 Flight Control Principal Function Automated Tables

The automated Interface Definition Document (IDD) parameters are listed in tables 4.10.1–1, 4.10.1–2, 4.10.2–1, 4.10.2–2, 4.10.3–1 and 4.10.3–2 define signal (parameter) interface requirements either between hardware (LRU) and software elements and other software elements.

Values for I-loads are listed in the I-loads requirements document JSC-19350. I-load parameters applicable to this document are listed in tables 4.10.1–3, 4.10.2–3 and 4.10.3–3.

K-loads by definitiion are former I-loads which have become hard-coded and are listed in tables 4.10.1–4, 4.10.2–4 and 4.10.3–4.

Constants parameters and their associated principal functions are listed in tables 4.10.1–5, 4.10.2–5 and 4.10.3–5.

TABLE 4.10.1-1. INPUT FUNCTIONAL PARAMETERS FOR AERO-JET DIGITAL AUTOPILOT (G4.36)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	L A S T	C R E V	R E C
ALPCMD	V90H0803CA	COMMANDED ANGLE OF ATTACK	ENT GUID	DEG			93017G	*	
ALPHA	V95H3021C	GN&C ANGLE OF ATTACK	ADTA SOP	DEG	SPL		93017G	*	
ALPHA_N	V90H2246C	NAV DERIVED ANGLE OF ATTACK	A/E ATT PROC	DEG	SPL		93017G	*	
ALT	V95H0175CC	CURR ORB ALT ABOVE REF ELLIPSOID	ENT UPP	FT	SPL		93017G	*	
ALT_ELV	V93X4493X	ALTERNATE ELEVON SCHEDULE CMD	OVERRIDE DISP			BD			
AL_IND	V90X8651X	AUTOLAND INDICATOR	MSC						
AUTMANBF	V96X1051X	STATION SELECTED AUT/MAN BODY FLAP	GN&C SW RM						
AUTOP	V96X1031X	STATION SELECTED AUTO-PITCH	GN&C SW RM						
AUTORY	V96X1041X	STATION SELECTED AUTO-ROLL/YAW	GN&C SW RM						
AUTOSB	V96X1052X	STATION SEL SPD BK/THROT AUTO/MAN	GN&C SW RM						
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(05)	V90X4535X	JET R1R AVAILABLE	RCS RM			BD	93017G	*	
AVAILABLE_JET_AFT(06)	V90X4536X	JET R1U 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(13)	V90X4541X	JET R3R AVAILABLE	RCS RM			BD	93017G	*	
AVAILABLE_JET_AFT(14)	V90X4542X	JET R3D 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	*	
BETA_N	V90H2249C	INERTIAL SIDESLIP ANGLE	A/E ATT PROC	DEG	SPL		93017G	*	
COMP_NW_POSN	V91H6378C	COMPENSATED NOSEWHEEL POSITION	NW POSN SOP	DEG					89889H
COSPHI	V90H2204C	EULER ANGLE ROLL COSINE	A/E ATT PROC						
COSTH	V90H2215C	EULER ANGLE PITCH COSINE	A/E ATT PROC						93090E
CROSSFEED_OPEN	V90X1540X	RCS CROSSFEED SEQ COMPLETE FLAG	RCS/RCS XFEED						
CSSP	V96X1035X	STATION SELECTED CSS-PITCH	GN&C SW RM						
CSSRY	V96X1045X	STATION SELECTED CSS-ROLL/YAW	GN&C SW RM						
DAMAN/RHC(1)	V96H0005CA	MANUAL ROLL CMD	2-AX RHC SOP		DEG				
DATM_PAN	V96J1011C	MANUAL PANEL ROLL TRIM	2-AX RHC SOP						
DATM_RHC	V96J1054C	MANUAL RHC ROLL TRIM	2-AX RHC SOP						
DBFMAN	V96J1021C	MANUAL BODY FLAP CMD	BF SLEW SOP						
DBFOFB	V95H8310C	COMP BODY FLAP POS	BF PFB SOP		DEG				
DEFB	V95H8001C	ELEVATOR POSITION	ELVN PFB SOP	DEG	SPL		93017G	*	
DELIBOFB	V95H8010C	COMP LIB ELEVON POS	ELVN PFB SOP	DEG	BSS				
DELOBOFB	V95H8060C	COMP LOB ELEVON POS	ELVN PFB SOP	DEG	BSS				
DEMAN/RHC(2)	V96H0007CA	MANUAL PITCH CMD	2-AX RHC SOP	DEG					

TABLE 4.10.1-1. INPUT FUNCTIONAL PARAMETERS FOR AERO-JET DIGITAL AUTOPILOT (G4.36)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	L A S T C R	R E V
DERIBOFB	V95H8110C	COMP RIB ELEVON POS	ELVN PFB SOP	DEG	BSS		92230F	
DEROBOFB	V95H8160C	COMP ROB ELEVON POS	ELVN PFB SOP	DEG	BSS			
DETM_PAN	V96J1013C	MANUAL PANEL PITCH TRIM	2-AX RHC SOP					
DETM_RHC	V96J1053C	MANUAL RHC PITCH TRIM	2-AX RHC SOP					
DOWNLOCK	V96X3011X	DOWNLOCK FLAG	HYD SYS SOP					
DRMAN	V96H0009C	MANUAL YAW CMD	RPTA SOP	DEG				
DROFB	V95H8210C	COMP RUDDER POS	RUD PFB SOP	DEG	BSS			
DRT	V96J1015C	MANUAL YAW TRIM CMD	RPTA SOP					
DSBC_AL	V90H1011CB	SPEEDBRAKE ANGLE COMMAND-AUTO LAND	A/L GUID	DEG		93017G	*	
DSBC_AT	V90H1011CC	SPEEDBRAKE ANGLE COMMAND-AUTO LAND	TAEM GUID	DEG		93017G	*	
DSBMAN	V96H0001C	SEL MAN SPDBK CMD	SBTC SOP	DEG				
DSBOFB	V95H8260C	COMP SPDBK POS	SB PFB SOP	DEG		93087E		
EAS	V95L3145C	GN&C EQUIVALENT AIRSPEED	ADTA SOP	FT/S	SPL	93017G	*	
FILT	V93X4494X	BODY BENDING FILTER SCHED CMD	OVERRIDE DISP					
FLATTURN_CMD	V96X0051X	FLATTURN INDICATOR	LANDING SOP					
GSENBL	V90X2554X	GROUND SPEED ENBL CMD - NWS	LANDING SOP		BD	93017G	*	
HYDRFAIL(1)	V96X3005X	HYDR SYS 1 FAIL STATUS	HYD SYS SOP		BD	93017G	*	
HYDRFAIL(2)	V96X3006X	HYDR SYS 2 FAIL STATUS	HYD SYS SOP		BD	93017G	*	
HYDRFAIL(3)	V96X3007X	HYDR SYS 3 FAIL STATUS	HYD SYS SOP		BD	93017G	*	
JET_FAIL_CHANGE_FLAG	V90X4619X	JET STATUS CHANGED	RCS RM					
JET_MAP(01)	V90J5727C	1ST PRIORITY JET IN GROUP 1	RCS RM					
JET_MAP(02)	V90J5728C	2ND PRIORITY JET IN GROUP 1	RCS RM					
JET_MAP(03)	V90J5729C	3RD PRIORITY JET IN GROUP 1	RCS RM					
JET_MAP(04)	V90J5730C	1ST PRIORITY JET IN GROUP 2	RCS RM					
JET_MAP(05)	V90J5731C	2ND PRIORITY JET IN GROUP 2	RCS RM					
JET_MAP(06)	V90J5732C	1ST PRIORITY JET IN GROUP 3	RCS RM					
JET_MAP(07)	V90J5733C	2ND PRIORITY JET IN GROUP 3	RCS RM					
JET_MAP(08)	V90J5734C	1ST PRIORITY JET IN GROUP 4	RCS RM					
JET_MAP(09)	V90J5735C	2ND PRIORITY JET IN GROUP 4	RCS RM					
JET_MAP(10)	V90J5736C	3RD PRIORITY JET IN GROUP 4	RCS RM					
JET_MAP(11)	V90J5737C	1ST PRIORITY JET IN GROUP 5	RCS RM					
JET_MAP(12)	V90J5738C	2ND PRIORITY JET IN GROUP 5	RCS RM					
JET_MAP(13)	V90J5739C	1ST PRIORITY JET IN GROUP 6	RCS RM					
JET_MAP(14)	V90J5740C	2ND PRIORITY JET IN GROUP 6	RCS RM					
JET_MAP(15)	V90J5741C	1ST PRIORITY JET IN GROUP 7	RCS RM					
JET_MAP(16)	V90J5742C	2ND PRIORITY JET IN GROUP 7	RCS RM					
JET_MAP(17)	V90J5743C	1ST PRIORITY JET IN GROUP 8	RCS RM					
JET_MAP(18)	V90J5744C	2ND PRIORITY JET IN GROUP 8	RCS RM					
JET_MAP(19)	V90J5745C	1ST PRIORITY JET IN GROUP 9	RCS RM					
JET_MAP(20)	V90J5746C	2ND PRIORITY JET IN GROUP 9	RCS RM					
JET_MAP(21)	V90J5747C	3RD PRIORITY JET IN GROUP 9	RCS RM					
JET_MAP(22)	V90J5748C	4TH PRIORITY JET IN GROUP 9	RCS RM					
JET_MAP(23)	V90J5749C	1ST PRIORITY JET IN GROUP 10	RCS RM					
JET_MAP(24)	V90J5750C	2ND PRIORITY JET IN GROUP 10	RCS RM					
JET_MAP(25)	V90J5751C	3RD PRIORITY JET IN GROUP 10	RCS RM					
JET_MAP(26)	V90J5752C	4TH PRIORITY JET IN GROUP 10	RCS RM					

TABLE 4.10.1-1. INPUT FUNCTIONAL PARAMETERS FOR AERO-JET DIGITAL AUTOPILOT (G4.36)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R	LAST CR E	R E V
JET_MAP(27)	V90J5753C	1ST PRIORITY JET IN GROUP 11	RCS RM					
JET_MAP(28)	V90J5754C	2ND PRIORITY JET IN GROUP 11	RCS RM					
JET_MAP(29)	V90J5755C	3RD PRIORITY JET IN GROUP 11	RCS RM					
JET_MAP(30)	V90J5756C	1ST PRIORITY JET IN GROUP 12	RCS RM					
JET_MAP(31)	V90J5757C	2ND PRIORITY JET IN GROUP 12	RCS RM					
JET_MAP(32)	V90J5758C	3RD PRIORITY JET IN GROUP 12	RCS RM					
JET_MAP(33)	V90J5759C	1ST PRIORITY JET IN GROUP 13	RCS RM					
JET_MAP(34)	V90J5760C	2ND PRIORITY JET IN GROUP 13	RCS RM					
JET_MAP(35)	V90J5761C	3RD PRIORITY JET IN GROUP 13	RCS RM					
JET_MAP(36)	V90J5762C	1ST PRIORITY JET IN GROUP 14	RCS RM					
JET_MAP(37)	V90J5763C	2ND PRIORITY JET IN GROUP 14	RCS RM					
JET_MAP(38)	V90J5764C	3RD PRIORITY JET IN GROUP 14	RCS RM					
L_GAIN	V90X3321X	SEL ENTRY ROLL MODE L GAIN	GN&C SW RM			BD	92157	
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_304/MM_304	V90X8161X	MAJOR MODE 304 FLAG	MSC				92355B	
MM_CODE_305/MM_305	V90X8162X	MAJOR MODE 305 FLAG	MSC				92355B	
NO_Y_JET	V90X3322X	SEL ENTRY ROLL MODE NO Y JET	GN&C SW RM			BD	92157	
NWS1_MODE_FLAG	V91X6376X	NWS1 MODE	NW POSN SOP			BD	89889H	
NWS2_MODE_FLAG	V91X6377X	NWS2 MODE	NW POSN SOP			BD	89889H	
NY	V90A5361C	SELECTED AA LATERAL ACCEL	SF		G	SPL	93017G	*
NZ	V90A5381C	SELECTED AA NORMAL ACCEL	SF		G	SPL	93017G	*
NZC	V90A1025CA	NORMAL ACCEL CMD	A/L GUID				93017G	*
NZC	V90A1025CB	NORMAL ACCEL CMD	TAEM GUID		G		93017G	*
N_HYDRAULIC_GOOD	V96Q3001C	HYDR SYS GOOD STATUS	HYD SYS SOP			HXS	93017G	*
PHI/PHI_TOPO	V90H2202C	BODY ROLL ATTITUDE EULER ANGLE	A/E ATT PROC		DEG	SPL	93017G	*
PHIC_AL	V90H1044CA	COMMANDED ROLL ANGLE	A/L GUID		DEG		93017G	*
PHIC_AT	V90H1044CB	COMMANDED ROLL ANGLE	TAEM GUID		DEG		93017G	*
PRL_TVC_ISOL_VLV_OP	V90X5522X	PRL TVC ISO VLV OPEN FLAG	LDG GEAR VLV CNTL				89991E	
PTI_ACT	V90X3251X	PTI ACTIVE IND	PTI			BD		
PTI_ACT_D	V90X3249X	PTI ACTIVE FLAG	PTI			BD	93017G	*
PTI_AIL	V90R3252C	PTI AILERON CMD	PTI					
PTI_ELV	V90R3253C	PTI ELEVON CMD	PTI					
PTI_PIT	V90R3256C	PTI PITCH CMD	PTI					
PTI_RHC	V93U0892C	PTI ROLL RATE COMMAND	PTI		DEG/SEC	SPL	90476F	
PTI_ROLL	V90R3255C	PTI ROLL CMD	PTI					
PTI_RUD	V90R3254C	PTI RUDDER CMD	PTI					
PTI_WRAP	V93X0893X	PTI WRAPAROUND MODE FLAG	PTI			BD	90476F	
PTI_YAW	V90R3257C	PTI YAW CMD	PTI					
P_ORB	V90R5301CA	SELECTED RGA ROLL RATE	SF		DEG/S		93017G	*
QBAR/QBAR_AD	V95P3011C	GN&C DYNAMIC PRESSURE	ADTA SOP		LBF/FT2	SPL	93017G	*
Q_ORB/Q	V90R5321CA	SELECTED RGA PITCH RATE	SF		DEG/S		93017G	*
RC	V90R1027CA	AUTOLAND YAW RATE CMD	A/L GUID		DEG/S		93017G	*
RECONFIG_CMPL	V90X1539X	RCS XFD RECONFIG SEQ COMPLETE FLAG	RCS/RCS XFEED				89599C	
RETRACT_BF	V90X1030XA	BF RETRACT FLAG	A/L GUID					
RHC_STATE(1)	V96J0015CB	RHC OUT OF DETENT ROLL	2-AX RHC SOP				89740B	

TABLE 4.10.1-1. INPUT FUNCTIONAL PARAMETERS FOR AERO-JET DIGITAL AUTOPILOT (G4.36)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V C
RHC_STATE(2)	V96J0017CB	RHC OUT OF DETENT PITCH	2-AX RHC SOP				89740B	
ROLLC(1)	V90H1044CC	COMMANDED ROLL ANGLE	ENT GUID	DEG			93017G	*
ROLLOUT_IND	V96X0052X	ROLLOUT FLAG	LANDING SOP				90102D	
R_ORB	V90R5341CA	SELECTED RGA YAW RATE	SF	DEG/S			93017G	*
SBEV_LH	V96X0002X	CMDR SBTC TAKEOVER FLAG	SBTC SOP					
SBEV_RH	V96X0003X	PLT SBTC TAKEOVER FLAG	SBTC SOP					
SINPHI	V90H2203C	EULER ANGLE ROLL SINE	A/E ATT PROC					
SINTH	V90H2216C	EULER ANGLE PITCH SINE	A/E ATT PROC				93090E	
TAS	V95L3015C	GN&C TRUE AIRSPEED	ADTA SOP	FT/S	SPL		93017G	*
TG_END	V90X1108XA	TAEM GUIDANCE TERMINATION FLAG	TAEM GUID				93017G	*
THETA/THETA_TOPO	V90H2217C	BODY PITCH ATTITUDE EULER ANGLE	A/E ATT PROC	DEG	SPL		93017G	*
UPLOCK_REL	V96X3010X	UPLOCKED RELEASE FLAG	HYD SYS SOP					
WOWLON_IND	V96X0050X	WEIGHT ON MAIN WHEELS INDICATOR	LANDING SOP		BD		93017G	*
WRAP_MODE	V93X0891X	WRAPAROUND FCS MODE	OVERRIDE DISP		BD		90476F	

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

TABLE 4.10.1-2. OUTPUT FUNCTIONAL PARAMETERS FROM AERO-JET DIGITAL AUTOPILOT (G4.36)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	L A S T	C R E V
ALFERR_FDC	V90H1623CB	ANGLE OF ATTACK ERROR	E/L ADI PROC TLM	DEG				
AUTOBF_IND	V90X1582XA	BF AUTO FLAG	E/L EV AN PROC				92354	
AUTOP_IND/AUTOP_LAMP	V90X1632XA	PITCH AUTO FLAG	2-AX RHC SOP A/L GUID E/L EV AN PROC MEDS FC GNC XFER TAEM GUID TLM				92522D	
AUTORY_IND/AUTORY_LAMP	V90X1642XA	ROLL/YAW AUTO FLAG	2-AX RHC SOP A/L GUID E/L EV AN PROC ENT GUID MEDS FC GNC XFER TAEM GUID TLM				92522D	
AUTOSB_IND/AUTOSB_LAMP	V90X1565XA	SPDBK AUTO FLAG	E/L EV AN PROC MEDS FC GNC XFER				92676B	
BETAfdc	V90U1664CA	DAP SIDESLIP ANGLE	E/L ADI PROC					
CSSP_IND/CSSP_LAMP	V90X1631XA	PITCH CSS FLAG	E/L ADI PROC	DEG			92354	
CSSRY_IND/CSSRY_LAMP	V90X1641XA	ROLL/YAW CSS FLAG	E/L EV AN PROC				92354	
DAC	V90H1644C	AILERON DEFLECTION CMD(DAC)	TLM	DEG				
DATRIM	V90H1629CA	AILERON TRIM	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5 TLM VERT SIT1 DISP VERT SIT2 DISP	DEG				
DAY	V90R1620C	COMMANDED YAW RATE(DAY)	DL FMT 23/1	DEG/S			93017G	*
DBFPC	V90H1647CA	BF POSITION CMD	E/L EV AN PROC TLM	DEG				
DBFRC	V90H1580CC	BODY FLAP DEFLECTION CMD	AERO ACT SOP BF CMD RM DL FMT 23/1				93017G	*
DCSP	V90H1500C	PRELIM AILERON CMD(DCSP)	DL FMT 21/1 DL FMT 23/A	DEG			93017G	*
DECC	V90H1503C	ELEVATOR DEFLECTION CMD(DECC)	DL FMT 21/1 DL FMT 23/B	DEG			93017G	*
DLIBPC	V90H1734CB	LIB ELEVON POSITION CMD	AERO ACT SOP	DEG				
DLOBPC	V90H1735CB	LOB ELEVON POSITION CMD	AERO ACT SOP	DEG				

TABLE 4.10.1-2. OUTPUT FUNCTIONAL PARAMETERS FROM AERO-JET DIGITAL AUTOPILOT (G4.36)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	L A S T C R	R E V
DNWC	V90H1672CA	NOSEWHEEL DEFLECTION CMD	AERO ACT SOP DL FMT 23/2 NW POSN SOP	DEG			93017G	*
DRCPF	V90H1621CA	PRELIMINARY RUDDER COMMAND (DRCPF)	DL FMT 23/1	DEG			93017G	*
DRIBPC	V90H1737CB	RIB ELEVON POSITION CMD	AERO ACT SOP	DEG				
DROBPC	V90H1738CB	ROB ELEVON POSITION CMD	AERO ACT SOP	DEG				
DRPC	V90R1550CC	RATE LIMITED RUDDER CMD	AERO ACT SOP DL FMT 23/2	DEG			93017G	*
DRTI	V90H1669CA	LATERAL ACCEL TRIM	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5 VERT SIT1 DISP VERT SIT2 DISP					
DRTRIM	V90H1668CA	RUDDER TRIM	ENTRY TRAJ1 ENTRY TRAJ2 ENTRY TRAJ3 ENTRY TRAJ4 ENTRY TRAJ5 VERT SIT1 DISP VERT SIT2 DISP	DEG				
DSBC	V90H1634CA	SPDBK CMD	E/L EV AN PROC TLM	DEG				
DSBPC	V90R1560CC	RATE LIMITED SPDBK CMD	AERO ACT SOP	DEG			93017G	*
DSB_ENT_SCHED	V90H1624CA	SCHEDULED SPDBK CMD	DL FMT 23/1 E/L EV AN PROC SPI PROC	DEG			92447C	
FCS_ACCEPT_ICNCT	V90X8296XA	INTERCONNECTED DUMP CONSTRAINT	ABT CNTL SEQ				90705H	
HUD_AIL_CMD	V90H1633CA	HUD AIL CMD	DL FMT 23/1 HUDE1 HUDE2	DEG			93017G	*
LOAD_RELIEF	V90X1643XA	LOAD RELIEF DISCRETE	2-AX RHC SOP				89120A	
MNLBF_IND	V90X1583XA	BF MD FLAG	E/L EV AN PROC				92354	
MNLSB_CMD_IND	V90X1567XA	CDR SPDBK MD FLAG	E/L EV AN PROC				92354	
MNLSB_PLT_IND	V90X1568XA	PLT SPDBK MD FLAG	E/L EV AN PROC				92354	
MODE_BANK	V90X2406X	AUTO/MANUAL BANK FLAG	PTI					
MODE_PITCH	V90X2407X	AUTO/MANUAL PITCH FLAG	PTI					
NEW_JONLST_AFT(02)/L1L_ON	V90X1673XC	RCS JET L1L ON CMD	E/L RCS CMD SOP TLM				89463	
NEW_JONLST_AFT(03)/L1U_ON	V90X1674XC	RCS JET L1U ON CMD	E/L RCS CMD SOP TLM				89463	
NEW_JONLST_AFT(05)/R1R_ON	V90X1683XC	RCS JET R1R ON CMD	E/L RCS CMD SOP TLM				89463	
NEW_JONLST_AFT(06)/R1U_ON	V90X1684XC	RCS JET R1U ON CMD	E/L RCS CMD SOP TLM				89463	

TABLE 4.10.1-2. OUTPUT FUNCTIONAL PARAMETERS FROM AERO-JET DIGITAL AUTOPILOT (G4.36)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	L A S T	C R E V	R E C
NEW_JONLST_AFT(10)/L3L_ON	V90X1678XC	RCS JET L3L ON CMD	E/L RCS CMD SOP TLM						89463
NEW_JONLST_AFT(11)/L3D_ON	V90X1679XC	RCS JET L3D ON CMD	E/L RCS CMD SOP TLM						89463
NEW_JONLST_AFT(13)/R3R_ON	V90X1688XC	RCS JET R3R ON CMD	E/L RCS CMD SOP TLM						89463
NEW_JONLST_AFT(14)/R3D_ON	V90X1689XC	RCS JET R3D ON CMD	E/L RCS CMD SOP TLM						89463
NEW_JONLST_AFT(17)/L2L_ON	V90X1675XC	RCS JET L2L ON CMD	E/L RCS CMD SOP TLM						89463
NEW_JONLST_AFT(18)/L2U_ON	V90X1676XC	RCS JET L2U ON CMD	E/L RCS CMD SOP TLM						89463
NEW_JONLST_AFT(19)/L2D_ON	V90X1677XC	RCS JET L2D ON CMD	E/L RCS CMD SOP TLM						89463
NEW_JONLST_AFT(20)/R2R_ON	V90X1685XC	RCS JET R2R ON CMD	E/L RCS CMD SOP TLM						89463
NEW_JONLST_AFT(21)/R2U_ON	V90X1686XC	RCS JET R2U ON CMD	E/L RCS CMD SOP TLM						89463
NEW_JONLST_AFT(22)/R2D_ON	V90X1687XC	RCS JET R2D ON CMD	E/L RCS CMD SOP TLM						89463
NEW_JONLST_AFT(23)/L4L_ON	V90X1680XC	RCS JET L4L ON CMD	E/L RCS CMD SOP TLM						89463
NEW_JONLST_AFT(24)/L4U_ON	V90X1681XC	RCS JET L4U ON CMD	E/L RCS CMD SOP TLM						89463
NEW_JONLST_AFT(25)/L4D_ON	V90X1682XC	RCS JET L4D ON CMD	E/L RCS CMD SOP TLM						89463
NEW_JONLST_AFT(26)/R4R_ON	V90X1690XC	RCS JET R4R ON CMD	E/L RCS CMD SOP TLM						89463
NEW_JONLST_AFT(27)/R4U_ON	V90X1691XC	RCS JET R4U ON CMD	E/L RCS CMD SOP TLM						89463
NEW_JONLST_AFT(28)/R4D_ON	V90X1692XC	RCS JET R4D ON CMD	E/L RCS CMD SOP TLM						89463
NZERRFD	V90A1619CB	NORMAL ACCEL ERROR	DL FMT 23/B E/L ADI PROC	G	SPL	93017G	*		
PC	V90R1600CA	ROLL RATE COMMAND(PC)	DL FMT 23/1			93017G	*		
PTI_INHIBIT	V93X5227XB	INHIBIT PTI EXECUTION	DL FMT 23/1 HORIZ SIT DISP			93017G	*		
P_STAB	V90R1622CB	STABILITY ROLL RATE	E/L ADI PROC TLM	DEG/S					
QFFDC	V90R1626CA	SLAPDOWN PITCH RATE ERROR	E/L ADI PROC	DEG/S		92354			
RMBETA	V90H1646CA	RMBETA	ADTA RM	DEG		89862A			
RS_AILERON	V90X1604XB	AILERON RATE SATURATION FLAG	RCS ACT LT						
RS_ELEVATOR	V90X1602XB	ELEVATOR RATE SATURATION FLAG	RCS ACT LT						
R_STAB	V90R1627CB	STABILITY YAW RATE	E/L ADI PROC TLM	DEG/S					
UXCMD	V90J1636CA	ROLL JET COMMAND	RCS ACT LT						

TABLE 4.10.1-2. OUTPUT FUNCTIONAL PARAMETERS FROM AERO-JET DIGITAL AUTOPILOT (G4.36)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V C
UYCMD	V90J1638CA	PITCH JET COMMAND	RCS ACT LT					
UZCMD	V90H2736CA	ROTATION JET COMMAND YAW	DL FMT 23/2				93017G	*
WRAP	V94X0008X	WRAPAROUND MODE DISCRETE	RCS ACT LT					
ZERO_YAWJET	V90X1639X	INDICATES TERMINATION OF YAW JETS	DL FMT 23/A			BD	93017G	*
	V90M2995PA	CGCB_MC163_FLAG_2	OVERRIDE DISP				93017G	*
	V90X1666X	FC FLIGHT REGIME INDICATOR	MSC				93017G	*
	V94M3063P	WRAPAROUND MODE PARENT	DL FMT 23/1				93017G	*
	V96M0141PA	CGCB_MC163_FLAG_1	DL FMT 23/1				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

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
ALPHA_LIM_INTC	V97U1282C	DEG			F	S	D C G4.227 G4.36	01	ZF8	89674E	
BFRADB	V97U1147C	DEG			F	S	D X G4.227 G4.36	03	ZF8	90710	
BFRBDB	V97U1148C	DEG			F	S	D X G4.227 G4.36	00	ZF7	90710	
BRAKE_FLOW	V97U1201C	GAL/MIN			F	S	D A G4.227 G4.36	00	ZF8	92438A	
CPHIMIN	V97U0608C	ND			F	S	D C G4.227 G4.36	00	ZS7	89680A	
DACDOT_LIM1	V97U1192C	DEG/SEC			F	S	D A G4.227 G4.36	00	ZF8	89674E	
DACDOT_LIM2	V97U1193C	DEG/SEC			F	S	D A G4.227 G4.36	00	ZF8	89674E	
DACDOT_LIM3	V97U1194C	DEG/SEC			F	S	D A G4.227 G4.36	00	ZF8	89674E	
DACDOT_LIMW	V97U1202C	DEG/SEC			F	S	D A G4.227 G4.36	00	ZF8	92438A	
DAC_LIM	V97U0612C	DEG			F	S	D C G4.227 G4.36	00	ZS7	89680A	
DATLIM	V97U0615C	DEG/SEC			F	S	D C G4.227 G4.36	00	ZS7	89680A	
DATRIM_LIM_NYJET	V97U7431C	DEG			F	S	D C G4.36	00	ZF9	90476F	
DBFADBN	V97U0623C	DEG			F	S	D C G4.227 G4.36	00	ZF7	90711D	
DBFADBP	V97U9620C	DEG			F	S	D C G4.227 G4.36	00	ZF7	90711D	
DBFBDB	V97U0624C	DEG			F	S	D C G4.227 G4.36	00	ZF7	90710	
DBFD	V97U1112C	DEG			F	S	D C G4.227 G4.36	01	JDG	79962F	
DBFL	V97U0627C	GAL/MIN			F	S	D X G4.227 G4.36	03	JDG		
DECCDOT_LIM1	V97U1189C	DEG/SEC			F	S	D A G4.227 G4.36	00	ZF8	89674E	
DECCDOT_LIM2	V97U1190C	DEG/SEC			F	S	D A G4.227 G4.36	00	ZF8	89674E	
DECCDOT_LIM3	V97U1191C	DEG/SEC			F	S	D A G4.227 G4.36	00	ZF8	89674E	
DECCDOT_LIMW	V97U1203C	DEG/SEC			F	S	D A G4.227 G4.36	00	ZF8	92438A	
DECCMAX	V97U1104C	DEG			F	S	D C G4.227 G4.36	00	ZS7	89680A	
DECCMIN	V97U1105C	DEG			F	S	D C G4.227 G4.36	00	ZS7	89680A	
DECCSLP	V97U1179C	DEG			F	S	D C G4.227 G4.36	00	ZF8	89674E	

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
DELVC_MAX	V97U0639C	DEG		F	S	D	C	G4.227 G4.36	00	ZS7	89680A
DELVC_MIN	V97U0640C	DEG		F	S	D	C	G4.227 G4.36	00	ZS7	89680A
DEMAX	V97U0642C	DEG		F	S	D	C	G4.227 G4.36	00	ZS7	89680A
DETRIM_MAX	V97U0644C	DEG		F	S	D	C	G4.227 G4.36	00	ZS7	89680A
DETRIM_MIN	V97U0645C	DEG		F	S	D	C	G4.227 G4.36	00	ZS7	89680A
DETR_LIM	V97U0643C	DEG/SEC		F	S	D	C	G4.227 G4.36	00	ZS7	89680A
DLIM	V97U0651C	DEG		F	S	D	X	G4.227 G4.36	00	ZS7	89680A
DNWC_LIM	V97U0652C	DEG		F	S	D	C	G4.227 G4.36	00	ZF7	90710
DNWMAX	V97U0653C	DEG		F	S	D	C	G4.227 G4.36	00	ZF7	90710
DRDOT_LIM1	V97U1369C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	89674E
DRDOT_LIM2	V97U1370C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	89674E
DRDOT_LIM3	V97U1180C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	89674E
DRDOT_LIM_SLIM1	V97U1376C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	89674E
DRDOT_LIM_SLIM2	V97U1377C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	89674E
DRDOT_LIM_SLIM3	V97U1378C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	89674E
DRR_LIM	V98U9653C	DEG/SEC		F	S	D	C	G4.227 G4.36	01	ZF9	DC2453
DRR_LIM_NYJET	V97U7438C	DEG/SEC		F	S	D	C	G4.36	03	ZF9	
DR_LLM	V99U9683C	DEG		F	S	D	C	G4.227 G4.36	00	NWS	90102D
DSBCM	V97U0131C	ND		F	S	D	C	G4.204 G4.36 G4.9	01 03	ZF8 ZF8	89674E
DSBDOT_NLIM11	V97U1209C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	92438A
DSBDOT_NLIM12	V97U0678C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	92438A
DSBDOT_NLIM13	V97U0679C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	92438A
DSBDOT_NLIM2	V97U0668C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	89674E

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
DSBDOT_NLIM_SLIM1	V97U1373C	DEG/SEC		F	S	D	X	G4.227 G4.36	00	ZF7	90710
DSBDOT_NLIM_SLIM2	V97U1374C	DEG/SEC		F	S	D	X	G4.227 G4.36	00	ZF7	90710
DSBDOT_NLIM_SLIM3	V97U1375C	DEG/SEC		F	S	D	X	G4.227 G4.36	00	ZF7	90710
DSBDOT_PLIM1	V97U1210C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	92438A
DSBDOT_PLIM2	V97U0670C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	92438A
DSBDOT_PLIM3	V97U0671C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	92438A
DSB_MAX	V97U0664C	DEG		F	S	D	C	G4.227 G4.36	00	ZS7	89680A
EAS_SD	V96U9372C	FT/SEC		F	S	D	P	G4.227 G4.36	00	JDC	DC0762C
FCS_INTC_COUNT	V97U1281C	ND		I	S	D	C	G4.227 G4.36	01 03	ZF8 ZF8	89674E
FLOW_AVAIL	V97U1372C	GAL/MIN		F	S	D	X	G4.227 G4.36	00	ZF7	90710
GALFERR(1)	V96U9669C	ND		F	S	D	P	G4.36	00	ZF7	90710
GALFERR(2)	V96U9670C	ND		F	S	D	P	G4.36	00	ZF7	90710
GALFERR(3)	V96U9671C	ND		F	S	D	P	G4.36	00	ZF7	90710
GALFERRL(1)	V97U0575C	ND		F	S	D	P	G4.36	00	ZF9	90476F
GALFERRL(2)	V97U0576C	ND		F	S	D	P	G4.36	00	ZF9	90476F
GALFERRL(3)	V97U0577C	ND		F	S	D	P	G4.36	00	ZF9	90476F
GALRE	V98U9650C	ND		F	S	D	C	G4.227 G4.36	00	ZF7	90710
GALR_BIAS	V98U9652C	ND		F	S	D	C	G4.227 G4.36	00	ZS7	89680A
GBA(1,1)	V96U9604C	ND		F	S	D	X	G4.227 G4.36	00	JDB	89674E
GBA(1,2)	V96U9619C	ND		F	S	D	X	G4.227 G4.36	00	JDB	89674E
GBA(2,1)	V96U9605C	ND		F	S	D	X	G4.227 G4.36	00	JDB	89674E
GBA(2,2)	V96U9620C	ND		F	S	D	X	G4.227 G4.36	00	JDB	89674E
GBA(3,1)	V96U9606C	ND		F	S	D	X	G4.227 G4.36	00	JDB	89674E
GBA(3,2)	V96U9621C	ND		F	S	D	X	G4.227 G4.36	00	JDB	89674E
GBA(4,1)	V96U9607C	ND		F	S	D	X	G4.227 G4.36	00	JDB	89674E
GBA(4,2)	V96U9622C	ND		F	S	D	X	G4.227 G4.36	00	JDB	89674E

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
GBA(5,1)	V96U9608C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GBA(5,2)	V96U9623C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GBETA	V97U1140C	DEG/SEC/DEG			F	S	D C G4.227 G4.36	00	ZS7	89680A	
GDAB	V97U0685C	LBS/FT**2			F	S	D X G4.227 G4.36	00	ZS7	89680A	
GDA_MAX	V97U0683C	DEG/DEG/ SEC			F	S	D X G4.227 G4.36	00	ZF8	89674E	
GDA_MIN	V97U0684C	DEG/DEG/ SEC			F	S	D X G4.227 G4.36	00	ZF8	89674E	
GDET_MAX	V97U0566C	ND			F	S	D C G4.36	00	ZF9	90476F	
GDET_MIN	V97U0565C	ND			F	S	D C G4.36	00	ZF9	90476F	
GDGAI(1)	V97U0690C	ND			F	S	D X G4.227 G4.36	01	ZF7	90710	03
GDGAI(2)	V97U0691C	ND			F	S	D X G4.227 G4.36	01	ZF7	90710	03
GDGAI(3)	V97U0692C	ND			F	S	D X G4.227 G4.36	01	ZF7	90710	03
GDQ_MAX	V97U0693C	DEG/DEG/ SEC			F	S	D C G4.227 G4.36	00	ZF8	89674E	
GDQ_MIN	V97U0695C	DEG/DEG/ SEC			F	S	D C G4.227 G4.36	00	ZF8	89674E	
GDRGB(1)	V97U0700C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	
GDRGB(2)	V97U0701C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	
GDRGB(3)	V97U0702C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	
GDRGB(4)	V97U0703C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	
GDRGB(5)	V97U0704C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	
GDSBMAN	V97U0706C	DEG/DEG			F	S	D C G4.227 G4.36	00	ZS7	89680A	
GEBA(1)	V97U0707C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBA(2)	V97U0708C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBA(3)	V97U0709C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBA(4)	V97U0710C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBA(5)	V97U0711C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
GEBB(1)	V97U0712C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBB(2)	V97U0713C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBB(3)	V97U0714C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBB(4)	V97U0715C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBB(5)	V97U0716C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBC(1)	V96U8573C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBC(2)	V96U8574C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBC(3)	V96U7897C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBC(4)	V96U7898C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBC(5)	V96U7899C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GELError(1)	V97U0717C	ND			F	S	M C G4.227 G4.36	00	JDC	DC0762C	
GELError(2)	V97U0718C	ND			F	S	M C G4.227 G4.36	00	JDC	DC0762C	
GELError(3)	V97U0719C	ND			F	S	M C G4.227 G4.36	00	JDC	DC0762C	
GF1	V99U9671C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GF2	V99U9672C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GF3	V99U9673C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GF4	V99U9674C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GF5	V99U9675C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GHLBY(1)	V99U9753C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
GHLBY(2)	V99U9754C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
GHLBY(3)	V99U9755C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
GHLBY(4)	V99U9756C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
GHLBY(5)	V99U9757C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
GMGA1	V99U7170C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGA2	V99U7171C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGA3	V99U7172C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGA4	V99U7173C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGA5	V99U7174C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGB1	V99U7175C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGB2	V99U7176C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGB3	V99U7177C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGB4	V99U7178C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGB5	V99U7179C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGC1	V99U7180C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGC2	V99U7181C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGC3	V99U7182C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGC4	V99U7183C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGC5	V99U7184C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMLA1	V99U7185C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMLA2	V99U7186C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMLA3	V99U7187C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMLA4	V99U7188C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMLA5	V99U7189C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMLB1	V99U7190C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMLB2	V99U7191C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMLB3	V99U7192C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
GMLB4	V99U7193C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMLB5	V99U7194C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMLC1	V99U7195C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMLC2	V99U7196C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMLC3	V99U7197C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMLC4	V99U7198C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMLC5	V99U7199C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GNWR	V97U0723C	SEC			F	S	D P G4.227 G4.36	00	ZF7	90710	
GNY(1)	V99U9677C	ND			F	S	D C G4.227 G4.36	00	NWS	90102D	
GNY(2)	V99U9678C	ND			F	S	D C G4.227 G4.36	00	NWS	90102D	
GNY(3)	V99U9679C	ND			F	S	D C G4.227 G4.36	00	NWS	90102D	
GNY(4)	V99U9680C	ND			F	S	D C G4.227 G4.36	00	NWS	90102D	
GNY(5)	V99U9681C	ND			F	S	D C G4.227 G4.36	00	NWS	90102D	
GNYNWS	V99U9676C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GNYR	V99U9682C	DEG/G			F	S	D C G4.227 G4.36	00	NWS	90102D	
GNZfilt_AL(1)	V96U9616C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	
GNZfilt_AL(2)	V96U9617C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	
GNZfilt_AL(3)	V96U9618C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	
GPA(1)	V97U0727C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	
GPA(2)	V97U0728C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	
GPA(3)	V97U0729C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	
GPA(4)	V97U0730C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	
GPA(5)	V97U0731C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
GPB(1)	V97U0732C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	
GPB(2)	V97U0733C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	
GPB(3)	V97U0734C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	
GPB(4)	V97U0735C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	
GPB(5)	V97U0736C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	
GPC_LL	V96U9368C	DEG/(DEG/SEC)			F	S	D X G4.227 G4.36	00	ZF7	90710	
GPC_UL	V96U9367C	DEG/(DEG/SEC)			F	S	D X G4.227 G4.36	00	ZF7	90710	
GPFWDLO	V97U1157C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
GPPANT	V97U0740C	DEG/SEC			F	S	D C G4.227 G4.36	00	ZS7	89680A	
GPRHCT	V97U0741C	DEG/SEC**2			F	S	D C G4.227 G4.36	00	ZF8	DC0882B	
GPRJA(1)	V96U9594C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPRJA(2)	V96U9595C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPRJA(3)	V96U9596C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPRJA(4)	V96U9597C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPRJA(5)	V96U9598C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPRJB(1)	V96U9599C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPRJB(2)	V96U9600C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPRJB(3)	V96U9601C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPRJB(4)	V96U9602C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPRJB(5)	V96U9603C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPX	V97U0742C	ND			F	S	D C G4.227 G4.36	00	ZS7	89680A	
GRCA(1)	V97U0751C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCA(2)	V97U0752C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
GRCA(3)	V97U0753C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCA(4)	V97U0754C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCA(5)	V97U0755C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCB(1)	V97U0756C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCB(2)	V97U0757C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCB(3)	V97U0758C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCB(4)	V97U0759C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCB(5)	V97U0760C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCSA	V97U0761C	ND			F	S	D C G4.227 G4.36	00	ZS7	89680A	
GRCYJA(1,1)	V96U9624C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJA(1,2)	V96U9634C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJA(2,1)	V96U9625C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJA(2,2)	V96U9635C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJA(3,1)	V96U9626C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJA(3,2)	V96U9636C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJA(4,1)	V96U9627C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJA(4,2)	V96U9637C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJA(5,1)	V96U9628C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJA(5,2)	V96U9638C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJB(1,1)	V96U9629C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJB(1,2)	V96U9639C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJB(2,1)	V96U9630C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJB(2,2)	V96U9640C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
GRCYJB(3,1)	V96U9631C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJB(3,2)	V96U9641C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJB(4,1)	V96U9632C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJB(4,2)	V96U9642C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJB(5,1)	V96U9633C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJB(5,2)	V96U9643C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRPANT	V98U9626C	DEG/SEC			F	S	D C G4.227 G4.36	00	ZF7	90710	
GRR	V97U0765C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	
GRYFWDLO	V97U1162C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GSBETA	V97U1119C	DEG/SEC/DEG			F	S	D C G4.227 G4.36	00	ZS7	89680A	
GSD(1)	V97U0778C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GSD(2)	V97U0779C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GSD(3)	V97U0780C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GTRIMB	V96U8085C	ND			F	S	D C G4.227 G4.36	01	ZF9	DC2453	
GTRIMB_NYJET IYAW_CYCLE	V97U7439C	ND			F	S	D C G4.36	03	ZF9		
	V97U1146C	ND			I	S	D C G4.227 G4.36	00	ZF7	90476F	
KDAB_AUTO	V96U9371C	DEG/DEG			F	S	D P G4.227 G4.36	00	ZF7	90710	
KDAB_CSS	V96U9370C	DEG/DEG			F	S	D C G4.227 G4.36	00	ZF7	90710	
KDEMLIN	V97U0798C	DEG/DEG			F	S	D C G4.227 G4.36	00	ZS7	89680A	
KEIO	V97U1167C	(GAL/MIN)/(DEG/SEC)			F	S	D A G4.227 G4.36	00	ZF8	89674E	
KEIS	V97U1171C	(GAL/MIN)/(DEG/SEC)			F	S	D A G4.227 G4.36	00	ZF8	89674E	
KEOO	V97U1168C	(GAL/MIN)/(DEG/SEC)			F	S	D A G4.227 G4.36	00	ZF8	89674E	
KEOS	V97U1172C	(GAL/MIN)/(DEG/SEC)			F	S	D A G4.227 G4.36	00	ZF8	89674E	
KGPC	V96U9366C	LB*SEC/FT**2			F	S	D X G4.227 G4.36	00	ZF7	90710	

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
KNWMLIN	V97U0806C	DEG/DEG			F	S	D C G4.227 G4.36	00	ZF7	90710	
KNWMPAR	V97U0807C	DEG/DEG**2			F	S	D C G4.227 G4.36	00	ZF7	90710	
KQR	V97U1371C	(GAL/MIN) / (DEG/SEC)			F	S	D A G4.227 G4.36	00	ZF8	89674E	
KQSB	V97U0809C	(GAL/MIN) / (DEG/SEC)			F	S	D X G4.227 G4.36	00	ZF7	90710	
LEAKAGE1	V97U1181C	GAL/MIN			F	S	D A G4.227 G4.36	00	ZF8	89674E	
LEAKAGE2	V97U1182C	GAL/MIN			F	S	D A G4.227 G4.36	00	ZF8	89674E	
LEAKAGE3	V97U1183C	GAL/MIN			F	S	D A G4.227 G4.36	00	ZF8	89674E	
LIMPR_HA	V97U1368C	DEG/SEC			F	S	D A G4.227 G4.36	00	ZF8	89674E	
LIMPR_LA	V97U1367C	DEG/SEC			F	S	D A G4.227 G4.36	00	ZF8	89674E	
LLIM	V97U0819C	DEG			F	S	D X G4.227 G4.36	00	ZS7	89680A	
LNDG_GR_FLOW	V97U1174C	GAL/MIN			F	S	D A G4.227 G4.36	00	ZF8	89674E	
LNDG_GR_LEAKAGE	V97U1175C	GAL/MIN			F	S	D A G4.227 G4.36	00	ZF8	89674E	
LOAD_RELIEF_DELAY	V97U0820C	SEC			F	S	D C G4.227 G4.36	00	ZF7	90710	
MACH_1	V96U9658C	ND			F	S	D X G4.227 G4.36	00	ZF9	DC2453	
MACH_ADTA	V99U6210C	ND			F	S	M P G4.248 G4.36	00	PTI	DC0599	
MACH_AILERON	V98U9703C	ND			F	S	D C G4.227 G4.36	00	ZF9	DC2453	
MACH_HYST	V96U8083C	ND			F	S	D C G4.227 G4.36	00	ZF9	DC2453	
MACH_RRXF	V98U9704C	ND			F	S	D X G4.227 G4.36	00	ZF9	DC2453	
MACH_RUDDER	V98U9702C	ND			F	S	D C G4.227 G4.36	00	ZF9	DC2453	
MACH_TAL	V97U9870C	ND			F	S	M P G4.36	00	ZF8	89674E	
MACH_WINDOWS	V99U6201C	ND			I	S	M P G4.36	00	PTI	DC0599	
MACH_YAWJET	V97U0825C	ND			F	S	D X G4.227 G4.36	00	ZF9	DC2453	
M_PHI	V96U9668C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	
NP_HIGH	V97U0832C	ND			I	S	D X G4.227 G4.36	00	ZS7	89680A	

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
NP_LOW	V97U0833C	ND		I	S	D	X G4.227 G4.36	00	ZS7	89680A	
NR(2)	V97U0837C	ND		I	S	D	C G4.227 G4.36	00	ZS7	89680A	
NR(3)	V97U0838C	ND		I	S	D	C G4.227 G4.36	00	ZS7	89680A	
NR(4)	V97U0839C	ND		I	S	D	C G4.227 G4.36	00	ZS7	89680A	
NWS_FLOW	V97U1204C	GAL/MIN		F	S	D	A G4.227 G4.36	00	ZF8	92438A	
NZFDfilt(1)	V97U0841C	ND		F	S	D	C G4.227 G4.36	00	ZF7	90710	
NZFDfilt(2)	V97U0842C	ND		F	S	D	C G4.227 G4.36	00	ZF7	90710	
NZFDfilt(3)	V97U0843C	ND		F	S	D	C G4.227 G4.36	00	ZF7	90710	
PHI_LIM_INTC	V97U1283C	DEG		F	S	D	C G4.227 G4.36	01	ZF8	89674E	
PIO_ENABLE	V96U8761C	ND		D		D	C G4.227 G4.36	00	ZF9	DC2453	
PSF(1)	V96U8762C	ND		F	S	D	C G4.227 G4.36	00	ZF7	90710	
PSF(2)	V96U8763C	ND		F	S	D	C G4.227 G4.36	00	ZF7	90710	
PSF(3)	V96U8764C	ND		F	S	D	C G4.227 G4.36	00	ZF7	90710	
PSF(4)	V96U8765C	ND		F	S	D	C G4.227 G4.36	00	ZF7	90710	
PSF(5)	V96U8766C	ND		F	S	D	C G4.227 G4.36	00	ZF7	90710	
PSFL	V96U8773C	DEG		F	S	D	C G4.227 G4.36	00	ZF7	90710	
P_LIM_INTC	V97U1284C	DEG/S		F	S	D	C G4.227 G4.36	01	ZF8	89674E	
QBAR(1)	V97U0866C	LBS/FT**2		F	S	D	C G4.227 G4.36	03	ZF8	DC2453	
QBAR(2)	V97U0867C	LBS/FT**2		F	S	D	C G4.227 G4.36	00	ZF9	DC2453	
QBAR(3)	V97U0868C	LBS/FT**2		F	S	D	C G4.227 G4.36	00	ZF9	DC2453	
QBAR(4)	V97U0869C	LBS/FT**2		F	S	D	C G4.227 G4.36	00	ZF9	DC2453	
QBAR(5)	V97U0870C	LBS/FT**2		F	S	D	X G4.227 G4.36	01	ZF9	DC2453	
QBAR(6)	V97U0871C	LBS/FT**2		F	S	D	X G4.227 G4.36	03	ZF9	DC2453	

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
QBAR(7)	V97U9873C	LBS/FT**2			F	S	D C G4.227 G4.36	00	ZF9	DC2453	
QBAR(8)	V97U9874C	LBS/FT**2			F	S	D C G4.227 G4.36	00	ZF9	DC2453	
QBARB	V97U0873C	LBS/FT**2			F	S	D C G4.227 G4.36	00	ZS7	89680A	
QBAR_OFFSET	V97U0872C	LBS/FT**2			F	S	D C G4.227 G4.36	00	ZS7	89680A	
QBAR_WINDOWS	V99U6200C	ND			I	S	M P G4.36	00	PTI	DC0599	
QBAR_WRAP_HIGH	V97U0595C	LB/FT**2			F	S	D C G4.36	00	ZF9	90476F	
QBAR_WRAP_LOW	V97U0594C	LB/FT**2			F	S	D C G4.36	00	ZF9	90476F	
QBLIML_CSS	V97U1153C	LBS/FT**2			F	S	D C G4.227 G4.36	00	ZF9	DC2453	
QC_ALT(1,1)	V96U9377C	DEG/SEC			F	S	M P G4.36	00	JDC	DC0762C	
QC_ALT(1,2)	V96U9379C	DEG			F	S	M P G4.36	00	JDC	DC0762C	
QC_ALT(2,1)	V96U9378C	DEG/SEC			F	S	M P G4.36	00	JDC	DC0762C	
QC_ALT(2,2)	V96U9380C	DEG			F	S	M P G4.36	00	JDC	DC0762C	
QC_NOM(1,1)	V96U9373C	DEG/SEC			F	S	M P G4.227 G4.36	01	JDC	DC0762C	03
QC_NOM(1,2)	V96U9375C	DEG			F	S	M P G4.227 G4.36	01	JDC	DC0762C	03
QC_NOM(2,1)	V96U9374C	DEG/SEC			F	S	M P G4.227 G4.36	01	JDC	DC0762C	03
QC_NOM(2,2)	V96U9376C	DEG			F	S	M P G4.227 G4.36	01	JDC	DC0762C	03
Q_LIM_INTC	V97U1285C	DEG/S			F	S	D C G4.227 G4.36	01	ZF8	89674E	03
Q_PK_LOAD	V97U2901C	DEG/S			F	S	D C G4.227 G4.36	00	ZF7	90710	
Q_STRUCT	V97U2902C	DEG/S			F	S	D C G4.227 G4.36	00	ZF7	90710	
RATE_LIMIT(1)	V99U6207C	DEG/SEC			F	S	M P G4.36	00	PTI	DC0599	
RATE_LIMIT(2)	V99U6208C	DEG/SEC			F	S	M P G4.36	00	PTI	DC0599	
RATE_LIMIT(3)	V99U6209C	DEG/SEC			F	S	M P G4.36	00	PTI	DC0599	
RBBF1	V99U8870C	ND			F	S	M C G4.227 G4.36	00	JDY	89679C	
RBBF2	V99U8871C	ND			F	S	M C G4.227 G4.36	00	JDY	89679C	
RBBF3	V99U8872C	ND			F	S	M C G4.227 G4.36	00	JDY	89679C	
RBBF4	V99U8873C	ND			F	S	M C G4.227 G4.36	00	JDY	89679C	
RBBF5	V99U8874C	ND			F	S	M C G4.227 G4.36	00	JDY	89679C	
RTHL(1,1)	V96U9659C	ND			F	S	D X G4.227 G4.36	01 03	ZF7 ZF7	90710	

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
RTHL(1,2)	V96U9661C	DEG/S			F	S	D X G4.227 G4.36	01 03	ZF7 ZF7	90710	
RTHL(2,1)	V96U9660C	ND			F	S	D X G4.227 G4.36	01 03	ZF7 ZF7	90710	
RTHL(2,2)	V96U9662C	DEG/S			F	S	D X G4.227 G4.36	01 03	ZF7 ZF7	90710	
R_LIM_INTC	V97U1286C	DEG/S			F	S	D C G4.227 G4.36	01 03	ZF8 ZF8	89674E	
SB_SOFT_STOP	V97U1103C	DEG			F	S	D C G4.227 G4.36	00	ZF8	89674E	
SFA(1)	V96U8767C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
SFA(2)	V96U8768C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
SFA(3)	V96U8769C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
SFB(1)	V96U8770C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
SFB(2)	V96U8771C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
SFB(3)	V96U8772C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
SIN_LIM	V97U1128C	ND			F	S	D C G4.227 G4.36	00	ZS7	89680A	
SLIMHYS	V97U1173C	DEG			F	S	D X G4.227 G4.36	00	ZF7	90710	
SSME_ISOL_VLV_LEAKAGE	V97U4274C	GAL/MIN			F	S	D A G4.36	00	ZF9	DC2453	
TAS_PIO	V96U8760C	FT/SEC			F	S	D C G4.227 G4.36	00	ZF9	DC2453	
TAS_SW	V97U1166C	FT/SEC			F	S	D C G4.227 G4.36	00	ZF8	89674E	
TDAXFDL(1,1)	V97U7432C	DEG			F	S	D P G4.36	00	ZF9	90476F	
TDAXFDL(1,2)	V97U7433C	DEG			F	S	D P G4.36	00	ZF9	90476F	
TDAXFDL(2,1)	V97U7434C	DEG			F	S	D P G4.36	00	ZF9	90476F	
TDAXFDL(2,2)	V97U7435C	DEG			F	S	D P G4.36	00	ZF9	90476F	
TDAXFDL(3,1)	V97U7436C	DEG			F	S	D P G4.36	00	ZF9	90476F	
TDAXFDL(3,2)	V97U7437C	DEG			F	S	D P G4.36	00	ZF9	90476F	
TDETD(1,1)	V97U0906C	DEG			F	S	M C G4.36	00	JD3	DC0599	
TDETD(1,2)	V97U0907C	ND			F	S	M C G4.36	00	JD3	DC0599	
TDETD(2,1)	V97U0908C	DEG			F	S	M C G4.36	00	JD3	DC0599	
TDETD(2,2)	V97U0909C	ND			F	S	M C G4.36	00	JD3	DC0599	
TDETD(3,1)	V97U0910C	DEG			F	S	M C G4.36	00	JD3	DC0599	
TDETD(3,2)	V97U0911C	ND			F	S	M C G4.36	00	JD3	DC0599	
TDETD(4,1)	V97U0912C	DEG			F	S	M C G4.36	00	JD3	DC0599	
TDETD(4,2)	V97U0913C	ND			F	S	M C G4.36	00	JD3	DC0599	
TDETD(5,1)	V97U0914C	DEG			F	S	M C G4.36	00	JD3	DC0599	
TDETD(5,2)	V97U0915C	ND			F	S	M C G4.36	00	JD3	DC0599	

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TDETD(6,1)	V97U0916C	DEG		F	S	M	C	G4.36	00	JD3	DC0599
TDETD(6,2)	V97U0917C	ND		F	S	M	C	G4.36	00	JD3	DC0599
TDETD(7,1)	V97U0918C	DEG		F	S	M	C	G4.36	00	JD3	DC0599
TDETD(7,2)	V97U0919C	ND		F	S	M	C	G4.36	00	JD3	DC0599
TDETD(8,1)	V97U0920C	DEG		F	S	M	C	G4.36	00	JD3	DC0599
TDETD(8,2)	V97U0921C	ND		F	S	M	C	G4.36	00	JD3	DC0599
TDETDA(1,1)	V97U1339C	DEG		F	S	M	C	G4.227	01	JD1	DC0599
								G4.36	03	JD2	
TDETDA(1,2)	V97U1340C	ND		F	S	M	C	G4.227	01	JD1	DC0599
								G4.36	03	JD2	
TDETDA(2,1)	V97U1341C	DEG		F	S	M	C	G4.227	01	JD1	DC0599
								G4.36	03	JD2	
TDETDA(2,2)	V97U1342C	ND		F	S	M	C	G4.227	01	JD1	DC0599
								G4.36	03	JD2	
TDETDA(3,1)	V97U1343C	DEG		F	S	M	C	G4.227	01	JD1	DC0599
								G4.36	03	JD2	
TDETDA(3,2)	V97U1344C	ND		F	S	M	C	G4.227	01	JD1	DC0599
								G4.36	03	JD2	
TDETDA(4,1)	V97U1196C	DEG		F	S	M	C	G4.227	01	JD1	DC0599
								G4.36	03	JD2	
TDETDA(4,2)	V97U1197C	ND		F	S	M	C	G4.227	01	JD1	DC0599
								G4.36	03	JD2	
TDETDA(5,1)	V97U1198C	DEG		F	S	M	C	G4.227	01	JD1	DC0599
								G4.36	03	JD2	
TDETDA(5,2)	V97U1199C	ND		F	S	M	C	G4.227	01	JD1	DC0599
								G4.36	03	JD2	
TDETDA(6,1)	V97U1333C	DEG		F	S	M	C	G4.227	01	JD1	DC0599
								G4.36	03	JD2	
TDETDA(6,2)	V97U1334C	ND		F	S	M	C	G4.227	01	JD1	DC0599
								G4.36	03	JD2	
TDETDA(7,1)	V97U1335C	DEG		F	S	M	C	G4.227	01	JD1	DC0599
								G4.36	03	JD2	
TDETDA(7,2)	V97U1336C	ND		F	S	M	C	G4.227	01	JD1	DC0599
								G4.36	03	JD2	
TDETDA(8,1)	V97U1337C	DEG		F	S	M	C	G4.227	01	JD1	DC0599
								G4.36	03	JD2	
TDETDA(8,2)	V97U1338C	ND		F	S	M	C	G4.227	01	JD1	DC0599
								G4.36	03	JD2	
TDETREF(1,1)	V97U0541C	ND		F	S	D	C	G4.36	00	ZF9	90476F
TDETREF(1,2)	V97U0542C	ND		F	S	D	C	G4.36	00	ZF9	90476F
TDETREF(2,1)	V97U0543C	ND		F	S	D	C	G4.36	00	ZF9	90476F
TDETREF(2,2)	V97U0544C	ND		F	S	D	C	G4.36	00	ZF9	90476F
TDETREF(3,1)	V97U0545C	ND		F	S	D	C	G4.36	00	ZF9	90476F
TDETREF(3,2)	V97U0546C	ND		F	S	D	C	G4.36	00	ZF9	90476F
TDETREF(4,1)	V97U0547C	ND		F	S	D	C	G4.36	00	ZF9	90476F
TDETREF(4,2)	V97U0548C	ND		F	S	D	C	G4.36	00	ZF9	90476F
TDETREF(5,1)	V97U0549C	ND		F	S	D	C	G4.36	00	ZF9	90476F

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TDETREF(5,2)	V97U0550C	ND			F	S	D C G4.36	00	ZF9	90476F	
TDETREF(6,1)	V97U0551C	ND			F	S	D C G4.36	00	ZF9	90476F	
TDETREF(6,2)	V97U0552C	ND			F	S	D C G4.36	00	ZF9	90476F	
TDETRNG(1,1)	V97U0553C	DEG**-1			F	S	D C G4.36	00	ZF9	90476F	
TDETRNG(1,2)	V97U0554C	ND			F	S	D C G4.36	00	ZF9	90476F	
TDETRNG(2,1)	V97U0555C	DEG**-1			F	S	D C G4.36	00	ZF9	90476F	
TDETRNG(2,2)	V97U0556C	ND			F	S	D C G4.36	00	ZF9	90476F	
TDETRNG(3,1)	V97U0557C	DEG**-1			F	S	D C G4.36	00	ZF9	90476F	
TDETRNG(3,2)	V97U0558C	ND			F	S	D C G4.36	00	ZF9	90476F	
TDETRNG(4,1)	V97U0559C	DEG**-1			F	S	D C G4.36	00	ZF9	90476F	
TDETRNG(4,2)	V97U0560C	ND			F	S	D C G4.36	00	ZF9	90476F	
TDETRNG(5,1)	V97U0561C	DEG**-1			F	S	D C G4.36	00	ZF9	90476F	
TDETRNG(5,2)	V97U0562C	ND			F	S	D C G4.36	00	ZF9	90476F	
TDETRNG(6,1)	V97U0563C	DEG**-1			F	S	D C G4.36	00	ZF9	90476F	
TDETRNG(6,2)	V97U0564C	ND			F	S	D C G4.36	00	ZF9	90476F	
TDSBCOM(1,1)	V97U0922C	DEG			F	S	D C G4.36	00	JDD	89674E	
TDSBCOM(1,2)	V97U0923C	ND			F	S	D C G4.36	00	JDD	89674E	
TDSBCOM(2,1)	V97U0924C	DEG			F	S	D C G4.36	00	JDD	89674E	
TDSBCOM(2,2)	V97U0925C	ND			F	S	D C G4.36	00	JDD	89674E	
TDSBCOM(3,1)	V97U0926C	DEG			F	S	D C G4.36	00	JDD	89674E	
TDSBCOM(3,2)	V97U0927C	ND			F	S	D C G4.36	00	JDD	89674E	
TDSBCOM(4,1)	V97U0928C	DEG			F	S	D C G4.36	00	JDD	89674E	
TDSBCOM(4,2)	V97U0929C	ND			F	S	D C G4.36	00	JDD	89674E	
TGALRD(1,1)	V99U9721C	ND			F	S	M C G4.227	00	ZF7	90710	
							G4.36				
TGALRD(1,2)	V99U9722C	ND			F	S	M C G4.227	00	ZF7	90710	
							G4.36				
TGALRD(2,1)	V99U9723C	ND			F	S	M C G4.227	00	ZF7	90710	
							G4.36				
TGALRD(2,2)	V99U9724C	ND			F	S	M C G4.227	00	ZF7	90710	
							G4.36				
TGALRD(3,1)	V99U9725C	ND			F	S	M C G4.227	00	ZF7	90710	
							G4.36				
TGALRD(3,2)	V99U9726C	ND			F	S	M C G4.227	00	ZF7	90710	
							G4.36				
TGALRD(4,1)	V99U9727C	ND			F	S	M C G4.227	00	ZF7	90710	
							G4.36				
TGALRD(4,2)	V99U9728C	ND			F	S	M C G4.227	00	ZF7	90710	
							G4.36				
TGALRD(5,1)	V99U9729C	ND			F	S	M C G4.227	00	ZF7	90710	
							G4.36				
TGALRD(5,2)	V99U9730C	ND			F	S	M C G4.227	00	ZF7	90710	
							G4.36				
TGALRD(6,1)	V99U9731C	ND			F	S	M C G4.227	00	ZF7	90710	
							G4.36				
TGALRD(6,2)	V99U9732C	ND			F	S	M C G4.227	00	ZF7	90710	
							G4.36				

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TGALRD(7,1)	V99U9733C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGALRD(7,2)	V99U9734C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGALRD(8,1)	V99U9735C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGALRD(8,2)	V99U9736C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGALRT(1,1)	V98U9638C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(1,2)	V98U9639C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(2,1)	V98U9640C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(2,2)	V98U9641C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(3,1)	V98U9642C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(3,2)	V98U9643C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(4,1)	V98U9644C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(4,2)	V98U9645C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(5,1)	V98U9646C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(5,2)	V98U9647C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(6,1)	V98U9648C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(6,2)	V98U9649C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGBAY(1,1)	V99U9737C	DEG/SEC/G			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGBAY(1,2)	V99U9738C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGBAY(2,1)	V99U9739C	DEG/SEC/G			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGBAY(2,2)	V99U9740C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGBAY(3,1)	V99U9741C	DEG/SEC/G			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGBAY(3,2)	V99U9742C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGBAY(4,1)	V99U9743C	DEG/SEC/G			F	S	M C G4.227 G4.36	00	ZF7	90710	

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TGBAY(4,2)	V99U9744C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGBAY(5,1)	V99U9745C	DEG/SEC/G			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGBAY(5,2)	V99U9746C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGBAY(6,1)	V99U9747C	DEG/SEC/G			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGBAY(6,2)	V99U9748C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGBAY(7,1)	V99U9749C	DEG/SEC/G			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGBAY(7,2)	V99U9750C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGBAY(8,1)	V99U9751C	DEG/SEC/G			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGBAY(8,2)	V99U9752C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGBFAUTO(1,1)	V97U1388C	DEG			F	S	D C G4.227 G4.36	01 03	ZF8	89674E	ZF8
TGBFAUTO(1,2)	V97U1389C	DEG			F	S	D C G4.227 G4.36	01 03	ZF8	89674E	ZF8
TGBFAUTO(2,1)	V97U1390C	DEG			F	S	D C G4.227 G4.36	01 03	ZF8	89674E	ZF8
TGBFAUTO(2,2)	V97U1391C	DEG			F	S	D C G4.227 G4.36	01 03	ZF8	89674E	ZF8
TGBFAUTO(3,1)	V97U1392C	DEG			F	S	D C G4.227 G4.36	01 03	ZF8	89674E	ZF8
TGBFAUTO(3,2)	V97U1393C	DEG			F	S	D C G4.227 G4.36	01 03	ZF8	89674E	ZF8
TGBFAUTO(4,1)	V97U1394C	DEG			F	S	D C G4.227 G4.36	01 03	ZF8	89674E	ZF8
TGBFAUTO(4,2)	V97U1395C	DEG			F	S	D C G4.227 G4.36	01 03	ZF8	89674E	ZF8
TGBFMACH(1,1)	V97U1380C	ND			F	S	D C G4.227 G4.36	01 03	ZF8	89674E	ZF8
TGBFMACH(1,2)	V97U1381C	ND			F	S	D C G4.227 G4.36	01 03	ZF8	89674E	ZF8
TGBFMACH(2,1)	V97U1382C	ND			F	S	D C G4.227 G4.36	01 03	ZF8	89674E	ZF8
TGBFMACH(2,2)	V97U1383C	ND			F	S	D C G4.227 G4.36	01 03	ZF8	89674E	ZF8
TGBFMACH(3,1)	V97U1384C	ND			F	S	D C G4.227 G4.36	01 03	ZF8	89674E	ZF8
TGBFMACH(3,2)	V97U1385C	ND			F	S	D C G4.227 G4.36	01 03	ZF8	89674E	ZF8

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TGBFMACH(4,1)	V97U1386C	ND			F	S	D C G4.227 G4.36	01	ZF8	89674E	
TGBFMACH(4,2)	V97U1387C	ND			F	S	D C G4.227 G4.36	03	ZF8	89674E	
TGBFR(1,1)	V97U0940C	DEG/SEC			F	S	D X G4.227 G4.36	01	ZF8	89674E	
TGBFR(1,2)	V97U0941C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGBFR(2,1)	V97U0942C	DEG/SEC			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGBFR(2,2)	V97U0943C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGBFR(3,1)	V97U0944C	DEG/SEC			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGBFR(3,2)	V97U0945C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGBFR(4,1)	V97U0946C	DEG/SEC			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGBFR(4,2)	V97U0947C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGPAY(1,1)	V98U9634C	ND			F	S	D C G4.227 G4.36	01	ZF9	DC2453	
TGPAY(1,2)	V98U9635C	ND			F	S	D C G4.227 G4.36	03	ZF9	DC2453	
TGPAY(2,1)	V98U9636C	ND			F	S	D C G4.227 G4.36	01	ZF9	DC2453	
TGPAY(2,2)	V98U9637C	ND			F	S	D C G4.227 G4.36	03	ZF9	DC2453	
TGPAY(3,1)	V97U1120C	ND			F	S	D C G4.227 G4.36	01	ZF9	DC2453	
TGPAY(3,2)	V97U1121C	ND			F	S	D C G4.227 G4.36	03	ZF9	DC2453	
TGQALL(1,1)	V97U0578C	(DEG/SEC)/DEG			F	S	D P G4.36	00	ZF9	90476F	
TGQALL(1,2)	V97U0579C	ND			F	S	D P G4.36	00	ZF9	90476F	
TGQALL(2,1)	V97U0580C	(DEG/SEC)/DEG			F	S	D P G4.36	00	ZF9	90476F	
TGQALL(2,2)	V97U0581C	ND			F	S	D P G4.36	00	ZF9	90476F	
TGQALL(3,1)	V97U0582C	(DEG/SEC)/DEG			F	S	D P G4.36	00	ZF9	90476F	
TGQALL(3,2)	V97U0583C	ND			F	S	D P G4.36	00	ZF9	90476F	
TGQALL(4,1)	V97U0584C	(DEG/SEC)/DEG			F	S	D P G4.36	00	ZF9	90476F	
TGQALL(4,2)	V97U0585C	ND			F	S	D P G4.36	00	ZF9	90476F	
TGQALL(5,1)	V97U0586C	(DEG/SEC)/DEG			F	S	D P G4.36	00	ZF9	90476F	
TGQALL(5,2)	V97U0587C	ND			F	S	D P G4.36	00	ZF9	90476F	
TGQALL(6,1)	V97U0588C	(DEG/SEC)/DEG			F	S	D P G4.36	00	ZF9	90476F	
TGQALL(6,2)	V97U0589C	ND			F	S	D P G4.36	00	ZF9	90476F	
TGRAY(1,1)	V97U0990C	DEG/SEC/G			F	S	D C G4.227 G4.36	01	ZF9	DC2453	
								03	ZF9		

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TGRAY(1,2)	V97U0991C	ND			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(2,1)	V97U0992C	DEG/SEC/G			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(2,2)	V97U0993C	ND			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(3,1)	V97U0994C	DEG/SEC/G			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(3,2)	V97U0995C	ND			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(4,1)	V97U0996C	DEG/SEC/G			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(4,2)	V97U0997C	ND			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(5,1)	V98U9684C	DEG/SEC/G			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(5,2)	V98U9685C	ND			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(6,1)	V98U9686C	DEG/SEC/G			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(6,2)	V98U9687C	ND			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRH(1,1)	V98U9667C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGRH(1,2)	V98U9668C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGRH(2,1)	V98U9669C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGRH(2,2)	V98U9670C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
THETA_PK_LOAD	V97U2903C	DEG			F	S	D C G4.227 G4.36	00	ZF7	90710	
THETA_STRUCT	V97U2904C	DEG			F	S	D C G4.227 G4.36	00	ZF7	90710	
TKDRC(1,1)	V97U1014C	LB*SEC/FT**2			F	S	D X G4.227 G4.36	00	ZF7	90710	
TKDRC(1,2)	V97U1015C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TKDRC(2,1)	V97U1016C	LB*SEC/FT**2			F	S	D X G4.227 G4.36	00	ZF7	90710	
TKDRC(2,2)	V97U1017C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TKDRC(3,1)	V98U9688C	LB*SEC/FT**2			F	S	D X G4.227 G4.36	00	ZF7	90710	
TKDRC(3,2)	V98U9689C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TKDRC(4,1)	V98U9690C	LB*SEC/FT**2	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKDRC(4,2)	V98U9691C	ND	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKGDA(1,1)	V98U9622C	LB*SEC/FT**2	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKGDA(1,2)	V98U9623C	ND	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKGDA(2,1)	V98U9624C	LB*SEC/FT**2	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKGDA(2,2)	V98U9625C	ND	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKGDA(3,1)	V96U8075C	LB*SEC/FT**2	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKGDA(3,2)	V96U8076C	ND	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKGDA(4,1)	V96U8077C	LB*SEC/FT**2	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKGDA(4,2)	V96U8078C	ND	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKGDA(5,1)	V96U8079C	LB*SEC/FT**2	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKGDA(5,2)	V96U8080C	ND	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKGDA(6,1)	V96U8081C	LB*SEC/FT**2	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKGDA(6,2)	V96U8082C	ND	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKPIT(1,2)	V98U9605C	ND	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKPIT(2,2)	V98U9607C	ND	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKPIT(3,2)	V98U9609C	ND	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKPIT(4,2)	V98U9611C	ND	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKPIT(5,2)	V98U9613C	ND	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKPIT(6,2)	V98U9615C	ND	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKPIT_AUTO(1,1)	V98U9604C	SEC*LB**.5/FT	F	S	D	P	G4.227 G4.36	00	ZF7	90710	
TKPIT_AUTO(2,1)	V98U9606C	SEC*LB**.5/FT	F	S	D	P	G4.227 G4.36	00	ZF7	90710	
TKPIT_AUTO(3,1)	V98U9608C	SEC*LB**.5/FT	F	S	D	P	G4.227 G4.36	00	ZF7	90710	

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TKPIT_AUTO(4,1)	V98U9610C	SEC*LB**.5/FT	F	S	D	P	G4.227 G4.36	00	ZF7	90710	
TKPIT_AUTO(5,1)	V98U9612C	SEC*LB**.5/FT	F	S	D	P	G4.227 G4.36	00	ZF7	90710	
TKPIT_AUTO(6,1)	V98U9614C	SEC*LB**.5/FT	F	S	D	P	G4.227 G4.36	00	ZF7	90710	
TKPIT_CSS(1,1)	V97U1018C	SEC*LB**.5/FT	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKPIT_CSS(2,1)	V97U1020C	SEC*LB**.5/FT	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKPIT_CSS(3,1)	V97U1022C	SEC*LB**.5/FT	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKPIT_CSS(4,1)	V97U1024C	SEC*LB**.5/FT	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKPIT_CSS(5,1)	V97U1026C	SEC*LB**.5/FT	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKPIT_CSS(6,1)	V97U1028C	SEC*LB**.5/FT	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TLREL(1,1)	V97U0810C	DEG	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
TLREL(1,2)	V97U0811C	FT/SEC	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
TLREL(2,1)	V97U0812C	DEG	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
TLREL(2,2)	V97U0813C	FT/SEC	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
TLREL(3,1)	V97U0814C	DEG	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
TLREL(3,2)	V97U0815C	FT/SEC	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
TLREL(4,1)	V97U0816C	DEG	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
TLREL(4,2)	V97U0817C	FT/SEC	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
TNWFADE	V97U1036C	SEC	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
TPCLIML(1,1)	V97U0567C	DEG/SEC	F	S	D	P	G4.36	00	ZF9	90476F	
TPCLIML(1,2)	V97U0568C	ND	F	S	D	P	G4.36	00	ZF9	90476F	
TPCLIML(2,1)	V97U0569C	DEG/SEC	F	S	D	P	G4.36	00	ZF9	90476F	
TPCLIML(2,2)	V97U0570C	ND	F	S	D	P	G4.36	00	ZF9	90476F	
TPCLIML(3,1)	V97U0571C	DEG/SEC	F	S	D	P	G4.36	00	ZF9	90476F	
TPCLIML(3,2)	V97U0572C	ND	F	S	D	P	G4.36	00	ZF9	90476F	
TPCLIML(4,1)	V97U0573C	DEG/SEC	F	S	D	P	G4.36	00	ZF9	90476F	
TPCLIML(4,2)	V97U0574C	ND	F	S	D	P	G4.36	00	ZF9	90476F	
TPCLIML(5,1)	V97U0590C	DEG/SEC	F	S	D	P	G4.36	00	ZF9	90476F	
TPCLIML(5,2)	V97U0591C	ND	F	S	D	P	G4.36	00	ZF9	90476F	
TPCLIML(6,1)	V97U0592C	DEG/SEC	F	S	D	P	G4.36	00	ZF9	90476F	

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TPCLIML(6,2)	V97U0593C	ND			F	S	D P G4.36	00	ZF9	90476F	
TQCFADE	V97U2905C	SEC			F	S	D P G4.227 G4.36	00	ZF7	90710	
TRWY_FADE	V96U9381C	SEC			F	S	D X G4.227 G4.36	00	ZF7	90710	
ULIM	V97U0626C	DEG			F	S	D C G4.227 G4.36	00	ZF7	90710	
WGT_SD	V96U9510C	SLUGS			F	S	M P G4.36	00	JDC	DC0762C	
WINDOW_LE(1)	V99U6150C	ND			F	S	M P G4.36	00	PTI	DC0599	
WINDOW_LE(10)	V99U6159C	ND			F	S	M P G4.36	00	PTI	DC0599	
WINDOW_LE(2)	V99U6151C	ND			F	S	M P G4.36	00	PTI	DC0599	
WINDOW_LE(3)	V99U6152C	ND			F	S	M P G4.36	00	PTI	DC0599	
WINDOW_LE(4)	V99U6153C	ND			F	S	M P G4.36	00	PTI	DC0599	
WINDOW_LE(5)	V99U6154C	ND			F	S	M P G4.36	00	PTI	DC0599	
WINDOW_LE(6)	V99U6155C	ND			F	S	M P G4.36	00	PTI	DC0599	
WINDOW_LE(7)	V99U6156C	ND			F	S	M P G4.36	00	PTI	DC0599	
WINDOW_LE(8)	V99U6157C	ND			F	S	M P G4.36	00	PTI	DC0599	
WINDOW_LE(9)	V99U6158C	ND			F	S	M P G4.36	00	PTI	DC0599	
WINDOW_TE(1)	V99U6175C	ND			F	S	M P G4.36	00	PTI	DC0599	
WINDOW_TE(10)	V99U6184C	ND			F	S	M P G4.36	00	PTI	DC0599	
WINDOW_TE(2)	V99U6176C	ND			F	S	M P G4.36	00	PTI	DC0599	
WINDOW_TE(3)	V99U6177C	ND			F	S	M P G4.36	00	PTI	DC0599	
WINDOW_TE(4)	V99U6178C	ND			F	S	M P G4.36	00	PTI	DC0599	
WINDOW_TE(5)	V99U6179C	ND			F	S	M P G4.36	00	PTI	DC0599	
WINDOW_TE(6)	V99U6180C	ND			F	S	M P G4.36	00	PTI	DC0599	
WINDOW_TE(7)	V99U6181C	ND			F	S	M P G4.36	00	PTI	DC0599	
WINDOW_TE(8)	V99U6182C	ND			F	S	M P G4.36	00	PTI	DC0599	
WINDOW_TE(9)	V99U6183C	ND			F	S	M P G4.36	00	PTI	DC0599	
WJETD(1,2)	V97U7450C	LB/FT**2			F	S	D X G4.36	00	ZF9	90476F	
WJETD(2,2)	V97U7449C	LB/FT**2			F	S	D X G4.36	00	ZF9	90476F	
WJETD1(1,1)	V97U7441C	DEC/SEC			F	S	D X G4.36	00	ZF9	90476F	
WJETD1(2,1)	V97U7440C	DEG/SEC			F	S	D X G4.36	00	ZF9	90476F	
WJETD2(1,1)	V97U7443C	DEG/SEC			F	S	D X G4.36	00	ZF9	90476F	
WJETD2(2,1)	V97U7442C	DEG/SEC			F	S	D X G4.36	00	ZF9	90476F	
WJETD3(1,1)	V97U7445C	DEG/SEC			F	S	D X G4.36	00	ZF9	90476F	
WJETD3(2,1)	V97U7444C	DEG/SEC			F	S	D X G4.36	00	ZF9	90476F	
WJETD4(1,1)	V97U7447C	DEG/SEC			F	S	D X G4.36	00	ZF9	90476F	
WJETD4(2,1)	V97U7446C	DEG/SEC			F	S	D X G4.36	00	ZF9	90476F	
WJETHYST	V97U7448C	DEG/SEC			F	S	D C G4.36	00	ZF9	90476F	
WJNR1_HIGHQ	V97U7451C	ND			I	S	D C G4.36	00	ZF9	90476F	
WJNR1_LOWQ	V97U7452C	ND			I	S	D C G4.36	00	ZF9	90476F	
WJNR2_HIGHQ	V97U7453C	ND			I	S	D C G4.36	00	ZF9	90476F	
WJNR2_LOWQ	V97U7454C	ND			I	S	D C G4.36	00	ZF9	90476F	
WJNR3_HIGHQ	V97U7455C	ND			I	S	D C G4.36	00	ZF9	90476F	
WJNR3_LOWQ	V97U7456C	ND			I	S	D C G4.36	00	ZF9	90476F	
WJNR4_HIGHQ	V97U7457C	ND			I	S	D C G4.36	00	ZF9	90476F	
WJNR4_LOWQ	V97U7458C	ND			I	S	D C G4.36	00	ZF9	90476F	

TABLE 4.10.1-3. AERO-JET DIGITAL AUTOPILOT (G4.36) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
WONG_LEAKAGE	V97U1205C	GAL/MIN			F	S	D A G4.227 G4.36	00	ZF8	92438A	
XKQ(1,1)	V96U8774C	DEG/DEG**2			F	S	D X G4.227 G4.36	00	ZF7	90710	
XKQ(1,2)	V96U8775C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
XKQ(2,1)	V96U8776C	DEG/DEG**2			F	S	D X G4.227 G4.36	00	ZF7	90710	
XKQ(2,2)	V96U8777C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
YAW_RCS_ALT	V97U1150C	FT			F	S	D C G4.227 G4.36	00	ZF9	DC2453	

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

TABLE 4.10.1-4. AERO-JET DIGITAL AUTOPILOT (G4.36) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
ALFERR_LIM LIMIT ON ANGLE OF ATTACK ERROR	V97U0600C	01	+5.0	E+00	DEG			G4.227 G4.36	89674E	
		03	+2.0	E+00						
ALFERR_LIM_TAL	V97U9871C	00	+4.0	E+00	DEG			G4.36	89674E	
ALFLIM1 TABULATED ALPHA	V97U8712C	00	+1.0	E+01	DEG			G4.227 G4.36	89674E	
ALFLIM2 TABULATED ALPHA	V97U8713C	00	+2.0	E+01	DEG			G4.227 G4.36	89674E	
COTALF_LIM LIMIT ON COTANGENT OF ALPHA	V97U0607C	00	+1.143	E+01	ND			G4.227 G4.36	89674E	
DATTRIM_LIM LIMIT ON AILERON TRIM COMMAND	V97U0616C	00	+3.0	E+00	DEG			G4.227 G4.36	89674E	
DBFRET BODY FLAP RETRACTED POSITION	V97U0629C	00	+0.0	E+00	DEG			G4.227 G4.36	89674E	
DPJET_CUTOFF POINT BTWN LOW & HIGH PITCH JETS	V97U0654C	00	+1.0000000	E+00	DEG/SEC			G4.36	89674E	
DRC_LIM_FLIGHT LIMIT ON RUDDER DEFLECTION CMD	V97U0655C	00	+2.41	E+01	DEG			G4.227 G4.36	89674E	
DRC_LIM_ROLLOUT MAX RUDDER DEFLECTION CMD LIMIT - ROLLOUT	V99U7415C	00	+2.66	E+01	DEG			G4.227 G4.36	92321	
DRJETTH(1) THRESHOLD ON DRJET	V97U0658C	00	+5.0000000	E-01	DEG/SEC			G4.227 G4.36	89674E	
DRJETTH(2) THRESHOLD ON DRJET	V97U0659C	00	+1.0000000	E+00	DEG/SEC			G4.227 G4.36	89674E	
DRJETTH(3) THRESHOLD ON DRJET	V97U0660C	00	+1.5000000	E+00	DEG/SEC			G4.227 G4.36	89674E	
DRMAX MAX VALUE OF SHAPED PEDAL OUTPUT	V97U0661C	00	+2.2500000	E+01	DEG			G4.227 G4.36	89674E	
DRTRIM_LIM INTEGRAL RUDDER TRIM LIMIT	V97U0663C	00	+6.0	E+00	DEG			G4.227 G4.36	89674E	
DRT_LIM LIMIT ON MANUAL YAW TRIM	V97U0662C	00	+1.0	E-01	G			G4.227 G4.36	89674E	
DSB_BIAS_U SPEED BRAKE BIAS	V97U1142C	00	+0.0	E+00	DEG			G4.36	89674E	
DSB_CLOSED SPEEDBRAKE CLOSED CMD	V97U2425C	00	-9.9	E+00	DEG			G4.176 G4.227 G4.36 G4.50	89674E	
DSB_MIN_L SP BK LOWER POSITION LIMIT	V97U0665C	03	-9.9	E+00	DEG			G4.227	92321	
		01	+1.5	E+01						
DSB_MIN_M SPDBK LOWER POS LIMIT	V97U1143C	00	+1.5	E+01	DEG			G4.36	92321	
DSB_MIN_U SP BK LOWER POSITION LIMIT	V97U0666C	00	+1.5000000	E+01	DEG			G4.108 G4.227 G4.36	89674E	

TABLE 4.10.1-4. AERO-JET DIGITAL AUTOPILOT (G4.36) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
GBETA1 FILTER COEFFICIENT	V97U8724C	00	+1.37931	E-01	ND		F	S P G4.227 G4.36	89674E	
GBETA2 FILTER COEFFICIENT	V97U8725C	00	+1.37931	E-01	ND		F	S P G4.227 G4.36	89674E	
GBETA3 FILTER COEFFICIENT	V97U8726C	00	-7.241379	E-01	ND		F	S P G4.227 G4.36	89674E	
GBFMAN MANUAL BODY FLAP GAIN	V97U1088C	00	+1.0	E+03	DEG/SEC		F	S C G4.227 G4.36	89674E	
GBOFILT(1)	V99U7410C	00	+9.96016	E-01	ND		F	S C G4.227 G4.36	89674E	
GBOFILT(2)	V99U7411C	00	-9.96016	E-01	ND		F	S C G4.227 G4.36	89674E	
GBOFILT(3)	V99U7412C	00	-9.92032	E-01	ND		F	S C G4.227 G4.36	89674E	
GDAMS(1) FILTER COEFFICIENT	V97U0687C	00	+3.2968	E-01	ND		F	S C G4.227 G4.36	89674E	
GDAMS(2) FILTER COEFFICIENT	V97U0688C	00	+0.0	E+00	ND		F	S C G4.227 G4.36	89674E	
GDAMS(3) FILTER COEFFICIENT	V97U0689C	00	-6.7032	E-01	ND		F	S C G4.227 G4.36	89674E	
GDISP1 FILTER COEFFICIENT	V97U8721C	00	+1.37931	E-01	ND		F	S C G4.227 G4.36	89674E	
GDISP2 FILTER COEFFICIENT	V97U8722C	00	+1.37931	E-01	ND		F	S C G4.227 G4.36	89674E	
GDISP3 FILTER COEFFICIENT	V97U8723C	00	-7.241379	E-01	ND		F	S C G4.227 G4.36	89674E	
GDRC_MAX MAXIMUM VALUE OF GDRC	V97U0696C	00	+1.50	E+01	DEG/DEG/SEC		F	S C G4.227 G4.36	89674E	
GDRC_MIN MINIMUM VALUE OF GDRC	V97U0697C	00	+1.2	E+00	DEG/DEG/SEC		F	S C G4.227 G4.36	89674E	
GDRTI GN TO CNVT BEEP TRM ACCLN TRM BIAS	V97U0705C	00	+2.0	E-02	G/SEC		F	S X G4.227 G4.36	89674E	
GNZFILT_TAEM(1) FILT.COEF.IPHASEB=0,1,2,3,5	V97U0724C	00	+2.30769	E-01	ND		F	S P G4.227 G4.36	89674E	
GNZFILT_TAEM(2) FILT.COEF.IPHASEB=0,1,2,3,5	V97U0725C	00	-1.53846	E-01	ND		F	S P G4.227 G4.36	89674E	
GNZFILT_TAEM(3) FILT.COEF.IPHASEB=0,1,2,3,5	V97U0726C	00	-9.23077	E-01	ND		F	S P G4.227 G4.36	89674E	
GQALR GAIN CONV ANG ATTACK ERROR PITCH	V97U0744C	01	+4.0	E-01	DEG/SEC/DEG		F	S P G4.227 G4.36	89674E	
GQAL_TAL	V97U9872C	00	+3.3	E-01	(DEG/SEC)/DEG		F	S P G4.36	89674E	
GQCOMP(1) FILTER COEFFICIENT	V97U0745C	00	+7.4074	E-02	ND		F	S C G4.227 G4.36	89674E	
GQCOMP(2) FILTER COEFFICIENT	V97U0746C	00	+7.4074	E-02	ND		F	S C G4.227 G4.36	89674E	

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TABLE 4.10.1-4. AERO-JET DIGITAL AUTOPILOT (G4.36) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
GQCOMP(3) FILTER COEFFICIENT	V97U0747C	00	-8.51852	E-01	ND		F	S C G4.227 G4.36	89674E	
GQN_AL APPROACH/LAND SCALE FACTOR	V97U0750C	00	+4.2	E+00	DEG/SEC/G		F	S P G4.227 G4.36	89674E	
GQN_TAEM SC FCTR WHEN IPHASEB=0,1,2,3	V97U0749C	01	+2.5	E+00	DEG/SEC/G		F	S X G4.227 G4.36	89674E	
GRPHI TURN COORD SCALE FACTOR	V97U1089C	00	+3.36 +5.7300000	E+00 E+01	DEG		F	S X G4.227 G4.36	89674E	
GRRCS(1) FILTER COEFFICIENT	V97U0766C	00	+1.96	E+00	ND		F	S C G4.227 G4.36	89674E	
GRRCS(2) FILTER COEFFICIENT	V97U0767C	00	-1.96	E+00	ND		F	S C G4.227 G4.36	89674E	
GRRCS(3) FILTER COEFFICIENT	V97U0768C	00	-9.23	E-01	ND		F	S C G4.227 G4.36	89674E	
GRRHCT BEEP TRIM/TRIM ACCELN CONV	V97U0769C	00	+6.0	E-01	DEG/SEC**2		F	S C G4.227 G4.36	89674E	
GSBHI HIGH SCALING GAIN	V97U0776C	00	+2.5000000	E+01	DEG/SEC/DEG		F	S C G4.227 G4.36	89674E	
GSBLO LOW SCALING GAIN	V97U0777C	00	+1.0000000	E+01	DEG/SEC/DEG		F	S C G4.227 G4.36	89674E	
GTAS_OFS BIAS FOR GTAS	V97U0781C	00	+1.0000000	E+00	ND		F	S P G4.227 G4.36	89674E	
GYJRO1	V99U7200C	00	+7.92952	E-01	ND		F	S C G4.227 G4.36	89674E	
GYJRO2	V99U7201C	00	+1.585904	E+00	ND		F	S C G4.227 G4.36	89674E	
GYJRO3	V99U7202C	00	+7.92952	E-01	ND		F	S C G4.227 G4.36	89674E	
GYJRO4	V99U7203C	00	+1.541850	E+00	ND		F	S C G4.227 G4.36	89674E	
GYJRO5	V99U7204C	00	+6.29956	E-01	ND		F	S C G4.227 G4.36	89674E	
KBETAL TABULATED SIDESLIP	V97U8727C	00	+5.0	E-03	(FT**3/SEC**2)/(DEG*LB S)		F	S P G4.227 G4.36	89674E	
KBETAU TABULATED SIDESLIP	V97U8728C	00	+9.0	E-03	(FT**3/SEC**2)/(DEG*LB S)		F	S P G4.227 G4.36	89674E	
KBMACHL TABULATED MACH	V97U8730C	00	+1.0	E+00	ND		F	S P G4.227 G4.36	89674E	
KBMACHU TABULATED MACH	V97U8729C	00	+2.5	E+00	ND		F	S P G4.227 G4.36	89674E	
KCON KDISP CONSTANT	V97U8716C	00	+1.7082	E+01	(FT/SEC**2)/DEG		F	S C G4.227 G4.36	89674E	
KDRMLIN PARABOLIC SHAPING LINEAR COEF	V97U0800C	00	+1.0	E+00	DEG/DEG		F	S C G4.227 G4.36	91041A	
KDRMPAR PARABOLIC SHAPING SQR TERM COEF	V97U0801C	00	+0.0	E+00	DEG/DEG**2		F	S C G4.227 G4.36	91041A	

TABLE 4.10.1-4. AERO-JET DIGITAL AUTOPILOT (G4.36) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
KJCMPC JET CORRECTION CONSTANT	V97U8720C	00	+1.695	E-01	FT/SEC**2	F	S	C G4.227 G4.36	89674E	
KLIM1 TABULATED GAIN	V97U8714C	00	+6.342	E+00	(FT/SEC**2)/DEG	F	S	P G4.227 G4.36	89674E	
KLIM2 TABULATED GAIN	V97U8715C	00	+9.02	E-01	(FT/SEC**2)/DEG	F	S	P G4.227 G4.36	89674E	
KLIN KDISP LINEAR CONSTANT	V97U8717C	00	-1.339	E+00	(FT/SEC**2)/DEG**2	F	S	C G4.227 G4.36	89674E	
KPAR KDISP PARABOLIC CONSTANT	V97U8718C	00	+2.65	E-02	(FT/SEC**2)/DEG**3	F	S	C G4.227 G4.36	89674E	
KRCMP ANGULAR CORRECTION CONSTANT	V97U8719C	00	+6.545	E+00	(FT/SEC)/DEG	F	S	C G4.227 G4.36	89674E	
KYALWR TABULATED AILERON CONSTANT	V97U8732C	00	+0.0	E+00	(FT**3/SEC**2)/(DEG*LB S)	F	S	X G4.227 G4.36	89674E	
KYAUP TABULATED AILERON CONSTANT	V97U8731C	00	-1.4	E-03	(FT**3/SEC**2)/(DEG*LB S)	F	S	X G4.227 G4.36	89674E	
KYMACHL TABULATED MACH	V97U8734C	00	+8.0	E-01	ND	F	S	X G4.227 G4.36	89674E	
KYMACHU TABULATED MACH	V97U8733C	00	+1.1	E+00	ND	F	S	X G4.227 G4.36	89674E	
KYRLWR TABULATED RUDDER CONSTANT	V97U8736C	00	+4.0	E-04	(FT**3/SEC**2)/(DEG*LB S)	F	S	X G4.227 G4.36	89674E	
KYRML TABULATED MACH	V97U8737C	00	+9.0	E-01	ND	F	S	X G4.227 G4.36	89674E	
KYRMU TABULATED MACH	V97U8738C	00	+2.3	E+00	ND	F	S	X G4.227 G4.36	89674E	
KYRUP TABULATED RUDDER CONSTANT	V97U8735C	00	+1.2	E-03	(FT**3/SEC**2)/(DEG*LB S)	F	S	X G4.227 G4.36	89674E	
MACH_SBH MACH_LVL TO SW MACH_SB_REG	V97U1144C	00	+1.0000000	E+01	ND	F	S	C G4.36	89674E	
NQHI HIGH NO PITCH JETS CAN FIRE	V97U0834C	00	+4		ND	I	S	X G4.36	89674E	
NQLO LOW NO PITCH JETS CAN FIRE	V97U0835C	00	+2		ND	I	S	X G4.36	89674E	
NR(1) LOW NUMBER OF YAW JETS	V97U0836C	00	+2		ND	I	S	C G4.227 G4.36	89674E	
PADB INNER DEADBAND	V97U1110C	00	+2.45	E-01	DEG/SEC	F	S	C G4.36	89674E	
Pbdb OUTER DEADBAND	V97U0854C	00	+2.5	E-01	DEG/SEC	F	S	C G4.36	89674E	
PE_CUTOFF MAG PE CHGS NO ROLL JETS SELECTA	V97U0855C	00	+5.0	E-01	DEG/SEC	F	S	C G4.227 G4.36	89674E	
PHI_MOD MAX ROLL CMD TO ROLL THROUGH ZERO	V97U0494C	00	+1.6	E+02	DEG	F	S	P G4.36	89674E	
QBLIML_AUTO	V96U9369C	00	+5.00	E+01	LBS/FT**2	F	S	P G4.227 G4.36	89674E	

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TABLE 4.10.1-4. AERO-JET DIGITAL AUTOPILOT (G4.36) K-LOADS

TABLE 4.10.1-4. AERO-JET DIGITAL AUTOPILOT (G4.36) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
TGNYDRM(1,1) TABULATED GNYDRM	V97U0964C	00	+4.0	E-02	G/DEG	F	S	X G4.227 G4.36	91041A	
TGNYDRM(1,2) TABULATED TAS	V97U0965C	00	+6.833	E+02	FT/SEC	F	S	X G4.227 G4.36	91041A	
TGNYDRM(2,1) TABULATED GNYDRM	V97U0966C	00	+1.0	E-02	G/DEG	F	S	X G4.227 G4.36	89674E	
TGNYDRM(2,2) TABULATED TAS	V97U0967C	00	+9.0000000	E+02	FT/SEC	F	S	X G4.227 G4.36	89674E	
TGPBANK(1,1) TABULATED GPBANK	V97U0972C	00	+1.2	E+00	DEG/SEC/DEG	F	S	P G4.227 G4.36	89674E	
TGPBANK(1,2) TABULATED MACH	V97U0973C	00	+6.0	E-01	ND	F	S	P G4.227 G4.36	89674E	
TGPBANK(2,1) TABULATED GPBANK	V97U0938C	00	+5.0000000	E-01	DEG/SEC/DEG	F	S	P G4.227 G4.36	89674E	
TGPBANK(2,2) TABULATED MACH	V97U0939C	00	+1.2	E+00	ND	F	S	P G4.227 G4.36	89674E	
TGPBANK(3,1) TGPBANK(3,2)	V96U8071C	00	+5.0	E-01	DEG/SEC/DEG	F	S	P G4.227 G4.36	89674E	
V96U8072C	00	+1.40	E+01	ND	F	S	P G4.227 G4.36	89674E		
TGPBANK(4,1)	V96U8073C	00	+5.0	E-01	DEG/SEC/DEG	F	S	P G4.227 G4.36	89674E	
TGPBANK(4,2)	V96U8074C	00	+2.60	E+01	ND	F	S	P G4.227 G4.36	89674E	
TGPRHC(1,1) TABULATED GPRHC	V97U0978C	00	+4.0	E-01	DEG/SEC/DEG	F	S	X G4.227 G4.36	89674E	
TGPRHC(1,2) TABULATED MACH	V97U0979C	00	+1.2	E+00	ND	F	S	X G4.227 G4.36	89674E	
TGPRHC(2,1) TABULATED GPRHC	V97U0980C	00	+1.25	E-01	DEG/SEC/DEG	F	S	X G4.227 G4.36	89674E	
TGPRHC(2,2) TABULATED MACH	V97U0981C	00	+2.0	E+00	ND	F	S	X G4.227 G4.36	89674E	
TGQAL(1,1) TABULATED GQAL	V97U0982C	01	+5.0	E-01	DEG/SEC/DEG	F	S	P G4.227 G4.36	89674E	
TGQAL(1,2) TABULATED MACH	V97U0983C	01	+7.0	E-01	ND	F	S	P G4.227 G4.36	89674E	
TGQAL(2,1) TABULATED GQAL	V97U0984C	01	+4.8	E+00	ND	F	S	P G4.227 G4.36	89674E	
TGQAL(2,2) TABULATED MACH	V97U0985C	01	+2.2	E+01	DEG/SEC/DEG	F	S	P G4.227 G4.36	89674E	
TGRRHC(1,1) TABULATED GRRHC	V97U0998C	00	+4.0	E-01	DEG/SEC/DEG	F	S	X G4.227 G4.36	89674E	
TGRRHC(1,2) TABULATED MACH	V97U0999C	00	+3.3	E-01	ND	F	S	X G4.227 G4.36	89674E	
TGRRHC(2,1) TABULATED GRRHC	V97U1000C	00	+5.2	E+00	ND	F	S	X G4.227 G4.36	89674E	
		03	+2.3	E+01						
		03	+1.17	E+00						

TABLE 4.10.1-4. AERO-JET DIGITAL AUTOPILOT (G4.36) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
TGRRHC(2,2)	V97U1001C	00	+1.5000000	E+00	ND			G4.227		
TABULATED MACH								G4.36		
TGTRA(1,1)	V98U9655CA	00	+2.5	E-01	DEG/SEC/DEG			G4.227		
TABULATED GTRA AUTO								G4.36		
TGTRA(1,2)	V98U9656C	01	+1.2500000	E+00	ND			G4.227		
TABULATED MACH		03	+1.2500000	E+00				G4.36		
TGTRA(2,1)	V98U9657C	01	+1.0	E-01	DEG/SEC/DEG			G4.227		
TABULATED GTRA		03	+1.0	E-01				G4.36		
TGTRA(2,2)	V98U9658C	01	+1.26	E+00	ND			G4.227		
TABULATED MACH		03	+1.26	E+00				G4.36		
TGTRA(3,1)	V98U9659C	01	+1.0	E-01	DEG/SEC/DEG			G4.227		
TABULATED GTRA		03	+1.0	E-01				G4.36		
TGTRA(3,2)	V98U9660C	01	+3.5	E+00	ND			G4.227		
TABULATED MACH		03	+3.5	E+00				G4.36		
TGTRA(4,1)	V98U9661C	01	+0.0	E+00	DEG/SEC/DEG			G4.227		
TABULATED GTRA		03	+0.0	E+00				G4.36		
TGTRA(4,2)	V98U9662C	01	+3.55	E+00	ND			G4.227		
TABULATED MACH		03	+3.55	E+00				G4.36		
TGTRA(5,1)	V98U9663C	01	+0.0	E+00	DEG/SEC/DEG			G4.227		
TABULATED GTRA		03	+0.0	E+00				G4.36		
TGTRA(5,2)	V98U9664C	01	+4.0000000	E+00	ND			G4.227		
TABULATED MACH		03	+4.0	E+00				G4.36		
TGTRA(6,1)	V98U9665C	01	+0.0	E+00	DEG/SEC/DEG			G4.227		
TABULATED GTRA		03	+0.0	E+00				G4.36		
TGTRA(6,2)	V98U9666C	03	+3.0000000	E+01	ND			G4.227		
TABULATED MACH		01	+3.0000000	E+01				G4.36		
TGTRA_CSS(1,1)	V98U9655C	00	+0.0	E+00	DEG/SEC/DEG			G4.227		
TABULATED GTRA CSS								G4.36		
TGTRE(1,2)	V97U1003C	00	+3.0000000	E+00	ND			G4.227		
TABULATED MACH								G4.36		
TGTRE(2,2)	V97U1005C	00	+3.5000000	E+00	ND			G4.227		
TABULATED MACH								G4.36		
TGTRE(3,2)	V97U4259C	01	+5.5	E+00	ND			G4.227		
		03	+1.0	E+01				G4.36		
TGTRE(4,2)	V97U4261C	01	+5.6	E+00	ND			G4.227		
TABULATED MACH		03	+1.2	E+01				G4.36		
TGTRE_AUTO(1,1)	V97U1002C	01	+1.0	E+00	DEG/SEC/DEG			G4.227		
TABULATED GTRE - AUTO		03	+6.0	E-01				G4.36		
TGTRE_AUTO(2,1)	V97U1004C	01	+1.0	E+00	DEG/SEC/DEG			G4.227		
TABULATED GTRE - AUTO		03	+6.0	E-01				G4.36		
TGTRE_AUTO(3,1)	V97U4258C	01	+1.0	E+00	DEG/SEC/DEG			G4.227		
TABULATED GTRE - AUTO		03	+6.0	E-01				G4.36		
TGTRE_AUTO(4,1)	V97U4260C	01	+5.0	E-01	DEG/SEC/DEG			G4.227		
TABULATED GTRE - AUTO		03	+3.0	E-01				G4.36		
TGTRE_CSS(1,1)	V97U4262C	00	+1.5000000	E+00	DEG/SEC/DEG			G4.227		
TABULATED GTRE - CSS								G4.36		

TABLE 4.10.1-4. AERO-JET DIGITAL AUTOPILOT (G4.36) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
TGTRE_CSS(2,1)	V97U4264C	00	+1.0000000	E+00	DEG/SEC/DEG	F	S	X G4.227	89674E	
TABULATED GTRE - CSS								G4.36		
TGTRE_CSS(3,1)	V97U4266C	00	+1.0000000	E+00	DEG/SEC/DEG	F	S	X G4.227	89674E	
TABULATED GTRE - CSS								G4.36		
TGTRE_CSS(4,1)	V97U4268C	01	+7.0	E-01	DEG/SEC/DEG	F	S	C G4.227	89674E	
TABULATED GTRE - CSS		03	+1.0	E+00				G4.36		
TGTRR(1,1)	V97U1135C	00	+1.0	E-01	DEG/SEC/DEG	F	S	X G4.227	89674E	
TABULATED GTRR								G4.36		
TGTRR(1,2)	V97U1136C	00	+9.5	E-01	ND	F	S	X G4.227	89674E	
TABULATED MACH								G4.36		
TGTRR(2,1)	V97U1137C	00	+5.0	E-01	DEG/SEC/DEG	F	S	X G4.227	89674E	
TABULATED GTRRF								G4.36		
TGTRR(2,2)	V97U1138C	00	+1.2	E+00	ND	F	S	X G4.227	89674E	
TABULATED MACH								G4.36		
TKDAMLIN(1,1)	V97U1006C	00	+2.0000000	E-01	DEG/DEG	F	S	X G4.227	89674E	
TABULATED KDAMLIN								G4.36		
TKDAMLIN(1,2)	V97U1007C	00	+6.0000000	E-01	ND	F	S	X G4.227	89674E	
TABULATED MACH								G4.36		
TKDAMLIN(2,1)	V97U1008C	00	+9.3240000	E-01	DEG/DEG	F	S	X G4.227	89674E	
TABULATED KDAMLIN								G4.36		
TKDAMLIN(2,2)	V97U1009C	00	+1.5000000	E+00	ND	F	S	X G4.227	89674E	
TABULATED MACH								G4.36		
TKDAMPAR(1,1)	V97U1010C	00	+5.71	E-02	DEG/DEG**2	F	S	X G4.227	89674E	
TABULATED KDAMPAR								G4.36		
TKDAMPAR(1,2)	V97U1011C	00	+6.0000000	E-01	ND	F	S	X G4.227	89674E	
TABULATED MACH								G4.36		
TKDAMPAR(2,1)	V97U1012C	00	+8.0000000	E-03	DEG/DEG**2	F	S	X G4.227	89674E	
TABULATED KDAMPAR								G4.36		
TKDAMPAR(2,2)	V97U1013C	00	+1.5000000	E+00	ND	F	S	X G4.227	89674E	
TABULATED MACH								G4.36		
TPCLIM(1,1)	V97U1037C	00	+2.0000000	E+01	DEG/SEC	F	S	P G4.227	89674E	
TABULATED PCLIM								G4.36		
TPCLIM(1,2)	V97U1038C	00	+6.0	E-01	ND	F	S	P G4.227	89674E	
TABULATED MACH								G4.36		
TPCLIM(2,1)	V97U1039C	00	+5.0	E+00	DEG/SEC	F	S	P G4.227	89674E	
TABULATED PCLIM								G4.36		
TPCLIM(2,2)	V97U1040C	00	+1.5	E+00	ND	F	S	P G4.227	89674E	
TABULATED MACH								G4.36		
TPCLIM(3,1)	V97U1041C	00	+5.0000000	E+00	DEG/SEC	F	S	P G4.227	89674E	
TABULATED PCLIM								G4.36		
TPCLIM(3,2)	V97U1042C	00	+2.3	E+01	ND	F	S	P G4.227	89674E	
TABULATED MACH								G4.36		
TPCLIM(4,1)	V97U1043C	00	+3.0	E+00	DEG/SEC	F	S	P G4.227	89674E	
TABULATED PCLIM								G4.36		
TPCLIM(4,2)	V97U1044C	00	+2.35	E+01	ND	F	S	P G4.227	89674E	
TABULATED MACH								G4.36		

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TABLE 4.10.1-4. AERO-JET DIGITAL AUTOPILOT (G4.36) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
UYBB(1) FILTER COEFFICIENT	V96U8563C	00	+1.733907	E-01	ND	F	S	X G4.227 G4.36	89674E	
UYBB(2) FILTER COEFFICIENT	V96U7886C	00	-1.198055	E-01	ND	F	S	X G4.227 G4.36	89674E	
UYBB(3) FILTER COEFFICIENT	V96U7887C	00	+1.559513	E-01	ND	F	S	X G4.227 G4.36	89674E	
UYBB(4) FILTER COEFFICIENT	V96U7888C	00	-1.2396259	E+00	ND	F	S	X G4.227 G4.36	89674E	
UYBB(5) FILTER COEFFICIENT	V96U7889C	00	+4.491623	E-01	ND	F	S	X G4.227 G4.36	89674E	
XKQ0	V96U9351C	00	+4.84	E-02	DEG**-1	F	S	C G4.227 G4.36	89674E	
YADB_HI FINAL YAW INNER DEADBAND	V97U1081C	00	+3.3	E-01	DEG/SEC	F	S	C G4.227 G4.36	89674E	
YADB_LO INITIAL YAW INNER DEAD BAND	V97U1082C	00	+3.3	E-01	DEG/SEC	F	S	C G4.227 G4.36	89674E	
YBDB_HI FINAL YAW OUTER DEADBAND	V97U1083C	00	+3.5	E-01	DEG/SEC	F	S	C G4.227 G4.36	89674E	
YBDB_LO EARLY OUTER DEADBAND	V97U1084C	00	+3.5	E-01	DEG/SEC	F	S	C G4.227 G4.36	89674E	

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

TABLE 4.10.1-5. AERO-JET DIGITAL AUTOPILOT (G4.36) 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 4.10.1-5. AERO-JET DIGITAL AUTOPILOT (G4.36) 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	

TABLE 4.10.1-5. AERO-JET DIGITAL AUTOPILOT (G4.36) 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	
TEG TIME INCREMENT BETWEEN ENTRY GUIDANCE UPDATES	V97U6235C	00	+1.920	E+00	SEC	F	D	C	G4.227 G4.36	91061B	
TF DAP FAST CYCLE TIME	V97U6236C	00	+4.0	E-02	SEC	F	D	C	G4.176 G4.227 G4.36	90374C	
TG TIME INCREMENT BETWEEN TAEM AND GRTLS TAEM GUIDANCE UPDATES	V97U6237C	00	+9.60	E-01	SEC	F	D	C	G4.227 G4.36	91061B	
TM DAP MEDIUM CYCLE TIME	V97U6238C	00	+8.0	E-02	SEC	F	D	C	G4.175 G4.176 G4.227 G4.36	90374C	
TS DAP SLOW CYCLE TIME AT WHICH BANKCSM IS UPDATED	V97U6239C	00	+1.6	E-01	SEC	F	D	C	G4.227 G4.36	90374C	

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TABLE 4.10.1-5. AERO-JET DIGITAL AUTOPILOT (G4.36) CONSTANTS

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

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

TABLE 4.10.2-1. INPUT FUNCTIONAL PARAMETERS FOR GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	L A S T C R E V
ALPCMD	V90H0803CB	COMMANDED ANGLE OF ATTACK	GRTLS TAEM GUID	DEG		93017G	*
ALPHA	V95H3021C	GN&C ANGLE OF ATTACK	ADTA SOP	DEG	SPL	93017G	*
ALPHA_N	V90H2246C	NAV DERIVED ANGLE OF ATTACK	A/E ATT PROC	DEG	SPL	93017G	*
ALT	V95H0175CA	CURR ORB ALT ABOVE REF ELLIPSOID	RTLS UPP	FT	SPL	93017G	*
AL_IND	V90X8651X	AUTOLAND INDICATOR	MSC				
AUTMANBF	V96X1051X	STATION SELECTED AUT/MAN BODY FLAP	GN&C SW RM				
AUTO	V90X1710X	AUTO GUIDANCE MODE FLAG	ASC DAP		BD	93017G	*
AUTOP	V96X1031X	STATION SELECTED AUTO-PITCH	GN&C SW RM				
AUTORY	V96X1041X	STATION SELECTED AUTO-ROLL/YAW	GN&C SW RM				
AUTOSB	V96X1052X	STATION SEL SPD BK/THROTT AUTO/MAN	GN&C SW RM				
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(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(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(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(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(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	*
BETA_N	V90H2249C	INERTIAL SIDESLIP ANGLE	A/E ATT PROC	DEG	SPL	93017G	*

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TABLE 4.10.2-1. INPUT FUNCTIONAL PARAMETERS FOR GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	L A S T	C R E V	R E C
COMP_NW_POSN	V91H6378C	COMPENSATED NOSEWHEEL POSITION	NW POSN SOP	DEG					89889H
CONT_2EO_PR_DELAY	V90W6985C	MINUS Z CONT BURN TIMER	PW CONT GUID	S	SPL				90705H
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_PR_DELAY	V90W0919C	CONT 3 E/O PITCH/ROLL DELAY TIME	CONT 3E/O GUID	SEC					90705H
CONT_3EO_REGION	V90J0108C	CONTINGENCY 3 E/O REGION INDEX	CONT 3E/O GUID						93017G *
CONT_3EO_START	V90X0909X	CONTINGENCY 3 E/O START FLAG	CONT 3E/O GUID	BD					93017G *
CONT_EXT_MINUSZ_ENA	V90X3235X	CONTINGENCY EXTENDED -Z BURN FLAG	CONT 3E/O GUID	BD					92504G
CONT_RCS_PLUSX_ON	V90X3236X	CONTINGENCY +X RCS BURN FLAG	CONT 3E/O GUID	BD					92504G
CONT_SEP_CPLT	V90X0918X	CONTINGENCY SEP COMPLETE FLAG	CONT 3E/O GUID	BD					90705H
COSPHI	V90H2204C	EULER ANGLE ROLL COSINE	A/E ATT PROC						
COSTH	V90H2215C	EULER ANGLE PITCH COSINE	A/E ATT PROC						93090E
CROSSFEED_OPEN	V90X1540X	RCS CROSSFEED SEQ COMPLETE FLAG	RCS/RCS XFEED						
CSSP	V96X1035X	STATION SELECTED CSS-PITCH	GN&C SW RM						
CSSRY	V96X1045X	STATION SELECTED CSS-ROLL/YAW	GN&C SW RM						
DAMAN/RHC(1)	V96H0005CA	MANUAL ROLL CMD	2-AX RHC SOP	DEG					
DATM_PAN	V96J1011C	MANUAL PANEL ROLL TRIM	2-AX RHC SOP						
DATM_RHC	V96J1054C	MANUAL RHC ROLL TRIM	2-AX RHC SOP						
DBFMAN	V96J1021C	MANUAL BODY FLAP CMD	BF SLEW SOP						
DBFOFB	V95H8310C	COMP BODY FLAP POS	BF PFB SOP	DEG					
DEFB	V95H8001C	ELEVATOR POSITION	ELVN PFB SOP	DEG	SPL				93017G *
DELIBOFB	V95H8010C	COMP LIB ELEVON POS	ELVN PFB SOP	DEG	BSS				
DELOBOFB	V95H8060C	COMP LOB ELEVON POS	ELVN PFB SOP	DEG	BSS				
DEMAN/RHC(2)	V96H0007CA	MANUAL PITCH CMD	2-AX RHC SOP	DEG					
DERIBOFB	V95H8110C	COMP RIB ELEVON POS	ELVN PFB SOP	DEG	BSS				92230F
DEROBOFB	V95H8160C	COMP ROB ELEVON POS	ELVN PFB SOP	DEG	BSS				
DETM_PAN	V96J1013C	MANUAL PANEL PITCH TRIM	2-AX RHC SOP						
DETM_RHC	V96J1053C	MANUAL RHC PITCH TRIM	2-AX RHC SOP						
DOWNLOCK	V96X3011X	DOWNLOCK FLAG	HYD SYS SOP						
DRMAN	V96H0009C	MANUAL YAW CMD	RPTA SOP	DEG					
DROFB	V95H8210C	COMP RUDDER POS	RUD PFB SOP	DEG	BSS				
DRT	V96J1015C	MANUAL YAW TRIM CMD	RPTA SOP						
DSBC_AL	V90H1011CD	SPEEDBRAKE ANGLE COMMAND-AUTO LAND	GRTLS A/L GUID	DEG					93017G *
DSBC_AT	V90H1011CA	SPEEDBRAKE ANGLE COMMAND-AUTO LAND	GRTLS TAEML GUID	DEG					93017G *
DSBMAN	V96H0001C	SEL MAN SPDBK CMD	SBTC SOP	DEG					
DSBOFB	V95H8260C	COMP SPDBK POS	SB PFB SOP	DEG					93087E
EAS	V95L3145C	GN&C EQUIVALENT AIRSPEED	ADTA SOP	FT/S	SPL				93017G *
EBFB(1)	V95H3523C	BODY ROLL ATT ERROR	G/C STEER	DEG	SPL				93017G *
EBFB(2)	V95H3521C	BODY PITCH ATT ERROR	G/C STEER	DEG	SPL				93017G *
EBFB(3)	V95H3522C	BODY YAW ATT ERROR	G/C STEER	DEG	SPL				93017G *
ETSEP_Y_DRIFT	V97U1086C	ETSEP YAW AXIS OPEN LOOP TIME	CONT 3E/O GUID	SEC					90705H
ET_SEP_CMD	V90X8250X	ET SEPARATION CMD FLAG	ET SEP SEQ		BD				93017G *
FAST_SEP_FLAG	V90X8267X	FAST SEPARATION FLAG	ET SEP SEQ						79643A
FLATTURN_CMD	V96X0051X	FLATTURN INDICATOR	LANDING SOP						

TABLE 4.10.2-1. INPUT FUNCTIONAL PARAMETERS FOR GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E	L A S T C R E V	R E V
FLT_PATH_ANG_DOT	V90R0924C	GROUND-REL FLT PATH ANGLE RATE	RTLS UPP	DEG/S			90705H	
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	*	
GSENBL	V90X2554X	GROUND SPEED ENBL CMD - NWS	LANDING SOP		BD	93017G	*	
HYDRFAIL(1)	V96X3005X	HYDR SYS 1 FAIL STATUS	HYD SYS SOP		BD	93017G	*	
HYDRFAIL(2)	V96X3006X	HYDR SYS 2 FAIL STATUS	HYD SYS SOP		BD	93017G	*	
HYDRFAIL(3)	V96X3007X	HYDR SYS 3 FAIL STATUS	HYD SYS SOP		BD	93017G	*	
I_PHASE	V90J1117CB	TAEM GUIDANCE PHASE INDICATOR	GRTLS TAEM GUID	ND			93017G	*
JET_MAP(01)	V90J5727C	1ST PRIORITY JET IN GROUP 1	RCS RM					
JET_MAP(02)	V90J5728C	2ND PRIORITY JET IN GROUP 1	RCS RM					
JET_MAP(03)	V90J5729C	3RD PRIORITY JET IN GROUP 1	RCS RM					
JET_MAP(04)	V90J5730C	1ST PRIORITY JET IN GROUP 2	RCS RM					
JET_MAP(05)	V90J5731C	2ND PRIORITY JET IN GROUP 2	RCS RM					
JET_MAP(06)	V90J5732C	1ST PRIORITY JET IN GROUP 3	RCS RM					
JET_MAP(07)	V90J5733C	2ND PRIORITY JET IN GROUP 3	RCS RM					
JET_MAP(08)	V90J5734C	1ST PRIORITY JET IN GROUP 4	RCS RM					
JET_MAP(09)	V90J5735C	2ND PRIORITY JET IN GROUP 4	RCS RM					
JET_MAP(10)	V90J5736C	3RD PRIORITY JET IN GROUP 4	RCS RM					
JET_MAP(11)	V90J5737C	1ST PRIORITY JET IN GROUP 5	RCS RM					
JET_MAP(12)	V90J5738C	2ND PRIORITY JET IN GROUP 5	RCS RM					
JET_MAP(13)	V90J5739C	1ST PRIORITY JET IN GROUP 6	RCS RM					
JET_MAP(14)	V90J5740C	2ND PRIORITY JET IN GROUP 6	RCS RM					
JET_MAP(15)	V90J5741C	1ST PRIORITY JET IN GROUP 7	RCS RM					
JET_MAP(16)	V90J5742C	2ND PRIORITY JET IN GROUP 7	RCS RM					
JET_MAP(17)	V90J5743C	1ST PRIORITY JET IN GROUP 8	RCS RM					
JET_MAP(18)	V90J5744C	2ND PRIORITY JET IN GROUP 8	RCS RM					
JET_MAP(19)	V90J5745C	1ST PRIORITY JET IN GROUP 9	RCS RM					
JET_MAP(20)	V90J5746C	2ND PRIORITY JET IN GROUP 9	RCS RM					
JET_MAP(21)	V90J5747C	3RD PRIORITY JET IN GROUP 9	RCS RM					
JET_MAP(22)	V90J5748C	4TH PRIORITY JET IN GROUP 9	RCS RM					
JET_MAP(23)	V90J5749C	1ST PRIORITY JET IN GROUP 10	RCS RM					
JET_MAP(24)	V90J5750C	2ND PRIORITY JET IN GROUP 10	RCS RM					
JET_MAP(25)	V90J5751C	3RD PRIORITY JET IN GROUP 10	RCS RM					
JET_MAP(26)	V90J5752C	4TH PRIORITY JET IN GROUP 10	RCS RM					
JET_MAP(27)	V90J5753C	1ST PRIORITY JET IN GROUP 11	RCS RM					
JET_MAP(28)	V90J5754C	2ND PRIORITY JET IN GROUP 11	RCS RM					
JET_MAP(29)	V90J5755C	3RD PRIORITY JET IN GROUP 11	RCS RM					
JET_MAP(30)	V90J5756C	1ST PRIORITY JET IN GROUP 12	RCS RM					
JET_MAP(31)	V90J5757C	2ND PRIORITY JET IN GROUP 12	RCS RM					
JET_MAP(32)	V90J5758C	3RD PRIORITY JET IN GROUP 12	RCS RM					
JET_MAP(33)	V90J5759C	1ST PRIORITY JET IN GROUP 13	RCS RM					
JET_MAP(34)	V90J5760C	2ND PRIORITY JET IN GROUP 13	RCS RM					
JET_MAP(35)	V90J5761C	3RD PRIORITY JET IN GROUP 13	RCS RM					

TABLE 4.10.2-1. INPUT FUNCTIONAL PARAMETERS FOR GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	L A S T C R E V	R E C
JET_MAP(36)	V90J5762C	1ST PRIORITY JET IN GROUP 14	RCS RM					
JET_MAP(37)	V90J5763C	2ND PRIORITY JET IN GROUP 14	RCS RM					
JET_MAP(38)	V90J5764C	3RD PRIORITY JET IN GROUP 14	RCS RM					
L_GAIN	V90X3321X	SEL ENTRY ROLL MODE L GAIN	GN&C SW RM		BD	92157		
M/MACH	V95L3029C	GN&C MACH NUMBER	ADTA SOP		SPL	93017G	*	
MECO_CMD	V90X8569XA	MECO COMMAND FLAG	SSME OPS		BD	93017G	*	
MECO_CMD	V90X8569XB	MECO COMMAND FLAG	MSC					
MECO_CONFIRMED	V90X8561X	MECO CONFIRMED FLAG	SSME OPS		BD	93017G	*	
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		
NO_Y_JET	V90X3322X	SEL ENTRY ROLL MODE NO Y JET	GN&C SW RM		BD	92157		
NWS1_MODE_FLAG	V91X6376X	NWS1 MODE	NW POSN SOP		BD	89889H		
NWS2_MODE_FLAG	V91X6377X	NWS2 MODE	NW POSN SOP		BD	89889H		
NY	V90A5361C	SELECTED AA LATERAL ACCEL	SF	G	SPL	93017G	*	
NZ	V90A5381C	SELECTED AA NORMAL ACCEL	SF	G	SPL	93017G	*	
NZC	V90A1025CC	NORMAL ACCEL CMD	GRTLS A/L GUID	G		93017G	*	
NZC	V90A1025CD	NORMAL ACCEL CMD	GRTLS TAEML GUID	G		93017G	*	
N_HYDRAULIC_GOOD	V96Q3001C	HYDR SYS GOOD STATUS	HYD SYS SOP		HXS	93017G	*	
PCH_CMD_REG4	V90X0913X	PITCH CMD CONT REGION 4 FLAG	CONT 3E/O GUID		BD	90705H		
PHI/PHI_TOPO	V90H2202C	BODY ROLL ATTITUDE EULER ANGLE	A/E ATT PROC	DEG	SPL	93017G	*	
PHIC_AL	V90H1044CD	COMMANDER ROLL ANGLE	GRTLS A/L GUID	DEG		93017G	*	
PHIC_AT	V90H1044CE	COMMANDER ROLL ANGLE	GRTLS TAEML GUID	DEG		93017G	*	
P_ORB	V90R5301CA	SELECTED RGA ROLL RATE	SF	DEG/S		93017G	*	
QBAR/QBAR_AD	V95P3011C	GN&C DYNAMIC PRESSURE	ADTA SOP		LBF/FT2	SPL	93017G	*
Q_BAR_A	V95P0500CA	DERIVED ASCENT DYNAMIC PRESS	RTLS UPP		LB/FT2	SPL	93017G	*
Q_ORB/Q	V90R5321CA	SELECTED RGA PITCH RATE	SF	DEG/S		93017G	*	
RC	V90R1027CB	AUTOLAND YAW RATE CMD	GRTLS A/L GUID	DEG/S				
RECONFIG_CMPL	V90X1539X	RCS XFD RECONFIG SEQ COMPLETE FLAG	RCS/RCS XFEED			89599C		
RETRACT_BF	V90X1030XB	BF RETRACT FLAG	GRTLS A/L GUID					
RHC_STATE(1)	V96J0015CB	RHC OUT OF DETENT ROLL	2-AX RHC SOP			89740B		
RHC_STATE(2)	V96J0017CB	RHC OUT OF DETENT PITCH	2-AX RHC SOP			89740B		
ROLLOUT_IND	V96X0052X	ROLLOUT FLAG	LANDING SOP			90102D		
R_ORB	V90R5341CA	SELECTED RGA YAW RATE	SF	DEG/S		93017G	*	
SBEV_LH	V96X0002X	CMDR SBTC TAKEOVER FLAG	SBTC SOP					
SBEV_RH	V96X0003X	PLT SBTC TAKEOVER FLAG	SBTC SOP					
SINPHI	V90H2203C	EULER ANGLE ROLL SINE	A/E ATT PROC					
SINTH	V90H2216C	EULER ANGLE PITCH SINE	A/E ATT PROC			93090E		
TAS	V95L3015C	GN&C TRUE AIRSPEED	ADTA SOP		FT/S	SPL	93017G	*
TG_END	V90X1108XB	TAEM GUIDANCE TERMINATION FLAG	GRTLS TAEML GUID			92355B		
THC_FSN(3)	V90X7696X	SEL FWD THC NEG Z OUTPUT	GN&C SW RM		BD	93017G	*	
THETA/THETA_TOPO	V90H2217C	BODY PITCH ATTITUDE EULER ANGLE	A/E ATT PROC	DEG	SPL	93017G	*	
UB1	V90U2651C	FRST COMP OF BODY FRM REL VEL VCTR	A/E ATT PROC	FT/S		89413B		
UPLOCK_REL	V96X3010X	UPLOCKED RELEASE FLAG	HYD SYS SOP					
WFBI_FB1	V95H3528C	ROLL RATE, FLIGHT BODY-INERTIAL	G/C STEER		SPL	93017G	*	
WFBI_FB2	V95H3526C	PITCH RATE, FLIGHT BODY-INERTIAL	G/C STEER		SPL	93017G	*	
WFBI_FB3	V95H3527C	YAW RATE, FLIGHT BODY-INERTIAL	G/C STEER		SPL	93017G	*	

TABLE 4.10.2-1. INPUT FUNCTIONAL PARAMETERS FOR GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	LAST CR	R E V
WOWLON_IND	V96X0050X	WEIGHT ON MAIN WHEELS INDICATOR	LANDING SOP		BD		93017G	*

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

TABLE 4.10.2-2. OUTPUT FUNCTIONAL PARAMETERS FROM GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	L A S T	C R E V
ALFERR_FDC	V90H1623CA	ANGLE OF ATTACK ERROR	E/L ADI PROC TLM					
AUTOBF_IND	V90X1582XB	BF AUTO FLAG	E/L EV AN PROC					
AUTOP_IND/AUTOP_LAMP	V90X1632XB	PITCH AUTO FLAG	2-AX RHC SOP E/L EV AN PROC GRTLS A/L GUID GRTLS TAEML GUID MEDS FC GNC XFER TLM				92522D	
AUTORY_IND/AUTORY_LAMP	V90X1642XB	ROLL/YAW AUTO FLAG	2-AX RHC SOP E/L EV AN PROC GRTLS A/L GUID GRTLS TAEML GUID MEDS FC GNC XFER TLM				92522D	
AUTOSB_IND/AUTOSB_LAMP	V90X1565XB	SPDBK AUTO FLAG	E/L EV AN PROC MEDS FC GNC XFER				92676B	
BETAFDC	V90U1664CB	DAP SIDESLIP ANGLE	E/L ADI PROC	DEG				
CONT_MINUS_Z_COMPL	V90X7002X	CONTINGENCY MINUS Z COMPLETE FLAG	CONT 3E/O GUID PW CONT GUID		BD		90705H	
CSSP_IND/CSSP_LAMP	V90X1631XB	PITCH CSS FLAG	E/L ADI PROC E/L EV AN PROC				90996G	
CSSRY_IND/CSSRY_LAMP	V90X1641XB	ROLL/YAW CSS FLAG	E/L ADI PROC E/L EV AN PROC				90996G	
DATRIM	V90H1629CB	AILERON TRIM	VERT SIT1 DISP VERT SIT2 DISP	DEG				
DBFPC	V90H1647CB	BF POSITION CMD	E/L EV AN PROC TLM					
DBFRC	V90H1580CA	BODY FLAP DEFLECTION CMD	AERO ACT SOP BF CMD RM TLM				93064D	
DLIBPC	V90H1734CD	LIB ELEVON POSITION CMD	AERO ACT SOP	DEG				
DLOBPC	V90H1735CD	LOB ELEVON POSITION CMD	AERO ACT SOP	DEG				
DNWC	V90H1672CB	NOSEWHEEL DEFLECTION CMD	AERO ACT SOP NW POSN SOP TLM				89889H	
DPJET_MC	V90R0917C	CONT GRTLS DAP PITCH ERR SIGNAL	CONT 3E/O GUID DL FMT 21/1	DEG/S	SPL	93017G	*	
DRCPF	V90H1621CB	PRELIMINARY RUDDER COMMAND (DRCPF)	TLM				92912D	
DRIBPC	V90H1737CD	RIB ELEVON POSITION CMD	AERO ACT SOP	DEG				
DROBPC	V90H1738CD	ROB ELEVON POSITION CMD	AERO ACT SOP	DEG				
DRPC	V90R1550CA	RATE LIMITED RUDDER CMD	AERO ACT SOP TLM					
DRTI	V90H1669CB	LATERAL ACCEL TRIM	VERT SIT1 DISP VERT SIT2 DISP					

TABLE 4.10.2-2. OUTPUT FUNCTIONAL PARAMETERS FROM GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	L A S T	C R E V
DRTRIM	V90H1668CB	RUDDER TRIM	VERT SIT1 DISP VERT SIT2 DISP	DEG				
DSBC	V90H1634CB	SPDBK CMD	E/L EV AN PROC TLM					
DSBPC	V90R1560CA	RATE LIMITED SPDBK CMD	AERO ACT SOP TLM	DEG				
FCS_ACCEPT_ICNCT	V90X8296XB	INTERCONNECTED DUMP CONSTRAINT	ABT CNTL SEQ				90705H	
HUD_AIL_CMD	V90H1633CB	HUD AIL CMD	HUDE1 HUDE2 TLM	DEG			93017G	*
LOAD_RELIEF	V90X1643XB	LOAD RELIEF DISCRETE	2-AX RHC SOP				89120A	
MNLBF_IND	V90X1583XB	BF MD FLAG	E/L EV AN PROC					
MNLSB_CMD_IND	V90X1567XB	CDR SPDBK MD FLAG	E/L EV AN PROC					
MNLSB_PLT_IND	V90X1568XB	PLT SPDBK MD FLAG	E/L EV AN PROC				92354	
NEW_JONLST_AFT(01)/L1A_ON	V90X1455XC	RCS JET L1A ON CMD	ASC RCS CMD SOP				92504G	
NEW_JONLST_AFT(02)/L1L_ON	V90X1673XA	RCS JET L1L ON CMD	ASC RCS CMD SOP TLM				89463	
NEW_JONLST_AFT(03)/L1U_ON	V90X1674XA	RCS JET L1U ON CMD	ASC RCS CMD SOP TLM				89463	
NEW_JONLST_AFT(04)/R1A_ON	V90X1457XC	RCS JET R1A ON CMD	ASC RCS CMD SOP TLM				92504G	
NEW_JONLST_AFT(05)/R1R_ON	V90X1683XA	RCS JET R1R ON CMD	ASC RCS CMD SOP TLM				89463	
NEW_JONLST_AFT(06)/R1U_ON	V90X1684XA	RCS JET R1U ON CMD	ASC RCS CMD SOP TLM				89463	
NEW_JONLST_AFT(09)/L3A_ON	V90X1456XC	RCS JET L3A ON CMD	ASC RCS CMD SOP TLM				92504G	
NEW_JONLST_AFT(10)/L3L_ON	V90X1678XA	RCS JET L3L ON CMD	ASC RCS CMD SOP TLM				89463	
NEW_JONLST_AFT(11)/L3D_ON	V90X1679XA	RCS JET L3D ON CMD	ASC RCS CMD SOP TLM				89463	
NEW_JONLST_AFT(12)/R3A_ON	V90X1459XC	RCS JET R3A ON CMD	ASC RCS CMD SOP TLM				92504G	
NEW_JONLST_AFT(13)/R3R_ON	V90X1688XA	RCS JET R3R ON CMD	ASC RCS CMD SOP TLM				89463	
NEW_JONLST_AFT(14)/R3D_ON	V90X1689XA	RCS JET R3D ON CMD	ASC RCS CMD SOP TLM				89463	
NEW_JONLST_AFT(17)/L2L_ON	V90X1675XA	RCS JET L2L ON CMD	ASC RCS CMD SOP TLM				89463	
NEW_JONLST_AFT(18)/L2U_ON	V90X1676XA	RCS JET L2U ON CMD	ASC RCS CMD SOP TLM				89463	
NEW_JONLST_AFT(19)/L2D_ON	V90X1677XA	RCS JET L2D ON CMD	ASC RCS CMD SOP TLM				89463	
NEW_JONLST_AFT(20)/R2R_ON	V90X1685XA	RCS JET R2R ON CMD	ASC RCS CMD SOP TLM				89463	

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TABLE 4.10.2-2. OUTPUT FUNCTIONAL PARAMETERS FROM GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G.227)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	L A S T C R	R E V
NEW_JONLST_AFT(21)/R2U_ON	V90X1686XA	RCS JET R2U ON CMD	ASC RCS CMD SOP TLM					89463
NEW_JONLST_AFT(22)/R2D_ON	V90X1687XA	RCS JET R2D ON CMD	ASC RCS CMD SOP TLM					89463
NEW_JONLST_AFT(23)/L4L_ON	V90X1680XA	RCS JET L4L ON CMD	ASC RCS CMD SOP TLM					89463
NEW_JONLST_AFT(24)/L4U_ON	V90X1681XA	RCS JET L4U ON CMD	ASC RCS CMD SOP TLM					89463
NEW_JONLST_AFT(25)/L4D_ON	V90X1682XA	RCS JET L4D ON CMD	ASC RCS CMD SOP TLM					89463
NEW_JONLST_AFT(26)/R4R_ON	V90X1690XA	RCS JET R4R ON CMD	ASC RCS CMD SOP TLM					89463
NEW_JONLST_AFT(27)/R4U_ON	V90X1691XA	RCS JET R4U ON CMD	ASC RCS CMD SOP TLM					89463
NEW_JONLST_AFT(28)/R4D_ON	V90X1692XA	RCS JET R4D ON CMD	ASC RCS CMD SOP TLM					89463
NEW_JONLST_FWD(02)/F1L_ON	V90X1442XA	RCS JET F1L ON CMD	ASC RCS CMD SOP					89463
NEW_JONLST_FWD(03)/F1U_ON	V90X1443XA	RCS JET F1U ON CMD	ASC RCS CMD SOP					92504G
NEW_JONLST_FWD(04)/F1D_ON	V90X1444XA	RCS JET F1D ON CMD	ASC RCS CMD SOP					89463
NEW_JONLST_FWD(06)/F2R_ON	V90X1446XA	RCS JET F2R ON CMD	ASC RCS CMD SOP					89463
NEW_JONLST_FWD(07)/F2U_ON	V90X1447XA	RCS JET F2U ON CMD	ASC RCS CMD SOP					92504G
NEW_JONLST_FWD(08)/F2D_ON	V90X1448XA	RCS JET F2D ON CMD	ASC RCS CMD SOP					89463
NEW_JONLST_FWD(09)/F4R_ON	V90X1453XA	RCS JET F4R ON CMD	ASC RCS CMD SOP					89463
NEW_JONLST_FWD(10)/F4D_ON	V90X1454XA	RCS JET F4D ON CMD	ASC RCS CMD SOP					89463
NEW_JONLST_FWD(14)/F3L_ON	V90X1450XA	RCS JET F3L ON CMD	ASC RCS CMD SOP					89463
NEW_JONLST_FWD(15)/F3U_ON	V90X1451XA	RCS JET F3U ON CMD	ASC RCS CMD SOP					92504G
NEW_JONLST_FWD(16)/F3D_ON	V90X1452XA	RCS JET F3D ON CMD	ASC RCS CMD SOP					89463
NZERRFD	V90A1619CA	NORMAL ACCEL ERROR	DL FMT 21/B E/L ADI PROC TLM	G	SPL	93017G	*	
PC	V90R1600CB	ROLL RATE COMMAND(PC)						
P_STAB	V90R1622CA	STABILITY ROLL RATE	E/L ADI PROC	DEG/S				
QFFDC	V90R1626CB	SLAPDOWN PITCH RATE ERROR	E/L ADI PROC	DEG/S				
RMBETA	V90H1646CB	RMBETA	ADTA RM	DEG				89862A
RS_AILERON	V90X1604XA	AILERON RATE SATURATION FLAG	RCS ACT LT					
RS_ELEVATOR	V90X1602XA	ELEVATOR RATE SATURATION FLAG	RCS ACT LT					
R_STAB	V90R1627CA	STABILITY YAW RATE	E/L ADI PROC					
SEP_COMPLETE	V90X2455X	SEPARATION -Z BURN COMPLETE	MSC					
UXCMD	V90J1636CB	ROLL JET COMMAND	RCS ACT LT					
UYCMD	V90J1638CB	PITCH JET COMMAND	RCS ACT LT					
UZCMD	V90H2736CB	ROTATION JET COMMAND YAW	DL FMT 21/2 RCS ACT LT					93017G *

TABLE 4.10.2-2. OUTPUT FUNCTIONAL PARAMETERS FROM GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R E C	LAST CR	R E V C
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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 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
ALF_REG4_FC	V97U8564C	DEG			F	S	D P G4.227	00	A3F	91036B	
ALPHA_LIM_INTC	V97U1282C	DEG			F	S	D C G4.227	01	ZF8	89674E	
							G4.36	03	ZF8		
ALT_NOYJET	V99U9800C	FT			F	S	D P G4.227	00	ZF8	89674E	
BFBIAS	V97U9621C	DEG			F	S	D P G4.227	00	ZF7	90711D	
BFRADB	V97U1147C	DEG			F	S	D X G4.227	00	ZF7	90710	
							G4.36				
BFRBDB	V97U1148C	DEG			F	S	D X G4.227	00	ZF7	90710	
							G4.36				
BRAKE_FLOW	V97U1201C	GAL/MIN			F	S	D A G4.227	00	ZF8	92438A	
							G4.36				
CBFRADB	V97U9622C	DEG			F	S	D P G4.227	00	ZF7	90711D	
CBFRBDB	V97U9623C	DEG			F	S	D P G4.227	00	ZF7	90711D	
CGBFR	V97U9624C	DEG/SEC			F	S	D P G4.227	00	ZF7	90711D	
CONT_KMCX	V97U8575C	DEG/SEC/DEG			F	S	D P G4.227	00	A3F	91036B	
CONT_KMCY	V97U8577C	DEG/SEC/DEG			F	S	D P G4.227	00	A3F	91036B	
CONT_KMCZ	V97U8573C	DEG/SEC/DEG			F	S	D P G4.227	00	A3F	91036B	
CONT_KSEPX	V97U8581C	DEG/SEC/DEG			F	S	D P G4.227	00	A3F	91036B	
CONT_KSEPY	V97U8583C	DEG/SEC/DEG			F	S	D P G4.227	00	A3F	91036B	
CONT_KSEPZ	V97U8579C	DEG/SEC/DEG			F	S	D P G4.227	00	A3F	91036B	
CONT_MINUS_Z_MIN_TIME	V97U8206C	SEC			F	S	D P G4.227	00	ZSR	90007G	
CONT_PMC_LIM	V97U8574C	DEG/SEC			F	S	D P G4.227	00	A3F	91036B	
CONT_PSEP_LIM	V97U8580C	DEG/SEC			F	S	D P G4.227	00	A3F	91036B	
CONT_QMC_LIM	V97U8576C	DEG/SEC			F	S	D P G4.227	00	A3F	91036B	
CONT_QSEP_LIM	V97U8582C	DEG/SEC			F	S	D P G4.227	00	A3F	91036B	
CONT_RMC_LIM	V97U8572C	DEG/SEC			F	S	D P G4.227	00	A3F	91036B	
CONT_RSEP_LIM	V97U8578C	DEG/SEC			F	S	D P G4.227	00	A3F	91036B	
CPHIMIN	V97U0608C	ND			F	S	D C G4.227	00	ZS7	89680A	
							G4.36				
CTBFINT	V97U9619C	DEG			F	S	D P G4.227	00	ZF7	90711D	
DACDOT_LIM1	V97U1192C	DEG/SEC			F	S	D A G4.227	00	ZF8	89674E	
							G4.36				
DACDOT_LIM2	V97U1193C	DEG/SEC			F	S	D A G4.227	00	ZF8	89674E	
							G4.36				
DACDOT_LIM3	V97U1194C	DEG/SEC			F	S	D A G4.227	00	ZF8	89674E	
							G4.36				
DACDOT_LIMW	V97U1202C	DEG/SEC			F	S	D A G4.227	00	ZF8	92438A	
							G4.36				
DAC_LIM	V97U0612C	DEG			F	S	D C G4.227	00	ZS7	89680A	
							G4.36				
DATLIM	V97U0615C	DEG/SEC			F	S	D C G4.227	00	ZS7	89680A	
							G4.36				
DBFADBN	V97U0623C	DEG			F	S	D C G4.227	00	ZF7	90711D	
							G4.36				
DBFADBP	V97U9620C	DEG			F	S	D C G4.227	00	ZF7	90711D	
							G4.36				

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
DBFBDB	V97U0624C	DEG		F	S	D	C	G4.227 G4.36	00	ZF7	90710
DBFD	V97U1112C	DEG		F	S	D	C	G4.227 G4.36	01	JDG	79962F
DBFL	V97U0627C	GAL/MIN		F	S	D	X	G4.227 G4.36	03	JDG	ZF7 90710
DECCDOT_LIM1	V97U1189C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	89674E
DECCDOT_LIM2	V97U1190C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	89674E
DECCDOT_LIM3	V97U1191C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	89674E
DECCDOT_LIMW	V97U1203C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	92438A
DECCMAX	V97U1104C	DEG		F	S	D	C	G4.227 G4.36	00	ZS7	89680A
DECCMIN	V97U1105C	DEG		F	S	D	C	G4.227 G4.36	00	ZS7	89680A
DECCSLP	V97U1179C	DEG		F	S	D	C	G4.227 G4.36	00	ZF8	89674E
DELVC_MAX	V97U0639C	DEG		F	S	D	C	G4.227 G4.36	00	ZS7	89680A
DELVC_MIN	V97U0640C	DEG		F	S	D	C	G4.227 G4.36	00	ZS7	89680A
DEL_MC1 DEMAX	V97U8567C V97U0642C	DEG/SEC DEG		F	S	D	P	G4.227	00	A3F	91036B
				F	S	D	C	G4.227 G4.36	00	ZS7	89680A
DETRIM_MAX	V97U0644C	DEG		F	S	D	C	G4.227 G4.36	00	ZS7	89680A
DETRIM_MIN	V97U0645C	DEG		F	S	D	C	G4.227 G4.36	00	ZS7	89680A
DETR_LIM	V97U0643C	DEG/SEC		F	S	D	C	G4.227 G4.36	00	ZS7	89680A
DLIM	V97U0651C	DEG		F	S	D	X	G4.227 G4.36	00	ZS7	89680A
DNWC_LIM	V97U0652C	DEG		F	S	D	C	G4.227 G4.36	00	ZF7	90710
DNWMAX	V97U0653C	DEG		F	S	D	C	G4.227 G4.36	00	ZF7	90710
DNZCP_4 DRDOT_LIM1	V98U9964C V97U1369C	G DEG/SEC		F	S	D	X	G4.227	00	ZS7	89680A
				F	S	D	A	G4.227 G4.36	00	ZF8	89674E
DRDOT_LIM2	V97U1370C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	89674E
DRDOT_LIM3	V97U1180C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	89674E

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
DRDOT_LIM_SLIM1	V97U1376C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	89674E
DRDOT_LIM_SLIM2	V97U1377C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	89674E
DRDOT_LIM_SLIM3	V97U1378C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	89674E
DRR_LIM	V98U9653C	DEG/SEC		F	S	D	C	G4.227 G4.36	01	ZF9	DC2453
DR_LLM	V99U9683C	DEG		F	S	D	C	G4.227 G4.36	03	ZF9	NWS 90102D
DSBDOT_NLIM11	V97U1209C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	92438A
DSBDOT_NLIM12	V97U0678C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	92438A
DSBDOT_NLIM13	V97U0679C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	92438A
DSBDOT_NLIM2	V97U0668C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	89674E
DSBDOT_NLIM_SLIM1	V97U1373C	DEG/SEC		F	S	D	X	G4.227 G4.36	00	ZF7	90710
DSBDOT_NLIM_SLIM2	V97U1374C	DEG/SEC		F	S	D	X	G4.227 G4.36	00	ZF7	90710
DSBDOT_NLIM_SLIM3	V97U1375C	DEG/SEC		F	S	D	X	G4.227 G4.36	00	ZF7	90710
DSBDOT_PLIM1	V97U1210C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	92438A
DSBDOT_PLIM2	V97U0670C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	92438A
DSBDOT_PLIM3	V97U0671C	DEG/SEC		F	S	D	A	G4.227 G4.36	00	ZF8	92438A
DSB_DEF_M	V97U1509C	DEG		F	S	D	C	G4.227	00	ZSR	93087E
DSB_MAX	V97U0664C	DEG		F	S	D	C	G4.227 G4.36	00	ZS7	89680A
DT_PITCH_ERR_TAB(1)	V97U1490C	SEC		F	S	D	C	G4.227	00	ZSR	93087E
DT_PITCH_ERR_TAB(10)	V97U1499C	SEC		F	S	D	C	G4.227	00	ZSR	93087E
DT_PITCH_ERR_TAB(2)	V97U1491C	SEC		F	S	D	C	G4.227	00	ZSR	93087E
DT_PITCH_ERR_TAB(3)	V97U1492C	SEC		F	S	D	C	G4.227	00	ZSR	93087E
DT_PITCH_ERR_TAB(4)	V97U1493C	SEC		F	S	D	C	G4.227	00	ZSR	93087E
DT_PITCH_ERR_TAB(5)	V97U1494C	SEC		F	S	D	C	G4.227	00	ZSR	93087E
DT_PITCH_ERR_TAB(6)	V97U1495C	SEC		F	S	D	C	G4.227	00	ZSR	93087E
DT_PITCH_ERR_TAB(7)	V97U1496C	SEC		F	S	D	C	G4.227	00	ZSR	93087E
DT_PITCH_ERR_TAB(8)	V97U1497C	SEC		F	S	D	C	G4.227	00	ZSR	93087E
DT_PITCH_ERR_TAB(9)	V97U1498C	SEC		F	S	D	C	G4.227	00	ZSR	93087E
EAS_SD	V96U9372C	FT/SEC		F	S	D	P	G4.227 G4.36	00	JDC	DC0762C
ETBB(1)	V99U7207C	ND		F	S	D	C	G4.227	00	ZFR	90014G
ETBB(2)	V99U7208C	ND		F	S	D	C	G4.227	00	ZFR	90014G

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
ETBB(3)	V99U7209C	ND		F	S	D	C G4.227	00	ZFR	90014G	
ETBB(4)	V99U7210C	ND		F	S	D	C G4.227	00	ZFR	90014G	
ETBB(5)	V99U7211C	ND		F	S	D	C G4.227	00	ZFR	90014G	
ETSEP_P_DELAY	V97U1507C	SEC		F	S	D	C G4.227	00	ZSR	93087E	
ETSEP_R_DELAY	V97U1508C	SEC		F	S	D	C G4.227	00	ZSR	93087E	
ETSEP_Y_DRIFT	V97U1086C	SEC		F	S	D	C G4.227	00	ZSR	90007G	
FCS_INTC_COUNT	V97U1281C	ND		I	S	D	C G4.227	01	ZF8	89674E	
							G4.36	03	ZF8		
FLOW_AVAIL	V97U1372C	GAL/MIN		F	S	D	X G4.227	00	ZF7	90710	
							G4.36				
GALRE	V98U9650C	ND		F	S	D	C G4.227	00	ZF7	90710	
							G4.36				
GALR_BIAS	V98U9652C	ND		F	S	D	C G4.227	00	ZS7	89680A	
							G4.36				
GBA(1,1)	V96U9604C	ND		F	S	D	X G4.227	00	JDB	89674E	
							G4.36				
GBA(1,2)	V96U9619C	ND		F	S	D	X G4.227	00	JDB	89674E	
							G4.36				
GBA(2,1)	V96U9605C	ND		F	S	D	X G4.227	00	JDB	89674E	
							G4.36				
GBA(2,2)	V96U9620C	ND		F	S	D	X G4.227	00	JDB	89674E	
							G4.36				
GBA(3,1)	V96U9606C	ND		F	S	D	X G4.227	00	JDB	89674E	
							G4.36				
GBA(3,2)	V96U9621C	ND		F	S	D	X G4.227	00	JDB	89674E	
							G4.36				
GBA(4,1)	V96U9607C	ND		F	S	D	X G4.227	00	JDB	89674E	
							G4.36				
GBA(4,2)	V96U9622C	ND		F	S	D	X G4.227	00	JDB	89674E	
							G4.36				
GBA(5,1)	V96U9608C	ND		F	S	D	X G4.227	00	JDB	89674E	
							G4.36				
GBA(5,2)	V96U9623C	ND		F	S	D	X G4.227	00	JDB	89674E	
							G4.36				
GBETA	V97U1140C	DEG/SEC/DEG		F	S	D	C G4.227	00	ZS7	89680A	
							G4.36				
GDAB	V97U0685C	LBS/FT**2		F	S	D	X G4.227	00	ZS7	89680A	
							G4.36				
GDA_MAX	V97U0683C	DEG/DEG/SEC		F	S	D	X G4.227	00	ZF8	89674E	
							G4.36				
GDA_MIN	V97U0684C	DEG/DEG/SEC		F	S	D	X G4.227	00	ZF8	89674E	
							G4.36				
GDGAI(1)	V97U0690C	ND		F	S	D	X G4.227	01	ZF7	90710	
							G4.36	03	ZF7		
GDGAI(2)	V97U0691C	ND		F	S	D	X G4.227	01	ZF7	90710	
							G4.36	03	ZF7		

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
GDGAI(3)	V97U0692C	ND			F	S	D X G4.227 G4.36	01	ZF7	90710	
GDQ_MAX	V97U0693C	DEG/DEG/SEC			F	S	D C G4.227 G4.36	03	ZF7	89674E	
GDQ_MIN	V97U0695C	DEG/DEG/SEC			F	S	D C G4.227 G4.36	00	ZF8	89674E	
GDRGB(1)	V97U0700C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	
GDRGB(2)	V97U0701C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	
GDRGB(3)	V97U0702C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	
GDRGB(4)	V97U0703C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	
GDRGB(5)	V97U0704C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	
GDRJ(1)	V97U1206C	ND			F	S	D C G4.227	00	ZFR	90014G	
GDRJ(2)	V97U1207C	ND			F	S	D C G4.227	00	ZFR	90014G	
GDRJ(3)	V97U1208C	ND			F	S	D C G4.227	00	ZFR	90014G	
GDSBMAN	V97U0706C	DEG/DEG			F	S	D C G4.227 G4.36	00	ZS7	89680A	
GEBA(1)	V97U0707C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBA(2)	V97U0708C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBA(3)	V97U0709C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBA(4)	V97U0710C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBA(5)	V97U0711C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBB(1)	V97U0712C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBB(2)	V97U0713C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBB(3)	V97U0714C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBB(4)	V97U0715C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBB(5)	V97U0716C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBC(1)	V96U8573C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBC(2)	V96U8574C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBC(3)	V96U7897C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
GEBC(4)	V96U7898C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GEBC(5)	V96U7899C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GELERROR(1)	V97U0717C	ND			F	S	M C G4.227 G4.36	00	JDC	DC0762C	
GELERROR(2)	V97U0718C	ND			F	S	M C G4.227 G4.36	00	JDC	DC0762C	
GELERROR(3)	V97U0719C	ND			F	S	M C G4.227 G4.36	00	JDC	DC0762C	
GF1	V99U9671C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GF2	V99U9672C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GF3	V99U9673C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GF4	V99U9674C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GF5	V99U9675C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GGD	V97U8601C	SEC			F	S	D P G4.227	00	A3F	91036B	
GHLBY(1)	V99U9753C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
GHLBY(2)	V99U9754C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
GHLBY(3)	V99U9755C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
GHLBY(4)	V99U9756C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
GHLBY(5)	V99U9757C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
GMGA1	V99U7170C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGA2	V99U7171C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGA3	V99U7172C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGA4	V99U7173C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGA5	V99U7174C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGB1	V99U7175C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGB2	V99U7176C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	
GMGB3	V99U7177C	ND			F	S	M C G4.227 G4.36	00	JDB	89674E	

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
GMGB4	V99U7178C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMGB5	V99U7179C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMGC1	V99U7180C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMGC2	V99U7181C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMGC3	V99U7182C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMGC4	V99U7183C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMGC5	V99U7184C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMLA1	V99U7185C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMLA2	V99U7186C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMLA3	V99U7187C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMLA4	V99U7188C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMLA5	V99U7189C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMLB1	V99U7190C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMLB2	V99U7191C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMLB3	V99U7192C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMLB4	V99U7193C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMLB5	V99U7194C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMLC1	V99U7195C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMLC2	V99U7196C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMLC3	V99U7197C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMLC4	V99U7198C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GMLC5	V99U7199C	ND		F	S	M	C G4.227 G4.36	00	JDB	89674E	
GNWR	V97U0723C	SEC		F	S	D	P G4.227 G4.36	00	ZF7	90710	

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
GNY(1)	V99U9677C	ND			F	S	D C G4.227 G4.36	00	NWS	90102D	
GNY(2)	V99U9678C	ND			F	S	D C G4.227 G4.36	00	NWS	90102D	
GNY(3)	V99U9679C	ND			F	S	D C G4.227 G4.36	00	NWS	90102D	
GNY(4)	V99U9680C	ND			F	S	D C G4.227 G4.36	00	NWS	90102D	
GNY(5)	V99U9681C	ND			F	S	D C G4.227 G4.36	00	NWS	90102D	
GNYNWS	V99U9676C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GNYR	V99U9682C	DEG/G			F	S	D C G4.227 G4.36	00	NWS	90102D	
GNZfilt_AL(1)	V96U9616C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	
GNZfilt_AL(2)	V96U9617C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	
GNZfilt_AL(3)	V96U9618C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	
GPA(1)	V97U0727C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	
GPA(2)	V97U0728C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	
GPA(3)	V97U0729C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	
GPA(4)	V97U0730C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	
GPA(5)	V97U0731C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	
GPB(1)	V97U0732C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	
GPB(2)	V97U0733C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	
GPB(3)	V97U0734C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	
GPB(4)	V97U0735C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	
GPB(5)	V97U0736C	ND			F	S	M X G4.227 G4.36	00	JDB	89674E	
GPC_LL	V96U9368C	DEG/(DEG/SEC)			F	S	D X G4.227 G4.36	00	ZF7	90710	
GPC_UL	V96U9367C	DEG/(DEG/SEC)			F	S	D X G4.227 G4.36	00	ZF7	90710	
GPFWDLO	V97U1157C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
GPPANT	V97U0740C	DEG/SEC			F	S	D C G4.227 G4.36	00	ZS7	89680A	
GPRHCT	V97U0741C	DEG/SEC**2			F	S	D C G4.227 G4.36	00	ZF8	DC0882B	
GPRHC_6	V98U9963C	DEG/SEC/DEG			F	S	D C G4.227	00	ZS7	89680A	
GPRJA(1)	V96U9594C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPRJA(2)	V96U9595C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPRJA(3)	V96U9596C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPRJA(4)	V96U9597C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPRJA(5)	V96U9598C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPRJB(1)	V96U9599C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPRJB(2)	V96U9600C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPRJB(3)	V96U9601C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPRJB(4)	V96U9602C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPRJB(5)	V96U9603C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GPX	V97U0742C	ND			F	S	D C G4.227 G4.36	00	ZS7	89680A	
GRCA(1)	V97U0751C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCA(2)	V97U0752C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCA(3)	V97U0753C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCA(4)	V97U0754C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCA(5)	V97U0755C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCB(1)	V97U0756C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCB(2)	V97U0757C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCB(3)	V97U0758C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCB(4)	V97U0759C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCB(5)	V97U0760C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
GRCSA	V97U0761C	ND			F	S	D C G4.227 G4.36	00	ZS7	89680A	
GRCYJA(1,1)	V96U9624C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJA(1,2)	V96U9634C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJA(2,1)	V96U9625C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJA(2,2)	V96U9635C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJA(3,1)	V96U9626C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJA(3,2)	V96U9636C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJA(4,1)	V96U9627C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJA(4,2)	V96U9637C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJA(5,1)	V96U9628C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJA(5,2)	V96U9638C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJB(1,1)	V96U9629C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJB(1,2)	V96U9639C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJB(2,1)	V96U9630C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJB(2,2)	V96U9640C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJB(3,1)	V96U9631C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJB(3,2)	V96U9641C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJB(4,1)	V96U9632C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJB(4,2)	V96U9642C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJB(5,1)	V96U9633C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRCYJB(5,2)	V96U9643C	ND			F	S	D X G4.227 G4.36	00	JDB	89674E	
GRPANT	V98U9626C	DEG/SEC			F	S	D C G4.227 G4.36	00	ZF7	90710	
GRR	V97U0765C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
GRYFWDLO	V97U1162C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GSBETA	V97U1119C	DEG/SEC/DEG			F	S	D C G4.227 G4.36	00	ZS7	89680A	
GSD(1)	V97U0778C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GSD(2)	V97U0779C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GSD(3)	V97U0780C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
GTAS_5	V98U9962C	ND			F	S	D X G4.227	00	ZS7	89680A	
GTRIMB	V96U8085C	ND			F	S	D C G4.227 G4.36	01	ZF9	DC2453	
IYAW_CYCLE	V97U1146C	ND			I	S	D C G4.227 G4.36	00	ZF7	90710	
KDAB_AUTO	V96U9371C	DEG/DEG			F	S	D P G4.227 G4.36	00	ZF7	90710	
KDAB_CSS	V96U9370C	DEG/DEG			F	S	D C G4.227 G4.36	00	ZF7	90710	
KDEMLIN	V97U0798C	DEG/DEG			F	S	D C G4.227 G4.36	00	ZS7	89680A	
KEIO	V97U1167C	(GAL/MIN)/(DEG/SEC)			F	S	D A G4.227 G4.36	00	ZF8	89674E	
KEIS	V97U1171C	(GAL/MIN)/(DEG/SEC)			F	S	D A G4.227 G4.36	00	ZF8	89674E	
KEOO	V97U1168C	(GAL/MIN)/(DEG/SEC)			F	S	D A G4.227 G4.36	00	ZF8	89674E	
KEOS	V97U1172C	(GAL/MIN)/(DEG/SEC)			F	S	D A G4.227 G4.36	00	ZF8	89674E	
KGPC	V96U9366C	LB*SEC/FT**2			F	S	D X G4.227 G4.36	00	ZF7	90710	
KMCX	V97U1224C	DEG/SEC/DEG			F	S	D C G4.227	00	ZSR	90007G	
KMCY	V97U1225C	(DEG/SEC)/DEG			F	S	D C G4.227	00	ZSR	90007G	
KMCZ	V97U1226C	(DEG/SEC/DEG)			F	S	D C G4.227	00	ZSR	90007G	
KNWMLIN	V97U0806C	DEG/DEG			F	S	D C G4.227 G4.36	00	ZF7	90710	
KNWMPAR	V97U0807C	DEG/DEG**2			F	S	D C G4.227 G4.36	00	ZF7	90710	
KQR	V97U1371C	(GAL/MIN)/(DEG/SEC)			F	S	D A G4.227 G4.36	00	ZF8	89674E	
KQSB	V97U0809C	(GAL/MIN)/(DEG/SEC)			F	S	D X G4.227 G4.36	00	ZF7	90710	
KRB_ETSEP	V97U1510C	(DEG/SEC)/DEG			F	S	D C G4.227	00	ZSR	93087E	
KYB	V97U1232C	(DEG/SEC)/DEG			F	S	D C G4.227	00	ZSR	90007G	
KYP(1)	V97U1234C	DEG			F	S	D C G4.227	00	ZSR	90007G	
KYP(2)	V97U1235C	DEG			F	S	D C G4.227	00	ZSR	90007G	

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
LEAKAGE1	V97U1181C	GAL/MIN			F	S	D A G4.227 G4.36	00	ZF8	89674E	
LEAKAGE2	V97U1182C	GAL/MIN			F	S	D A G4.227 G4.36	00	ZF8	89674E	
LEAKAGE3	V97U1183C	GAL/MIN			F	S	D A G4.227 G4.36	00	ZF8	89674E	
LIMPR_HA	V97U1368C	DEG/SEC			F	S	D A G4.227 G4.36	00	ZF8	89674E	
LIMPR_LA	V97U1367C	DEG/SEC			F	S	D A G4.227 G4.36	00	ZF8	89674E	
LLIM	V97U0819C	DEG			F	S	D X G4.227 G4.36	00	ZS7	89680A	
LNDG_GR_FLOW	V97U1174C	GAL/MIN			F	S	D A G4.227 G4.36	00	ZF8	89674E	
LNDG_GR_LEAKAGE	V97U1175C	GAL/MIN			F	S	D A G4.227 G4.36	00	ZF8	89674E	
LOAD_RELIEF_DELAY	V97U0820C	SEC			F	S	D C G4.227 G4.36	00	ZF7	90710	
LOW_PCH_GAIN	V97U8566C	ND			F	S	D P G4.227	00	A3F	91036B	
LRE	V97U1238C	DEG/SEC			F	S	D C G4.227	00	ZSR	90007G	
LYP	V97U1241C	DEG/SEC			F	S	D C G4.227	00	ZSR	90007G	
MACH_1	V96U9658C	ND			F	S	D X G4.227 G4.36	00	ZF9	DC2453	
MACH_AILERON	V98U9703C	ND			F	S	D C G4.227 G4.36	00	ZF9	DC2453	
MACH_HYST	V96U8083C	ND			F	S	D C G4.227 G4.36	00	ZF9	DC2453	
MACH_RRXF	V98U9704C	ND			F	S	D X G4.227 G4.36	00	ZF9	DC2453	
MACH_RUDDER	V98U9702C	ND			F	S	D C G4.227 G4.36	00	ZF9	DC2453	
MACH_YAWJET	V97U0825C	ND			F	S	D X G4.227 G4.36	00	ZF9	DC2453	
MCBB(1)	V96U9803C	ND			F	S	D C G4.227	00	ZFR	90014G	
MCBB(2)	V96U9804C	ND			F	S	D C G4.227	00	ZFR	90014G	
MCBB(3)	V96U9805C	ND			F	S	D C G4.227	00	ZFR	90014G	
MCBB(4)	V96U9806C	ND			F	S	D C G4.227	00	ZFR	90014G	
MCBB(5)	V96U9807C	ND			F	S	D C G4.227	00	ZFR	90014G	
MINUS_Z_MIN_ALPHA	V98U9959C	DEG			F	S	D C G4.227	00	ZSR	90007G	
MINUS_Z_MIN_TIME	V98U9958C	SEC			F	D	D C G4.227	00	ZSR	90007G	
M_PHI	V96U9668C	ND			F	S	D P G4.227 G4.36	00	ZF7	90710	
NP_HIGH	V97U0832C	ND	I	S	D X		G4.227 G4.36	00	ZS7	89680A	
NP_LOW	V97U0833C	ND	I	S	D X		G4.227 G4.36	00	ZS7	89680A	

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
NR (2)	V97U0837C	ND	I	S	D	C	G4.227 G4.36	00	ZS7	89680A	
NR (3)	V97U0838C	ND	I	S	D	C	G4.227 G4.36	00	ZS7	89680A	
NR (4)	V97U0839C	ND	I	S	D	C	G4.227 G4.36	00	ZS7	89680A	
NWS_FLOW	V97U1204C	GAL/MIN	F	S	D	A	G4.227 G4.36	00	ZF8	92438A	
NZFDfilt(1)	V97U0841C	ND	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
NZFDfilt(2)	V97U0842C	ND	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
NZFDfilt(3)	V97U0843C	ND	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
PE1	V97U1242C	DEG/SEC	F	S	D	C	G4.227	00	ZSR	90007G	
PE2	V97U1243C	DEG/SEC	F	S	D	C	G4.227	00	ZSR	90007G	
PE3	V97U1244C	DEG/SEC	F	S	D	C	G4.227	00	ZSR	90007G	
PE4	V97U1245C	DEG/SEC	F	S	D	C	G4.227	00	ZSR	90007G	
PE5	V97U1246C	DEG/S	F	S	D	C	G4.227	00	ZFR	90014G	
PE6	V97U8570C	DEG/SEC	F	S	D	P	G4.227	00	A3F	91036B	
PE7	V97U8571C	DEG/SEC	F	S	D	P	G4.227	00	A3F	91036B	
PEBFB_LIM	V98U9976C	DEG/SEC	F	S	D	C	G4.227	00	ZSR	90007G	
PHI_LIM_INTC	V97U1283C	DEG	F	S	D	C	G4.227 G4.36	01	ZF8	89674E	
PIO_ENABLE	V96U8761C	ND	D		D	C	G4.227 G4.36	00	ZF9	DC2453	
PITCH_ERR_LIM	V97U1568C	DEG/SEC	F	S	D	C	G4.227	00	ZSR	93087E	
PITCH_ERR_TAB(1)	V97U1553C	DEG/SEC	F	S	D	C	G4.227	00	ZSR	93087E	
PITCH_ERR_TAB(10)	V97U1567C	DEG/SEC	F	S	D	C	G4.227	00	ZSR	93087E	
PITCH_ERR_TAB(2)	V97U1554C	DEG/SEC	F	S	D	C	G4.227	00	ZSR	93087E	
PITCH_ERR_TAB(3)	V97U1555C	DEG/SEC	F	S	D	C	G4.227	00	ZSR	93087E	
PITCH_ERR_TAB(4)	V97U1556C	DEG/SEC	F	S	D	C	G4.227	00	ZSR	93087E	
PITCH_ERR_TAB(5)	V97U1557C	DEG/SEC	F	S	D	C	G4.227	00	ZSR	93087E	
PITCH_ERR_TAB(6)	V97U1563C	DEG/SEC	F	S	D	C	G4.227	00	ZSR	93087E	
PITCH_ERR_TAB(7)	V97U1564C	DEG/SEC	F	S	D	C	G4.227	00	ZSR	93087E	
PITCH_ERR_TAB(8)	V97U1565C	DEG/SEC	F	S	D	C	G4.227	00	ZSR	93087E	
PITCH_ERR_TAB(9)	V97U1566C	DEG/SEC	F	S	D	C	G4.227	00	ZSR	93087E	
PSF(1)	V96U8762C	ND	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
PSF(2)	V96U8763C	ND	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
PSF(3)	V96U8764C	ND	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
PSF(4)	V96U8765C	ND	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
PSF(5)	V96U8766C	ND	F	S	D	C	G4.227 G4.36	00	ZF7	90710	

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
PSFL	V96U8773C	DEG		F	S	D	C	G4.227 G4.36	00	ZF7	90710
P_ERROR_DBAND	V97U1569C	DEG		F	S	D	C	G4.227	00	ZSR	93087E
P_LIM_INTC	V97U1284C	DEG/S		F	S	D	C	G4.227 G4.36	01 03	ZF8 ZF8	89674E
P_MC_1	V97U8562C	DEG/SEC		F	S	D	P	G4.227	00	A3F	91036B
P_MC_2	V97U8563C	DEG/SEC		F	S	D	P	G4.227	00	A3F	91036B
QBAR(1)	V97U0866C	LBS/FT**2		F	S	D	C	G4.227 G4.36	00	ZF9	DC2453
QBAR(2)	V97U0867C	LBS/FT**2		F	S	D	C	G4.227 G4.36	00	ZF9	DC2453
QBAR(3)	V97U0868C	LBS/FT**2		F	S	D	C	G4.227 G4.36	00	ZF9	DC2453
QBAR(4)	V97U0869C	LBS/FT**2		F	S	D	C	G4.227 G4.36	00	ZF9	DC2453
QBAR(5)	V97U0870C	LBS/FT**2		F	S	D	X	G4.227 G4.36	01 03	ZF9 ZF9	DC2453
QBAR(6)	V97U0871C	LBS/FT**2		F	S	D	X	G4.227 G4.36	01 03	ZF9 ZF9	DC2453
QBAR(7)	V97U9873C	LBS/FT**2		F	S	D	C	G4.227 G4.36	00	ZF9	DC2453
QBAR(8)	V97U9874C	LBS/FT**2		F	S	D	C	G4.227 G4.36	00	ZF9	DC2453
QBARB	V97U0873C	LBS/FT**2		F	S	D	C	G4.227 G4.36	00	ZS7	89680A
QBAR_OFFSET	V97U0872C	LBS/FT**2		F	S	D	C	G4.227 G4.36	00	ZS7	89680A
QBLIML_CSS	V97U1153C	LBS/FT**2		F	S	D	C	G4.227 G4.36	00	ZF9	DC2453
QC_NOM(1,1)	V96U9373C	DEG/SEC		F	S	M	P	G4.227 G4.36	01 03	JDC	DC0762C
QC_NOM(1,2)	V96U9375C	DEG		F	S	M	P	G4.227 G4.36	01 03	JDC	DC0762C
QC_NOM(2,1)	V96U9374C	DEG/SEC		F	S	M	P	G4.227 G4.36	01 03	JDC	DC0762C
QC_NOM(2,2)	V96U9376C	DEG		F	S	M	P	G4.227 G4.36	01 03	JDC	DC0762C
QE1	V97U1252C	DEG/SEC		F	S	D	C	G4.227	00	ZSR	90007G
QE11	V97U1261C	DEG/SEC		F	S	D	C	G4.227	00	ZSR	90007G
QE12	V97U1262C	DEG/SEC		F	S	D	C	G4.227	00	ZSR	90007G
QE13	V97U8569C	DEG/SEC		F	S	D	P	G4.227	00	A3F	91036B
QE2	V97U1253C	DEG/SEC		F	S	D	C	G4.227	00	ZSR	90007G
QE3	V97U1254C	DEG/SEC		F	S	D	C	G4.227	00	ZSR	90007G
QEFB_LIM	V98U9966C	DEG/SEC		F	S	D	C	G4.227	00	ZSR	90007G
Q_BAR_A_LIM	V97U1598C	LBS/FT**2		F	S	D	C	G4.227	00	ZSR	93087E
Q_LIM_INTC	V97U1285C	DEG/S		F	S	D	C	G4.227 G4.36	01 03	ZF8 ZF8	89674E

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
Q_PK_LOAD	V97U2901C	DEG/S			F	S	D C G4.227 G4.36	00	ZF7	90710	
Q_REG4_FC	V97U8565C	DEG/SEC			F	S	D P G4.227	00	A3F	91036B	
Q_STRUCT	V97U2902C	DEG/S			F	S	D C G4.227 G4.36	00	ZF7	90710	
RBBF1	V99U8870C	ND			F	S	M C G4.227 G4.36	00	JDY	89679C	
RBBF2	V99U8871C	ND			F	S	M C G4.227 G4.36	00	JDY	89679C	
RBBF3	V99U8872C	ND			F	S	M C G4.227 G4.36	00	JDY	89679C	
RBBF4	V99U8873C	ND			F	S	M C G4.227 G4.36	00	JDY	89679C	
RBBF5	V99U8874C	ND			F	S	M C G4.227 G4.36	00	JDY	89679C	
RCSJ_LIM	V97U1298C	ND			I	S	D C G4.227	00	ZF7	93161	
RE1	V97U1271C	DEG/SEC			F	S	D C G4.227	00	ZSR	90007G	
RE2	V97U1272C	DEG/SEC			F	S	D C G4.227	00	ZSR	90007G	
RE3	V97U1273C	DEG/SEC			F	S	D C G4.227	00	ZSR	90007G	
RE4	V97U1274C	DEG/SEC			F	S	D C G4.227	00	ZSR	90007G	
RE5	V96U7896C	DEG/SEC			F	S	D C G4.227	00	ZSR	90007G	
RE6	V97U8568C	DEG/SEC			F	S	D P G4.227	00	A3F	91036B	
REBFB_LIM	V98U9999C	DEG/SEC			F	S	D C G4.227	00	ZSR	90007G	
RTHL(1,1)	V96U9659C	ND			F	S	D X G4.227 G4.36	01	ZF7	90710	
RTHL(1,2)	V96U9661C	DEG/S			F	S	D X G4.227 G4.36	01	ZF7	90710	
RTHL(2,1)	V96U9660C	ND			F	S	D X G4.227 G4.36	01	ZF7	90710	
RTHL(2,2)	V96U9662C	DEG/S			F	S	D X G4.227 G4.36	01	ZF7	90710	
R_LIM_INTC	V97U1286C	DEG/S			F	S	D C G4.227 G4.36	01	ZF8	89674E	
SB_SOFT_STOP	V97U1103C	DEG			F	S	D C G4.227 G4.36	00	ZF8	89674E	
SFA(1)	V96U8767C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
SFA(2)	V96U8768C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
SFA(3)	V96U8769C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
SFB(1)	V96U8770C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
SFB(2)	V96U8771C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	
SFB(3)	V96U8772C	ND			F	S	D C G4.227 G4.36	00	ZF7	90710	

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
SIN_LIM	V97U1128C	ND			F	S	D C G4.227 G4.36	00	ZS7	89680A	
SLIMHYS	V97U1173C	DEG			F	S	D X G4.227 G4.36	00	ZF7	90710	
TAS_PIO	V96U8760C	FT/SEC			F	S	D C G4.227 G4.36	00	ZF9	DC2453	
TAS_SW	V97U1166C	FT/SEC			F	S	D C G4.227 G4.36	00	ZF8	89674E	
TDETDA(1,1)	V97U1339C	DEG			F	S	M C G4.227 G4.36	01	JD1	DC0599	
TDETDA(1,2)	V97U1340C	ND			F	S	M C G4.227 G4.36	01	JD1	DC0599	
TDETDA(2,1)	V97U1341C	DEG			F	S	M C G4.227 G4.36	01	JD1	DC0599	
TDETDA(2,2)	V97U1342C	ND			F	S	M C G4.227 G4.36	01	JD1	DC0599	
TDETDA(3,1)	V97U1343C	DEG			F	S	M C G4.227 G4.36	01	JD1	DC0599	
TDETDA(3,2)	V97U1344C	ND			F	S	M C G4.227 G4.36	01	JD1	DC0599	
TDETDA(4,1)	V97U1196C	DEG			F	S	M C G4.227 G4.36	01	JD1	DC0599	
TDETDA(4,2)	V97U1197C	ND			F	S	M C G4.227 G4.36	01	JD1	DC0599	
TDETDA(5,1)	V97U1198C	DEG			F	S	M C G4.227 G4.36	01	JD1	DC0599	
TDETDA(5,2)	V97U1199C	ND			F	S	M C G4.227 G4.36	01	JD1	DC0599	
TDETDA(6,1)	V97U1333C	DEG			F	S	M C G4.227 G4.36	01	JD1	DC0599	
TDETDA(6,2)	V97U1334C	ND			F	S	M C G4.227 G4.36	01	JD1	DC0599	
TDETDA(7,1)	V97U1335C	DEG			F	S	M C G4.227 G4.36	01	JD1	DC0599	
TDETDA(7,2)	V97U1336C	ND			F	S	M C G4.227 G4.36	01	JD1	DC0599	
TDETDA(8,1)	V97U1337C	DEG			F	S	M C G4.227 G4.36	01	JD1	DC0599	
TDETDA(8,2)	V97U1338C	ND			F	S	M C G4.227 G4.36	01	JD1	DC0599	
TGALRD(1,1)	V99U9721C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGALRD(1,2)	V99U9722C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGALRD(2,1)	V99U9723C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TGALRD(2,2)	V99U9724C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGALRD(3,1)	V99U9725C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGALRD(3,2)	V99U9726C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGALRD(4,1)	V99U9727C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGALRD(4,2)	V99U9728C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGALRD(5,1)	V99U9729C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGALRD(5,2)	V99U9730C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGALRD(6,1)	V99U9731C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGALRD(6,2)	V99U9732C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGALRD(7,1)	V99U9733C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGALRD(7,2)	V99U9734C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGALRD(8,1)	V99U9735C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGALRD(8,2)	V99U9736C	ND			F	S	M C G4.227 G4.36	00	ZF7	90710	
TGALRT(1,1)	V98U9638C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(1,2)	V98U9639C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(2,1)	V98U9640C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(2,2)	V98U9641C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(3,1)	V98U9642C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(3,2)	V98U9643C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(4,1)	V98U9644C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(4,2)	V98U9645C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(5,1)	V98U9646C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGALRT(5,2)	V98U9647C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TGALRT(6,1)	V98U9648C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TGALRT(6,2)	V98U9649C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TGBAY(1,1)	V99U9737C	DEG/SEC/G		F	S	M	C	G4.227 G4.36	00	ZF7	90710
TGBAY(1,2)	V99U9738C	ND		F	S	M	C	G4.227 G4.36	00	ZF7	90710
TGBAY(2,1)	V99U9739C	DEG/SEC/G		F	S	M	C	G4.227 G4.36	00	ZF7	90710
TGBAY(2,2)	V99U9740C	ND		F	S	M	C	G4.227 G4.36	00	ZF7	90710
TGBAY(3,1)	V99U9741C	DEG/SEC/G		F	S	M	C	G4.227 G4.36	00	ZF7	90710
TGBAY(3,2)	V99U9742C	ND		F	S	M	C	G4.227 G4.36	00	ZF7	90710
TGBAY(4,1)	V99U9743C	DEG/SEC/G		F	S	M	C	G4.227 G4.36	00	ZF7	90710
TGBAY(4,2)	V99U9744C	ND		F	S	M	C	G4.227 G4.36	00	ZF7	90710
TGBAY(5,1)	V99U9745C	DEG/SEC/G		F	S	M	C	G4.227 G4.36	00	ZF7	90710
TGBAY(5,2)	V99U9746C	ND		F	S	M	C	G4.227 G4.36	00	ZF7	90710
TGBAY(6,1)	V99U9747C	DEG/SEC/G		F	S	M	C	G4.227 G4.36	00	ZF7	90710
TGBAY(6,2)	V99U9748C	ND		F	S	M	C	G4.227 G4.36	00	ZF7	90710
TGBAY(7,1)	V99U9749C	DEG/SEC/G		F	S	M	C	G4.227 G4.36	00	ZF7	90710
TGBAY(7,2)	V99U9750C	ND		F	S	M	C	G4.227 G4.36	00	ZF7	90710
TGBAY(8,1)	V99U9751C	DEG/SEC/G		F	S	M	C	G4.227 G4.36	00	ZF7	90710
TGBAY(8,2)	V99U9752C	ND		F	S	M	C	G4.227 G4.36	00	ZF7	90710
TGBFAUTO(1,1)	V97U1388C	DEG		F	S	D	C	G4.227 G4.36	01	ZF8	89674E
TGBFAUTO(1,2)	V97U1389C	DEG		F	S	D	C	G4.227 G4.36	03	ZF8	89674E
TGBFAUTO(2,1)	V97U1390C	DEG		F	S	D	C	G4.227 G4.36	01	ZF8	89674E
TGBFAUTO(2,2)	V97U1391C	DEG		F	S	D	C	G4.227 G4.36	03	ZF8	89674E
TGBFAUTO(3,1)	V97U1392C	DEG		F	S	D	C	G4.227 G4.36	01	ZF8	89674E
									03	ZF8	

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TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TGBFAUTO(3,2)	V97U1393C	DEG		F	S	D	C	G4.227 G4.36	01	ZF8	89674E
TGBFAUTO(4,1)	V97U1394C	DEG		F	S	D	C	G4.227 G4.36	03	ZF8	89674E
TGBFAUTO(4,2)	V97U1395C	DEG		F	S	D	C	G4.227 G4.36	01	ZF8	89674E
TGBFMACH(1,1)	V97U1380C	ND		F	S	D	C	G4.227 G4.36	01	ZF8	89674E
TGBFMACH(1,2)	V97U1381C	ND		F	S	D	C	G4.227 G4.36	01	ZF8	89674E
TGBFMACH(2,1)	V97U1382C	ND		F	S	D	C	G4.227 G4.36	01	ZF8	89674E
TGBFMACH(2,2)	V97U1383C	ND		F	S	D	C	G4.227 G4.36	01	ZF8	89674E
TGBFMACH(3,1)	V97U1384C	ND		F	S	D	C	G4.227 G4.36	01	ZF8	89674E
TGBFMACH(3,2)	V97U1385C	ND		F	S	D	C	G4.227 G4.36	01	ZF8	89674E
TGBFMACH(4,1)	V97U1386C	ND		F	S	D	C	G4.227 G4.36	01	ZF8	89674E
TGBFMACH(4,2)	V97U1387C	ND		F	S	D	C	G4.227 G4.36	01	ZF8	89674E
TGBFR(1,1)	V97U0940C	DEG/SEC		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TGBFR(1,2)	V97U0941C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TGBFR(2,1)	V97U0942C	DEG/SEC		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TGBFR(2,2)	V97U0943C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TGBFR(3,1)	V97U0944C	DEG/SEC		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TGBFR(3,2)	V97U0945C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TGBFR(4,1)	V97U0946C	DEG/SEC		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TGBFR(4,2)	V97U0947C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TGPAY(1,1)	V98U9634C	ND		F	S	D	C	G4.227 G4.36	01	ZF9	DC2453
TGPAY(1,2)	V98U9635C	ND		F	S	D	C	G4.227 G4.36	01	ZF9	DC2453
TGPAY(2,1)	V98U9636C	ND		F	S	D	C	G4.227 G4.36	01	ZF9	DC2453
TGPAY(2,2)	V98U9637C	ND		F	S	D	C	G4.227 G4.36	01	ZF9	DC2453

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TGPAY(3,1)	V97U1120C	ND			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGPAY(3,2)	V97U1121C	ND			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(1,1)	V97U0990C	DEG/SEC/G			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(1,2)	V97U0991C	ND			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(2,1)	V97U0992C	DEG/SEC/G			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(2,2)	V97U0993C	ND			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(3,1)	V97U0994C	DEG/SEC/G			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(3,2)	V97U0995C	ND			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(4,1)	V97U0996C	DEG/SEC/G			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(4,2)	V97U0997C	ND			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(5,1)	V98U9684C	DEG/SEC/G			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(5,2)	V98U9685C	ND			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(6,1)	V98U9686C	DEG/SEC/G			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRAY(6,2)	V98U9687C	ND			F	S	D C G4.227 G4.36	01 03	ZF9	DC2453	
TGRH(1,1)	V98U9667C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGRH(1,2)	V98U9668C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGRH(2,1)	V98U9669C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TGRH(2,2)	V98U9670C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
THETA_PK_LOAD	V97U2903C	DEG			F	S	D C G4.227 G4.36	00	ZF7	90710	
THETA_STRUCT	V97U2904C	DEG			F	S	D C G4.227 G4.36	00	ZF7	90710	
TKDRC(1,1)	V97U1014C	LB*SEC/FT**2			F	S	D X G4.227 G4.36	00	ZF7	90710	
TKDRC(1,2)	V97U1015C	ND			F	S	D X G4.227 G4.36	00	ZF7	90710	
TKDRC(2,1)	V97U1016C	LB*SEC/FT**2			F	S	D X G4.227 G4.36	00	ZF7	90710	

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TKDRC(2,2)	V97U1017C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKDRC(3,1)	V98U9688C	LB*SEC/FT**2		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKDRC(3,2)	V98U9689C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKDRC(4,1)	V98U9690C	LB*SEC/FT**2		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKDRC(4,2)	V98U9691C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKGDA(1,1)	V98U9622C	LB*SEC/FT**2		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKGDA(1,2)	V98U9623C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKGDA(2,1)	V98U9624C	LB*SEC/FT**2		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKGDA(2,2)	V98U9625C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKGDA(3,1)	V96U8075C	LB*SEC/FT**2		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKGDA(3,2)	V96U8076C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKGDA(4,1)	V96U8077C	LB*SEC/FT**2		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKGDA(4,2)	V96U8078C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKGDA(5,1)	V96U8079C	LB*SEC/FT**2		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKGDA(5,2)	V96U8080C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKGDA(6,1)	V96U8081C	LB*SEC/FT**2		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKGDA(6,2)	V96U8082C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKPIT(1,2)	V98U9605C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKPIT(2,2)	V98U9607C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKPIT(3,2)	V98U9609C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKPIT(4,2)	V98U9611C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKPIT(5,2)	V98U9613C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710
TKPIT(6,2)	V98U9615C	ND		F	S	D	X	G4.227 G4.36	00	ZF7	90710

TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TKPIT_AUTO(1,1)	V98U9604C	SEC*LB**.5/FT	F	S	D	P	G4.227 G4.36	00	ZF7	90710	
TKPIT_AUTO(2,1)	V98U9606C	SEC*LB**.5/FT	F	S	D	P	G4.227 G4.36	00	ZF7	90710	
TKPIT_AUTO(3,1)	V98U9608C	SEC*LB**.5/FT	F	S	D	P	G4.227 G4.36	00	ZF7	90710	
TKPIT_AUTO(4,1)	V98U9610C	SEC*LB**.5/FT	F	S	D	P	G4.227 G4.36	00	ZF7	90710	
TKPIT_AUTO(5,1)	V98U9612C	SEC*LB**.5/FT	F	S	D	P	G4.227 G4.36	00	ZF7	90710	
TKPIT_AUTO(6,1)	V98U9614C	SEC*LB**.5/FT	F	S	D	P	G4.227 G4.36	00	ZF7	90710	
TKPIT_CSS(1,1)	V97U1018C	SEC*LB**.5/FT	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKPIT_CSS(2,1)	V97U1020C	SEC*LB**.5/FT	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKPIT_CSS(3,1)	V97U1022C	SEC*LB**.5/FT	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKPIT_CSS(4,1)	V97U1024C	SEC*LB**.5/FT	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKPIT_CSS(5,1)	V97U1026C	SEC*LB**.5/FT	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TKPIT_CSS(6,1)	V97U1028C	SEC*LB**.5/FT	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TLREL(1,1)	V97U0810C	DEG	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
TLREL(1,2)	V97U0811C	FT/SEC	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
TLREL(2,1)	V97U0812C	DEG	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
TLREL(2,2)	V97U0813C	FT/SEC	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
TLREL(3,1)	V97U0814C	DEG	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
TLREL(3,2)	V97U0815C	FT/SEC	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
TLREL(4,1)	V97U0816C	DEG	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
TLREL(4,2)	V97U0817C	FT/SEC	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
TNWFADE	V97U1036C	SEC	F	S	D	C	G4.227 G4.36	00	ZF7	90710	
TQCFADE	V97U2905C	SEC	F	S	D	P	G4.227 G4.36	00	ZF7	90710	
TRWY_FADE	V96U9381C	SEC	F	S	D	X	G4.227 G4.36	00	ZF7	90710	
TURN_COORD_THETA_LIM	V99U9801C	ND	F	S	D	P	G4.227	00	ZF8	89674E	

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TABLE 4.10.2-3. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
TXKALP(1,1)	V99U7568C	ND			F	S	D X G4.227	00	ZF8	89674E	
TXKALP(1,2)	V99U7569C	DEG			F	S	D X G4.227	00	ZF8	89674E	
TXKALP(2,1)	V99U7570C	ND			F	S	D X G4.227	00	ZF8	89674E	
TXKALP(2,2)	V99U7571C	DEG			F	S	D X G4.227	00	ZF8	89674E	
ULIM	V97U0626C	DEG			F	S	D C G4.227	00	ZF7	90710	
							G4.36				
UX1	V98U9977C	ND			I	S	D C G4.227	00	ZSR	90007G	
UX12	V98U9980C	ND			I	S	D C G4.227	00	ZFR	90014G	
UX13	V98U9981C	ND			I	S	D C G4.227	00	ZFR	90014G	
UY1	V98U9967C	ND			I	S	D C G4.227	00	ZSR	90007G	
UY11	V98U9971C	ND			I	S	D C G4.227	00	ZSR	90007G	
UY12	V98U9972C	ND			I	S	D C G4.227	00	ZFR	90014G	
UY2	V98U9968C	ND			I	S	D C G4.227	00	ZSR	90007G	
UY3	V98U9969C	ND			I	S	D C G4.227	00	ZFR	90014G	
UY4	V98U9970C	ND			I	S	D C G4.227	00	ZFR	90014G	
UZ1	V98U7386C	ND			I	S	D C G4.227	00	ZSR	90007G	
UZ11	V98U7387C	ND			I	S	D C G4.227	00	ZSR	90007G	
UZ2	V96U7895C	ND			I	S	D C G4.227	00	ZSR	90007G	
WONG_LEAKAGE	V97U1205C	GAL/MIN			F	S	D A G4.227	00	ZF8	92438A	
							G4.36				
XKQ(1,1)	V96U8774C	DEG/DEG**2			F	S	D X G4.227	00	ZF7	90710	
							G4.36				
XKQ(1,2)	V96U8775C	ND			F	S	D X G4.227	00	ZF7	90710	
							G4.36				
XKQ(2,1)	V96U8776C	DEG/DEG**2			F	S	D X G4.227	00	ZF7	90710	
							G4.36				
XKQ(2,2)	V96U8777C	ND			F	S	D X G4.227	00	ZF7	90710	
							G4.36				
YAW_RCS_ALT	V97U1150C	FT			F	S	D C G4.227	00	ZF9	DC2453	
							G4.36				

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

TABLE 4.10.2-4. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
ALFERR_LIM LIMIT ON ANGLE OF ATTACK ERROR	V97U0600C	01	+5.0	E+00	DEG		F	S P G4.227 G4.36	89674E	
		03	+2.0	E+00						
ALFLIM1 TABULATED ALPHA	V97U8712C	00	+1.0	E+01	DEG		F	S C G4.227 G4.36	89674E	
ALFLIM2 TABULATED ALPHA	V97U8713C	00	+2.0	E+01	DEG		F	S C G4.227 G4.36	89674E	
COTALF_LIM LIMIT ON COTANGENT OF ALPHA	V97U0607C	00	+1.143	E+01	ND		F	S C G4.227 G4.36	89674E	
DATRIM_LIM LIMIT ON AILERON TRIM COMMAND	V97U0616C	00	+3.0	E+00	DEG		F	S C G4.227 G4.36	89674E	
DBFRET BODY FLAP RETRACTED POSITION	V97U0629C	00	+0.0	E+00	DEG		F	S C G4.227 G4.36	89674E	
DRC_LIM_FLIGHT LIMIT ON RUDDER DEFLECTION CMD	V97U0655C	00	+2.41	E+01	DEG		F	S C G4.227 G4.36	89674E	
DRC_LIM_ROLLOUT MAX RUDDER DEFLECTION CMD LIMIT - ROLLOUT	V99U7415C	00	+2.66	E+01	DEG		F	S C G4.227 G4.36	92321	
DRJETTH(1) THRESHOLD ON DRJET	V97U0658C	00	+5.0000000	E-01	DEG/SEC		F	S C G4.227 G4.36	89674E	
DRJETTH(2) THRESHOLD ON DRJET	V97U0659C	00	+1.0000000	E+00	DEG/SEC		F	S C G4.227 G4.36	89674E	
DRJETTH(3) THRESHOLD ON DRJET	V97U0660C	00	+1.5000000	E+00	DEG/SEC		F	S C G4.227 G4.36	89674E	
DRMAX MAX VALUE OF SHAPED PEDAL OUTPUT	V97U0661C	00	+2.2500000	E+01	DEG		F	S C G4.227 G4.36	89674E	
DRTTRIM_LIM INTEGRAL RUDDER TRIM LIMIT	V97U0663C	00	+6.0	E+00	DEG		F	S C G4.227 G4.36	89674E	
DRT_LIM LIMIT ON MANUAL YAW TRIM	V97U0662C	00	+1.0	E-01	G		F	S C G4.227 G4.36	89674E	
DSB_CLOSED SPEEDBRAKE CLOSED CMD	V97U2425C	00	-9.9	E+00	DEG		F	S C G4.176 G4.227 G4.36 G4.50	89674E	
DSB_MIN_L SP BK LOWER POSITION LIMIT	V97U0665C	03	-9.9	E+00	DEG		F	S P G4.227 G4.36	92321	
DSB_MIN_U SP BK LOWER POSITION LIMIT	V97U0666C	01	+1.5	E+01			F	S C G4.108 G4.227 G4.36	89674E	
		00	+1.5000000	E+01	DEG					
GBETA1 FILTER COEFFICIENT	V97U8724C	00	+1.37931	E-01	ND		F	S P G4.227 G4.36	89674E	
GBETA2 FILTER COEFFICIENT	V97U8725C	00	+1.37931	E-01	ND		F	S P G4.227 G4.36	89674E	
GBETA3 FILTER COEFFICIENT	V97U8726C	00	-7.241379	E-01	ND		F	S P G4.227 G4.36	89674E	
GBFMAN MANUAL BODY FLAP GAIN	V97U1088C	00	+1.0	E+03	DEG/SEC		F	S C G4.227 G4.36	89674E	

TABLE 4.10.2-4. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
GBOFILT(1)	V99U7410C	00	+9.96016	E-01	ND			G4.227 G4.36	89674E	
GBOFILT(2)	V99U7411C	00	-9.96016	E-01	ND			G4.227 G4.36	89674E	
GBOFILT(3)	V99U7412C	00	-9.92032	E-01	ND			G4.227 G4.36	89674E	
GDAMS(1) FILTER COEFFICIENT	V97U0687C	00	+3.2968	E-01	ND			G4.227 G4.36	89674E	
GDAMS(2) FILTER COEFFICIENT	V97U0688C	00	+0.0	E+00	ND			G4.227 G4.36	89674E	
GDAMS(3) FILTER COEFFICIENT	V97U0689C	00	-6.7032	E-01	ND			G4.227 G4.36	89674E	
GDISP1 FILTER COEFFICIENT	V97U8721C	00	+1.37931	E-01	ND			G4.227 G4.36	89674E	
GDISP2 FILTER COEFFICIENT	V97U8722C	00	+1.37931	E-01	ND			G4.227 G4.36	89674E	
GDISP3 FILTER COEFFICIENT	V97U8723C	00	-7.241379	E-01	ND			G4.227 G4.36	89674E	
GDRC_MAX MAXIMUM VALUE OF GDRC	V97U0696C	00	+1.50	E+01	DEG/DEG/SEC			G4.227 G4.36	89674E	
GDRC_MIN MINIMUM VALUE OF GDRC	V97U0697C	00	+1.2	E+00	DEG/DEG/SEC			G4.227 G4.36	89674E	
GDRTI GN TO CNVT BEEP TRM ACCLN TRM BIAS	V97U0705C	00	+2.0	E-02	G/SEC			X G4.227 G4.36	89674E	
GNZfilt_TAEM(1) FILT.COEFIPHASEB=0,1,2,3,5	V97U0724C	00	+2.30769	E-01	ND			G4.227 G4.36	89674E	
GNZfilt_TAEM(2) FILT.COEFIPHASEB=0,1,2,3,5	V97U0725C	00	-1.53846	E-01	ND			G4.227 G4.36	89674E	
GNZfilt_TAEM(3) FILT.COEFIPHASEB=0,1,2,3,5	V97U0726C	00	-9.23077	E-01	ND			G4.227 G4.36	89674E	
GQALR GAIN CONV ANG ATTACK ERROR PITCH	V97U0744C	01	+4.0	E-01	DEG/SEC/DEG			G4.227 G4.36	89674E	
GQCOMP(1) FILTER COEFFICIENT	V97U0745C	00	+3.3	E-01				G4.227 G4.36	89674E	
GQCOMP(2) FILTER COEFFICIENT	V97U0746C	00	+7.4074	E-02	ND			G4.227 G4.36	89674E	
GQCOMP(3) FILTER COEFFICIENT	V97U0747C	00	+7.4074	E-02	ND			G4.227 G4.36	89674E	
GQN_5 SC FCTR WHEN IPHASEB=5	V97U1211C	00	-8.51852	E-01	ND			G4.227 G4.36	89674E	
GQN_AL APPROACH/LAND SCALE FACTOR	V97U0750C	00	+6.500000	E+00	DEG/SEC/G			X G4.227 G4.36	89674E	
GQN_TAEM SC FCTR WHEN IPHASEB=0,1,2,3	V97U0749C	01	+4.2	E+00	DEG/SEC/G			G4.227 G4.36	89674E	
GRPHI	V97U0749C	03	+2.5	E+00	DEG/SEC/G			G4.227 G4.36	89674E	
TURN COORD SCALE FACTOR	V97U1089C	00	+5.730000	E+01	DEG			X G4.227 G4.36	89674E	

TABLE 4.10.2-4. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
GRRCS(1) FILTER COEFFICIENT	V97U0766C	00	+1.96	E+00	ND		F	S C G4.227 G4.36	89674E	
GRRCS(2) FILTER COEFFICIENT	V97U0767C	00	-1.96	E+00	ND		F	S C G4.227 G4.36	89674E	
GRRCS(3) FILTER COEFFICIENT	V97U0768C	00	-9.23	E-01	ND		F	S C G4.227 G4.36	89674E	
GRRHCT BEEP TRIM/TRIM ACCELN CONV	V97U0769C	00	+6.0	E-01	DEG/SEC**2		F	S C G4.227 G4.36	89674E	
GSBHI HIGH SCALING GAIN	V97U0776C	00	+2.5000000	E+01	DEG/SEC/DEG		F	S C G4.227 G4.36	89674E	
GSEBLO LOW SCALING GAIN	V97U0777C	00	+1.0000000	E+01	DEG/SEC/DEG		F	S C G4.227 G4.36	89674E	
GTAS_OFS BIAS FOR GTAS	V97U0781C	00	+1.0000000	E+00	ND		F	S P G4.227 G4.36	89674E	
GTRE_AUTO_6	V97U9875C	01	+5.0	E-01	(DEG/SEC)/DEG		F	S P G4.227	89674E	
GTRE_CSS_6	V97U9876C	00	+7.0	E-01	(DEG/SEC)/DEG		F	S C G4.227	89674E	
GYJRO1	V99U7200C	00	+7.92952	E-01	ND		F	S C G4.227 G4.36	89674E	
GYJRO2	V99U7201C	00	+1.585904	E+00	ND		F	S C G4.227 G4.36	89674E	
GYJRO3	V99U7202C	00	+7.92952	E-01	ND		F	S C G4.227 G4.36	89674E	
GYJRO4	V99U7203C	00	+1.541850	E+00	ND		F	S C G4.227 G4.36	89674E	
GYJRO5	V99U7204C	00	+6.29956	E-01	ND		F	S C G4.227 G4.36	89674E	
KBETAL TABULATED SIDESLIP	V97U8727C	00	+5.0	E-03	(FT**3/SEC**2)/(DEG*LB S)		F	S P G4.227 G4.36	89674E	
KBETAU TABULATED SIDESLIP	V97U8728C	00	+9.0	E-03	(FT**3/SEC**2)/(DEG*LB S)		F	S P G4.227 G4.36	89674E	
KBMACHL TABULATED MACH	V97U8730C	00	+1.0	E+00	ND		F	S P G4.227 G4.36	89674E	
KBMACHU TABULATED MACH	V97U8729C	00	+2.5	E+00	ND		F	S P G4.227 G4.36	89674E	
KCON KDISP CONSTANT	V97U8716C	00	+1.7082	E+01	(FT/SEC**2)/DEG		F	S C G4.227 G4.36	89674E	
KDRMLIN PARABOLIC SHAPING LINEAR COEF	V97U0800C	00	+1.0	E+00	DEG/DEG		F	S C G4.227 G4.36	91041A	
KDRMPAR PARABOLIC SHAPING SQR TERM COEF	V97U0801C	00	+0.0	E+00	DEG/DEG**2		F	S C G4.227 G4.36	91041A	
KJCMP JET CORRECTION CONSTANT	V97U8720C	00	+1.695	E-01	FT/SEC**2		F	S C G4.227 G4.36	89674E	
KLIM1 TABULATED GAIN	V97U8714C	00	+6.342	E+00	(FT/SEC**2)/DEG		F	S P G4.227 G4.36	89674E	

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TABLE 4.10.2-4. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR	FCTN	LAST CR	R E V
KLIM2	V97U8715C	00	+9.02	E-01	(FT/SEC**2)/DEG	F	S	P	G4.227	89674E	
TABULATED GAIN									G4.36		
KLIN	V97U8717C	00	-1.339	E+00	(FT/SEC**2)/DEG**2	F	S	C	G4.227	89674E	
KDISP LINEAR CONSTANT									G4.36		
KPAR	V97U8718C	00	+2.65	E-02	(FT/SEC**2)/DEG**3	F	S	C	G4.227	89674E	
KDISP PARABOLIC CONSTANT									G4.36		
KRCMP	V97U8719C	00	+6.545	E+00	(FT/SEC)/DEG	F	S	C	G4.227	89674E	
ANGULAR CORRECTION CONSTANT									G4.36		
KYALWR	V97U8732C	00	+0.0	E+00	(FT**3/SEC**2)/(DEG*LB S)	F	S	X	G4.227	89674E	
TABULATED AILERON CONSTANT									G4.36		
KYAUP	V97U8731C	00	-1.4	E-03	(FT**3/SEC**2)/(DEG*LB S)	F	S	X	G4.227	89674E	
TABULATED AILERON CONSTANT									G4.36		
KYMACHL	V97U8734C	00	+8.0	E-01	ND	F	S	X	G4.227	89674E	
TABULATED MACH									G4.36		
KYMACHU	V97U8733C	00	+1.1	E+00	ND	F	S	X	G4.227	89674E	
TABULATED MACH									G4.36		
KYRLWR	V97U8736C	00	+4.0	E-04	(FT**3/SEC**2)/(DEG*LB S)	F	S	X	G4.227	89674E	
TABULATED RUDDER CONSTANT									G4.36		
KYRML	V97U8737C	00	+9.0	E-01	ND	F	S	X	G4.227	89674E	
TABULATED MACH									G4.36		
KYRMU	V97U8738C	00	+2.3	E+00	ND	F	S	X	G4.227	89674E	
TABULATED MACH									G4.36		
KYRUP	V97U8735C	00	+1.2	E-03	(FT**3/SEC**2)/(DEG*LB S)	F	S	X	G4.227	89674E	
TABULATED RUDDER CONSTANT									G4.36		
NR(1)	V97U0836C	00	+2		ND	I	S	C	G4.227	89674E	
LOW NUMBER OF YAW JETS									G4.36		
PE_CUTOFF	V97U0855C	00	+5.0	E-01	DEG/SEC	F	S	C	G4.227	89674E	
MAG PE CHGS NO ROLL JETS SELECTA									G4.36		
QBLIML_AUTO	V96U9369C	00	+5.00	E+01	LBS/FT**2	F	S	P	G4.227	89674E	
									G4.36		
QE21	V97U1268C	00	+2.95	E-01	DEG/SEC	F	S	P	G4.227	89674E	
PITCH ERR QUANTIZER SW LEVEL-ENTRY											
QE22	V97U1269C	00	+3.0	E-01	DEG/SEC	F	S	P	G4.227	89674E	
PITCH ERR QUANTIZER SW LEVEL-ENTRY											
QE23	V97U1270C	00	+1.0000000	E+00	DEG/SEC	F	S	P	G4.227	89674E	
PITCH ERR QUANTIZER SW LEVEL-ENTRY											
RADB	V97U1090C	00	+3.3	E-01	DEG/SEC	F	S	C	G4.227	89674E	
INNER DEADBAND									G4.36		
RBDB	V97U1091C	00	+3.5	E-01	DEG/SEC	F	S	C	G4.227	89674E	
OUTER DEADBAND									G4.36		
R_ETV	V98U9683C	00	+2.1300000	E+07	FT	F	S	X	G4.227	89674E	
DIST CNTR EARTH TO VEHICLE									G4.36		
TANPHI_LIM	V97U1096C	00	+1.0000000	E+00	ND	F	S	C	G4.227	89674E	
LIMIT FOR TANGENT(PHI)									G4.36		
TAN_LIM	V98U9654C	00	+1.73	E+00	ND	F	S	C	G4.227	89674E	
LIMIT OF TANGENT OF PHI									G4.36		

TABLE 4.10.2-4. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
TDAMAX(1,1)	V97U0897C	00	+2.3000000	E+01	DEG	F	S	X G4.227 G4.36	89674E	
TABULATED DAMAX										
TDAMAX(1,2)	V97U0898C	00	+6.0	E-01	ND	F	S	X G4.227 G4.36	89674E	
TABULATED MACH										
TDAMAX(2,1)	V97U0899C	00	+2.0000000	E+01	DEG	F	S	X G4.227 G4.36	89674E	
TABULATED DAMAX										
TDAMAX(2,2)	V97U0900C	00	+1.5000000	E+00	ND	F	S	X G4.227 G4.36	89674E	
TABULATED MACH										
TGDSB(1,1)	V97U0956C	00	+6.0	E-02	DEG/DEG	F	S	X G4.227 G4.36	89674E	
TABULATED GDSB										
TGDSB(1,2)	V97U0957C	00	+4.0	E+00	ND	F	S	X G4.227 G4.36	89674E	
TABULATED MACH										
TGDSB(2,1)	V97U0958C	00	+0.0	E+00	DEG/DEG	F	S	X G4.227 G4.36	89674E	
TABULATED GDSB										
TGDSB(2,2)	V97U0959C	00	+4.5	E+00	ND	F	S	X G4.227 G4.36	89674E	
TABULATED MACH										
TGNYDRM(1,1)	V97U0964C	00	+4.0	E-02	G/DEG	F	S	X G4.227 G4.36	91041A	
TABULATED GNYDRM										
TGNYDRM(1,2)	V97U0965C	00	+6.833	E+02	FT/SEC	F	S	X G4.227 G4.36	91041A	
TABULATED TAS										
TGNYDRM(2,1)	V97U0966C	00	+1.0	E-02	G/DEG	F	S	X G4.227 G4.36	89674E	
TABULATED GNYDRM										
TGNYDRM(2,2)	V97U0967C	00	+9.0000000	E+02	FT/SEC	F	S	X G4.227 G4.36	89674E	
TABULATED TAS										
TGPBANK(1,1)	V97U0972C	00	+1.2	E+00	DEG/SEC/DEG	F	S	P G4.227 G4.36	89674E	
TABULATED GPBANK										
TGPBANK(1,2)	V97U0973C	00	+6.0	E-01	ND	F	S	P G4.227 G4.36	89674E	
TABULATED MACH										
TGPBANK(2,1)	V97U0938C	00	+5.0000000	E-01	DEG/SEC/DEG	F	S	P G4.227 G4.36	89674E	
TABULATED GPBANK										
TGPBANK(2,2)	V97U0939C	00	+1.2	E+00	ND	F	S	P G4.227 G4.36	89674E	
TABULATED MACH										
TGPBANK(3,1)	V96U8071C	00	+5.0	E-01	DEG/SEC/DEG	F	S	P G4.227 G4.36	89674E	
TGPBANK(3,2)	V96U8072C	00	+1.40	E+01	ND	F	S	P G4.227 G4.36	89674E	
TGPBANK(4,1)	V96U8073C	00	+5.0	E-01	DEG/SEC/DEG	F	S	P G4.227 G4.36	89674E	
TGPBANK(4,2)	V96U8074C	00	+2.60	E+01	ND	F	S	P G4.227 G4.36	89674E	
TGPRHC(1,1)	V97U0978C	00	+4.0	E-01	DEG/SEC/DEG	F	S	X G4.227 G4.36	89674E	
TABULATED GPRHC										
TGPRHC(1,2)	V97U0979C	00	+1.2	E+00	ND	F	S	X G4.227 G4.36	89674E	
TABULATED MACH										
TGPRHC(2,1)	V97U0980C	00	+1.25	E-01	DEG/SEC/DEG	F	S	X G4.227 G4.36	89674E	
TABULATED GPRHC										

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TABLE 4.10.2-4. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
TGPRHC(2,2)	V97U0981C	00	+2.0	E+00	ND		F	X	G4.227	
TABULATED MACH								G4.36		
TGQAL(1,1)	V97U0982C	01	+5.0	E-01	DEG/SEC/DEG		F	S	P	G4.227
TABULATED GQAL		03	+7.0	E-01				G4.36		
TGQAL(1,2)	V97U0983C	01	+4.8	E+00	ND		F	S	P	G4.227
TABULATED MACH		03	+2.2	E+01				G4.36		
TGQAL(2,1)	V97U0984C	01	+4.0	E-01	DEG/SEC/DEG		F	S	P	G4.227
TABULATED GQAL		03	+3.3	E-01				G4.36		
TGQAL(2,2)	V97U0985C	01	+5.2	E+00	ND		F	S	P	G4.227
TABULATED MACH		03	+2.3	E+01				G4.36		
TGRRHC(1,1)	V97U0998C	00	+1.17	E+00	DEG/SEC/DEG		F	S	X	G4.227
TABULATED GRRHC								G4.36		
TGRRHC(1,2)	V97U0999C	00	+6.0	E-01	ND		F	S	X	G4.227
TABULATED MACH								G4.36		
TGRRHC(2,1)	V97U1000C	00	+3.0000000	E-01	DEG/SEC/DEG		F	S	X	G4.227
TABULATED GRRHC								G4.36		
TGRRHC(2,2)	V97U1001C	00	+1.5000000	E+00	ND		F	S	X	G4.227
TABULATED MACH								G4.36		
TGTRA(1,1)	V98U9655CA	00	+2.5	E-01	DEG/SEC/DEG		F	S	P	G4.227
TABULATED GTRA AUTO								G4.36		
TGTRA(1,2)	V98U9656C	01	+1.2500000	E+00	ND		F	S	C	G4.227
TABULATED MACH		03	+1.2500000	E+00				G4.36		
TGTRA(2,1)	V98U9657C	01	+1.0	E-01	DEG/SEC/DEG		F	S	C	G4.227
TABULATED GTRA		03	+1.0	E-01				G4.36		
TGTRA(2,2)	V98U9658C	01	+1.26	E+00	ND		F	S	C	G4.227
TABULATED MACH		03	+1.26	E+00				G4.36		
TGTRA(3,1)	V98U9659C	01	+1.0	E-01	DEG/SEC/DEG		F	S	C	G4.227
TABULATED GTRA		03	+1.0	E-01				G4.36		
TGTRA(3,2)	V98U9660C	01	+3.5	E+00	ND		F	S	C	G4.227
TABULATED MACH		03	+3.5	E+00				G4.36		
TGTRA(4,1)	V98U9661C	01	+0.0	E+00	DEG/SEC/DEG		F	S	C	G4.227
TABULATED GTRA		03	+0.0	E+00				G4.36		
TGTRA(4,2)	V98U9662C	01	+3.55	E+00	ND		F	S	C	G4.227
TABULATED MACH		03	+3.55	E+00				G4.36		
TGTRA(5,1)	V98U9663C	01	+0.0	E+00	DEG/SEC/DEG		F	S	C	G4.227
TABULATED GTRA		03	+0.0	E+00				G4.36		
TGTRA(5,2)	V98U9664C	01	+4.0000000	E+00	ND		F	S	C	G4.227
TABULATED MACH		03	+4.0	E+00				G4.36		
TGTRA(6,1)	V98U9665C	01	+0.0	E+00	DEG/SEC/DEG		F	S	C	G4.227
TABULATED GTRA		03	+0.0	E+00				G4.36		
TGTRA(6,2)	V98U9666C	03	+3.0000000	E+01	ND		F	S	C	G4.227
TABULATED MACH		01	+3.0000000	E+01				G4.36		
TGTRA_CSS(1,1)	V98U9655C	00	+0.0	E+00	DEG/SEC/DEG		F	S	X	G4.227
TABULATED GTRA CSS								G4.36		
TGTRE(1,2)	V97U1003C	00	+3.0000000	E+00	ND		F	S	X	G4.227
TABULATED MACH								G4.36		

TABLE 4.10.2-4. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
TGTRE(2,2)	V97U1005C	00	+3.5000000	E+00	ND		F	S X G4.227	89674E	
TABULATED MACH								G4.36		
TGTRE(3,2)	V97U4259C	01	+5.5	E+00	ND		F	S C G4.227	89674E	
		03	+1.0	E+01				G4.36		
TGTRE(4,2)	V97U4261C	01	+5.6	E+00	ND		F	S C G4.227	89674E	
TABULATED MACH		03	+1.2	E+01				G4.36		
TGTRE_AUTO(1,1)	V97U1002C	01	+1.0	E+00	DEG/SEC/DEG		F	S P G4.227	89674E	
TABULATED GTRE - AUTO		03	+6.0	E-01				G4.36		
TGTRE_AUTO(2,1)	V97U1004C	01	+1.0	E+00	DEG/SEC/DEG		F	S P G4.227	89674E	
TABULATED GTRE - AUTO		03	+6.0	E-01				G4.36		
TGTRE_AUTO(3,1)	V97U4258C	01	+1.0	E+00	DEG/SEC/DEG		F	S P G4.227	89674E	
TABULATED GTRE - AUTO		03	+6.0	E-01				G4.36		
TGTRE_AUTO(4,1)	V97U4260C	01	+5.0	E-01	DEG/SEC/DEG		F	S P G4.227	89674E	
TABULATED GTRE - AUTO		03	+3.0	E-01				G4.36		
TGTRE_CSS(1,1)	V97U4262C	00	+1.5000000	E+00	DEG/SEC/DEG		F	S X G4.227	89674E	
TABULATED GTRE - CSS								G4.36		
TGTRE_CSS(2,1)	V97U4264C	00	+1.0000000	E+00	DEG/SEC/DEG		F	S X G4.227	89674E	
TABULATED GTRE - CSS								G4.36		
TGTRE_CSS(3,1)	V97U4266C	00	+1.0000000	E+00	DEG/SEC/DEG		F	S X G4.227	89674E	
TABULATED GTRE - CSS								G4.36		
TGTRE_CSS(4,1)	V97U4268C	01	+7.0	E-01	DEG/SEC/DEG		F	S C G4.227	89674E	
TABULATED GTRE - CSS		03	+1.0	E+00				G4.36		
TGTTR(1,1)	V97U1135C	00	+1.0	E-01	DEG/SEC/DEG		F	S X G4.227	89674E	
TABULATED GTRR								G4.36		
TGTRR(1,2)	V97U1136C	00	+9.5	E-01	ND		F	S X G4.227	89674E	
TABULATED MACH								G4.36		
TGTRR(2,1)	V97U1137C	00	+5.0	E-01	DEG/SEC/DEG		F	S X G4.227	89674E	
TABULATED GTRRF								G4.36		
TGTRR(2,2)	V97U1138C	00	+1.2	E+00	ND		F	S X G4.227	89674E	
TABULATED MACH								G4.36		
TKDAMLIN(1,1)	V97U1006C	00	+2.0000000	E-01	DEG/DEG		F	S X G4.227	89674E	
TABULATED KDAMLIN								G4.36		
TKDAMLIN(1,2)	V97U1007C	00	+6.0000000	E-01	ND		F	S X G4.227	89674E	
TABULATED MACH								G4.36		
TKDAMLIN(2,1)	V97U1008C	00	+9.3240000	E-01	DEG/DEG		F	S X G4.227	89674E	
TABULATED KDAMLIN								G4.36		
TKDAMLIN(2,2)	V97U1009C	00	+1.5000000	E+00	ND		F	S X G4.227	89674E	
TABULATED MACH								G4.36		
TKDAMPAR(1,1)	V97U1010C	00	+5.71	E-02	DEG/DEG**2		F	S X G4.227	89674E	
TABULATED KDAMPAR								G4.36		
TKDAMPAR(1,2)	V97U1011C	00	+6.0000000	E-01	ND		F	S X G4.227	89674E	
TABULATED MACH								G4.36		
TKDAMPAR(2,1)	V97U1012C	00	+8.0000000	E-03	DEG/DEG**2		F	S X G4.227	89674E	
TABULATED KDAMPAR								G4.36		
TKDAMPAR(2,2)	V97U1013C	00	+1.5000000	E+00	ND		F	S X G4.227	89674E	
TABULATED MACH								G4.36		

TABLE 4.10.2-4. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
TPCLIM(1,1) TABULATED PCLIM	V97U1037C	00	+2.0000000	E+01	DEG/SEC	F	S	P G4.227 G4.36	89674E	
TPCLIM(1,2) TABULATED MACH	V97U1038C	00	+6.0	E-01	ND	F	S	P G4.227 G4.36	89674E	
TPCLIM(2,1) TABULATED PCLIM	V97U1039C	00	+5.0	E+00	DEG/SEC	F	S	P G4.227 G4.36	89674E	
TPCLIM(2,2) TABULATED MACH	V97U1040C	00	+1.5	E+00	ND	F	S	P G4.227 G4.36	89674E	
TPCLIM(3,1) TABULATED PCLIM	V97U1041C	00	+5.0000000	E+00	DEG/SEC	F	S	P G4.227 G4.36	89674E	
TPCLIM(3,2) TABULATED MACH	V97U1042C	00	+2.3	E+01	ND	F	S	P G4.227 G4.36	89674E	
TPCLIM(4,1) TABULATED PCLIM	V97U1043C	00	+3.0	E+00	DEG/SEC	F	S	P G4.227 G4.36	89674E	
TPCLIM(4,2) TABULATED MACH	V97U1044C	00	+2.35	E+01	ND	F	S	P G4.227 G4.36	89674E	
UY21 ENTRY PITCH JET COMMAND	V98U9973C	00	+2		ND	I	S	P G4.227	89674E	
UY22 ENTRY PITCH JET COMMAND	V98U9974C	00	+4		ND	I	S	P G4.227	89674E	
UYBB(1) FILTER COEFFICIENT	V96U8563C	00	+1.733907	E-01	ND	F	S	X G4.227 G4.36	89674E	
UYBB(2) FILTER COEFFICIENT	V96U7886C	00	-1.198055	E-01	ND	F	S	X G4.227 G4.36	89674E	
UYBB(3) FILTER COEFFICIENT	V96U7887C	00	+1.559513	E-01	ND	F	S	X G4.227 G4.36	89674E	
UYBB(4) FILTER COEFFICIENT	V96U7888C	00	-1.2396259	E+00	ND	F	S	X G4.227 G4.36	89674E	
UYBB(5) FILTER COEFFICIENT	V96U7889C	00	+4.491623	E-01	ND	F	S	X G4.227 G4.36	89674E	
XKQO	V96U9351C	00	+4.84	E-02	DEG**-1	F	S	C G4.227 G4.36	89674E	
YADB_HI FINAL YAW INNER DEADBAND	V97U1081C	00	+3.3	E-01	DEG/SEC	F	S	C G4.227 G4.36	89674E	
YADB_LO INITIAL YAW INNER DEAD BAND	V97U1082C	00	+3.3	E-01	DEG/SEC	F	S	C G4.227 G4.36	89674E	
YBDB_HI FINAL YAW OUTER DEADBAND	V97U1083C	00	+3.5	E-01	DEG/SEC	F	S	C G4.227 G4.36	89674E	
YBDB_LO EARLY OUTER DEADBAND	V97U1084C	00	+3.5	E-01	DEG/SEC	F	S	C G4.227 G4.36	89674E	

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

TABLE 4.10.2-5. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) 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 4.10.2-5. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) 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	

TABLE 4.10.2-5. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) 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 RADIANS 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	
TDAXFD(1,1) TABULATED BKERR (GRTLS)	V97U6221C	00	+0.0	E+00	DEG	F	S	P	G4.227	90374C	
TDAXFD(1,2) TABULATED BANKERR (GRTLS)	V97U6222C	00	+5.0	E-01	DEG	F	S	P	G4.227	90374C	
TDAXFD(2,1) TABULATED BKERR (GRTLS)	V97U6223C	00	+2.0	E+00	DEG	F	S	P	G4.227	90374C	
TDAXFD(2,2) TABULATED BANKERR (GRTLS)	V97U6224C	00	+5.0	E+00	DEG	F	S	P	G4.227	90374C	
TDAXFD(3,1) TABULATED BKERR (GRTLS)	V97U6225C	00	+7.0	E+00	DEG	F	S	P	G4.227	90374C	
TDAXFD(3,2) TABULATED BANKERR (GRTLS)	V97U6226C	00	+1.0	E+01	DEG	F	S	P	G4.227	90374C	
TEG TIME INCREMENT BETWEEN ENTRY GUIDANCE UPDATES	V97U6235C	00	+1.920	E+00	SEC	F	D	C	G4.227 G4.36	91061B	

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TABLE 4.10.2-5. GLIDE RTLS AERO-JET DIGITAL AUTOPILOT (G4.227) CONSTANTS

FSSR NAME DESCRIPTION	MSID	MC	CONSTANT VALUE	ENG UNITS	DT	P R	S	PR FCTN	LAST CR	R E V
TF DAP FAST CYCLE TIME	V97U6236C	00	+4.0	E-02	SEC		F	D C G4.176 G4.227 G4.36	90374C	
TG TIME INCREMENT BETWEEN TAEM AND GRTLS TAEM GUIDANCE UPDATES	V97U6237C	00	+9.60	E-01	SEC		F	D C G4.227 G4.36	91061B	
TM DAP MEDIUM CYCLE TIME	V97U6238C	00	+8.0	E-02	SEC		F	D C G4.175 G4.176 G4.227 G4.36	90374C	
TS DAP SLOW CYCLE TIME AT WHICH BANKCSM IS UPDATED	V97U6239C	00	+1.6	E-01	SEC		F	D C G4.227 G4.36	90374C	

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

TABLE 4.10.3-1. INPUT FUNCTIONAL PARAMETERS FOR PROGRAMMED TEST INPUT MODULE (G4.248)

FSSR NAME	M/S ID	NOMENCLATURE	SOURCE	UNITS	DATA TYPE	P R E C	L A S T C R	R E V C
AVAILABLE_JET_FWD(02)	V90X4549X	JET F1L AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(06)	V90X4553X	JET F2R AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(09)	V90X4560X	JET F4R AVAILABLE	RCS RM		BD		93017G	*
AVAILABLE_JET_FWD(14)	V90X4557X	JET F3L AVAILABLE	RCS RM		BD		93017G	*
GUID_ACCEPT	V90X1200XA	AUTO PTI ACCEPTABLE DISCRETE	ENT GUID				89740B	
GUID_ACCEPT	V90X1200XB	AUTO PTI ACCEPTABLE DISCRETE	TAEM GUID				89740B	
M/MACH	V95L3029C	GN&C MACH NUMBER	ADTA SOP		SPL		93017G	*
MODE_BANK	V90X2406X	AUTO/MANUAL BANK FLAG	AEROJET DAP					
MODE_PITCH	V90X2407X	AUTO/MANUAL PITCH FLAG	AEROJET DAP					
NY	V90A5361C	SELECTED AA LATERAL ACCEL	SF	G	SPL		93017G	*
PTI_INHIBIT	V93X5227XA	INHIBIT PTI EXECUTION	HORIZ SIT DISP				89599C	
P_ORB	V90R5301CA	SELECTED RGA ROLL RATE	SF		DEG/S		93017G	*
QBAR/QBAR_AD	V95P3011C	GN&C DYNAMIC PRESSURE	ADTA SOP	LBF/FT2	SPL		93017G	*
Q_ORB/Q	V90R5321CA	SELECTED RGA PITCH RATE	SF		DEG/S		93017G	*
R_ORB	V90R5341CA	SELECTED RGA YAW RATE	SF		DEG/S		93017G	*

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

TABLE 4.10.3-2. OUTPUT FUNCTIONAL PARAMETERS FROM PROGRAMMED TEST INPUT MODULE (G4.248)

FSSR NAME	M/S ID	NOMENCLATURE	DESTINATION	UNITS	DATA TYPE	P R	L E	C R E V
NEW_JONLST_FWD(02)/F1L_ON	V90X1442XE	RCS JET F1L ON CMD	E/L RCS CMD SOP					89463
NEW_JONLST_FWD(06)/F2R_ON	V90X1446XE	RCS JET F2R ON CMD	E/L RCS CMD SOP					89463
NEW_JONLST_FWD(09)/F4R_ON	V90X1453XE	RCS JET F4R ON CMD	E/L RCS CMD SOP					89463
NEW_JONLST_FWD(14)/F3L_ON	V90X1450XE	RCS JET F3L ON CMD	E/L RCS CMD SOP					89463
PTI_ACT	V90X3251X	PTI ACTIVE IND	AEROJET DAP				BD	
			TLM					
PTI_ACT_D	V90X3249X	PTI ACTIVE FLAG	AEROJET DAP				BD	93017G *
			DL FMT 23/3					
			ENT DIP					
			HORIZ SIT SPEC					
			MSC					
PTI_AIL	V90R3252C	PTI AILERON CMD	AEROJET DAP					
PTI_ELV	V90R3253C	PTI ELEVON CMD	AEROJET DAP					
PTI_INHIBIT	V93X5227XC	INHIBIT PTI EXECUTION	DL FMT 23/1					93017G *
			HORIZ SIT DISP					
PTI_NUMBER	V90J2402C	NUMBER OF PTI TO EXECUTE	DL FMT 23/1				HXS	93017G *
			HORIZ SIT DISP					
PTI_PIT	V90R3256C	PTI PITCH CMD	AEROJET DAP					
PTI_RHC	V93U0892C	PTI ROLL RATE COMMAND	AEROJET DAP				DEG/SEC	SPL
PTI_ROLL	V90R3255C	PTI ROLL CMD	AEROJET DAP					
PTI_RUD	V90R3254C	PTI RUDDER CMD	AEROJET DAP					
PTI_WINDOW	V90X2401X	VEHICLE IN PTI WINDOW	ENT DIP					89740B
			HORIZ SIT SPEC					
PTI_WRAP	V93X0893X	PTI WRAPAROUND MODE FLAG	AEROJET DAP				BD	90476F
PTI_YAW	V90R3257C	PTI YAW CMD	AEROJET DAP					
			DL FMT 23/3					93017G *
			DL FMT 23/1					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

TABLE 4.10.3-3. PROGRAMMED TEST INPUT MODULE (G4.248) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
DBLET_PAMP_1	V99U6000C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_10	V99U6009C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_11	V99U6010C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_12	V99U6011C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_13	V99U6012C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_14	V99U6013C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_15	V99U6014C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_16	V99U6015C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_17	V99U6016C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_18	V99U6017C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_19	V99U6018C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_2	V99U6001C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_20	V99U6019C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_21	V99U6211C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_22	V99U6212C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_23	V99U6213C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_24	V99U6214C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_25	V99U6215C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_26	V99U6216C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_27	V99U6217C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_28	V99U6218C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_29	V99U6219C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_3	V99U6002C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_30	V99U6220C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_4	V99U6003C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_5	V99U6004C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_6	V99U6005C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_7	V99U6006C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_8	V99U6007C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PAMP_9	V99U6008C	ND			F	S	M P G4.248	00	PTI	DC0599	
DBLET_PDAMP_1	V99U6060C	ND			I	S	M P G4.248	00	PTI	DC0599	
DBLET_PDAMP_10	V99U6069C	ND			I	S	M P G4.248	00	PTI	DC0599	
DBLET_PDAMP_11	V99U6070C	ND			I	S	M P G4.248	00	PTI	DC0599	
DBLET_PDAMP_12	V99U6071C	ND			I	S	M P G4.248	00	PTI	DC0599	
DBLET_PDAMP_13	V99U6072C	ND			I	S	M P G4.248	00	PTI	DC0599	
DBLET_PDAMP_14	V99U6073C	ND			I	S	M P G4.248	00	PTI	DC0599	
DBLET_PDAMP_15	V99U6074C	ND			I	S	M P G4.248	00	PTI	DC0599	
DBLET_PDAMP_16	V99U6075C	ND			I	S	M P G4.248	00	PTI	DC0599	
DBLET_PDAMP_17	V99U6076C	ND			I	S	M P G4.248	00	PTI	DC0599	
DBLET_PDAMP_18	V99U6077C	ND			I	S	M P G4.248	00	PTI	DC0599	
DBLET_PDAMP_19	V99U6078C	ND			I	S	M P G4.248	00	PTI	DC0599	
DBLET_PDAMP_2	V99U6061C	ND			I	S	M P G4.248	00	PTI	DC0599	
DBLET_PDAMP_20	V99U6079C	ND			I	S	M P G4.248	00	PTI	DC0599	
DBLET_PDAMP_21	V99U6286C	ND			I	S	M P G4.248	00	PTI	DC0599	
DBLET_PDAMP_22	V99U6287C	ND			I	S	M P G4.248	00	PTI	DC0599	
DBLET_PDAMP_23	V99U6288C	ND			I	S	M P G4.248	00	PTI	DC0599	
DBLET_PDAMP_24	V99U6289C	ND			I	S	M P G4.248	00	PTI	DC0599	

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TABLE 4.10.3-3. PROGRAMMED TEST INPUT MODULE (G4.248) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
DBLET_PDAMP_25	V99U6290C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PDAMP_26	V99U6291C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PDAMP_27	V99U6292C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PDAMP_28	V99U6293C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PDAMP_29	V99U6294C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PDAMP_3	V99U6062C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PDAMP_30	V99U6295C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PDAMP_4	V99U6063C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PDAMP_5	V99U6064C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PDAMP_6	V99U6065C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PDAMP_7	V99U6066C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PDAMP_8	V99U6067C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PDAMP_9	V99U6068C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_1	V99U6080C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_10	V99U6089C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_11	V99U6090C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_12	V99U6091C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_13	V99U6092C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_14	V99U6093C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_15	V99U6094C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_16	V99U6095C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_17	V99U6096C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_18	V99U6097C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_19	V99U6098C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_2	V99U6081C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_20	V99U6099C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_21	V99U6311C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_22	V99U6312C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_23	V99U6313C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_24	V99U6314C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_25	V99U6315C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_26	V99U6316C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_27	V99U6317C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_28	V99U6318C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_29	V99U6319C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_3	V99U6082C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_30	V99U6320C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_4	V99U6083C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_5	V99U6084C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_6	V99U6085C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_7	V99U6086C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_8	V99U6087C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PFFT_9	V99U6088C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PINT_1	V99U6040C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PINT_10	V99U6049C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PINT_11	V99U6050C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PINT_12	V99U6051C	ND	I	S	M	P	G4.248	00	PTI	DC0599	

TABLE 4.10.3-3. PROGRAMMED TEST INPUT MODULE (G4.248) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
DBLET_PINT_13	V99U6052C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_14	V99U6053C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_15	V99U6054C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_16	V99U6055C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_17	V99U6056C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_18	V99U6057C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_19	V99U6058C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_2	V99U6041C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_20	V99U6059C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_21	V99U6261C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_22	V99U6262C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_23	V99U6263C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_24	V99U6264C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_25	V99U6265C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_26	V99U6266C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_27	V99U6267C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_28	V99U6268C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_29	V99U6269C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_3	V99U6042C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_30	V99U6270C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_4	V99U6043C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_5	V99U6044C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_6	V99U6045C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_7	V99U6046C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_8	V99U6047C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PINT_9	V99U6048C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_1	V99U6020C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_10	V99U6029C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_11	V99U6030C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_12	V99U6031C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_13	V99U6032C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_14	V99U6033C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_15	V99U6034C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_16	V99U6035C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_17	V99U6036C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_18	V99U6037C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_19	V99U6038C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_2	V99U6021C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_20	V99U6039C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_21	V99U6236C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_22	V99U6237C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_23	V99U6238C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_24	V99U6239C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_25	V99U6240C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_26	V99U6241C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_27	V99U6242C	ND		I	S	M	P G4.248	00	PTI	DC0599	
DBLET_PWIDTH_28	V99U6243C	ND		I	S	M	P G4.248	00	PTI	DC0599	

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TABLE 4.10.3-3. PROGRAMMED TEST INPUT MODULE (G4.248) I-LOADS

FSSR NAME	MSID	ENG UNITS	DT	PR	D	S	PR FCTN	MC	CAT	LAST CR	R E V
DBLET_PWIDTH_29	V99U6244C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PWIDTH_3	V99U6022C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PWIDTH_30	V99U6245C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PWIDTH_4	V99U6023C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PWIDTH_5	V99U6024C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PWIDTH_6	V99U6025C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PWIDTH_7	V99U6026C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PWIDTH_8	V99U6027C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
DBLET_PWIDTH_9	V99U6028C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
MACH_ADTA	V99U6210C	ND	F	S	M	P	G4.248	00	PTI	DC0599	
							G4.36				
PTI_START_1	V99U6100C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
PTI_START_10	V99U6109C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
PTI_START_2	V99U6101C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
PTI_START_3	V99U6102C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
PTI_START_4	V99U6103C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
PTI_START_5	V99U6104C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
PTI_START_6	V99U6105C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
PTI_START_7	V99U6106C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
PTI_START_8	V99U6107C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
PTI_START_9	V99U6108C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
PTI_STOP_1	V99U6125C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
PTI_STOP_10	V99U6134C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
PTI_STOP_2	V99U6126C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
PTI_STOP_3	V99U6127C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
PTI_STOP_4	V99U6128C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
PTI_STOP_5	V99U6129C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
PTI_STOP_6	V99U6130C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
PTI_STOP_7	V99U6131C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
PTI_STOP_8	V99U6132C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
PTI_STOP_9	V99U6133C	ND	I	S	M	P	G4.248	00	PTI	DC0599	
WINDOW_LE(11)	V99U6160C	DEG/SEC	F	S	M	P	G4.248	00	PTI	DC0599	
WINDOW_LE(12)	V99U6161C	DEG/SEC	F	S	M	P	G4.248	00	PTI	DC0599	
WINDOW_LE(13)	V99U6162C	DEG/SEC	F	S	M	P	G4.248	00	PTI	DC0599	

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

TABLE 4.10.3-4. PROGRAMMED TEST INPUT MODULE (G4.248) K-LOADS

FSSR NAME DESCRIPTION	MSID	MC	KLOAD VALUE	ENG UNITS	DT R	P	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 4.10.3-5. PROGRAMMED TEST INPUT MODULE (G4.248) 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.

APPENDIX R CHANGE AUTHORIZATION REFERENCES

R.1 CR REFERENCE SUMMARY

Table R.1-1. lists 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.

Table R.1-1. CR Reference Summary

Paragraph	CR No.	OI	CR Title
N/A	92307	29	FSSR Format Change - Documentation Only
	92958A	32	Expand Effectivity of PASS/BFS RTF SCRs to Include OI-32
	92994	32	Reassign Effectivity of SCR 92912D to OI-32
1.3-1.(T)	92103A	26B	FSSR Parameter Table Upgrade
3.3.1-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
3.3.1-2.(T)	90711D	26	Auto Body Flap Performance Enhancement
3.3.4.1	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
	90711D	26	Auto Body Flap Performance Enhancement
3.4.1-2.(T)	93087E	33	RTLS ET Separation Improvements
4.0	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4-1.(T)	90711D	26	Auto Body Flap Performance Enhancement
	91061B	26	ALFCMD Smoother Delta-T Correction
	92384B	29	Priority Rate Limiting Improvement
	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
	93087E	33	RTLS ET Separation Improvements
4.2.1	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.2.2	93087E	33	RTLS ET Separation Improvements
4.2-1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.2-2.(T)	90711D	26	Auto Body Flap Performance Enhancement
4.2-2.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.2-2.(1)(F)	93087E	33	RTLS ET Separation Improvements
4.2-2.(2)(F)	93087E	33	RTLS ET Separation Improvements

Table R.1-1. CR Reference Summary

Paragraph	CR No.	OI	CR Title
4.2-2.(3)(F)	93087E	33	RTLS ET Separation Improvements
4.2-2.(4)(F)	93087E	33	RTLS ET Separation Improvements
4.2-2.(5)(F)	93087E	33	RTLS ET Separation Improvements
4.2-2.(6)(F)	93087E	33	RTLS ET Separation Improvements
4.2-2.(7)(F)	93087E	33	RTLS ET Separation Improvements
4.2-3.(T)	90711D	26	Auto Body Flap Performance Enhancement
	90996G	26	ADI & HUD Error Display Integrator Mods
	91061B	26	ALFCMD Smoother Delta-T Correction
	92354	27	Delete Erroneous TLM Destinations
	90704F	28	DAP Hotstick Downmode Alert and Message
	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
	93012D	32	PASS 6X TRAJ Display Enhancement
	93087E	33	RTLS ET Separation Improvements
4.2-4.(T)	93087E	33	RTLS ET Separation Improvements
4.2-5.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
	93087E	33	RTLS ET Separation Improvements
4.3.1.1-1.(F)	90711D	26	Auto Body Flap Performance Enhancement
	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
	93087E	33	RTLS ET Separation Improvements
4.3.1.1-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1-1.1.(T)	91061B	26	ALFCMD Smoother Delta-T Correction
	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1-1.2.(T)	91061B	26	ALFCMD Smoother Delta T Correction
4.3.1.1-2.(T)	91061B	26	ALFCMD Smoother Delta-T Correction
	90724D	28	OPS 6 Entry ECAL Automation
	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
	93087E	33	RTLS ET Separation Improvements
4.3.1.1.2-3.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS

Table R.1-1. CR Reference Summary

Paragraph	CR No.	OI	CR Title
4.3.1.1.2a-3.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.4.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.5	92409B	28	Documentation Closure for DRS 109134 and 110298
4.3.1.1.7-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.7-1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.8-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.9-1.(T)	90724D	28	OPS 6 Entry ECAL Automation
	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.10-2.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.11-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.12-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.13-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.14-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.15-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.16a	92409B	28	Documentation Closure for DRS 109134 and 110298
4.3.1.1.16a-1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.16-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.17-1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.17-2.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.19-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS

Table R.1-1. CR Reference Summary

Paragraph	CR No.	OI	CR Title
4.3.1.1.31-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.32	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.32-1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.32-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.33-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.36-2.(T)	91061B	26	ALFCMD Smoother Delta-T Correction
	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.36-3.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.37-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.37-2.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.37-3.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.38-2.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.38-3.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.41	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.41-3.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.42-1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.42-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.43-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.45-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.49-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS

Table R.1-1. CR Reference Summary

Paragraph	CR No.	OI	CR Title
4.3.1.1.50-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.52-1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.52-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.55	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.56-3.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.57-3.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.58	92001	26	Auto Body Flap Enhancement Cleanup CR
	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.58-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.58-2.(T)	92001	26	Auto Body Flap Enhancement Cleanup CR
	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.1.58-3.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2-1.(F)	92374A	27	AEROJET/GRTLS DAP Documentation Update
	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
	92547A	30	Prevent Inadvertent Flight Control Barrel Rolls
	93087E	33	RTLS ET Separation Improvements
4.3.1.2-2.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
	93087E	33	RTLS ET Separation Improvements
4.3.1.2-4.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.2-1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.3-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS

Table R.1-1. CR Reference Summary

Paragraph	CR No.	OI	CR Title
4.3.1.2.5	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.5-1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.5-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.5-2.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.7-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.8-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.10-1.(F)	92547A	30	Prevent Inadvertent Flight Control Barrel Rolls
4.3.1.2.16-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.17-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.18a-1.(F)	92374A	27	AEROJET/GRTLS DAP Documentation Update
4.3.1.2.18a-1.(T)	92374A	27	AEROJET/GRTLS DAP Documentation Update
4.3.1.2.21-2.(T)	91061B	26	ALFCMD Smoother Delta-T Correction
4.3.1.2.24-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.28-1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.28-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.31	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.31-1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.31-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.31-2.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.32	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.32-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS

Table R.1-1. CR Reference Summary

Paragraph	CR No.	OI	CR Title
4.3.1.2.39a-1.(F)	92374A	27	AEROJET/GRTLS DAP Documentation Update
4.3.1.2.39a-1.(T)	92374A	27	AEROJET/GRTLS DAP Documentation Update
	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.39a-3.(T)	92374A	27	AEROJET/GRTLS DAP Documentation Update
4.3.1.2.40	92374A	27	AEROJET/GRTLS DAP Documentation Update
4.3.1.2.40-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.41-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.42-2.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.44-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.46-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.47-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.2.48-2.(T)	91061B	26	ALFCMD Smoother Delta-T Correction
4.3.1.3-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.3-1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.3-2.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
	92912D	32	Correct the Unit to be DEG for MSID V90H1521C
4.3.1.3-3.(T)	93064D	32	Errata Issue Clean-Up Part II
4.3.1.3.1	92374A	27	AEROJET/GRTLS DAP Documentation Update
4.3.1.3.1-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.3.6-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.3.7-1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.3.7-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.3.8-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS

Table R.1-1. CR Reference Summary

Paragraph	CR No.	OI	CR Title
4.3.1.3.8–1.(F)	93064D	32	Errata Issue Clean-Up Part II
4.3.1.3.9–1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.3.12	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.3.12–1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.3.12–1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.3.12–2.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.3.14–1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.3.19–1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.3.22–1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.3.25–1.(T)	92912D	32	Correct the Unit to be DEG for MSID V90H1521C
4.3.1.3.25–2.(T)	92321	28	Descent FCS Single APU K-Load Value Changes for OI-28
4.3.1.3.26–1.(T)	92912D	32	Correct the Unit to be DEG for MSID V90H1521C
4.3.1.3.26–2.(T)	92321	28	Descent FCS Single APU K-Load Value Changes for OI-28
4.3.1.3.27–1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.3.1.3.33–1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.4	93087E	33	RTLS ET Separation Improvements
4.4–1.(F)	92384B	29	Priority Rate Limiting Improvement
	92438A	29	Doc-Only Corrections for CRs 92384B and 92422A
	93064D	32	Errata Issue Clean-Up Part II
4.4–1.(T)	92384B	29	Priority Rate Limiting Improvement
	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.4–2.(T)	92384B	29	Priority Rate Limiting Improvement
	93064D	32	Errata Issue Clean-Up Part II
4.4–2.(F)	92384B	29	Priority Rate Limiting Improvement
4.5.1	93087E	33	RTLS ET Separation Improvements

Table R.1-1. CR Reference Summary

Paragraph	CR No.	OI	CR Title
4.5.1-1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
	93064D	32	Errata Issue Clean-Up Part II
4.5.1-2.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
	93064D	32	Errata Issue Clean-Up Part II
	93087E	33	RTLS ET Separation Improvements
4.5.1-2.(F)	93087E	33	RTLS ET Separation Improvements
4.5.1-3.(T)	93087E	33	RTLS ET Separation Improvements
4.5.1.1-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.5.1.3-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.5.1.4-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.5.1.4-2.(T)	92321	28	Descent FCS Single APU K-Load Value Changes for OI-28
4.5.1.4-3.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.5.1.5-2.(T)	92321	28	Descent FCS Single APU K-Load Value Changes for OI-28
4.5.2-1.(T)	90711D	26	Auto Body Flap Performance Enhancement
4.5.2-1.(F)	90711D	26	Auto Body Flap Performance Enhancement
	92086A	26	Auto Body Flap Enhancement Correction CR
	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.5.2.1-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.5.2.1-2.(T)	90711D	26	Auto Body Flap Performance Enhancement
4.5.2.1-3.(T)	90711D	26	Auto Body Flap Performance Enhancement
4.5.2-2.(T)	90711D	26	Auto Body Flap Performance Enhancement
	90724D	28	OPS 6 Entry ECAL Automation
	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.5.2-3.(T)	90711D	26	Auto Body Flap Performance Enhancement
4.5.2-4.(T)	90711D	26	Auto Body Flap Performance Enhancement
4.5.2.2-1.(T)	90711D	26	Auto Body Flap Performance Enhancement
	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS

Table R.1-1. CR Reference Summary

Paragraph	CR No.	OI	CR Title
4.5.2.2-1.(F)	90711D	26	Auto Body Flap Performance Enhancement
4.5.2.2-2.(T)	90711D	26	Auto Body Flap Performance Enhancement
4.5.2.3	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.5.2.3-1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.5.2.3-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.5.2.3-2.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.5.2.4	92409B	28	Documentation Closure for DRS 109134 and 110298
4.5.2.4-3.(T)	90711D	26	Auto Body Flap Performance Enhancement
4.5.2.4a	90711D	26	Auto Body Flap Performance Enhancement
	92086A	26	Auto Body Flap Enhancement Correction CR
4.5.2.4a-1.(F)	90711D	26	Auto Body Flap Performance Enhancement
	92086A	26	Auto Body Flap Enhancement Correction CR
4.5.2.4a-1.(T)	90711D	26	Auto Body Flap Performance Enhancement
	92086A	26	Auto Body Flap Enhancement Correction CR
4.5.2.4a-2.(T)	90711D	26	Auto Body Flap Performance Enhancement
4.5.2.4a-3.(T)	90711D	26	Auto Body Flap Performance Enhancement
4.5.2.5	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.5.2.5-1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.5.2.5-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.5.2.5-2.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.5.3-2.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.5.3-1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.6.1-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.6.2	92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions
	93086A	33	Increase GRTLS Aft RCS Jet Limit

Table R.1-1. CR Reference Summary

Paragraph	CR No.	OI	CR Title
4.6.2-1.(T)	92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions
	93087E	33	RTSL ET Separation Improvements
4.6.2-2.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
	92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions
4.6.2.1	93087E	33	RTSL ET Separation Improvements
	93087E	33	RTSL ET Separation Improvements
4.6.2.1-1.(T)	93087E	33	RTSL ET Separation Improvements
4.6.2.1-2.(T)	93087E	33	RTSL ET Separation Improvements
4.6.2.1-2.(F)	93087E	33	RTSL ET Separation Improvements
4.6.2.1-3.(T)	93087E	33	RTSL ET Separation Improvements
4.6.2.1-3.(1)(F)	93087E	33	RTSL ET Separation Improvements
4.6.2.1-3.(2)(F)	93087E	33	RTSL ET Separation Improvements
4.6.2.1-3.(3)(F)	93087E	33	RTSL ET Separation Improvements
4.6.2.1-3.(4)(F)	93087E	33	RTSL ET Separation Improvements
4.6.2.2-1.(T)	92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions
4.6.2.2-1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.6.2.2-1.(1)(F)	92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions
4.6.2.2-1.(2)(F)	92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions
4.6.2.2-1.(3)(F)	92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions
4.6.2.2-1.(4)(F)	93064D	32	Errata Issue Clean-Up Part II
	93086A	33	Increase GRTLS Aft RCS Jet Limit
4.6.2.2-1.(5)(F)	92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions
	93086A	33	Increase GRTLS Aft RCS Jet Limit
4.6.2.2-1.(5)(F)	92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions
4.6.2.2-2.(T)	93086A	33	Increase GRTLS Aft RCS Jet Limit
	93087E	33	RTSL ET Separation Improvements

Table R.1-1. CR Reference Summary

Paragraph	CR No.	OI	CR Title
4.6.2.2-3.(T)	92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions
4.6.2.3-1.(F)	92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions
4.6.2.3-2.(F)	92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions
4.6.2.3-3.(F)	92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions
4.7.1	93087E	33	RTLS ET Separation Improvements
4.7.1-1.(T)	93087E	33	RTLS ET Separation Improvements
4.7.1-1.(F)	93087E	33	RTLS ET Separation Improvements
4.7.2	93087E	33	RTLS ET Separation Improvements
4.7.2-1.(T)	93087E	33	RTLS ET Separation Improvements
4.7.2-1.(F)	93087E	33	RTLS ET Separation Improvements
4.7.2-2.(T)	93087E	33	RTLS ET Separation Improvements
4.7.4-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.7.7-3.(T)	93087E	33	RTLS ET Separation Improvements
4.7.8-1.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.7.8-3.(T)	93087E	33	RTLS ET Separation Improvements
4.7.9-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.7.9-3.(T)	93087E	33	RTLS ET Separation Improvements
4.7.10-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.7.15-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.7.18-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.7.18-2.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.7.20-2.(F)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.8.1-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS

Table R.1-1. CR Reference Summary

Paragraph	CR No.	OI	CR Title
4.8.1-2.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.8.1.1-1.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.8.1.1-2.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.9.2-3.(T)	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
4.10.1-1.(T)	91051K	26B	Streamlined Shuttle GPS Capability
	92067D	27	Three String GPS Capability
	92144C	27	Three-String GPS Documentation Cleanup
	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
	92230F	28	Display FSSR Documentation Cleanup
	92350A	29	Fails OPS/Fail Safe SSME Repositioning for Drag Chute
	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
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104
	92332D	30	Add Theta Limits Bracket to MEDS ADI Displays
	92619A	30	Correction CR for CR 92522D
4.10.1-2.(T)	92676B	30	CR 92522D / CR 92619A Correction CR
	93023D	32	OI-32 Remote Control Orbiter Capability
	93087E	33	RTLS ET Separation Improvements
	93090E	33	Bearing Displays
	93100C	33	OI-33 Remote Control Orbiter Capability Enhancement
	90996G	26	ADI & HUD Error Display Integrator Mods
	92354	27	Delete Erroneous TLM Destinations
	90704F	28	DAP Hotstick Downmode Alert and Message
	92273	28	Delete Downlist Requirements for DECP
	92447C	29	Documentation Cleanup of FSSR 7 - Flight Control, Entry - GRTLS
	92522D	30	Overhaul MEDS Composite Flight Instrument Display

Table R.1-1. CR Reference Summary

Paragraph	CR No.	OI	CR Title
4.10.1-2.(T)	92676B	30	CR 92522D / CR 92619A Correction CR
	92912D	32	Correct the Unit to be DEG for MSID V90H1521C
4.10.1-3.(T)	90711D	26	Auto Body Flap Performance Enhancement
	92384B	29	Priority Rate Limiting Improvement
	92422A	29	Priority Rate Limiting Improvement - BFS
	92438A	29	Doc-Only Corrections for CRs 92384B and 92422A
4.10.1-4.(T)	92321	28	Descent FCS Single APU K-Load Value Changes for OI-28
4.10.1-5.(T)	91061B	26	ALFCMD Smoother Delta-T Correction
	91051K	26B	Streamlined Shuttle GPS Capability
	92389C	29	Spiral HAC in TAEM Area Navigation
	92395F	28	Incorporate G on MEDS Displays
	92332D	30	Add Theta Limits Bracket to MEDS ADI Displays
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	93090E	33	Bearing Displays
4.10.2-1.(T)	91051K	26B	Streamlined Shuttle GPS Capability
	92067D	27	Three String GPS Capability
	92144C	27	Three-String GPS Documentation Cleanup
	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
	92157	28	IDD Clarification to Remove Blanks from FSSR Names
	92230F	28	Display FSSR Documentation Cleanup
	92306A	28	Orbiter Window Protection
	92350A	29	Fails OPS/Fail Safe SSME Repositioning for Drag Chute
	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
	92404B	29	Preserve MECO Vi, Altitude, & Altitude Rate in MM104
	92332D	30	Add Theta Limits Bracket to MEDS ADI Displays
	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

Table R.1-1. CR Reference Summary

Paragraph	CR No.	OI	CR Title
4.10.2-2.(T)	92619A	30	Correction CR for CR 92522D
	92676B	30	CR 92522D / CR 92619A Correction CR
	92909A	30/3 2	ET Camera Power Control Commands
	92950	32	G/C Steer Roll Bias Ramp at PPD or MECO
	93012D	32	PASS 6X TRAJ Display Enhancement
	93023D	32	OI-32 Remote Control Orbiter Capability
	93087E	33	RTLS ET Separation Improvements
	93090E	33	Bearing Displays
	93100C	33	OI-33 Remote Control Orbiter Capability Enhancement
	90996G	26	ADI & HUD Error Display Integrator Mods
	92354	27	Delete Erroneous TLM Destinations
	90704F	28	DAP Hotstick Downmode Alert and Message
	92504G	30	Alleviate ET Recontact For RTLS 2EO Yellow and Orange Regions
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
4.10.2-3.(T)	92565A	30	SE RTLS Increased Pitch Authority Using Forward RCS Jets
	92676B	30	CR 92522D / CR 92619A Correction CR
	92912D	32	Correct the Unit to be DEG for MSID V90H1521C
	93064D	32	Errata Issue Clean-Up Part II
	92384B	29	Priority Rate Limiting Improvement
	92422A	29	Priority Rate Limiting Improvement - BFS
4.10.2-4.(T)	92438A	29	Doc-Only Corrections for CRs 92384B and 92422A
	93086A	33	Increase GRTLS Aft RCS Jet Limit
	93087E	33	RTSL ET Separation Improvements
	93161	33	Cleanup to GRTLS Aero-Jet DAP Table
	92321	28	Descent FCS Single APU K-Load Value Changes for OI-28
4.10.2-5.(T)	91061B	26	ALFCMD Smoother Delta-T Correction
	91051K	26B	Steamlined Shuttle GPS Capability
	92395F	28	Incorporate G on MEDS Displays
	92389C	29	Spiral HAC in TAEM Area Navigation
	92332D	30	Add Theta Limits Bracket to MEDS ADI Displays
	92522D	30	Overhaul MEDS Composite Flight Instrument Display
	93090E	33	Bearing Displays
4.10.3-1.(T)	90704F	28	DAP Hotstick Downmode Alert and Message

Table R.1-1. CR Reference Summary

Paragraph	CR No.	OI	CR Title
	90914C	28	Delay MOV MPS Dump/FRCS Dump at MM602
	92389C	29	Spiral HAC in TAEM Area Navigation
	92332D	30	Add Theta Limits Bracket to MEDS ADI Displays
	93023D	32	OI-32 Remote Control Orbiter Capability
	93090E	33	Bearing Displays

R.2 HISTORICAL CHANGE REQUEST SUMMARY

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.

Table R.2-1. Historical Change Request Summary		
CR No.	OI	CR Title
2107		RTLS Transition DIP
2166		Entry Input/Output
2185		Nosewheel
2186A		Hydraulic Thermal
2186B		Level B Changes for Hydraulic Thermal Conditioning
2213		Deletion of Drag Bias Integ FDBK/Entry
2226		Elimination of Unnecessary Low-Rate Exec
2238A		Speed Brake Channel
2243		Alpha Limit
2387A		PRL Saturation Flags
2417B		Revision of Entry Displays
2418A		Aerojet DAP Clarification
2420		PRL Saturation Indication
2422		FC Guidance Interface Smoother
2425A		Body Flap Channel
2444D		Level A Downlist Requirement (Entry)
2607		Update to D&C Book 2
12001		Vert Sit, Scale-Attitude
12019		STD FSSR P/F I/D Tables
12051		AXFDCOMP Correction
12218B		Aero Actuator Command SOP Rate
12232A		Cmd Signal Limiter
12233		Transition DAP Rate Change
12256A		Aerojet DAP Reconfiguration
12257		Primary Flight Control System Fader
12258		Misc Level B&C Cleanup
12269		MSID Corrections
12277C		Programmed Test Input (PTI) Module (PF 4.248)

Table R.2-1. Historical Change Request Summary

CR No.	OI	CR Title
12280A		Pitch Axis Update
12282A		Minimum Speed Brake Setting
12316		GNC SN RM Processing Rate Reduction
12338		I-Load Oft Baseline Constants
12336		I-Load
12337		I-Load
12339		I-Load
12349A		YAW RCS Jet Select Logic
12353B		Entry Displays Simulation Data
12361A		Vert Sit 1 and 2 Display Changes
12401		Jet Select Logic
12443		I-Load
12449E		Manual Landing SOP
12468B		Aerojet Roll/Yaw Update
12488C		RHC Processing at 25 HZ
12490B		A/E Attitude Sample Rate Reduction
12499D		Manual Landing SOP
12518		Latch of QBAR
12593		Add 2nd Elevon Schedule
12600		Integ. M510 Assign for Uplink
12612A		Mod Roll Error Logic (Concept Approval)
12624A		S/W Reqmts to Support FCS SW Changes
12635		Adaptive PRL
12695A		C.G. Reqmts, Aerojet/GRTLS DAP
12700		Angle of Attack Modulation
12721C		Post-FF5 FCS Update
12726A		Entry FC DOWNMODING_FORWARD
12727A		Entry FC DOWNMODING_CREW
12728A		Entry FC DOWNMODING_ROLL
12770A		Body Flap Cmd RM
12788		Delete Latch Reqmt on QBAR_Regime
12792C		Aerojet/FRTLS DAP Support Function Rate Reduction
12798		GRTLS FC Downmoding
12850C		Angle of Attack Modulation in Entry Guidance

Table R.2-1. Historical Change Request Summary

CR No.	OI	CR Title
12886A		Body Flap Auto/Manual
12893C		Adaptive PRL Mods
12913		GRTLS DAP Overview Section
12920B		GRTLS DAP Lashup
12936A		Compute Mode Dependent Gains
12937		Elevon Trim Schedule for OFT
12944		Aerojet DAP Smoother Initialization
12961		GRTLS DAP Recon First Pass Initialization
12966		RHC Processing, 25 HZ (Ref CR 12488B)
12984		Mated Coast and ET SEP DAP I-Load Changes
12987A		Entry Roll Mode Control SW Mode
19042		Programmed Test Input (PTI) Module (4.248)
19043		Wrong Coefficient in Elevator Cmd BF
19061A		Fast Sep Change to GRTLS DAP
19071A		Dynamic Pressure Limiting
19112		Redundant I-Load Deletions
19116		Delete GJET_COMP I-Load
19125		Sign Change at Summing Junction of GRTLS ET SEP DAP
19127		GRTLS DAP JET Select Logic
19157A		Aerojet Recon Initialization Changes
19158A		GRTLS Recon Initialization Change
19160		RHC Trim Rate Cleanup (CR 12966C)
19161A		Estimated Beta
19164A		I-Load Value Update for 12/11 S/W
19175		Elevon Schedule for GRTLS DAP
19178A		Pitch Axis Downmoding
19179		Transition DAP/RCS SOP Rate Reduction
19182		Autoland Slapdown and Rollout I-Load Changes
19183A		Fast Sep Attitude Control
19184B		Reverse Aileron Control
19202		Replace GRTLS DAP Smoother with Improved Smoother
19203A		Elimination of Unnecessary Low Rate Module Execution
19206A		Roll/Yaw Axes Downmoding
19212		Design Change GRTLS Coast Comm Faults

Table R.2-1. Historical Change Request Summary

CR No.	OI	CR Title
19216A		PTI Module (4.248) Auto Indexing
19218A		Change of Speed Brake Bias
19227B		Addition of FC Trim Data to Entry Traj 1–5 and Vert Sit 1 and 2
19248A		Changes to GRTLS DAP JSL
19260		Aerojet/GRTLS I–Load Fix
19261		PRL – APU Overspeed
19288		GRTLS PosT FF–5 FCS Update
19290		Body Flap Moding for GRTLS DAP (CR 12886A)
19296A		Body Bending Filter Changes
19303		Corrections to CR 19054
19304		Aerojet/GRTLS DAP Manual BF Initialization
19307		ET SET DAP I–Load Change
19308		Speed Brake I–Load Change
19321		Jet Select Translate Table I–Load
19330		Add ABF Filter Initialization
19343		Delete Simultaneous SBTV Takeover
19396		Pitch RHC Filter
19415A		Correction to I–Load CR'S 19164A, 19182, 19389A, 19390, 19357B
19424		Entry BF Filter Coefficients (Ref CR 19296)
19426		I–Loads for Entry Flight Control (Ref CR 19184B)
19437		GRTLS I–Load Mod
19442		Eliminate RHC Softstop Gain Doubling
19443		Aerojet/GRTLS DAP Body Flap Manual/Auto Initialization
19452B		I–Load Corrections Necessary for 3/19 Release and STS–1 FLIGHT
19484		I–Load Data Corrections from Command Review
19492		Reverse Aileron Gain for Roll/Yaw Axes Downmoding
19495		Correction of Body Flap Mode Determination
19501A		Eliminate Redundant Speed Brake Closed Bias
19505		Delete Check in GRTLS Pitch Channel
19556A		I–Load Correction for Version 2.3
19560A		I–Load Update Per IBM Testing
19562		Correct Yaw Zero Signal Check
19564		Elevator Trim and Command Limits in Entry and GRTLS DAP'S
19566		Beta Estimator Sign Correction (CR 19161A)

Table R.2-1. Historical Change Request Summary

CR No.	OI	CR Title
19570A		Update to DBFRE for Entry and GRTLS
19581B		Corrections to I-Load Paper Baseline
19610A		Correction to CR 19206A
19628		CR19296A Clarification for GRTLS DAP
19631A		Aerojet DAP Speed Brake Channel Initialization Delete
19644		GRTLS DAP Smoother Initialization and Block Diagram Update
19677		GPAY_COMP I-Load Change
19712		Corrections to I-Load Data Tape for 5/21 FSW 4/18 CPDS
19715		Correction GRTLS DAP Roll Channel Switching Logic
19722		Simplify ETSEP Adaptive Gains
19724A		RHC Pitch Axis Suppression Filter for STS-1
19725		YBB Filter Noise Reduction
19726		Estimated Beta I-Load Cleanup
19727		C.G. Location I-Load Update
19728		Add Limit on Tangent PHI Used for Pitch Axis Turn Compensation for GRTLS DAP
19729		Estimated Beta I-Load Correction
19736		Make-Work Lash-Up for GRTLS DAP Requirements to CR 19239 (MM 601 FAST SEP)
19746		Telemetry Impact of FC Body Bending Filter (CR 19296A) Changes
19768B		Corrections to Initialization Requirements in Downmoding CR's for Aerojet and GRTLS DAP
19789		GRTLS DAP FSSR Overview Revision
19848A		Deletion of CR 19396, Pitch RHC Filter
19877A		Update AEROJET/GRTLS DAP Speed Brake Channel Interface with Displays and Controls
19880		Corrected QCOMP for Turn Coordination
19932		Flight Control I-Load Changes from FSL DESENS I-Simulation
19937		Overview Update, Entry DAP
19958A		Ascent Flight Control Documentation Cleanup
19972		Estimated Beta Cleanup
19981		Unlatch Zero-Yawjet
19982B		Redefinition of Optional Jet Selection Logic Priorities
29007		I-Load Constrained to Single Values
29021		Downmoding GRTLS ET Separation DAP*
29029		Correction to DETRIM_MAX and DETRIM_MIN I-Load

Table R.2-1. Historical Change Request Summary

CR No.	OI	CR Title
29046B		FSC SW Nomenclature Change in Compliance with MCR 5949
29064		Unlatch Zero Yawjet (CR 19981) Cleanup
29094D		MPAD I-Load Update STS-1, Cycle 3.0
29108		MSID'S for PTI Module I-Loads (STS-2)
29118A		PRL-I-Load Change Rudder Panel, Elevon Hysteresis
29133		Consolidate Aerojet/GRTLS DAP FSSR'S
29134A		ETRIM_INT Sign Correction
29136		Yaw Rate Gain Schedule Change
29137		LD_REL_BIAS I-Load Change
29138		Aileron Trim Gain Schedule Change
29140A		Nosewheel Input Correction
29156		Maximum Alpha GALR Switch
29171B		Redesign of Slapdown and Rollout
29182A		STS-1 I-Loads for P10 Suppression Filter
29185A		Raised Maximum Firing Time, Failed RCS Jets
29206		Complete PRHC_SUM Requirements
29253		Aerojet/GRTLS DAP Priority Rate Limiting Cleanup
29254A		Complete Downlist Requirements of UZCMD for Aerojet and GRTLS DAP's
29270		I-Load Correction for PI0 Suppression Filter
29297		Use ASC RCS Cmd SOP for Jet Processing in MM 602/603
29444C		Entry Controls Display
29471B		HFE Overrun Definition
29546B		GRTLS FCS FSL Verif
29547B		ENT FCS FSL Verify Anom UPDT2
29554		Rudder Filter I-Load Change
29557A		Entry/GRTLS STS-2 I-Loads
29608		Correct CR'S 29546 and 29547
29666A		PCS GRTLS DAP I/L Changes
29762A		ATT_PROCE IDD Cleanup
29833		GRTLS Alt Elvn Sched PFS/BFS
29834		Entry Altitude Elevon Schedule PFS/BFS
29861C		RTLS Mated Coast Bending Filter
29901A		Delete Fader I-Load
29941		STS-1 CR'S on STS-2 IDT (Ref Only)

Table R.2-1. Historical Change Request Summary

CR No.	OI	CR Title
29971		Update to PTI I-Loads (Ref Only)
29985		Delete Fader I-Load from PASS (Ref Only)
39049		YAW_HYST Initialization Requirement
39087A		Head Up Display (HUD)
39113		Entry/GRTLS Bending Filter
39120A		GRTLS DAP ALFERR_FILT (Ref Only)
39155D		RCS Jet Priority Control
39250B		Flight Control for IUS Payload
39365F		HUD Proc I/O Cleanup
39401A		Transatlantic Abort Landing
39404		Control Modes for PTI
39446		PTI I-Load Update
39450		CR Implementing Baseline, May 29, 1981
39467A		DR Closeout – Documentation Cleanup
39550A		Add Beta Washout Filter
39590B		Rudder-Speed Brake Hinge Interference
39595		CR Implementation Baseline
39633		Rudder/Aileron Trim Initialization
39700D		Entry/GRTLS FCS Gain and Aero Mode (Ref CR 59009A)
39737		STS-4 Elevator Schedule (Ref Only)
39759		Remove APU Fail From PTI
39773I		Delete FCS Downmoding
39815		Automated PTI
39840		PTI I-Load Mod
39844B		Entry/GRTLS FSC Slapdown
39887		Delete Manual PTI I-Loads (Ref Only)
39912B		Mem. Config Alt Elev Schedule (Ref Only)
39962A		Elevator and Speed Brake Schedules (Ref Only)
39980		CR Implementation Baseline
39972		Elevator Trim Command – MM 304
39976		Pitch Rate Filter Initialize
39983A		Flight Control I/L IUS P/L (Ref Only)
59009A		Implementation of CR 39700D for STS-6
59047		STS-5 PTI Revisions (Ref Only)

Table R.2-1. Historical Change Request Summary

CR No.	OI	CR Title
59181B		STS-6 Auto PTI I-Loads (Ref Only)
59211A		STS-5 Auto PTI I-Loads (Ref Only)
59212A		STS-5 Autoland Improvements (Ref Only)
59231		Downmode to Bank if Late Sel
59312A		GRTLS Aileron Modification
59363C		SEL FCS Filter and/or Trim
59517E		CSS Slapdown Modification
59755B		GRTLS Low QBAR Flt Cntl Mod
69028		STS-9 Elevator Schedule Modification Update 2 (I-Loads Only)
69007		RCS Priority Mod for 099 (I-Load Only)
69009		RCS Priority/Grtls Mod for 099 (I-Loads Only)
69519		Pre-IMRB Rockwell I/L Ownership (Ref Only)
69606A		STS-51A PTI I-Loads (Ref Only)
69607A		STS-51A ELVN Schedule I/L (Ref Only)
69560A		ZF91 Category Update (I-Loads Only)
69728		ZF80 Occurrence Update (I-Loads Only)
69719A		Delete Veh Unique RCS Priority (I-Loads Only)
69731A		Cat JD20 Mid Aft Alt Elv Sch (I-Loads Only)
69732		Cat JD20 Aft Alt Elv Sch (I-Loads Only)
69787		IUS Bdg Filter I/L Cat JDBO 003 (I-Loads Only)
69953		Cat JD31 – STS 51D XCG (I-Loads Only)
69975		Aerojet DAP CG I/L – JDG0002 (I-Loads Only)
69976		Aerojet DAP CG I/L – JDGO 003 (I-Loads Only)
69977		Aerojet DAP CG I/L – JDGO 004 (I-Loads Only)
79017		STS 51B PTI I/L (I-Loads Only)
79029		STS 51G Entry Elev Sched (I-Loads Only)
79031		STS 51F Elev Sched, Alt (I-Loads Only)
79032		STS 51F Entry Elev Sched (I-Loads Only)
79143		Generic Elev Sched for Aft CG (I-Loads Only)
79166		RCS Doc Priority Corrections
79186		Upd GRTLS Elev Sched Cat JD10 (I-Loads Only)
79219		51G Alt Elv Schd, JD20010 (I-Loads Only)
79290		OP Elevon Schd Aft, Mid, Fwd CG (I-Loads Only)
79292		Early Rudder Mod (I-Loads Only)

Table R.2-1. Historical Change Request Summary

CR No.	OI	CR Title
79313		Corr Flg to Dsble Pitch Jet
79336		Early Rudder Mod OI5, ZF91104 (I-Loads Only)
79395C		CSS NWS with NY Feedback
79408		RCS ACT Lt Doc Change
79419		Ent FCS JSC I/L Owner Reassign (Ref Only)
79420A		STS 51I PTI I-Loads (I-Loads Only)
79561		Delete FCS Downmoding
79616G		No Yawjet Downmode
79644E		GRTLS DAP Mod for SPLT-S RTLS
79767F		Revision of GRTLS DAP Logic, ET SEP
79844G	20	Body Flap Update
79946F		Manual NWS FCS Update
79962F		Entry/GRTLS DAP OI-8C Scrub
89120A		Load Relief Modification
89184B		Load Relief Modification Cleanup
89211A		IMRB Category/OC Corrections
89245D		Post MECO TAL Declaration
89256		Subsonic/Low QBAR FCS Modification
89272B		GRTLS Guidance Activation
89334		Load Relief Modification Addendum
89408		Scrub Estimated Beta Att Proc
89413		Dir Check Auto MM601-2 Trans
89415		OI-8C Implementation of CR 69870F
89423D		Gear Pitch Notch Filter
89442G		Elevon Limit During Splashdown
89463		STS 83-0007B Errata Baseline
89558		OI-8C FCS Scrub Cleanup
89559A		OI-8C SUM and Bend Filter Cleanup
89630A		Entry/GRTLS DAP Scrub Cleanup
89674E	22	Entry FCS I/L – K/L Conversion
89678		GRTLS Aileron Trim Update
89679C	22	Yaw Rate Feedback BBF
89680A	20	Pitch RHC Slapdown Gain Reduction
89740B		FSSR 7 OI-8B PCN-1 Errata

Table R.2-1. Historical Change Request Summary

CR No.	OI	CR Title
89785		Entry Scrub Correction
89840		Documentation Cleanup of Pitch Notch File
89850		Body Bending Filter Initialization Clarification
89862A		Estimated – Beta Downlist Clean–Up
89889H	20	Improved Nosewheel Steering
89990E	21	Single Engine Auto Contingency Abort
89991E	21	Entry SSME Repositioning (For Drag Chute)
90014G	22	RTLS ET Separation DAP Mod
90031		Correct Units on GRN and TGRH
90050		Elevon Trim Initialization Correction
90054A		Entry FCS Errata
90061A		Modification of Nosewheel FADER Initialization
90114B	21	Abort Sequencing Redesign
90152D	22	Contingency Abort TAL Low–Energy Logic
90355	21	BFS Decent FCS Derived I–Loads Changed To Common I–Loads
90374C	20	Automated FSSR Constants
90476F	25	Wraparound Yaw Jet System w/PTI Effector
90517C	24	GRTLS Mated Coast Pitch/Roll Command Update
90518A	22	GJET_COMP K–Load Value Correction
90519A	22	Gear Load K–Load to I–Load Conversion
90531	22	Cleanup for 90014G: RTLS ET Sep DAP Mod
90628A	23	NY Feedback K–Load to I–Load Conversion
90690A	24	Deletion of EQTN MSID Column from K–Load FSSR Tables
90705H	25	3 Engines Out Auto Contingency
90710H	23	CR for Slapdown Tire Loads Reduction
90790	24	Add Memory Configuration to the FSSR I–Load Tables
90814C	24	Add Description of Database Generated FSSR Parameter Tables
90827A	22	Initialize 3-Axis RHC SOP Detent and Softstop Parameters
90881A	25	FSSR STS83–0001 Documentation Changes
90901A	24	FSSR Doc Changes, Flight Control Entry – GRTLS
90960E	25	HAC Initiation Predictor and Position Error Displays
90964	25	Interface Clarification for 3 Engines Out – CR 90705H
90966A	24	Deletion of the Qualifier from the FSSR I–Load Tables
91005B	23	OI-23 GN&C Doc Issues Cleanup

Table R.2-1. Historical Change Request Summary

CR No.	OI	CR Title
91036B	25	Corrections and Cleanup to CR 90705H: 3 Engines Out Auto Contingency
91041A	24	K-Load Patch Modifications to Post-WOW Rudder Pedal Command
91043B	25	Wraparound FCS Doc Only Cleanup
91052A	25	GRTLS DAP Recon Clarification for 3 E/O Auto Contingency
91066D	25	Standardize the FSSR Correlation Tables
92027B	25	TDMS-2 Required FSSR Changes

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