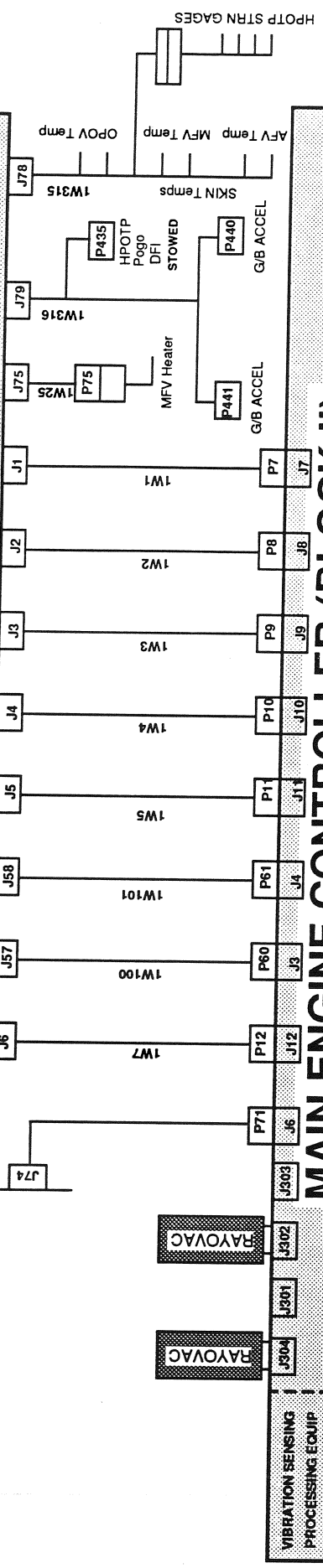
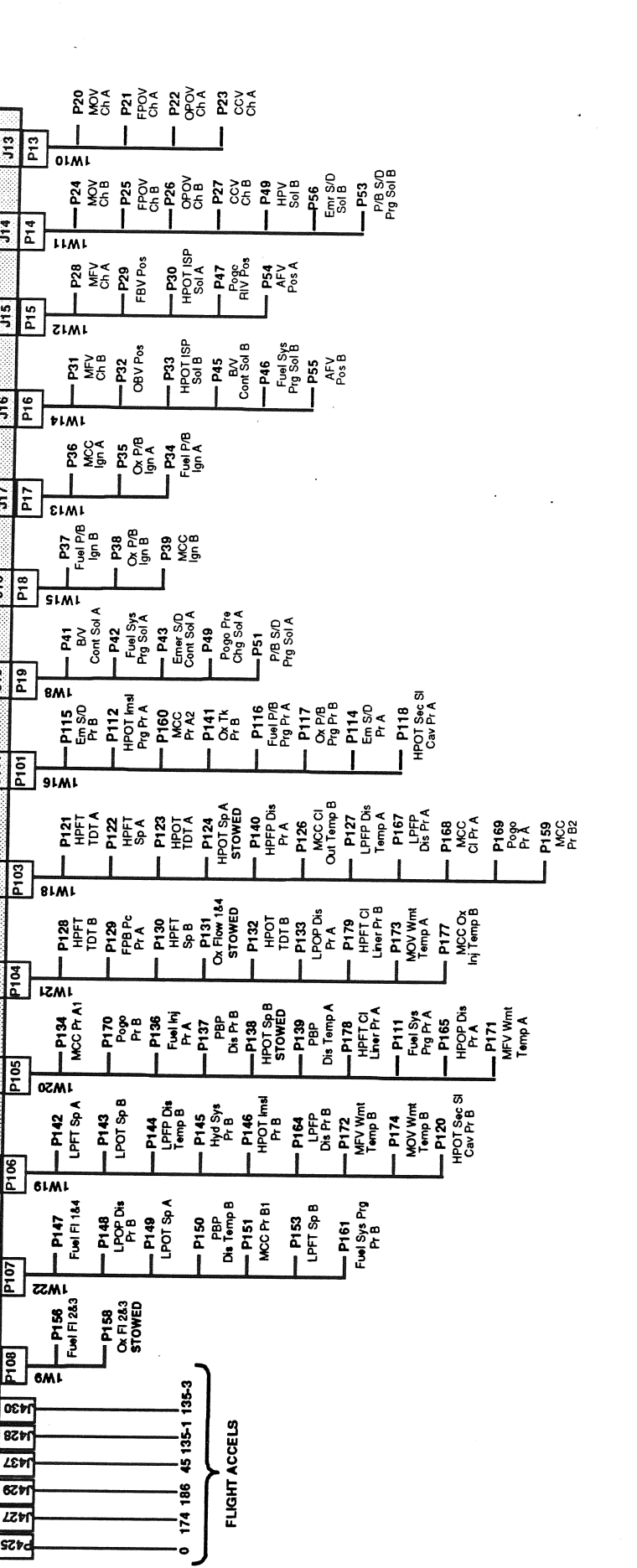
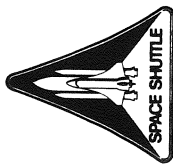


# ENGINE INTERFACE PANEL

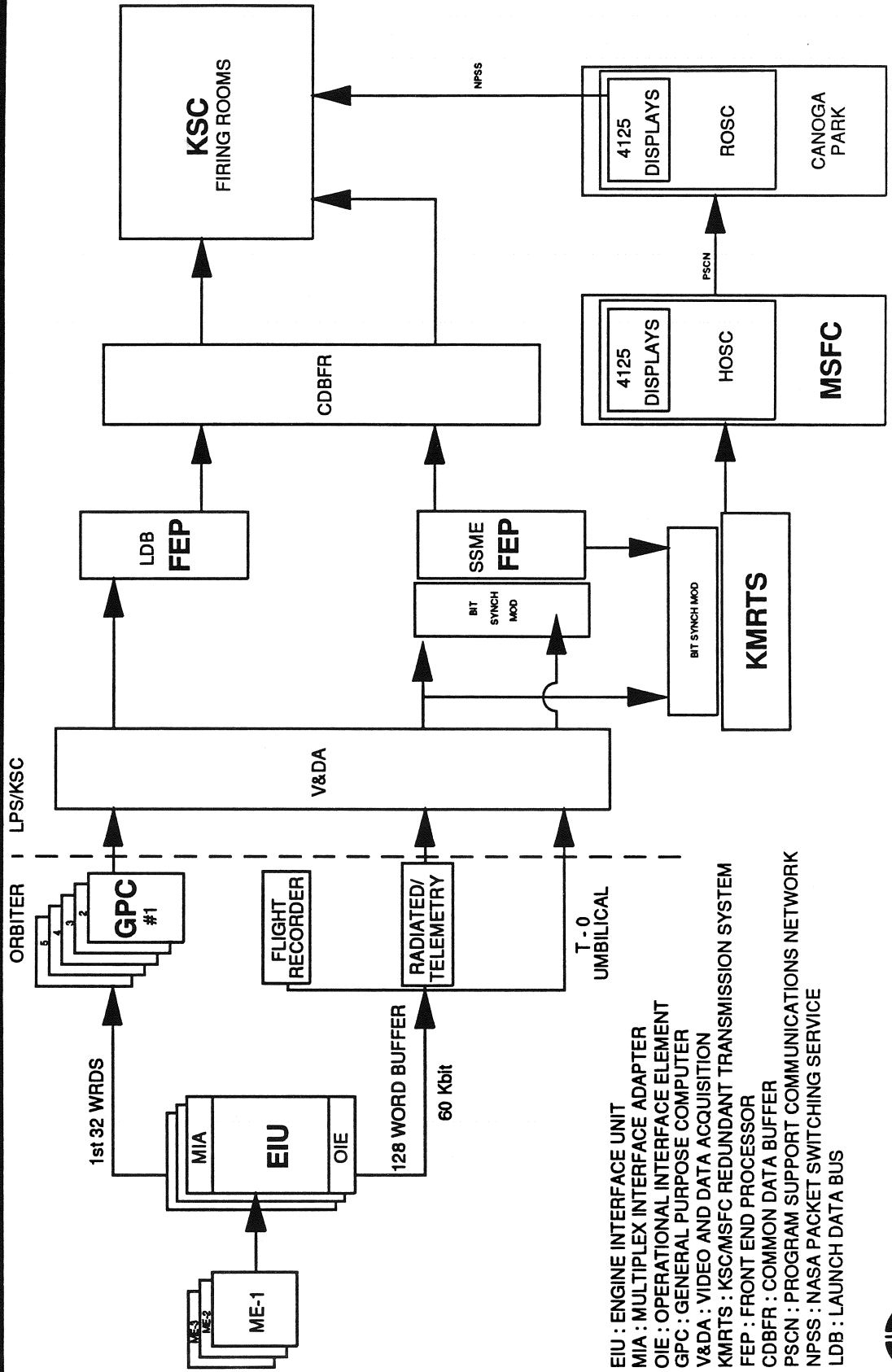


# MAIN ENGINE CONTROLLER (BLOCK II)



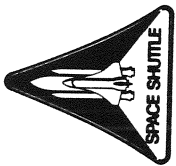


# REAL TIME DATA PROCESSING



EIU : ENGINE INTERFACE UNIT  
 MIA : MULTIPLEX INTERFACE ADAPTER  
 OIE : OPERATIONAL INTERFACE ELEMENT  
 GPC : GENERAL PURPOSE COMPUTER  
 V&DA : VIDEO AND DATA ACQUISITION  
 KMRTS : KSC/MSFC REDUNDANT TRANSMISSION SYSTEM  
 FEP : FRONT END PROCESSOR  
 CDBFR : COMMON DATA BUFFER  
 PSCN : PROGRAM SUPPORT COMMUNICATIONS NETWORK  
 NPSS : NASA PACKET SWITCHING SERVICE  
 LDB : LAUNCH DATA BUS





# ATLANTIS STS-46 SENSOR MONITORING

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- **SENSOR MONITORING** 4.2
- **FID LISTING** 4.56
- **DATAWORD/MSID/PID CROSS REFERENCE** 4.93

SENSOR.TBL

SENSOR MONITORING SUMMARY

ECP 704-1R2  
(Corresponds to Part I Version 2.5, + RCN 5193)

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tabular and graphic summaries of:

- \*\* Sensor Monitoring Criteria \*\*
  - Qualification
  - Engine Ready
  - Ignition Confirm
  - Redline
  - FASCOS
  - Purge & Ancillary
  - Backdoor Purge
  - RVDT Comparison
  - BlueLine
  - Actuators
  - Command Channel Voting
- \*\* On/Off Times \*\*
  - Pneumatic solenoids
  - Failsafes
  - Igniters

---

general rules and comments:

- Numerical limits are inclusive to pass
- Monitoring times are inclusive
- Limit Control Inhibit in effect changes any FID 13 (except Ignition Confirm) or FID 17 to 113 or 117, without Shutdown response
- NR indicates an MCF is Non-Resumable pre-Start (after Start MCF is always non-Resumable)

Contents

Page	TABLES	Qualifi- cation	Engine Ready	Ignition Confirm, Redline, FASCOS 113/13 117/17	Purge & Ancillary, Backdoor, Misc.	Actuator SEII, BlueLine	other
		111/11 116/16	12	113/13 117/17	14	15	
4	Actuator Channel A					X	
6	Actuator Channel B					X	
8	Anti-Flood Valve	X		X	X		
9	Bleed Valves (Fuel, Ox)				X		
10	Command Channel Voting						42
11	Emergency Shutdown Pressure		X		X		
12	Fuel Flowrate	X					
14	Fuel System Purge Pr				X		
15	HPFP Coolant Liner Pr	X			X		
16	HPFP Shaft Speed	X		X			
17	HPFP Vibration	X		X			
18	HPFT Discharge Temperature	X		X			
20	HPOP IMSL Purge Pressure	X		X	X		
22	HPOP Vibration	X		X			
23	HPOT Discharge Temperature	X		X			
25	HPOT Secondary Seal Cavity Pr	X		X			20
26	Hydraulic System Pr	X		X			no FID
27	LPFP Discharge Pr	X	X				
28	LPFP Discharge Temperature	X	X				
29	LPOP Discharge Pr	X	X				
30	MCC Lox Dome Temperature				X		
31	MCC Pressure	X					
35	MFV Hydraulic Temperature		X	X	X		20
36	MOV Hydraulic Temperature		X		X		20
37	OPOV Command						
38	POGO Precharge Pr	X					
41	POGO RIV Position						
42	Preburner Pump Discharge Temp	X	X				
43	Preburner S/D Purge Pr (Fuel,Ox)	X	X				
45	On/Off Times	X		X	X		
<b>GRAPHIC CHARTS</b>							
50	Sensor Monitors						
55	Nominal On/Off Periods						

ACTUATOR CHANNEL A  
(page 1 of 2)

- SERVOACTUATOR ERROR INDICATION INTERRUPT -

FID-Delim's 15-011, 021, 031, 041, 051	PHASE SP (MFV) (MOV) (CCV) (FPOV) (OPOV)	ST/MS	TIME START Start Prep	FINISH end of Start Prep	LIMITS		MCF First failure	INHIBIT First failure	RESPONSE if first channel actuator failure: switch control to channel B, turn on fail-op servo- switches, switch excitation - OR - if channel B already failed, or RVDT miscompare occurred: Hydraulic Lockup or Pneumatic Shutdown depending on phase
					LOWER hardware compares RVDT output : D/A driven model <= 6% full-open	UPPER			
		ST/MS	Start	end of Mainstage	"	"	"	-	
		S/D	Shutdown	end of Shutdown	"	"	"	-	
		PS/D	Post Shutdown	end of Post Shutdown	"	"	"	-	

- RVDT COMPARISON MONITOR -

FID-Delim's 15-110, 120,130 140,150	PHASE SP	ST/MS	TIME START Start Prep	FINISH end of Start Prep	LIMITS		MCF First failure	INHIBIT First failure	RESPONSE Inhibit engine start; If PSN4 or Engine Ready, revert to PSN3
					LOWER Ch A RVDT position : Ch B RVDT position <= 3% full-open (single strike)	UPPER			
		ST/MS	Start	Start + 2.28 sec	"	"	First failure	-	Pneumatic Shutdown
			Start + 2.3 sec (Ign Conf)	end of Mainstage	"	"	First failure	-	Pneumatic Shutdown when shutdown occurs
		S/D	Shutdown	end of Shutdown	"	"	First failure	-	Pneumatic Shutdown

ACTUATOR CHANNEL A  
(page 2 of 2)

- ACTUATOR SETTLING CHECK -

FID-Delim's 15-710	PHASE SP	TIME		LIMITS		INHIBIT First failure	RESPONSE Report if both failure channels of at least one of MOV, MFV, FPOV or OPOV fail comparison for 3 tries in PSN4
		START PSN4 + 10.04 sec	FINISH PSN4 + 17.72 sec	LOWER PSN3 128-point average > PSN4 128-point average by 0.1% open	UPPER MCF First NR		

ACTUATOR CHANNEL B  
(page 1 of 2)

- SERVOACTUATOR ERROR INDICATION INTERRUPT -  
(with previous Channel A Actuator disqualification)

FID-Delim's 15-012, 022,032 042,052	PHASE SP	TIME START Start Prep	FINISH end of Start Prep	LIMITS		MCF MCF becomes (NR)	INHIBIT Second failure	RESPONSE Pneumatic Shutdown
				LOWER hardware compares RVDT output : D/A driven model <= 10% full open	UPPER			
	ST/MS	Start	Start + 4.98 sec	"	"	MCF remains	-	Pneumatic shutdown
		Start + 5.0 sec	end of Mainstage	"	"	MCF remains	-	Hydraulic Lockup
	S/D	Shutdown	end of Shutdown	"	"	MCF remains	-	Pneumatic Shutdown
	PS/D	Post Shutdown	end of Post Shutdown	"	"	MCF remains	-	Pneumatic Shutdown

- SERVOACTUATOR ERROR INDICATION INTERRUPT -  
(at the time of RVDT miscompare)

FID-Delim's 15-012, 022,032 042,052	PHASE SP	TIME START Start Prep	FINISH end of Start Prep	LIMITS		MCF MCF remains	INHIBIT First failure	RESPONSE Disqualify Channel B Actuators
				LOWER hardware compares RVDT output : D/A driven model <= 10% full open	UPPER			

- CHANNEL B RVDT MONITORING -  
(after Channel A Actuators are disqualified)

FID-Delim's 15-512, 522,532 542,552	PHASE SP	TIME START Start Prep	FINISH end of Start Prep	LIMITS		MCF MCF becomes NR	INHIBIT -	RESPONSE Pneumatic Shutdown
				LOWER -3% open	UPPER -			



ACTUATOR CHANNEL B  
(page 2 of 2)

- ACTUATOR SETTLING CHECK -

FID-Delim's 15-710	PHASE SP	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START PSN4 + 10.04 sec	FINISH PSN4 + 17.72 sec	LOWER PSN3 128-point average > PSN4 128-point avg. by 0.1% open	UPPER			
						First failure NR	First failure	Report if both channels of at least one of MOV, MFV, FPOV or OPOV fail comparison for 3 tries in PSN4

ANTI-FLOOD VALVE POSITION (AFV)

- QUALIFICATION FOR IGNITION CONFIRMATION -

FID-Delimit's	PHASE ST/MS	TIME START Start + 2.3 sec	FINISH Start + 2.34 sec	LIMITS		MCF	INHIBIT	RESPONSE
				LOWER	UPPER			
111-505, 506				-10	40	-	-	report
				60	110			
11-505, 506	ST/MS	Start + 2.3 sec	Start + 2.34 sec	-10	40	superseded by SLE	-	Engine Shutdown via FID 13-007/010
				60	110			

- IGNITION CONFIRMATION -

FID-Delimit's	PHASE ST/MS	TIME START Start + 2.3 sec	FINISH Start + 2.34 sec	LIMITS		MCF	INHIBIT	RESPONSE
				LOWER	UPPER			
13-007, 010				80	-	SLE	-	Shutdown **

\*\* Ignition confirmation fails, causing Shutdown response if either:

- 1) a channel is qualified for at least one of the three major cycles of the monitoring period, but does not pass confirmation limits during any of the three major cycles; or
- 2) both channels are disqualified for all three major cycles of the monitoring period

- PURGE AND ANCILLARY MONITORING -

FID-Delimit's	PHASE SP	TIME START Start Prep	FINISH PSN4, E/R before Start Enable	LIMITS		MCF	INHIBIT	RESPONSE
				LOWER	UPPER			
14-015, 016				-	10	First failure	Each failure	Inhibit engine start
				-	10			
	PS/D	Start Enable + 1 sec	end of Start Prep	-	10	Second failure	Second failure	Second failure inhibits engine start
		Post Shutdown	end of Post Shutdown	-	10	-	-	report

BLEED VALVE POSITION (FUEL, OXIDIZER) (BV1, BV2)

- PURGE AND ANCILLARY MONITORING -

FID-Delim's 14-017, 020	PHASE SP	TIME		STATE	LIMITS		MCF	INHIBIT	RESPONSE
		START PSN1	FINISH end of PSN2		LOWER	UPPER			
		PSN3 (+2 sec)	PSN4,E/R before Start Enable	ON	80	-	First failure	Each failure	Inhibit engine start
		Start Enable (+2 sec)	end of Start Prep	OFF	-	20	First failure	Each failure	Inhibit engine start
	PS/D	Post Shutdown (+2 sec)	end of Post Shutdown	ON	80	-	-	-	report

Note: Monitoring is suspended for 2 sec when the controlling on/off function changes state. Nominal suspension times are indicated ( ) above. Actual suspensions in Start Prep depend on order of Purge Sequences.

COMMAND CHANNEL VOTING

- TWO COMMAND CHANNELS VOTE 'START ENABLE' OR 'START';  
THIRD COMMAND CHANNEL DISAGREES -

FID-Delim's	PHASE	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
42-101, 102, 103	all	Start Prep	end of Start Prep	any two command channels disagree (single strike)	command disagree (single strike)	First failure	Each failure (DCU A only)	Inhibit engine start
		Start	end of Post Shutdown	"	"	First failure	-	report -- only one report during engine-on phases

- ONE OR MORE COMMAND CHANNELS DISAGREES OR EQUALS ZERO;  
WITH NO VOTE FOR 'START ENABLE' OR 'START' -

FID-Delim's	PHASE	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
42-101, 102, 103	all	Start Prep	end of Post Shutdown	any two command channels disagree (single strike)	command disagree (single strike)	First failure	-	report -- only one report during engine- on phases

NOTE: delimiters indicate  
command channel that disagrees,  
Channels A, B, and C respectively

EMERGENCY SHUTDOWN PRESSURE (P20)

- ENGINE READY MONITORING -

FID-Delim's 12-011, 012	PHASE SP	TIME START PSN4 + 10 sec	FINISH PSN4, E/R before Start Enable	LIMITS		MCF First failure	INHIBIT Each failure	RESPONSE Inhibit engine start
				LOWER -	UPPER 50			

\* FID and Inhibit occur when either:

- 1) Engine Ready has been obtained and sensor exceeds limits for 1 continuous second; or
- 2) Engine Ready has not been obtained, Start Enable is commanded, and sensor is currently outside limits

- PURGE AND ANCILLARY MONITORING -

FID-Delim's 14-023, 024	PHASE SP	TIME START PSN3	FINISH end of PSN3	STATE OFF	LIMITS		MCF First failure	INHIBIT Each failure	RESPONSE Inhibit engine start
					LOWER 600	UPPER 900			
		PSN4 (+2 sec)	PSN4, E/R before Start Enable	ON	-	50	First failure	Each failure	Inhibit engine start
	ST/MS	Start	end of Mainstage	ON	900	-OR- 600	First failure	-	report

Note: Monitoring is suspended for 2 sec when the controlling on/off function changes state. Nominal suspension times are indicated ( ) above. Actual suspensions in Start Prep depend on order of Purge Sequences.

The Start/Mainstage test passes if the value of EMSD Pr is greater than or equal to 900, or less than or equal to 600; between 600 and 900 fails

- QUALIFICATION FOR CONTROL -

Notes:

FID 011 reports occur for failures on the second channel, and third or fourth individual sensor

In Start and Mainstage, when all three tests are performed, they are performed in this order:

- 5000-20000 reasonableness
- intra-channel
- inter-channel

Failure of one test will cause bypass or strike of succeeding tests.

FID-DeLim's	PHASE SP	TIME			LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER	First			
111-101, 102	Start Prep	end of Start Prep	intra-channel sensor 1 : sensor 2 within 1800	"	"	First failure	First failure	Inhibit engine start	
	ST/MS Start	end of Mainstage	"	"	"	First failure	-	report	
	S/D Shutdown	end of Shutdown	"	"	"	First failure	-	report	
	PS/D Post Shutdown	end of Post Shutdown	"	"	"	First failure	-	report	
111-103, 104, 105, 106	ST/MS Start + 3.5 sec	end of Mainstage	5000	20000		First failure	-	report	

- QUALIFICATION FOR CONTROL (cont.) -

FID-Delim's	PHASE ST/MS	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START Start +	FINISH Start +	LOWER inter-channel	UPPER inter-channel			
11-100	ST/MS	Start + 3.5 sec	Start + 4.98 sec	Channel A : Channel B within 1800	Channel B within 1800	First failure	-	Hydraulic Shutdown
		Start + 5.0 sec	end of Mainstage	" "	" "	First failure	-	Electrical Lockup
11-101, 102	SP	Start Prep	end of Start Prep	intra-channel sensor 1 : sensor 2 within 1800		MCF becomes (NR)	-	Pneumatic Shutdown
	ST/MS	Start	Start + 4.98 sec	" "	" "	MCF remains	-	Hydraulic Shutdown
		Start + 5.0 sec	end of Mainstage	" "	" "	MCF remains	-	Electrical Lockup
	S/D	Shutdown	end of Shutdown	" "	" "	MCF remains	-	report
	PS/D	Post Shutdown	end of Post Shutdown	" "	" "	MCF remains	-	report
11-103, 104, 105, 106	ST/MS	Start + 3.5 sec	Start + 4.98 sec	5000	20000	MCF remains	-	3rd sensor: Hydraulic Shutdown 4th sensor: report
		Start + 5.0 sec	end of Mainstage	5000	20000	MCF remains	-	3rd sensor: Electrical Lockup 4th sensor: report

FUEL SYSTEM PURGE PRESSURE (P8)

- PURGE AND ANCILLARY MONITORING -

FID-Delim's 14-005, 006	PHASE SP	TIME		STATE	LIMITS		MCF	INHIBIT	RESPONSE
		START PSN1	FINISH end of PSN1		LOWER	UPPER			
		PSN2 (+200msec)	PSN3 + 10 sec	ON	200	425	First failure	Each failure	Inhibit engine start
		PSN3 + 10.02 sec (+200msec)	PSN3 before 57 min	OFF	-	50	First failure	Each failure	Inhibit engine start
		PSN3 + 57 min (+200msec)	PSN3 before 60 min	ON	200	425	First failure	Each failure	Inhibit engine start
		(OFF/ON cycle repeats as long as in PSN3)							
		PSN4 (+200msec)	PSN4,E/R < Start Enable	ON	200	425	First failure	Each failure	Inhibit engine start
		Start Enable + 1 sec	end of Start Prep	ON	200	425	-	-	report
	PS/D	Post Shutdown	end of Post Shutdown	OFF	-	50	-	-	report

Note: Monitoring is suspended for 200 msec when the controlling on/off function changes state. Nominal suspension times are indicated ( ) above. Actual suspensions in Start Prep depend on order of Purge Sequences.



HPFP COOLANT LINER PRESSURE (P21)

- QUALIFICATION FOR REDLINE MONITORING -

FID-Delim's 111-411, 412	PHASE SP	TIME		LIMITS		MCF First failure	INHIBIT First failure	RESPONSE Inhibit engine start
		START Start Prep	FINISH end of Start Prep	LOWER -30	UPPER 50			
	ST/MS	Start + 5.04 sec	end of Mainstage	1800	4500	First failure	-	report
11-411, 412	SP	Start Prep	end of Start Prep	-30	50	MCF becomes (NR)	Second failure	Inhibit engine start
	ST/MS	Start + 5.04 sec	end of Mainstage	1800	4500	MCF remains	-	Loss of redline monitor

- LIMIT SHUTDOWN MONITORING -  
(REDLINE MONITORING)

FID-Delim's 113-411, 412	PHASE ST/MS	TIME		LIMITS		MCF First failure	INHIBIT -	RESPONSE report
		START Start + 5.04 sec	FINISH end of Mainstage	LOWER -	UPPER variable*			
13-411, 412	ST/MS	Start + 5.04 sec	end of Mainstage	-	variable*	SLE for second failure	-	Engine Shutdown

\* Limit initialized to 4000 at Start + 5.04; then, if Pc is qualified,  
 limit = A0 + (A1 \* PcReal) + Limit Tolerance, where  
 A0 = -97.3  
 A1 = 1.1583  
 Limit tolerance = 151 psi

HPFP SHAFT SPEED (N2)

- QUALIFICATION FOR IGNITION CONFIRMATION -

FID-Delim's 111-507, 510	PHASE ST/MS	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
	Start + 1.24 sec	Start + 1.28 sec	500	12500	-	-	Engine shutdown via FID 13-001/002	
11-507, 510	ST/MS	Start + 1.24 sec	Start + 1.28 sec	500	12500	superseded by SLE	-	Engine shutdown via FID 13-001/002

- IGNITION CONFIRMATION -

FID-Delim's 13-001, 002	PHASE ST/MS	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
	Start + 1.24 sec	Start + 1.28 sec	4600	-	SLE	-	Shutdown **	

\*\* Ignition confirmation fails, causing Shutdown response if either:

- 1) a channel is qualified for at least one of the three major cycles of the monitoring period, but does not pass confirmation limits during any of the three major cycles; or
- 2) both channels are disqualified for all three major cycles of the monitoring period

HPFP VIBRATION (V1)

- QUALIFICATION FOR SHUTDOWN LIMIT MONITORING -

FID-Delimit's	PHASE	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
116-101, 102, 103, 104, 105	SP	Start Prep	end of Start Prep	-	1.5	-	-	report; requires 7 strikes
	ST/MS	Start + 5.04 sec	end of Mainstage	0.25	-	-	-	report
16-101, 102, 103	SP	Start Prep	end of Start Prep	-	1.5	Second FASCOS channel failure	Second FASCOS channel failure	Inhibit engine start; requires 7 strikes
	ST/MS	Start + 5.04 sec	end of Mainstage	0.25	-	Second FASCOS channel failure	Second FASCOS channel failure	Loss of Limit Shutdown monitor for 2 of 3 channels disqualified

Note on qualification failure reporting: delimiters 101,102,103 represent channels A, B, and C respectively. Delim's 104 and 105 represent the separate 'CA' and 'CB' sensor inputs that, combined, constitute channel C. Delim 103 is only reported when the second of inputs 'CA' and 'CB' is disqualified. FID 16 indicates the second (entire) FASCOS channel disqualified. If both 'CA' and 'CB' are disqualified, only one FASCOS channel, channel C, is disqualified.

- SHUTDOWN LIMIT MONITORING -

FID-Delimit's	PHASE	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
117-101, 102, 103	ST/MS	Start + 5.04 sec	end of Mainstage	-	16.0	First failure	-	report; requires 5 strikes
17-101, 102, 103	ST/MS	Start + 5.04 sec	end of Mainstage	-	16.0	SLE for shutdown conditions	-	Engine Shutdown when all qualified FASCOS channels exceed limits, and FASCOS Monitor Only option is False; requires 5 strikes

HPFT DISCHARGE TEMPERATURE (T1)  
(page 1 of 2)

- QUALIFICATION FOR REDLINE MONITORING -

FID-DeLim's	PHASE	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
111-407, 410	SP	Start Prep	end of Start prep	420	600	First failure	First failure	Inhibit engine start
	ST/MS	Start + 5.04 sec	Start + 5.78 sec	810	2650	First failure	-	report
	ST/MS	Start + 5.8 sec	end of Mainstage	variable*	2650	First failure	-	report
11-407, 410	SP	Start Prep	end of Start Prep	420	600	MCF becomes (NR)	Second failure	Inhibit engine start
	ST/MS	Start + 5.04 sec	Start + 5.78 sec	810	2650	MCF remains	-	Loss of redline monitor
	ST/MS	Start + 5.8 sec	end of Mainstage	variable*	2650	MCF remains	-	Loss of redline monitor

\* Lower limit calculated every cycle beginning Start + 5.8:  
 $\text{limit} = (\text{slope}) * (\text{Pc Ref}) + (\text{offset})$   
 where  $\text{slope} = 0.1421$  (Channel A) or  $0.1809$  (Channel B)  
 and  $\text{offset} = (\text{channel average}) - (\text{slope}) * (\text{Pc Ref}) - (\text{delta})$   
 where channel average calculated from 32 samples from 5.00 to 5.62  
 and  $\text{delta} = 100$   
 if the calculated limit is less than 810, or if power level is less than 65% RPL,  
 then the limit is set to 810

HPFT DISCHARGE TEMPERATURE (T1)  
(page 2 of 2)

- LIMIT SHUTDOWN MONITORING -  
(REDLINE MONITORING)

FID-Delim's 113-407, 410	PHASE ST/MS	TIME		LIMITS		MCF	RESPONSE
		START	FINISH	LOWER	UPPER		
		Start + 5.04 sec	Start + 5.78 sec	-	1800 (Ch A) 1820 (Ch B)	First failure	report
		Start + 5.8 sec	end of Mainstage	-	1850 (Ch A) 1960 (Ch B)	First failure	report
13-407, 410	ST/MS	Start + 5.04 sec	Start + 5.78 sec	-	1800 (Ch A) 1820 (Ch B)	SLE for second failure	Engine shutdown
		Start + 5.8 sec	end of Mainstage	-	1850 (Ch A) 1960 (Ch B)	SLE for second failure	Engine shutdown

- RVDT BLUELINE MONITORING -

FID-Delim's 15-471	PHASE ST/MS	TIME		LIMITS		MCF	RESPONSE
		START	FINISH	LOWER	UPPER		
		Start + 5.04 sec	Start + 5.78 sec	-	1750 (Ch A) 1770 (Ch B)	MCF remains	All qualified channels outside limits (single strike) after RVDT miscompare cause Actuator switchover
		Start + 5.8 sec	end of Mainstage	-	1800 (Ch A) 1910 (Ch B)	MCF remains	same as above

- QUALIFICATION FOR REDLINE MONITORING -

FID-Delim's	PHASE	TIME	LIMITS		MCF	INHIBIT	RESPONSE
			LOWER	UPPER			
111-401, 402	SP	START Start Prep	0	650	First failure	First failure	Inhibit engine start
	ST/MS	Start	0	650	First failure	-	report
11-401, 402	SP	START Start Prep	0	650	MCF becomes (NR)	Second failure	Inhibit engine start
	ST/MS	Start	0	650	MCF remains	-	Loss of redline monitor

- LIMIT SHUTDOWN MONITORING -  
(REDLINE MONITORING)

FID-Delim's	PHASE	TIME	LIMITS		MCF	INHIBIT	RESPONSE
			LOWER	UPPER			
113-401, 402	ST/MS	START Start	170	-	First failure	-	report
	ST/MS	Start	170	-	SLE for second failure	-	Engine Shutdown; de-energize Emergency Shutdown Control Valve on initiation of S/D

- GN2/HE PURGE MONITOR -

FID-Delim's	PHASE	TIME	LIMITS		MCF	INHIBIT	RESPONSE
			LOWER	UPPER			
14-041, 042	SP	START PSN3	100	-	-	-	report; failure requires 10 strikes
	ST/MS	Start	100	-	-	-	-

HPOP IMSL PURGE PRESSURE (P15)  
(page 2 of 2)

- PURGE AND ANCILLARY MONITORING -

FID-Delim's 14-013, 014	PHASE SP	TIME		STATE	LIMITS		MCF	INHIBIT	RESPONSE
		START PSN1	FINISH end of PSN2		LOWER	UPPER 250			
		PSN3 + 10 sec (+120sec)	end of PSN3	OFF	-	250	First failure	Each failure	Inhibit engine start
		PSN4 (+120sec)	PSN4,E/R before Start Enable	ON	175	-	First failure	Each failure	Inhibit engine start
		Start Enable + 1.0 sec	end of Start Prep	ON	175	-	First failure	Each failure	Inhibit engine start
	PS/D	Post Shutdown (+119.8sec)	end of Post Shutdown	OFF	-	250	-	-	report

Note: Monitoring is suspended for 120 sec when the controlling on/off function changes state.  
Nominal suspension times are indicated ( ) above.  
Actual suspensions in Start Prep depend on order of Purge Sequences.

- BACKDOOR PURGE MONITORING -

FID-Delim's 14-033	PHASE S/D	TIME		STATE	LIMITS		MCF	INHIBIT	RESPONSE
		START Shutdown	FINISH Shutdown +13.5 sec		LOWER 170	UPPER 600			
		Shutdown	Shutdown +13.5 sec	OFF	170	600	-	-	De-energize Emergency S/D Control Valve if S/D from Start or M/S (both channels fail)

HPOP VIBRATION (V2)

- QUALIFICATION FOR SHUTDOWN LIMIT MONITORING -

FID-Delimit's	PHASE	TIME		LIMITS			MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER				
116-201, 202, 203, 204, 205	SP	Start Prep	end of Start Prep	-	1.5	-	-	-	report; requires 7 strikes
	ST/MS	Start + 5.04 sec	end of Mainstage	0.25	-	-	-	-	report
16-201, 202, 203	SP	Start Prep	end of Start Prep	-	1.5	Second FASCOS channel failure	Second FASCOS channel failure	Second FASCOS channel failure	Inhibit engine start; requires 7 strikes
	ST/MS	Start + 5.04 sec	end of Mainstage	0.25	-	Second FASCOS channel failure	Second FASCOS channel failure	Second FASCOS channel failure	Loss of Limit Shutdown monitor for 2 of 3 channels disqualified

Note on qualification failure reporting: delimiters 201,202,203 represent channels A, B, and C respectively. Delim's 204 and 205 represent the separate 'CA' and 'CB' sensor inputs that, combined, constitute channel C. Delim 203 is only reported when the second of inputs 'CA' and 'CB' is disqualified. FID 16 indicates the second (entire) FASCOS channel disqualified. If both 'CA' and 'CB' are disqualified, only one FASCOS channel, channel C, is disqualified.

- SHUTDOWN LIMIT MONITORING -

FID-Delimit's	PHASE	TIME		LIMITS			MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER				
117-201, 202, 203	ST/MS	Start + 5.04 sec	end of Mainstage	-	11.0	First failure	First failure	-	report; requires 5 strikes
17-201, 202, 203	ST/MS	Start + 5.04 sec	end of Mainstage	-	11.0	SLE for shutdown conditions	SLE for shutdown conditions	-	Engine Shutdown when all qualified FASCOS channels exceed limits, and FASCOS Monitor Only option is False; requires 5 strikes



HPOT DISCHARGE TEMPERATURE (T2)  
(page 1 of 2)

- QUALIFICATION FOR REDLINE MONITORING -

FID-Delim's	PHASE	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
111-405, 406	SP	Start Prep	end of Start Prep	420	600	First failure	First failure	Inhibit engine start
	ST/MS	Start	end of Mainstage	150	2650	First failure	-	report
11-405, 406	SP	Start Prep	end of Start Prep	420	600	MCF becomes (NR)	Second failure	Inhibit engine start
	ST/MS	Start	end of Mainstage	150	2650	MCF remains	-	Loss of redline monitor

- LIMIT SHUTDOWN MONITORING -  
(REDLINE MONITORING)

FID-Delim's	PHASE	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
113-405, 406	ST/MS	Start + 2.3 sec	Start + 3.78 sec	-	1560	First failure	-	report
		Start + 3.8 sec	Start + 5.78 sec	720	1560	First failure	-	report
		Start + 5.8 sec	end of Mainstage	720	1760	First failure	-	report
13-405, 406	ST/MS	Start + 2.3 sec	Start + 3.78 sec	-	1560	SLE for second failure	-	Engine shutdown
		Start + 3.8 sec	Start + 5.78 sec	720	1560	SLE for second failure	-	Engine shutdown
		Start + 5.8 sec	end of Mainstage	720	1760	SLE for second failure	-	Engine shutdown

HPOT DISCHARGE TEMPERATURE (T2)  
(page 2 of 2)

- RVDY BLUELINE MONITORING -

FID-Delim's	PHASE ST/MS	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
15-401		Start + 2.3 sec	Start + 3.78 sec	-	1510	MCF remains	-	All qualified channels outside limits (single strike) after RVDY miscompare cause Actuator switchover
		Start + 3.8 sec	Start + 5.78 sec	770	1510	MCF remains	-	same as above
		Start + 5.8 sec	end of Mainstage	770	1710	MCF remains	-	same as above

- MISCELLANEOUS MONITOR -

FID-Delim's	PHASE ST/MS	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
20-001, 002		Start + 3.8 sec	end of Mainstage	810	-	First failure	-	report

HPOT SECONDARY SEAL CAVITY PRESSURE (P16)

- QUALIFICATION FOR REDLINE MONITORING -

FID-Delim's 111-403, 404	PHASE SP	START PSN1	FINISH end of PSN3	LIMITS		MCF First failure	INHIBIT First failure	RESPONSE Inhibit engine start
				LOWER 4	UPPER 20			
	SP	PSN4	PSN4 + 9.98 sec	-		First failure	First failure	Inhibit engine start
	SP	PSN4 + 10.0	end of Start Prep	20		First failure	First failure	Inhibit engine start
	ST/MS	Start	end of Mainstage	300		First failure	-	report
11-403, 404	SP	PSN1	end of PSN3	20		MCF becomes (NR)	Second failure	Inhibit engine start
	SP	PSN4	PSN4 + 9.98 sec	-		MCF becomes (NR)	Second failure	Inhibit engine start
	SP	PSN4 + 10.0	end of Start Prep	20		MCF becomes (NR)	Second failure	Inhibit engine start
	ST/MS	Start	end of Mainstage	300		MCF remains	-	Loss of redline monitor

- LIMIT SHUTDOWN MONITORING -  
(REDLINE MONITORING)

FID-Delim's 113-403, 404	PHASE ST/MS	START Start	FINISH end of Mainstage	LIMITS		MCF First failure	INHIBIT -	RESPONSE report
				LOWER -	UPPER 100			
13-403, 404	ST/MS	Start	end of Mainstage	100		SLE for second failure	-	Engine Shutdown

HYDRAULIC SYSTEM PRESSURE (P12)

- PURGE AND ANCILLARY MONITORING -

FID-Delim's	PHASE	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
none	SP	PSN3	end of PSN3	300	600	-	-	Bypass or abort Actuator Exercise Sequence (Dither)

LFPF DISCHARGE PRESSURE (P1)

- QUALIFICATION -

FID-Delim's 111-301, 302	PHASE SP	TIME START Start Prep	FINISH PSN4, E/R before Start Enable	LIMITS		MCF First failure	INHIBIT First failure	RESPONSE Inhibit engine start
				LOWER 0	UPPER 61			
	ST/MS	Start + 3.5 sec	end of Mainstage	140	300	-	-	report
11-301, 302	SP	Start Prep	PSN4, E/R before Start Enable	0	61	Second failure (NR)	Second failure	Inhibit engine start
	ST/MS	Start + 3.5 sec	end of Mainstage	140	300	Second failure	-	Fixed Density

- ENGINE READY -

FID-Delim's 12-001, 002	PHASE SP	TIME START PSN4 + 10 sec	FINISH PSN4, E/R before Start Enable	LIMITS		MCF First failure	INHIBIT Each failure	RESPONSE Inhibit engine start *
				LOWER 47	UPPER 61			

\* FID and Inhibit occur when either:

- 1) Engine Ready has been obtained and sensor exceeds limits for 1 continuous second; or
- 2) Engine Ready has not been obtained, Start Enable is commanded, and sensor is currently outside limits

LFPF DISCHARGE TEMPERATURE (T3)

- QUALIFICATION -

FID-Delim's 111-303, 304	PHASE SP	TIME START PSN4	FINISH PSN4, E/R before Start Enable	LIMITS		MCF First failure	INHIBIT First failure	RESPONSE Inhibit engine start
				LOWER 35	UPPER 45			
	ST/MS	Start + 3.5 sec	end of Mainstage	40	45	-	-	report
11-303, 304	SP	PSN4	PSN4, E/R before Start Enable	35	45	Second failure (NR)	Second failure	Inhibit engine start
	ST/MS	Start + 3.5 sec	end of Mainstage	40	45	Second failure	-	Fixed Density

- ENGINE READY -

FID-Delim's 12-003, 004	PHASE SP	TIME START PSN4 + 10 sec	FINISH PSN4, E/R before Start Enable	LIMITS		MCF First failure	INHIBIT Each failure	RESPONSE Inhibit engine start
				LOWER 37	UPPER 42			
								*

\* FID and Inhibit occur when either:

- 1) Engine Ready has been obtained and sensor exceeds limits for 1 continuous second; or
- 2) Engine Ready has not been obtained, Start Enable is commanded, and sensor is currently outside limits

LPOP DISCHARGE PRESSURE (P4)

- ENGINE READY MONITORING -

FID-Delim's 12-007, 010	PHASE SP	TIME		LIMITS		MCF First failure	INHIBIT Each failure	RESPONSE Inhibit engine start *
		START PSN4 + 10 sec	FINISH PSN4, E/R before Start Enable	LOWER 95	UPPER -			

\* FID and Inhibit occur when either:

- 1) Engine Ready has been obtained and sensor exceeds limits for 1 continuous second; or
- 2) Engine Ready has not been obtained, Start Enable is commanded, and sensor is currently outside limits

MCC LOX Dome Temperature (T9A)

- MONITOR -

<u>FID-Delim's</u>	<u>PHASE</u>	<u>TIME</u>	<u>LOWER</u>	<u>UPPER</u>	<u>MCF</u>	<u>INHIBIT</u>	<u>RESPONSE</u>
14-052	SP	<u>START</u> PSN3	400	-	-	-	report
		<u>FINISH</u> PSN4,E/R before Start Enable					



MCC Pressure (P9)  
(page 1 of 4)

- QUALIFICATION FOR CONTROL -

FID-DeLim's 111-201, 202	PHASE SP	TIME START Start Prep	FINISH end of Start Prep	LIMITS		MCF First failure	INHIBIT First failure	RESPONSE Inhibit engine start
				LOWER intra-channel sensor 1 : sensor 2 within 75	UPPER			
111-203, 204	ST/MS	Start	end of Mainstage	"	"	First failure	-	report
	S/D	Shutdown	end of Shutdown	"	"	First failure	-	report
	PS/D	Post Shutdown	end of Post Shutdown	"	"	First failure	-	report
111-203, 204	SP	PSN4	end of Start Prep	0	37	First failure	First failure	Inhibit engine start
	ST/MS	Start + 2.1 sec	Start + 2.4 sec	Pc Ref	-	First failure	-	report
		Start + 2.42 sec	Start + 4.98 sec	Pc Ref -600	Pc Ref +350	First failure	-	report
	Mainstage	end of Mainstage		Pc Ref -delta	Pc Ref +delta	First failure	-	report

where:

delta = 200, if commanded power level <= 75%  
 delta = 200, during throttling and 50 major cycles thereafter  
 delta = 200, for 50 major cycles after Major Cycle Restart  
 delta = 75 , otherwise

- QUALIFICATION FOR CONTROL -

FID-Delim's	PHASE	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
11-201, 202	SP	Start Prep	end of Start Prep	intra-channel sensor 1 : sensor 2 within 75		MCF becomes (NR)	-	Pneumatic Shutdown
	ST/MS	Start	Start + 4.98 sec	"	"	MCF remains	-	Shutdown for second failure
		Start + 5.0 sec	end of Mainstage	"	"	MCF remains	-	Electrical Lockup; Fid 20-004 monitor begins for VDT report
	S/D	Shutdown	end of Shutdown	"	"	MCF remains	-	report
	PS/D	Post Shutdown	end of Post Shutdown	"	"	MCF remains	-	report
11-203, 204	SP	PSN4	end of Start Prep	0	37	MCF becomes (NR)	-	Pneumatic Shutdown
	ST/MS	Start + 2.1 sec	Start + 2.4 sec	Pc Ref	-	MCF remains	-	Shutdown for second failure
		Start + 2.42	Start + 4.98 sec	Pc Ref -600	Pc Ref +350	MCF remains	-	Shutdown for second failure
		Mainstage	end of Mainstage	Pc Ref -delta	Pc Ref +delta	MCF remains	-	Electrical Lockup; Fid 20-004 monitor begins for VDT report

where:  
delta = 200, if commanded power level <= 75%  
delta = 200, during throttling and 50 major cycles thereafter  
delta = 200, for 50 major cycles after Major Cycle Restart  
delta = 75 , otherwise

- QUALIFICATION FOR REDLINE MONITORING -

FID-Delim's	PHASE ST/MS	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
111-415, 416	ST/MS	Start + 5.04 sec	end of Mainstage	1000	3500	First failure	-	report
111-417, 420	ST/MS	Start + 5.04 sec	end of Mainstage	intra-channel sensor 1 : sensor 2 within 125		First failure	-	report
11-415, 416	ST/MS	Start + 5.04 sec	end of Mainstage	1000	3500	MCF remains	-	Loss of redline monitor
11-417, 420	ST/MS	Start + 5.04 sec	end of Mainstage	intra-channel sensor 1 : sensor 2 within 125		MCF remains	-	Loss of redline monitor

- IGNITION CONFIRMATION -

FID-Delim's	PHASE ST/MS	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
13-003, 004	ST/MS	Start + 1.7 sec	Start + 1.74 sec	290	-	SLE	-	Shutdown **
13-005, 006	ST/MS	Start + 2.3 sec	Start + 2.34 sec	610	1000	SLE	-	Shutdown **

\*\* Ignition confirmation fails, causing Shutdown response if either:

- 1) a channel is qualified for at least one of the three major cycles of the monitoring period, but does not pass confirmation limits during any of the three major cycles; or
- 2) both channels are disqualified for all three major cycles of the monitoring period

A channel is qualified according to the Qualification for Control tests in effect at the time; the intra-channel test at 1.7 seconds (FID 111/11 delim's 201,202); both this test and the Pc Ref comparison test (FID 111/11 delim's 203,204) at 2.3 seconds.

- LIMIT SHUTDOWN MONITORING -  
(REDLINE MONITORING)

FID-Delim's	PHASE ST/MS	TIME START Start + 5.04 sec	FINISH end of Mainstage	LIMITS		MCF First failure	INHIBIT -	RESPONSE report
				LOWER Pc Ref -400	UPPER -			
113-415, 416	ST/MS	Start + 5.04 sec	end of Mainstage	Pc Ref -400	-	SLE for second failure	-	Engine Shutdown

- QUALIFICATION FOR VDT REPORTING -

FID-Delim's	PHASE MS	TIME START after both MCC Pc channels disqualified	FINISH MCC Pc	LIMITS		MCF -	INHIBIT -	RESPONSE non-failed sensors are averaged for VDT reporting; when all sensors fail Pc Ref is reported in VDT; FID is reported only in Mainstage
				LOWER 1000	UPPER 3500			
20-004	MS	Start + 5.04 sec	end of Mainstage	Pc Ref -400	-	SLE for second failure	-	Engine Shutdown

MFV HYDRAULIC TEMPERATURE (T8)

- ENGINE READY MONITORING -

FID-Delim's 12-017, 020	PHASE SP	TIME START PSN4 + 10 sec	FINISH PSN4, E/R before Start Enable	LIMITS		MCF First failure	INHIBIT Each failure	RESPONSE Inhibit engine start *
				LOWER 490	UPPER -			

\* FID and Inhibit occur when either:

- 1) Engine Ready has been obtained and sensor exceeds limits for 1 continuous second; or
- 2) Engine Ready has not been obtained, Start Enable is commanded, and sensor is currently outside limits

- PURGE AND ANCILLARY MONITORING -

FID-Delim's 14-011, 012	PHASE SP	TIME START Start Prep	FINISH PSN4, E/R before Start Enable	PS/D Post Shutdown	LIMITS		MCF First failure	INHIBIT Each failure	RESPONSE Inhibit engine start
					LOWER 460	UPPER -			
		Start Enable + 1 sec	end of Start Prep		460	-	-	-	report
		Post Shutdown	end of Post Shutdown		460	-	-	-	report

MOV HYDRAULIC TEMPERATURE (T7)

- ENGINE READY MONITORING -

FID-Delim's 12-015, 016	PHASE SP	TIME START PSN4 + 10 sec	FINISH PSN4, E/R before Start Enable	LIMITS		MCF First failure	INHIBIT Each failure	RESPONSE Inhibit engine start *
				LOWER 490	UPPER -			

\* FID and Inhibit occur when either:

- 1) Engine Ready has been obtained and sensor exceeds limits for 1 continuous second; or
- 2) Engine Ready has not been obtained, Start Enable is commanded, and sensor is currently outside limits

- PURGE AND ANCILLARY MONITORING -

FID-Delim's 14-007, 010	PHASE SP	TIME START Start Prep	FINISH PSN4, E/R before Start Enable	PS/D	Post Shutdown	LIMITS		MCF First failure	INHIBIT Each failure	RESPONSE Inhibit engine start
						LOWER 450	UPPER -			
		Start Enable + 1 sec	end of Start Prep			450	-	-	-	report
		Post Shutdown	end of Post Shutdown			450	-	-	-	report

OPOV COMMAND

- MONITOR FOR THRUST LIMITING -

<p><u>FID-Delim's</u> 20-003</p>	<p><u>PHASE</u> ST/MS</p>	<p><u>TIME</u> <u>START</u> Mainstage</p>	<p><u>FINISH</u> end of Mainstage</p>	<p><u>LIMITS</u> <u>LOWER</u> OPOV Command &lt;= OPOV Command Limit</p>	<p><u>UPPER</u> OPOV Command &lt;= OPOV Command Limit</p>	<p><u>MCF</u> First failure</p>	<p><u>INHIBIT</u> -</p>	<p><u>RESPONSE</u> Set OPOV command to Command Limit when command exceeds Limit</p>
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FOGO PRECHARGE PRESSURE (P18)  
(page 1 of 3)

- PURGE AND ANCILLARY MONITORING -

FID-Delim's 14-001, 002	PHASE SP	TIME START	FINISH PSN4,E/R before Start Enable	STATE	LIMITS		MCF First failure (NR for second)	INHIBIT Each failure	RESPONSE Inhibit engine start
					LOWER	UPPER			
		Start Prep		OFF	0	1425			
		Start Enable (+120msec)	Start Enable + 440 msec	ON	600	-	First failure (NR for second)	Each failure	Inhibit engine start
		Start Enable + 440 msec (+200msec)	end of Start Prep	OFF	0	150	First failure (NR for second)	Each failure	Inhibit engine start
	Start	Start + 2.4 sec (+120msec)	Start + 4.4 sec	ON	600	-	First failure (NR)	-	report
	S/D	Shutdown + 0.02 sec (+120msec)	Shutdown + 4.0 sec	ON	600	-	Second failure (NR)	-	report
	PS/D	Post Shutdown	end of Post S/D	OFF	-	1425	Second failure (NR)	-	report

Note: Monitoring is suspended for 200 msec (at Start Enable + 440 msec) or 120 msec (otherwise) when the controlling on/off function changes state.  
Nominal suspension times are indicated ( ) above.  
Actual suspensions in Start Prep depend on order of Purge Sequences.

-- This parameter is not monitored by this test during Start, Mainstage, or Shutdown when in the OFF state.



POGO PRECHARGE PRESSURE (P18)  
(page 2 of 3)

- QUALIFICATION FOR POGO GOX FLOW CHECK -

FID-Delim's	PHASE ST/MS	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
111-601, 602		Start + 4.94 sec	Start + 4.98 sec	0	1600	-	-	report
11-601, 602	ST/MS	Start + 4.94 sec	Start + 4.98 sec	0	1600	Second failure	-	report

- POGO GOX FLOW CHECK -

FID-Delim's	PHASE ST/MS	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
14-025, 026		Start + 4.94 sec	Start + 4.98 sec	800	1425	First failure	-	report

- BACKDOOR PURGE MONITORING -

FID-Delim's	PHASE S/D	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
14-030		Shutdown + 0.12 sec	Shutdown + 4.0 sec	600	1500	-	-	De-energize Emergency Shutdown Control Valve if S/D from Mainstage (both channels fail)

POGO PRECHARGE PRESSURE (P18)  
(page 3 of 3)

- QUALIFICATION FOR PURGE AND ANCILLARY MONITOR -

FID-Delim's 111-701, 702	PHASE SP	TIME		LIMITS		MCF First failure	INHIBIT First failure	RESPONSE Inhibit engine start
		START Start Prep	FINISH end of Start Prep	LOWER 0	UPPER 1600			
	ST	Start + 2.4 sec	Start + 4.4 sec	0	1600	-	-	report
	SD	Shutdown + 0.02 sec	Shutdown + 4.0 sec	0	1600	-	-	report
11-701, 702	SP	Start Prep	end of Start Prep	0	1600	Second failure becomes NR	Second failure	Inhibit engine start
	ST	Start + 2.4 sec	Start + 4.4 sec	0	1600	Second failure (NR)	-	report
	SD	Shutdown + 0.02 sec	Shutdown + 4.0 sec	0	1600	Second failure (NR)	-	report

Note: Suspension of monitoring  
when controlling function changes  
state does not occur for this  
qualification monitor

POGO RIV POSITION (RIV)

- PURGE AND ANCILLARY MONITORING -

FID-DeLim's 14-021	PHASE SP	TIME START PSN1	FINISH end of PSN2	STATE	LIMITS		MCF First failure	INHIBIT First failure	RESPONSE Inhibit engine start
					LOWER 80	UPPER -			
		PSN3 (+2 sec)	PSN4,E/R before Start Enable	OFF	-	20	First failure	First failure	Inhibit engine start
		Start Enable (+2 sec)	end of Start Prep	ON	80	-	First failure	First failure	Inhibit engine start
	PS/D	Post Shutdown (+2 sec)	end of Post Shutdown	OFF	-	20	-	-	report

Note: Monitoring is suspended for 2000 msec when the controlling on/off function changes state. Nominal suspension times are indicated ( ) above. Actual suspensions in Start Prep depend on order of Purge Sequences.

**PREBURNER PUMP DISCHARGE TEMPERATURE (T4)  
(HPOTP BOOST STAGE DISCHARGE TEMPERATURE)**

- ENGINE READY MONITORING -

FID-DeLim's 12-005, 006	PHASE SP	START PSN4 + 10 sec	FINISH PSN4, E/R before Start Enable	LIMITS		MCF First failure	INHIBIT Each failure	RESPONSE Inhibit engine start *
				LOWER -	UPPER 186.5			

\* FID and Inhibit occur when either:

- 1) Engine Ready has been obtained and sensor exceeds limits for 1 continuous second; or
- 2) Engine Ready has not been obtained, Start Enable is commanded, and sensor is currently outside limits

- SENSOR INTEGRITY MONITOR -

FID-DeLim's 11-620	PHASE SP	START PSN4	FINISH end of Start Prep	LIMITS		MCF First failure	INHIBIT First failure	RESPONSE report when both sensors exceed limits
				LOWER -	UPPER 220			
	ST/MS	Start	end of Mainstage	-	220	First failure	-	report when both sensors exceed limits

**PREBURNER SHUTDOWN PURGE PRESSURE (FUEL, OXIDIZER) (P13, P19)**  
(page 1 of 2)

- QUALIFICATION FOR REDLINE MONITORING -

FID-Delim's	PHASE SP	TIME START PSN1	FINISH end of PSN2	LIMITS		MCF First failure	INHIBIT First failure	RESPONSE Inhibit engine start
				LOWER	UPPER			
111-413, 414	PSN4, E/R before Start Enable	PSN3 + 1 sec		Fuel	160	First failure	First failure	Inhibit engine start
				Ox	535			
	ST/MS	Start	Start + 2.28 sec	Fuel	1200	-	-	report
				Ox	1200			
11-413, 414	SP	PSN1	end of PSN2	Fuel	160	MCF becomes (NR)	Second failure	Inhibit engine start
				Ox	535			
	ST/MS	PSN3 + 1 sec	PSN4, E/R before Start Enable	Fuel	160	MCF becomes (NR)	Second failure	Inhibit engine start
				Ox	535			
	ST/MS	Start	Start + 2.28 sec	Fuel	1200	MCF (NR) for second failure	-	Engine Shutdown when both sensors disqualified
				Ox	1200			

- ENGINE READY -

FID-Delim's	PHASE SP	TIME START PSN4 + 10 sec	FINISH PSN4, E/R before Start Enable	LIMITS		MCF First failure	INHIBIT Each failure	RESPONSE Inhibit engine start *
				LOWER	UPPER			
12-013, 014				-	50			

\* FID and Inhibit occur when either:

- 1) Engine Ready has been obtained and sensor exceeds limits for 1 continuous second; or
- 2) Engine Ready has not been obtained, Start Enable is commanded, and sensor is currently outside limits

PREBURNER SHUTDOWN PURGE PRESSURE (FUEL, OXIDIZER) (P13, P19)  
 (page 2 of 2)

- LIMIT SHUTDOWN MONITORING -  
 (REDLINE MONITORING)

FID-Delim's 13-413, 414	PHASE ST/MS	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
		Start	Start + 2.28 sec	0	50	SLE for first failure	-	Engine shutdown for either parameter

- BACKDOOR PURGE MONITORING -

FID-Delim's 14-031	PHASE S/D	TIME		LIMITS		MCF	INHIBIT	RESPONSE
		START	FINISH	LOWER	UPPER			
		Shutdown + 2.0 sec	Shutdown + 13.5 sec	300	1500	-	-	De-energize Emergency Shutdown Control Valve if S/D from Mainstage (both pressures must fail)

**ON/OFF TIMES**  
(page 1 of 4)

Indications show when the controlling devices are commanded on or off. When no command is issued during a particular phase or mode, the state remains as last commanded.

All devices are commanded OFF at Post Shutdown Standby, Post Shutdown Terminate Sequence, and (except for Bleed Valve solenoids) Post Shutdown Oxidizer Dump.

FUNCTION	PHASE	TIME		COMMENTS
		ON	OFF	
Bleed Valve solenoids	SP	-	PSN1	Pogo RIV is keyed inversely off the Bleed Valve solenoids; closed when bleed valves are open, and vice versa
		-	PSN2	
		PSN3	-	
		PSN4	-	
		-	Start Enable	Start Enable
		-	Start Enable terminated	-
		PSN4	rollback	-
	ST/MS	-	-	-
	S/D	-	-	-
	Pne S/D	-	0.0 sec	-
	PS/D	PSD SB otherwise	PSD SB from TS	Turned OFF at Post Shutdown Standby if entered by Terminate Sequence Command; otherwise (e.g. entered from Shutdown), turned ON
Emergency Shutdown solenoids	SP	-	PSN1	Pressure is ON when function commanded OFF, and vice versa
		-	PSN2	
		-	PSN3	
		PSN4	-	
	ST/MS	-	-	-
	S/D	-	0.0 sec	Off upon entry to Shutdown only if HPOP IMSL Purge Pr was Shutdown Limit Exceeded in Start or Mainstage Otherwise
	Pne S/D	-	13.5 sec	
	PS/D	-	0.0 sec	
		-	0.0 sec	

**ON/OFF TIMES**  
(page 2 of 4)

FUNCTION	PHASE	TIME		COMMENTS
		ON	OFF	
Fuel System Purge solenoids	SP	-	PSN1	
		PSN2	-	
		PSN3	-	
		-	PSN3 + 10 sec	
		PSN3 + 57 min	-	
		-	PSN3 + 60 min	
		PSN4	-	
		ST/MS	-	0.0 sec
		S/D	-	-
		Pne S/D	-	0.0 sec
HPOP IMSL Purge solenoids	SP	-	PSN1 PSN2	
		PSN3	-	
		-	PSN3 + 10 sec	
		PSN4	-	
		ST/MS	-	-
		S/D	-	16.0 sec
		Pne S/D	-	0.0 sec
		PS/D	-	0.0 sec

While in Purge Sequence Number 3, activation repeats at the rate of 3 minutes out of every 60 minutes



ON/OFF TIMES  
(page 3 of 4)

FUNCTION	TIME		COMMENTS
	PHASE	ON	
Pogo Precharge solenoids	SP	-	PSN1
		-	PSN2
		-	PSN3
		-	PSN4
	Start	-	
	Enable	-	
	-	-	Start Enable + 0.44 sec
	-	-	Start Enable terminated
	-	-	PSN4 rollback
	ST/MS	2.4 sec	-
	-	-	4.4 sec
	S/D	0.02 sec	-
	-	-	Energized at Shutdown + 0.02 sec only if Thrust Buildup was attained
	-	-	4.0 sec
	Pne S/D	-	0.0 sec
	PS/D	-	0.0 sec
Pogo RIV	see Bleed Valve solenoids		
Preburner S/D Purge solenoids	SP	-	PSN1
		-	PSN2
		-	PSN3
		-	PSN4
	ST/MS	-	-
	S/D	f(PL)	-
	-	-	15.0 sec
	Pne S/D	-	0.0 sec
	PS/D	-	0.0 sec

Function of Power Level and previous phase:  
 if S/D from before Start + 2 sec, activate at Start + 2.0 sec;  
 if S/D from Mainstage, activate at 1.8 sec from S/D time;  
 otherwise compute activation time as linear function of  
 power level at Shutdown: 1.8 sec for 65%, 2.2 sec for 100%

FUNCTION	PHASE	TIME		COMMENTS
		ON	OFF	
Failsafe servo- switches	SP	-	PSN1	
	-	-	PSN2	
	-	-	PSN3 + 1.0 sec	
	PSN3 + 57 min	PSN3 + 60 min		Individual failsafe servoswitches are briefly activated and deactivated during the Actuator Exercise Sequence as long as Purge Sequence Number 3 is in effect
	PSN4 + .02 sec	-		
	ST/MS	-	-	
	SD	-	15.5 sec	
	Pne S/D	-	0.0 sec	
	PS/D	-	0.0 sec	
	PS/D, TermSeq	0.0 sec	-	If no previous failure disqualifying actuators 0.64 sec
	PS/D, OxDump	0.08 sec	-	Only the MOV Failsafe is energized
Igniters	SP	-	PSN1 PSN2 PSN3 PSN4	
	ST/MS	0.0 sec	-	
	S/D	-	4.4 sec	
	Pne S/D	-	0.0 sec	
	PS/D	-	0.0 sec	



Sensor Monitoring Graphic Charts, Page 1 of 5

Ck/O	PSN1	PSN2	PSN3	PSN4	ER	STEN	Start, Mainstage	S/D	PSD	Delims A,B	LIMITS LL..UL
<b>AFV Pos</b>											
Ig Conf Qual:							2.3			505,506	-10..40 or 60..110
Ig Conf:							13			007,010	80..
P&A off:	1414141414141414141414141414141414					1.0			14..	015,016	.10
(on n/a)											
<b>Bleed V Pos (Fuel, Ox)</b>											
P&A on:									14..	017,020	F8 80..
P&A off:	1414141414141414141414141414141414									017,020	.20
<b>ENSD Pr</b>											
E/R:										011,012	F4 ..50
P&A off:						1212				023,024	600..900
P&A on:										023,024	.50
P&A on:										023,024	.600 900..
<b>Fuel Flow</b>											
qual:											
intra-ch:							3.5			101,102	F0 :1800
sensor qual:										103,104, 5000..20000	
inter-ch:										105,106	
										100	:1800
<b>Fuel System</b>											
Purge Pr											
P&A on:							10.02, then dither			005,006	F5 200..425
P&A off:	1414141414141414141414141414141414								14..	005,006	.50





Sensor Monitoring Graphic Charts, Page 4 of 5

	Ck/O	PSN1	PSN2	PSN3	PSN4	ER	STEN	Start, Mainstage	S/D	PSD
Hyd Sys Pr										
dither qual:										
LPFP Disch Pr										
qual:										
qual:										
E/R:										
LPFP Disch Temp										
qual:										
qual:										
E/R:										
LPOP Disch Pr										
E/R:										
MCC Lox Dome Temp										
monitor:										
MCC Pc										
intra-ch:										
reasonable:										
Pc Ref:										
Pc Ref:										
Pc Ref:										
Ig Conf:										
Ig Conf:										
Redline Qual:										
Redline Qual:										
Redline:										
qual for VDT:										

Delims  
A,B  
no FID  
LIMITS  
LL..UL  
F2  
300..600

F6  
301,302  
"  
001,002  
LIMITS  
F6  
0..61  
140..300  
47..61

F9  
303,304  
"  
003,004  
LIMITS  
F9  
35..45  
40..45  
37..42

F5  
007,010  
LIMITS  
F5  
95..

F5  
052  
LIMITS  
F5  
400..

F3  
201,202  
203,204  
LIMITS  
F3  
:75  
0..37

PcRef..  
203,204  
LIMITS  
PcRef..  
-600..+350  
of PcRef  
+-75 or 200  
of PcRef  
290..

203,204  
203,204  
003,004  
005,006  
LIMITS  
PcRef..  
-600..+350  
of PcRef  
+-75 or 200  
of PcRef  
290..

610..1000  
417,420  
415,416  
415,416  
LIMITS  
PcRef..  
610..1000  
:125  
1000..3500  
PcRef-400..

004  
1000..3500  
LIMITS  
PcRef..  
610..1000  
:125  
1000..3500  
PcRef-400..







FAILURE REPORTING AND RESPONSE

Table Header Abbreviations

<u>Acronym</u>	<u>Definition</u>
C/O	Checkout phase
COMP DISQ	Component(s) disqualified in response to the failure.
DELIM	Failure Delimiter is the 9 least significant bits of the Failure Identification Word. The delimiter is used to uniquely identify a type of FID. DELIM is an octal number.
ESW	Engine Status Word. It is the Vehicle Data Table Word number 3.
ID	Failure ID (FID) which is the 7 most significant bits of the Failure Identification Word. The FID identifies a type of failure. FID is an octal number.
SP	Start Preparation phase.
ST	Start phase.
MS	Mainstage phase.
S/D	Shutdown phase.
PS/D	Post Shutdown phase.

Response abbreviations

-	Dash indicates no failure response is applicable in the indicated engine phase (Not monitored).
CR	Command rejection of Purge Sequence 1, 2, 3, 4, Terminate Sequence commands.
CR2	Command rejection of Purge Sequence 1, 2, 3, 4 commands.
D	Disqualification of indicated parameter(s).
D*	Disqualification for Engine Ready Monitoring.
D**	FID 5 or 6 response is taken in Shutdown Phase whether the Emergency Shutdown fail On occurs prior to Shutdown (with a FID 7 or 10 response) or during Shutdown.

Response abbreviations (Continued)

DF	Discontinue monitoring; command the function OFF. In the case of Halt Exit, the function is to the disabled state.
DM	Discontinue monitoring; do not command the function OFF.
DSD	DCU Self Disqualification. This response does not include a report of the failure.
E	Emergency Shutdown solenoid deenergized.
E*	Emergency Shutdown solenoid will be deenergized in first major cycle of shutdown, when shutdown occurs.
EL	Electrical Lockup
FD	Fixed Density
FID5	Response is found in FID 5.
FID6	Response is found in FID
FID75/FID76	Response is found in either FID 75 or FID 76 depending on an in-control DCU A or DCU B respectively.
HL	Hydraulic Lockup
I	Inhibit Control. If engine phase/mode is Engine Ready, change engine phase/mode to Purge Sequence No. 4.
I*	Inhibit Control, but remain in Current Component Checkout mode.
M	Continue monitoring for the failed ON condition; do not command the function OFF.
MF	Continue monitoring for the failed ON condition; command the function OFF.
P3	If the engine phase/mode is Purge Sequence No. 4 or Engine Ready, change engine phase/mode to Purge Sequence No. 3.
PS	Pneumatic Shutdown
R	Report only. All other failure responses include a report of the failure except DSD and the responses of FID 75/76.

Response abbreviations (Continued)

- S Hydraulic Shutdown
- T Terminate Checkout Sequence - Perform Terminate Sequence.
- TO Takeover by DCU B.

Conditional Responses Abbreviations

PS/HL If the engine phase is Start, the response is Pneumatic Shutdown. Else, the response is Hydraulic Lockup.

PS/PS If ignition has not been confirmed, the response is Pneumatic Shutdown. Else, when Shutdown occurs, perform Pneumatic Shutdown.

PS/S If in Hydraulic Lockup or RVDT comparison has failed, the response is Pneumatic Shutdown. Else, the response is Hydraulic Shutdown.

S/EL If the engine phase is Start, the response is Hydraulic Shutdown. Else, the response is Electrical Lockup.

ESW Self Test Abbreviations

MCF Major Component Failure (Resumable, reference paragraph 3.2.4:2).

MCF-I Major Component Failed - An MCF is reported only in Checkout or Start Prep and then only if I-Response is indicated. (Resumable, reference paragraph 3.2.4:2).

MCF-N Major Component Failed - not resumable.

SLE Shutdown Limit Exceeded.

Failure Parameter Usage Abbreviations

IWn Input Word, where n varies from 1 through 32.

PBD Power Bus Down Status bit.

mnemonic As defined in Table XXX, for example, Q1A1. The unscaled IE DPM value is used.

Sensor Value The value which has been scaled, as it would be reported in the normal VDT.

IW7+ Polarity IW7 bits 15-4, with the polarity of the test indicated in bits 3-0 as follows:  
%0100 = positive test, %0011 = negative test.

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE TYPE FUNCTION, DEVICE OR CHANNEL	COMP DISQ	C/O	SP	ST/MS	S/D	PS/D	ESW SELF TEST	FAILURE PARAMETER
001		DCU, Ch A (3.2.1:6.5)								
000		First DCU Failure (Reported by DCU B) DCU disqual without power loss (3.2.1:9) with no prior miscompare (DCU,OE Act, Position Sensors)	(DCU,OE Act, Position Sensors)	D+I+TO	D+I+TO	D+TO	D+TO	D+TO	MCF	IW4 Bits 2-0 +PBD in bit 3
001		DCU disqual with power loss (3.2.1:9.3.1) with no prior miscompare (DCU,IE, Sensors, OE, Act)	(Above+ Ch B Act)	D+I+TO	D+I+TO	D+TO	D+TO	D+TO	MCF	IW4 Bits 2-0 +PBD in bit 3
002		DCU disqual with power loss (3.2.1:9.3.2) with prior miscompare (DCU,IE, Sensors, OE, Act)	(Above+ Ch B Act)	D+I+TO	D+I+TO	D+TO	D+TO	D+TO	MCF	IW4 Bits 2-0 +PBD in bit 3
003		Simulated DCU/OE failure (3.2.3:2.4.3:1) with no prior miscompare (DCU,OE, Act)	(IE, OE, Sensors, Act)	D+I	D+I	D	D	D	MCF	IW4 Bits 2-0 +PBD in bit 3
002		DCU, Ch B (3.2.1:6.5) with prior miscompare (DCU,OE, Act)	(Above+ Ch B Act)	D+I+TO	D+I+TO	D+TO	D+TO	D+TO	MCF	IW4 Bits 2-0 +PBD in bit 3
000		First DCU Failure (Reported by DCU A) DCU disqual without power loss (3.2.1:9)	(DCU)	D+I	D+I	D	D	D	MCF	IW4 Bits 2-0 +PBD in bit 3
001		DCU disqual with power loss (3.2.1:9.3.1) with prior miscompare (DCU,IE, Sensors, OE, Act)	(DCU,IE, Sensors, OE, Act)	D+I	D+I	D	D	D	MCF	IW4 Bits 2-0 +PBD in bit 3
002		Power Loss after DCU disqual. (3.2.1:9.3.2) with no prior miscompare (IE, DCU, Sensors, OE, Act)	(IE, DCU, Sensors, OE, Act)	D+I	D+I	D	D	D	MCF	IW4 Bits 2-0 +PBD in bit 3
003		Simulated DCU/OE failure (3.2.3:2.4.3:1) with prior miscompare (DCU, OE, Act)	(DCU, OE, Act)	D+I	D+I	D	D	D	MCF	IW4 Bits 2-0 +PBD in bit 3

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE OR CHANNEL	COMP DISQ	RESPONSE PHASE				ESW SELF TEST	FAILURE PARAMETER	
					C/O	SP	ST/MS	S/D			PS/D
003		Input Electronics Ch A (3.2.1:6.2) (IE, Sensors, OE, Act)									
		Address/Data Bus Error (3.2.3:3.3.1)									
001		Test Word TW1A	1st IE Failure	Failure	D+I	D+I	D	D	D	MCF	TW1A
002		Test Word TW2A	2nd IE Failure	Failure	D+I+CR	D+DSD	D+DSD	D	D+PS	MCF-N	
012		Press Mux Cal 3A RC15	1st IE Failure	Failure	D+I	D+I	D	D	D	MCF	TW2A
013		Press Mux Cal 4A RC19	2nd IE Failure	Failure	D+I+CR	D+DSD	D+DSD	D	D+PS	MCF-N	RC15
201		Analog to Digital Converter (3.2.3:3.3.3)									
202		IE -10V Ref IE1A	1st IE Failure	Failure	D+I	D+I	D	D	D	MCF	IE1A
203		IE +10V Ref IE2A	2nd IE Failure	Failure	D+I+CR	D+DSD	D+DSD	D	D+PS	MCF-N	IE2A
204		Press Mux Gnd 2A RC05	1st IE Failure	Failure	D+I	D+I	D	D	D	MCF	RC05
205		Press Mux Gnd 3A RC09	2nd IE Failure	Failure	D+I+CR	D+DSD	D+DSD	D	D+PS	MCF-N	RC09
206		Press Mux Gnd 4A RC21	1st IE Failure	Failure	D+I	D+I	D	D	D	MCF	RC21
207		Press Mux Cal 1A RC03	2nd IE Failure	Failure	D+I+CR	D+DSD	D+DSD	D	D+PS	MCF-N	RC03
210		Press Mux Cal 2A RC07	1st IE Failure	Failure	D+I	D+I	D	D	D	MCF	RC07
211		Temp Mux Cal 1A RC13	2nd IE Failure	Failure	D+I+CR	D+DSD	D+DSD	D	D+PS	MCF-N	RC13
501		Temp Mux Cal 2A RC17	1st IE Failure	Failure	D+I	D+I	D	D	D	MCF	RC17
		OE Register 1 (3.2.3:3.2.3)									
		Group Switch 1 failed ON bit 9	1st IE Failure	Failure	D+I+CR	D+I	D	D	D	MCF	IWL5
		Group Switch 2 failed ON bit 8	2nd IE Failure	Failure	D+I+CR	D+DSD	D+DSD	D	D+PS	MCF-N	IWL5
		PRC Overflow failed ON bit 5									

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE OR CHANNEL	COMP DISQ (IE, Sensors, OE, Act)	RESPONSE ENGINE PHASE										ESW SELF TEST	FAILURE PARAMETER			
					C/O	SP	ST/MS	S/D	PS/D	D	D+DSD	D+PS	MCF	MCF-N					
004		Input Electronics Ch B (3.2.1:6.2)																	
		Address/Data Bus Error (3.2.3:3.3.1)																	
001		Test Word TW1B			D+I	D+I	D+I	D	D	D	D	D	D	D	D	D	MCF	MCF-N	TW1B
002		Test Word TW2B			D+I+CR	D+DSD	D+DSD	D	D+DSD	D+PS	D	D	D	D	D	D	MCF	MCF-N	TW2B
012		Press Mux Cal 3B RC14			D+I+CR	D+DSD	D+DSD	D	D+DSD	D+PS	D	D	D	D	D	D	MCF	MCF-N	RC14
013		Press Mux Cal 4B RC18			D+I+CR	D+DSD	D+DSD	D	D+DSD	D+PS	D	D	D	D	D	D	MCF	MCF-N	RC18
201		Analog to Digital Converter (3.2.3:3.3.3)																	
		IE -10V Ref IE1B			D+I	D+I	D	D	D	D	D	D	D	D	D	D	MCF	MCF-N	IE1B
202		IE +10V Ref IE2B			D+I+CR	D+DSD	D+DSD	D	D+DSD	D+PS	D	D	D	D	D	D	MCF	MCF-N	IE2B
203		Press Mux Gnd 2B RC04			D+I+CR	D+DSD	D+DSD	D	D+DSD	D+PS	D	D	D	D	D	D	MCF	MCF-N	RC04
204		Press Mux Gnd 3B RC08			D+I+CR	D+DSD	D+DSD	D	D+DSD	D+PS	D	D	D	D	D	D	MCF	MCF-N	RC08
205		Press Mux Gnd 4B RC20			D+I+CR	D+DSD	D+DSD	D	D+DSD	D+PS	D	D	D	D	D	D	MCF	MCF-N	RC20
206		Press Mux Cal 1B RC02			D+I+CR	D+DSD	D+DSD	D	D+DSD	D+PS	D	D	D	D	D	D	MCF	MCF-N	RC02
207		Press Mux Cal 2B RC06			D+I+CR	D+DSD	D+DSD	D	D+DSD	D+PS	D	D	D	D	D	D	MCF	MCF-N	RC06
210		Temp Mux Cal 1B RC12			D+I+CR	D+DSD	D+DSD	D	D+DSD	D+PS	D	D	D	D	D	D	MCF	MCF-N	RC12
211		Temp Mux Cal 2B RC16			D+I+CR	D+DSD	D+DSD	D	D+DSD	D+PS	D	D	D	D	D	D	MCF	MCF-N	RC16
501		OE Register 1 (3.2.3:3.2.3)																	
		Group Switch 1 failed ON bit 9			D+I+CR	D+I	D	D	D	D	D	D	D	D	D	D	MCF	MCF-N	IW16
		Group Switch 2 failed ON bit 8			D+I+CR	D+DSD	D+DSD	D	D+DSD	D+PS	D	D	D	D	D	D	MCF	MCF-N	IW16
		PRC Overflow failed ON bit 5			D+I+CR	D+DSD	D+DSD	D	D+DSD	D+PS	D	D	D	D	D	D	MCF	MCF-N	

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE OR CHANNEL	COMP DISQ	R E S P O N S E				ESW SELF TEST	FAILURE PARAMETER
					C/O	SP	ST/MS	S/D		
005		Output Electronics Ch A (3.2.1:6.3)		(OE,Act, Position Sensors)						
000		OE Storage Register (3.2.3:3.1.7)	1st OE Failure 2nd OE Failure	D+I D+I+CR	D+DSD D+DSD	D D	D D+PS	MCF MCF-N	IW21 Format, Failed Bits=1	
100		Hold failed bit 6 (3.2.3:3.2.3)	1st OE Failure 2nd OE Failure	D+I D+I+CR	D+DSD D+DSD	D D	D+PS D+PS	MCF MCF-N	IW15	
101		Emergency Shutdown failed ON (3.2.3:3.2.3)	1st OE Failure 2nd OE Failure	- -	- -	D** D+DSD	- -	MCF MCF-N	IW15	
102		Igniter failed ON bits 4-2 (3.2.3:3.2.3)	1st OE Failure 2nd OE Failure	D+I D+I+CR	- -	- -	- -	MCF MCF-N	IW15	
300		Act FS failed ON (3.2.3:3.2.3)	1st OE Failure 2nd OE Failure	D+I D+I+CR	D+DSD D+DSD	D D	D+PS D+PS	MCF MCF-N	IW19	
400		RVDT/LVDT Amplitude (3.2.3:3.3.4)	1st OE Failure 2nd OE Failure	D+I D+I+CR	D+DSD D+DSD	D D	D+PS D+PS	MCF MCF-N	FRVA	
401		RVDT/LVDT Frequency (3.2.3:3.3.4)	1st OE Failure 2nd OE Failure	D+I D+I+CR	D+DSD D+DSD	D D	D+PS D+PS	MCF MCF-N	TRCA	
404		Servoactuator Model/Monitor (3.2.3:3.2.4)	1st OE Failure 2nd OE Failure	D+I ***** FID75, Delimiter 031 in all phases	D D	D D	D D	MCF MCF	IW7+Polarity *****	
405		Multiple SEIs pending (3.2.3:6.1.3:1(d))	1st OE Failure 2nd OE Failure	D+I D+I+CR	D+DSD D+DSD	D D	D+PS D+PS	MCF MCF-N	IW7	
406		Different SEI pending (3.2.3:6.1.3:1(e)(2))	1st OE Failure 2nd OE Failure	D+I D+I+CR	D+DSD D+DSD	D D	D+PS D+PS	MCF MCF-N	IW7	
407		RVDT/LVDT PRC not updated (3.2.3:3.3.2:1)	1st OE Failure 2nd OE Failure	D+I D+I+CR	D+DSD D+DSD	D D	D+PS D+PS	MCF MCF-N	TRCA	



FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE OR CHANNEL	COMP DISQ		RESPONSE ENGINE PHASE			ESW SELF TEST	FAILURE PARAMETER
				(OE,Act)	(OE,Act)	C/O	SP	ST/MS		
Output Electronics Ch B										
(3.2.1:6.3)										
Position Sensors										
000		OE Storage Register (3.2.3:3.1.7)	1st OE Failure		D+I	D	D	D	MCF	IW22 Format, Failed Bits=1
100		Hold failed bit 6 (3.2.3:3.2.3)	2nd OE Failure		D+I+CR	D+DSD	D+DSD	D+PS	MCF-N	
101		Emergency Shutdown failed ON (3.2.3:3.2.3)	1st OE Failure		-	-	D**	-	MCF	IW16
102		Igniter failed ON bits 4-2 (3.2.3:3.2.3)	2nd OE Failure		-	-	D+DSD	-	MCF-N	
200		Act FO failed ON/OFF (3.2.3:3.2.3)	1st OE Failure		D+I	D	-	-	MCF	IW16
300		Act FS failed ON (3.2.3:3.2.3)	2nd OE Failure		D+I+CR	D+DSD	-	-	MCF-N	
400		RVDT/LVDT Amplitude (3.2.3:3.3.4)	1st OE Failure		D+I	D	D	D	MCF	IW18
401		RVDT/LVDT Frequency (3.2.3:3.3.4)	2nd OE Failure		D+I+CR	D+DSD	D+DSD	D+PS	MCF-N	
402,403		CIE Data MUX Reported by DCU A (3.2.3:3.2.1)	1st OE Failure		D+I	D	D	D	MCF	IW20
404		Servoactuator Model/Monitor (3.2.3:3.2.4)	2nd OE Failure		D+I+CR	D+DSD	D+DSD	D+PS	MCF-N	
404			1st OE Failure		D+I	D	D	D	MCF	FRVB
405		Multiple SEIs pending (3.2.3:6.1.3:1(d))	2nd OE Failure		D+I+CR	D+DSD	D+DSD	D+PS	MCF-N	
406		Different SEI pending (3.2.3:6.1.3:1(e)(2))	1st OE Failure		D+I	D	D	D	MCF	TRCB
407		RVDT/LVDT PRC not updated (3.2.3:3.3.2:1)	2nd OE Failure		D+I+CR	D+DSD	D+DSD	D+PS	MCF-N	
407			1st OE Failure		D+I	D	D	D	MCF	IW10, IW24
407			2nd OE Failure		D+I+CR	D+DSD	D+DSD	D+PS	MCF-N	
407			1st OE Failure		D+I	D	D	D	MCF	IW7+Polarity
407			2nd OE Failure		D+I+CR	D+DSD	D+DSD	D+PS	MCF-N	
407			1st OE Failure		D+I	D	D	D	MCF	IW7
407			2nd OE Failure		D+I+CR	D+DSD	D+DSD	D+PS	MCF-N	
407			1st OE Failure		D+I	D	D	D	MCF	IW7
407			2nd OE Failure		D+I+CR	D+DSD	D+DSD	D+PS	MCF-N	
407			1st OE Failure		D+I	D	D	D	MCF	TRCB
407			2nd OE Failure		D+I+CR	D+DSD	D+DSD	D+PS	MCF-N	

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE OR CHANNEL	COMP DISQ (N/A)	R E S P O N S E				E S W	FAILURE PARAMETER
					C/O	SP	ST/MS	S/D		
007		Output Electronics								
		Non-Disqualifying Ch A (3.2.3:3.2.3)		Command & Monitor Failed	ON/OFF					
100		Register 1								
		Bleed Valve Solenoid failed ON/OFF bit 15		DF/DF	I	I	R	R	MCF-I	IW15
		Fuel System Purge Solenoid failed ON/OFF bit 14		DF/DF	I	I	R	R	MCF-I	IW15
		Pogo Precharge Purge Solenoid failed ON/OFF bit 13		DF/DF	I	I	R	R	MCF-I	IW15
		Preburner Shutdown Purge Sol failed ON/OFF bit 12		DF/DF	I	I	R	R	MCF-I	IW15
		Emergency Shutdown Solenoid failed ON/ bit 11		DF/-	I+D**	I+D**	D**	FID5	MCF-I	IW15
		Emergency Shutdown Solenoid failed /OFF bit 11		-/MF	I	I	R	R	MCF-I	IW15
		HPOP IMSL failed ON/OFF bit 10		DF/DF	I	I	R	R	MCF	IW15
		Group 1 Switch failed /OFF bit 9		-/MF	I	-	-	-	MCF-I	IW15
		Group 2 Switch failed /OFF bit 8		-/MF	I	I	R	R	MCF-I	IW15
		DCU B Power Off Time Exceeded failed ON/ bit 7		DF/-	I	I	R	R	MCF-I	IW15
		Pull-in failed bit 6		-/MF	I	I	R	R	MCF-I	IW15
		PRC Overflow failed OFF bit 5		-/MF	I	I	R	R	MCF-I	IW15
200		Register 2								
		2Khz failed ON/OFF bit 8		DF/DM	I	I	R	R	MCF	IW17
		Halt exit failed ON/OFF bit 7		DF/DF	I	I	R	R	MCF-I	IW17
300		Register 3								
		Failsafe failed OFF bits 15-11		(HL: Both Act Chs)						
		Same Actuator:								
		1st FS Failed OFF		-/M	I	I	R	R	MCF	IW19
		2nd FS Failed OFF		-/MF	I+CR	CR+PS	PS/HL	PS	MCF	IW19

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE OR CHANNEL	COMP DISQ (N/A)	RESPONSE IN ENGINE PHASE						ESW SELF TEST	FAILURE PARAMETER	
					C/O	SP	ST/MS	S/D	PS/D				
010		Output Electronics		(N/A)									
		Non-Disqualifying Ch B (3.2.3:3.2.3)			Command & Monitor Failed ON/OFF								
100		Register 1											
		Bleed Valve Solenoid failed ON/OFF bit 15		DF/DF	I	I	R	R	R	R	MCF-I	IW16	
		Fuel System Purge Solenoid failed ON/OFF bit 14		DF/DF	I	I	R	R	R	R	MCF-I	IW16	
		Pogo Precharge Purge Solenoid failed ON/OFF bit 13		DF/DF	I	I	R	R	R	R	MCF-I	IW16	
		Preburner Shutdown Purge Sol failed ON/OFF bit 12		DF/DF	I	I	R	R	R	R	MCF-I	IW16	
		Emergency Shutdown Solenoid failed ON/ bit 11		DF/-	I+D**	I+D**	D**	FID6	R	R	MCF-I	IW16	
		Emergency Shutdown Solenoid failed /OFF bit 11		-/MF	I	I	R	R	R	R	MCF-I	IW16	
		HPOP IMSL failed ON/OFF bit 10		DF/DF	I	I	R	R	R	R	MCF	IW16	
		Group 1 Switch failed /OFF bit 9		-/MF	I	-	-	-	-	-	MCF-I	IW16	
		Group 2 Switch failed /OFF bit 8		-/MF	I	I	R	R	R	R	MCF-I	IW16	
		DCU A Power Off Time Exceeded failed ON/ bit 7		DF/-	I	I	R	R	R	R	MCF-I	IW16	
		Pull-in failed bit 6		-/MF	I	I	R	R	R	R	MCF-I	IW16	
		PRC Overflow failed OFF bit 5		-/MF	I	I	R	R	R	R	MCF-I	IW16	
200		Register 2											
		2Khz failed ON/OFF bit 8		DF/DM	I	I	R	R	R	R	MCF	IW18	
		Halt exit failed ON/OFF bit 7		DF/DF	I	I	R	R	R	R	MCF-I	IW18	
300		Register 3											
		Failsafe failed OFF bits 15-11											
		Same Actuator:											
		1st FS Failed OFF		-/M	I	I	R	R	R	R	MCF	IW20	
		2nd FS Failed OFF		-/MF	I+CR	CR+PS	PS/HL	PS	PS	PS	MCF	IW20	

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	COMP DISQ	R E S P O N S E P H A S E				ESW SELF TEST	FAILURE PARAMETER
				C/O	SP	ST/MS	S/D		
111		Sensor First Channel Disqualification (3.2.3:4.2) (Table XVII)							
		Sensor(s)							
		<b>Fuel Flowrate - Prop Drop &amp; Control</b>							
101,102		Intra-Channel Test Ch A, B	D+I	D+I	D	D	D	MCF	Delta or zero
		Sensor Qualification Limits							
103,104		Sensor A1, B1	-	-	D	-	-	MCF	Sensor Value
105,106		Sensor A2, B2	-	-	D	-	-	MCF	Sensor Value
		Pulse Rate Converter not updated (3.2.3:3.2:3)							
107,110		Sensor A1, B1	-	-	D	D	-	MCF	Q1A1/Q1B1
111,112		Sensor A2, B2	-	-	D	D	-	MCF	Q1A2/Q1B2
		<b>MCC Pc - Control &amp; Ignition Confirmation</b>							
201,202		Intra-Channel Test Ch A,B	D+I	D+I	D	D	D	MCF	Delta
203,204		Fixed Limit and Pc Ref Channel Reasonableness Tests Ch A, B	-	-	D	-	-	MCF	Channel Value
		<b>Density Parameters - Control</b>							
301,302		LPFP Discharge Press Ch A,B	-	-	D	-	-	MCF-I	Sensor Value
303,304		LPFP Discharge Temp Ch A,B	-	-	D	-	-	MCF-I	Sensor Value
		<b>Shutdown Limit Monitor Parameters</b>							
401,402		HPOP IMSL Purge Pr Ch A,B	-	-	D	-	-	MCF	Sensor Value
403,404		HPOT Sec Seal Cav Pr Ch A,B	-	-	D	-	-	MCF	Sensor Value
405,406		HPOT Disch Temp Ch A,B	-	-	D	-	-	MCF	Sensor Value
407,410		HPFT Disch Temp Ch A,B	-	-	D	-	-	MCF	Sensor Value
411,412		HPFP Coolant Liner Pr Ch A,B	-	-	D	-	-	MCF	Sensor Value
		<b>First Preburner S/D Purge Pressure:</b>							
413		Fuel	-	-	D	-	-	MCF-I	Sensor Value
414		Oxidizer	-	-	D	-	-	MCF-I	Sensor Value
		<b>MCC Pc - Shutdown Tests</b>							
415,416		Reasonableness Test Ch A, B	-	-	D	-	-	MCF	Channel Value
417,420		Intra-Channel Test Ch A, B	-	-	D	-	-	MCF	Delta
		<b>Ignition Confirmation</b>							
505,506		AFV Position Ch A, B	-	-	D	-	-	-	Sensor Value
		<b>HPFP Shaft Speed:</b>							
507,510		Qualification Limits Ch A, B	-	-	D	-	-	-	Sensor Value
511,512		PRC Ch A, B not updated (3.2.3:3.2:2)	-	-	D	-	-	-	N2A/N2B
		<b>Pogo GOX Flow Check</b>							
601,602		Pogo Precharge Pressure Ch A, B	-	-	D	-	-	-	Sensor Value
		<b>Purge and Ancillary System Monitor Parameters</b>							
701,702		Pogo Precharge Pressure Ch A, B	-	D+I	D	D	-	MCF-I	Sensor Value

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE OR CHANNEL	COMP DISQ	RESPONSE IN ENGINE PHASE				ESW SELF TEST	FAILURE PARAMETER	
					C/O	SP	ST/MS	S/D			PS/D
Sensor Second Channel Disqualification (3.2.3:4.2) (Table XVII) Sensor(s)											
<b>Fuel Flowrate Both Ch or 3 Sensors equiv.</b>											
100		Inter-Channel Test									
101,102		Intra-Channel Test Ch A, B									
Sensor Qualification Limits											
103,104		Sensor A1, B1									
105,106		Sensor A2, B2									
		3rd sensor failure									
		4th sensor failure									
Pulse Rate Converter not updated (3.2.3:3.3.2:3)											
107,110		Sensor A1, B1									
111,112		Sensor A2, B2									
		3rd sensor failure									
		4th sensor failure									
<b>MCC Pc</b>											
201,202		Intra-Channel Test Ch A,B									
203,204		Fixed Limit and Pc Ref. Channel Reasonableness Tests Ch A, B									
<b>Density Parameters</b>											
301,302		LPFP Discharge Press Ch A,B									
303,304		LPFP Discharge Temp Ch A,B									
<b>Shutdown Limit Monitor Parameters</b>											
401,402		HPOP IMSL Purge Pr Ch A,B									
403,404		HPOT Sec Seal Cav Pr Ch A,B									
405,406		HPOT Disch Temp Ch A,B									
407,410		HPFT Disch Temp Ch A,B									
411,412		HPFP Coolant Liner Pr Ch A,B									
<b>Second Preburner S/D Purge Pressure</b>											
413		Fuel									
414		Oxid									
<b>MCC Pc - Shutdown Tests</b>											
415,416		Reasonableness Test Ch A, B									
417,420		Intra-Channel Test Ch A, B									

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE		COMP DISQ	RESPONSE				ESW SELF TEST	FAILURE PARAMETER		
			OR	CHANNEL		C/O	SP	ST/MS	S/D			PS/D	
011		Sensor Second Channel Disqualification (continued)											
		(3.2.3:4.2) (Table XVII) Sensor(s)											
		<b>Ignition Confirmation</b>											
505,506		AFV Positions Ch A, B						D				MCF	Sensor Value
		HPFP Shaft Speed											
507,510		Qualification Limits Ch A, B						D				MCF	Sensor Value
511,512		Pulse Rate Converter not updated						D				MCF	N2A/N2B
		Ch A, B (3.2.3:3.3.2:2)											
		<b>Pogo GOX Flow Check</b>											
601,602		Pogo Precharge Pressure Ch A, B						D				MCF	Sensor Value
		Preburner Pump Discharge Temperature											
		Sensor Integrity Monitor											
620		Preburner Pump Discharge Temperature (3.2.3:6.8)					I	R				MCF	Either Sensor Value
		<b>Purge and Ancillary System Monitor Parameters</b>											
701,702		Pogo Precharge Pressure Ch A, B					D+I	D		D		MCF-N	Sensor Value
012		Engine Ready (3.2.3:1.2.6(b)) (N/A)											
		(3.2.3:5.1) (Table XVIII)											
001,002		LFPF Discharge Pressure A,B					I+D*	-				MCF	Sensor Value
003,004		LFPF Discharge Temperature A,B					I+D*	-				MCF	Sensor Value
005,006		Preburner Pump Discharge Temp A,B					I+D*	-				MCF	Sensor Value
007,010		LPOP Discharge Pressure A,B					I+D*	-				MCF	Sensor Value
011,012		Emergency Shutdown Pressure A,B					I+D*	-				MCF	Sensor Value
013		Fuel Preburner S/D Purge Pressure					I+D*	-				MCF	Sensor Value
014		Oxidizer Preburner S/D Purge Pressure					I+D*	-				MCF	Sensor Value
015,016		MOV Hydraulic Temperature A,B					I+D*	-				MCF	Sensor Value
017,020		MFV Hydraulic Temperature A,B					I+D*	-				MCF	Sensor Value

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE	COMP DISQ (N/A)	R E S P O N S E				ESW SELF TEST	FAILURE PARAMETER	
					C/O	SP	ST/MS	S/D			PS/D
113		Shutdown Limit Monitor (3.2.3:5.3, Table XX)									
<b>Limit exceeded on all qualified Channels with Limit Control Inhibited</b>											
401,402		HPOP IMSL Purge Press Ch A,B								SLE	Sensor Value
403,404		HPOP Sec Seal Cav Press Ch A,B								SLE	Sensor Value
405,406		HPOP Disch Temp Ch A,B								SLE	Sensor Value
407,410		HPFT Disch Temp Ch A,B								SLE	Sensor Value
411,412		HPFP Coolant Liner Press Ch A,B								SLE	Sensor Value
413		Fuel Preburner S/D Purge Press								SLE	Sensor Value
414		Oxid Preburner S/D Purge Press								SLE	Sensor Value
415,416		MCC Pc Ch A, B								SLE	Channel Value
<b>Fewer than all qualified channels voting for shutdown</b>											
401,402		HPOP IMSL Purge Press Ch A,B								MCF	Sensor Value
403,404		HPOP Sec Seal Cav Press Ch A,B								MCF	Sensor Value
405,406		HPOP Disch Temp Ch A,B								MCF	Sensor Value
407,410		HPFT Disch Temp Ch A,B								MCF	Sensor Value
411,412		HPFP Coolant Liner Press Ch A,B								MCF	Sensor Value
415,416		MCC Pc Ch A, B								MCF	Channel Value
013		Shutdown Limit exceeded (N/A)									
<b>Ignition confirm failures (3.2.3:5.2)</b>											
001,002		HPFP Shaft Speed A,B								PS/S	Sensor Value
003,004		MCC Pc A,B at 1.7 sec								PS/S	Channel Value
005,006		MCC Pc A,B at 2.3 sec								PS/S	Channel Value
007,010		Antiflood Valve A,B								PS/S	Sensor Value
<b>Shutdown Limit Monitor Parameters (Limit Control Enabled) (3.2.3:5.3, Table XX)</b>											
401,402		HPOP IMSL Purge Pressure Ch A, B								PS/S+E*	Sensor Value
403,404		HPOP Sec Seal Cav Pr Ch A,B								PS/S	Sensor Value
405,406		HPOP Discharge Temp Ch A, B								PS/S	Sensor Value
407,410		HPFT Discharge Temp Ch A, B								PS/S	Sensor Value
411,412		HPFP Coolant Liner Pressure Ch A,B								PS/S	Sensor Value
413		Fuel Preburner S/D Purge Press								PS/S	Sensor Value
414		Oxid Preburner S/D Purge Press								PS/S	Sensor Value
415,416		MCC Pc Ch A, B								PS/S	Channel Value

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE OR CHANNEL	COMP DISQ	RESPONSE			E S W	FAILURE PARAMETER
					C/O	SP	ST/MS		
					E N G I N E P H A S E			S/D	P S / D
					Start Enabled				
					No/Yes				

Purge and Ancillary Monitor (3.2.3:6.4)  
(Table XXI)

001,002		Pogo Precharge A Ch A, B	(Sensors)	-	-	D	-	-	MCF-N	Sensor Value
		Not all Qual Ch's Failed (Start)		-	D+I/D+I	-	D	-	MCF-I	Sensor Value
		Not all Qual Ch's Failed (otherwise)		-	D+I/D+I	D	D	-	MCF-N	Sensor Value
		All Qualified Channels failed	(N/A)	-	I/R	-	R	-	MCF-I	Sensor Value
005,006		Fuel System Purge Pr Ch A,B		-	I/R	-	R	-	MCF-I	Sensor Value
007,010		MOV Hyd Temp Ch A,B		-	I/R	-	R	-	MCF-I	Sensor Value
011,012		MFV Hyd Temp Ch A,B		-	I/R	-	R	-	MCF-I	Sensor Value
013,014		HPOP IMSL Purge Pr Ch A,B		-	I/I	-	R	-	MCF-I	Sensor Value
015,016		Antiflood Valve Pos	1st Failure	-	I/R	-	R	-	MCF-I	Sensor Value
		Ch A, B	2nd Failure	-	I/I	-	R	-	MCF-I	Sensor Value
017		Fuel Bleed Valve Pos		-	I/I	-	R	-	MCF-I	Sensor Value
020		Oxidizer Bleed Valve Pos		-	I/I	-	R	-	MCF-I	Sensor Value
021		Pogo RIV Pos		-	I/I	-	R	-	MCF-I	Sensor Value
023,024		Emergency Shutdown Press Ch A, B		-	I/-	R	-	-	MCF	Sensor Value

Pogo GOX Flow Check  
(3.2.3:6.5 Table XIX)

025,026		Pogo Precharge Press Ch A, B		-	-	R	-	-	MCF	Sensor Value
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Backdoor Purge Initiation Monitoring  
(3.2.3:5.5)

030		Pogo Precharge Press		-	-	-	E	-	-	Either Sen Value
031		Oxidizer/Fuel Preburner S/D Purge Pr		-	-	-	E	-	-	Either Sen Value
033		HPOP IMSL Purge Press		-	-	-	E	-	-	Either Sen Value

GN2/He Purge Monitor (3.2.3:6.6)

041,042		HPOP IMSL Purge Pressure Ch A, B		-	R/-	-	-	-	-	Sensor Value
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MCC LOX Dome Temperature Monitor (3.2.3:6.7)

052		MCC LOX Dome Temperature		-	R/-	-	-	-	-	Sensor Value
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FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE OR CHANNEL	COMP DISQ	RESPONSE			FAILURE PARAMETER
					C/O	SP	ST/MS	
015		Actuator (3.2.1:6.4)						
		HL: Both Act Chs)						
		SEII Occurred (3.2.3:6.1.3:1, 3.2.3:6.1.4)						
011		MFV Ch A 1st Failure with no miscompare			D+I	D+I	D	MCF
		1st Failure with prior miscompare			D+I	D+PS/HL	-	MCF
		2nd Failure			D+CR+I	D+PS/HL	D+PS	MCF-N
012		MFV Ch B 1st Failure with prior miscompare			-	D+I	-	MCF
		2nd Failure			D+CR+I	D+PS/HL	D+PS	MCF-N
021		MOV Ch A 1st Failure with no miscompare			D+I	D+I	D	MCF
		1st Failure with prior miscompare			D+I	D+PS/HL	-	MCF
		2nd Failure			D+CR+I	D+PS/HL	D+PS	MCF-N
022		MOV Ch B 1st Failure with prior miscompare			-	D+I	-	MCF
		2nd Failure			D+CR+I	D+PS/HL	D+PS	MCF-N
031		CCV Ch A 1st Failure with no miscompare			D+I	D+I	D	MCF
		1st Failure with prior miscompare			D+I	D+PS/HL	-	MCF
		2nd Failure			D+CR+I	D+PS/HL	D+PS	MCF-N
032		CCV Ch B 1st Failure with prior miscompare			-	D+I	-	MCF
		2nd Failure			D+CR+I	D+PS/HL	D+PS	MCF-N
041		FPOV Ch A 1st Failure with no miscompare			D+I	D+I	D	MCF
		1st Failure with prior miscompare			D+I	D+PS/HL	-	MCF
		2nd Failure			D+CR+I	D+PS/HL	D+PS	MCF-N
042		FPOV Ch B 1st Failure with prior miscompare			-	D+I	-	MCF
		2nd Failure			D+CR+I	D+PS/HL	D+PS	MCF-N
051		OPOV Ch A 1st Failure with no miscompare			D+I	D+I	D	MCF
		1st Failure with prior miscompare			D+I	D+PS/HL	-	MCF
		2nd Failure			D+CR+I	D+PS/HL	D+PS	MCF-N
052		OPOV Ch B 1st Failure with prior miscompare			-	D+I	-	MCF
		2nd Failure			D+CR+I	D+PS/HL	D+PS	MCF-N

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE OR CHANNEL	COMP DISQ	R E S P O N S E					ESW SELF TEST	FAILURE PARAMETER
					C/O	SP	ST/MS	S/D	PS/D		
015 Actuator (3.2.1:6.4) (continued)											
RVDT miscompare (3.2.3:6.1.4) (None)											
110		MFV		-	I+P3	PS/PS	PS	-	MCF		Delta Position
120		MOV		-	I+P3	PS/PS	PS	-	MCF		Delta Position
130		CCV		-	I+P3	PS/PS	PS	-	MCF		Delta Position
140		FPOV		-	I+P3	PS/PS	PS	-	MCF		Delta Position
150		OPOV		-	I+P3	PS/PS	PS	-	MCF		Delta Position
BlueLine (3.2.3:6.1.4(c)) (Act Ch A)											
401		HPOT Disch Temp		-	-	D	-	-	MCF		Either Sen Value
471		HPFT Disch Temp		-	-	D	-	-	MCF		Either Sen Value
-3% Test failure Ch B (3.2.3:6.1.5) (Act Ch B)											
512		MFV		-	D+PS	-	-	-	MCF-N		Ch B pos.
522		MOV		-	D+PS	-	-	-	MCF-N		Ch B pos.
532		CCV		-	D+PS	-	-	-	MCF-N		Ch B pos.
542		FPOV		-	D+PS	-	-	-	MCF-N		Ch B pos.
552		OPOV		-	D+PS	-	-	-	MCF-N		Ch B pos.

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE TYPE OR CHANNEL FUNCTION, DEVICE OR CHANNEL	COMP DISQ	RESPONSE IN ENGINE PHASE				ESW SELF TEST	FAILURE PARAMETER
				C/O	SP	ST/MS	S/D		

015 Actuator (3.2.1:6.4) (continued)

D to A Converter Failure (Act Ch; HL: Both Act Chs)  
 (3.2.3:3.3.5, 3.2.3:6.1.4)

611	MFV Ch A	1st Failure with no miscompare		D+I	D+I	D	D	MCF	LDA Difference
		1st Failure with prior miscompare		D+I	D+I	D	D	MCF	LDA Difference
		2nd Failure		D+CR+I	D+PS	D+PS	D+PS	MCF-N	LDA Difference
612	MFV Ch B	1st Failure		D+I	D+I	D	D	MCF	LDA Difference
		2nd Failure		D+CR+I	D+PS	D+PS	D+PS	MCF-N	LDA Difference
621	MOV Ch A	1st Failure with no miscompare		D+I	D+I	D	D	MCF	LDA Difference
		1st Failure with prior miscompare		D+I	D+I	D	D	MCF	LDA Difference
		2nd Failure		D+CR+I	D+PS	D+PS	D+PS	MCF-N	LDA Difference
622	MOV Ch B	1st Failure		D+I	D+I	D	D	MCF	LDA Difference
		2nd Failure		D+CR+I	D+PS	D+PS	D+PS	MCF-N	LDA Difference
631	CCV Ch A	1st Failure with no miscompare		D+I	D+I	D	D	MCF	LDA Difference
		1st Failure with prior miscompare		D+I	D+I	D	D	MCF	LDA Difference
		2nd Failure		D+CR+I	D+PS	D+PS	D+PS	MCF-N	LDA Difference
632	CCV Ch B	1st Failure		D+I	D+I	D	D	MCF	LDA Difference
		2nd Failure		D+CR+I	D+PS	D+PS	D+PS	MCF-N	LDA Difference
641	FPOV Ch A	1st Failure with no miscompare		D+I	D+I	D	D	MCF	LDA Difference
		1st Failure with prior miscompare		D+I	D+I	D	D	MCF	LDA Difference
		2nd Failure		D+CR+I	D+PS	D+PS	D+PS	MCF-N	LDA Difference
642	FPOV Ch B	1st Failure		D+I	D+I	D	D	MCF	LDA Difference
		2nd Failure		D+CR+I	D+PS	D+PS	D+PS	MCF-N	LDA Difference
651	OPOV Ch A	1st Failure with no miscompare		D+I	D+I	D	D	MCF	LDA Difference
		1st Failure with prior miscompare		D+I	D+I	D	D	MCF	LDA Difference
		2nd Failure		D+CR+I	D+PS	D+PS	D+PS	MCF-N	LDA Difference
652	OPOV Ch B	1st Failure		D+I	D+I	D	D	MCF	LDA Difference
		2nd Failure		D+CR+I	D+PS	D+PS	D+PS	MCF-N	LDA Difference

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	COMP DISQ	R E S P O N S E P H A S E						ESW SELF TEST	FAILURE PARAMETER	
				C/O	SP	ST/MS	S/D	PS/D				
015		Actuator (3.2.1:6.4) (continued)										
		Servoactuator Model/Monitor Failure (Act Chs) (3.2.3:3.2.4, 3.2.3:6.1.4)										
701	Ch A	1st Failure with no miscompare 1st Failure with prior miscompare 2nd Failure	D+I D+I D+CR+I	D+I D+I D+PS	D D+PS/HL D+PS/HL	D - D+PS	D D D+PS	D D D+PS	MCF MCF MCF-N	IW7+Polarity IW7+Polarity IW7+Polarity		
702	Ch B	1st Failure with no miscompare 1st Failure with prior miscompare 2nd Failure	D+I D+I D+CR+I	D+I D+I D+PS	D D D+PS/HL	D - D+PS	D D D+PS	D D D+PS	MCF MCF MCF-N	IW7+Polarity IW7+Polarity IW7+Polarity		
710		Actuator Settling Check (3.2.3:6.1.7)	(N/A)	I	-	-	-	-	MCF-N	Either Channel's PSN3-PSN4 Position Delta		

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	COMP DISQ	R E S P O N S E I N				FAILURE PARAMETER	
				E N G I N E P H A S E	C/O	SP	ST/MS		S/D
116 FASCOS First Channel Disqualification (3.2.3:4.2.8, 3.2.3:4.3.2, Table XVII)									
In Monitor Only Option, the failure responses shall be report only; no inhibits or MCFs will be posted. (3.2.5:2)									
<b>HPFP Vibration Channels</b>									
101		Ch V1A Failure	(V1A)	-	D	-	-	-	Channel Value
102		Ch V1B Failure	(V1B)	-	D	-	-	-	Channel Value
103		Ch V1C Failure (V1CA & V1CB)	(V1C)	-	D	-	-	-	Channel Value
104		Sensor V1CA Failure	(V1CA)	-	D	-	-	-	Sensor Value
105		Sensor V1CB Failure	(V1CB)	-	D	-	-	-	Sensor Value
<b>HPFP Vibration Channels</b>									
201		Ch V2A Failure	(V2A)	-	D	-	-	-	Channel Value
202		Ch V2B Failure	(V2B)	-	D	-	-	-	Channel Value
203		Ch V2C Failure (V2CA & V2CB)	(V2C)	-	D	-	-	-	Channel Value
204		Sensor V2CA Failure	(V2CA)	-	D	-	-	-	Sensor Value
205		Sensor V2CB Failure	(V2CB)	-	D	-	-	-	Sensor Value
301		Ch C +15 VDC Power Supply (3.2.3:3.3.7)	(IE3CA, IE3CB, V1CA, V1CB, V2CA, V2CB)	D+I	D	D	D	D	MCF-N Either IE3CA or IE3CB
302		1st Failure-Ch A	(IE3CA)	D	D	D	D	D	IE3CA
303		1st Failure-Ch B	(IE3CB)	D	D	D	D	D	IE3CB
401		Ch C -15 VDC Power Supply (3.2.3:3.3.7)	(IE4CA, IE4CB, V1CA, V1CB, V2CA, V2CB)	D+I	D	D	D	D	MCF-N Either IE4CA or IE4CB
402		1st Failure-Ch A	(IE4CA)	D	D	D	D	D	IE4CA
403		1st Failure-Ch B	(IE4CB)	D	D	D	D	D	IE4CB

016 FASCOS Second Channel Disqualification (3.2.3:4.2.8, 3.2.3:4.3.2, Table XVII)									
In Monitor Only Option, the failure responses shall be report only; no inhibits or MCFs will be posted. (3.2.5:2)									
<b>HPFP Vibration Channels</b>									
101		Ch V1A Failure	(V1A)	-	D+I	D	-	-	MCF Channel Value
102		Ch V1B Failure	(V1B)	-	D+I	D	-	-	MCF Channel Value
103		Ch V1C Failure	(V1C)	-	D+I	D	-	-	MCF Channel Value
<b>HPFP Vibration Channels</b>									
201		Ch V2A Failure	(V2A)	-	D+I	D	-	-	MCF Channel Value
202		Ch V2B Failure	(V2B)	-	D+I	D	-	-	MCF Channel Value
203		Ch V2C Failure	(V2C)	-	D+I	D	-	-	MCF Channel Value
301		Ch C +15 VDC Power Supply (3.2.3:3.3.7)	(IE3CA, IE3CB, V1CA, V1CB, V2CA, V2CB)	D+I	D	D	D	D	MCF-N Either IE3CA or IE3CB
401		Ch C -15 VDC Power Supply (3.2.3:3.3.7)	(IE4CA, IE4CB, V1CA, V1CB, V2CA, V2CB)	D+I	D	D	D	D	MCF-N Either IE4CA or IE4CB

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	COMP DISQ	(N/A)	C/O	SP	ST/MS	S/D	PS/D	ESW	FAILURE PARAMETER
		F A I L U R E T Y P E			R E S P O N S E I N			E N G I N E P H A S E		SELF	TEST
117		FASCOS Shutdown Limit Monitor (3.2.3:5.4, 3.2.3:5.4.1)	(N/A)	In Monitor Only Option, the failure response shall be report only; no, MCFs or SLEs will be posted. (3.2.5:2)							
<b>Limit exceeded on fewer than all qualified channels</b>											
HPFP Vibration Channels											
101		Ch V1A	-	-	-	R	-	-	-	MCF	Channel Value
102		Ch V1B	-	-	-	R	-	-	-	MCF	Channel Value
103		Ch V1C	-	-	-	R	-	-	-	MCF	Channel Value
HPOP Vibration Channels											
201		Ch V2A	-	-	-	R	-	-	-	MCF	Channel Value
202		Ch V2B	-	-	-	R	-	-	-	MCF	Channel Value
203		Ch V2C	-	-	-	R	-	-	-	MCF	Channel Value
<b>Limit exceeded on all qualified channels with Limit Control Inhibited and at least 2 Ch are qualified</b>											
HPFP Vibration Channels											
101		Ch V1A	-	-	-	R	-	-	-	SLE	Channel Value
102		Ch V1B	-	-	-	R	-	-	-	SLE	Channel Value
103		Ch V1C	-	-	-	R	-	-	-	SLE	Channel Value
HPOP Vibration Channels											
201		Ch V2A	-	-	-	R	-	-	-	SLE	Channel Value
202		Ch V2B	-	-	-	R	-	-	-	SLE	Channel Value
203		Ch V2C	-	-	-	R	-	-	-	SLE	Channel Value
017		FASCOS Shutdown Limit Exceeded (3.2.3:5.4, 3.2.3:5.4.1)	(N/A)	In Monitor Only Option, the failure response shall be report only; no SLEs will be posted and no shutdown responses will occur (3.2.5:2)							
<b>Limit exceeded on all qualified channels with Limit Control Enabled and at least 2 Ch are qualified</b>											
HPFP Vibration Channels											
101		Ch V1A	-	-	-	PS/S	-	-	-	SLE	Channel Value
102		Ch V1B	-	-	-	PS/S	-	-	-	SLE	Channel Value
103		Ch V1C	-	-	-	PS/S	-	-	-	SLE	Channel Value
HPOP Vibration Channels											
201		Ch V2A	-	-	-	PS/S	-	-	-	SLE	Channel Value
202		Ch V2B	-	-	-	PS/S	-	-	-	SLE	Channel Value
203		Ch V2C	-	-	-	PS/S	-	-	-	SLE	Channel Value

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE	COMP DISQ (N/A)	RESPONSE ENGINE PHASE				ESW SELF TEST	FAILURE PARAMETER
					C/O	SP	ST/MS	S/D		
Miscellaneous Reports										
001,002		HPOT Discharge Temperature Ch A,B below 810R (3.2.3:5.6)			-	R	-	-	MCF	Sensor Value
003		Thrust Limiting (3.2.3:1.7.3)			-	R	-	-	MCF	Desired OPOV Cmd
004		Report Pc Ref as MCC Pc Control Value in VDT (3.2.3:4.4.2)			-	R	-	-	-	None
100		Switch VRC Commanded			R	R	R	R	MCF	None
200		PSE Internal Voltages Ch B, Reported by DCU A (3.2.3:3.3.6)			R	R	R	R	MCF	P/S+5B
021		Propellant Drop Monitoring (3.2.3:2.1)		(N/A)						
001,002		LPFP Discharge Temperature Ch A,B			T	T	T	T	-	Sensor Value
003,004		Preburner Pump Discharge Temp Ch A,B			T	T	T	T	-	Sensor Value
Fuel Flowrate										
005		Sensor A1			T	T	T	T	-	Sensor Value
006		Sensor B1			T	T	T	T	-	Sensor Value
007		Sensor A2			T	T	T	T	-	Sensor Value
010		Sensor B2			T	T	T	T	-	Sensor Value
022		Igniter Checkout (3.2.3:2.3.2)		(N/A)						
Channel A Igniters failed OFF										
001		Fuel Preburner			I*	-	-	-	MCF	Failure count
002		Oxidizer Preburner			I*	-	-	-	MCF	Failure count
003		Main Combustion Chamber			I*	-	-	-	MCF	Failure count
Channel B Igniters failed OFF										
101		Fuel Preburner			I*	-	-	-	MCF	Failure count
102		Oxidizer Preburner			I*	-	-	-	MCF	Failure count
103		Main Combustion Chamber			I*	-	-	-	MCF	Failure count

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE OR CHANNEL	COMP DISQ	RESPONSE IN ENGINE PHASE				ESW SELF TEST	FAILURE PARAMETER
					C/O	SP	ST/MS	S/D PS/D		
023		PSE Logic/Redundancy Tests Support (N/A)								
		OE A Registers not deactivated/cleared on Power Recovery (3.2.1:1.6(e)(1))								
001		On/Off Register 1		R	-	-	-	-	-	IW15
002		On/Off Register 2		R	-	-	-	-	-	IW17
003		On/Off Register 3		R	-	-	-	-	-	IW19
004		Storage Register		R	-	-	-	-	-	IW21
		OE B Registers not deactivated/cleared on Power Recovery (3.2.1:1.6(e)(1))								
011		On/Off Register 1		R	-	-	-	-	-	IW16
012		On/Off Register 2		R	-	-	-	-	-	IW18
013		On/Off Register 3		R	-	-	-	-	-	IW20
014		Storage Register		R	-	-	-	-	-	IW22
		Checkout Standby Mode Test, PSE Output Voltages Maintenance Monitoring, (3.2.3:2.2.2)								
		Channel A Voltages out of limits								
100		GSE Battery Input		R	-	-	-	-	-	BATA1
101		AC Supplied +5 VDC for Memory		R	-	-	-	-	-	AC+5MA
102		Processor +5 VDC		R	-	-	-	-	-	C1P3
103		Memory +5 VDC		R	-	-	-	-	-	C1M3
104		I/O Electronics +15 VDC		R	-	-	-	-	-	OE3A
105		DC Supplied +5 VDC for memory/processor		R	-	-	-	-	-	DC+5MPA
106		CIE +5 VDC (Ch C)		R	-	-	-	-	MCF	CI1C
107		Logic +5 VDC		R	-	-	-	-	-	LOG5A
		Channel B Voltages out of limits								
200		GSE Battery Input		R	-	-	-	-	-	BATB1
201		AC Supplied +5 VDC for Memory		R	-	-	-	-	-	AC+5MB
202		Processor +5 VDC		R	-	-	-	-	-	C2P3
203		Memory +5 VDC		R	-	-	-	-	-	C2M3
204		I/O Electronics +15 VDC		R	-	-	-	-	-	OE3B
205		DC Supplied +5 VDC for memory/processor		R	-	-	-	-	-	DC+5MPB
206		CIE +5 VDC (Ch C)		R	-	-	-	-	MCF	CI2C
207		Logic +5 VDC		R	-	-	-	-	-	LOG5B



FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE	COMP DISQ	RESPONSE ENGINE PHASE				ESW SELF TEST	FAILURE PARAMETER
					C/O	SP	ST/MS	S/D		
034 Hydraulic Conditioning Opening Failure for Actuator not under test (3.2.3:2.3.9)										
100		MFV		(N/A)	R	-	-	-	MCF	Position
200		MOV			R	-	-	-	MCF	Position
300		CCV			R	-	-	-	MCF	Position
400		FPOV			R	-	-	-	MCF	Position
500		OPOV			R	-	-	-	MCF	Position
600		Hydraulic Pressure failure			I	-	-	-	MCF	Sensor Value
135 Opening Failure for Actuator not under test during Actuator Checkout on Channel A (3.2.3:2.3.4)										
100		MFV		(N/A)	R	-	-	-	MCF	Position
200		MOV			R	-	-	-	MCF	Position
300		CCV			R	-	-	-	MCF	Position
400		FPOV			R	-	-	-	MCF	Position
500		OPOV			R	-	-	-	MCF	Position
035 Actuator Checkout Ch A (Table XXIV)										
1YY		MFV		(N/A)	I*	-	-	-	MCF	Table XXIV
2YY		MOV			I*	-	-	-	MCF	Table XXIV
3YY		CCV			I*	-	-	-	MCF	Table XXIV
4YY		FPOV			I*	-	-	-	MCF	Table XXIV
5YY		OPOV			I*	-	-	-	MCF	Table XXIV
600		Hydraulic Pressure (3.2.3:2.3.4)			I*	-	-	-	MCF	Sensor Value
YY is the step number in Table XXIV										
136 Opening Failure for Actuator not under test during Actuator Checkout on Channel B (3.2.3:2.3.4)										
100		MFV		(N/A)	R	-	-	-	MCF	Position
200		MOV			R	-	-	-	MCF	Position
300		CCV			R	-	-	-	MCF	Position
400		FPOV			R	-	-	-	MCF	Position
500		OPOV			R	-	-	-	MCF	Position
036 Actuator Checkout Ch B (Table XXIV)										
1YY		MFV		(N/A)	I*	-	-	-	MCF	Table XXIV
2YY		MOV			I*	-	-	-	MCF	Table XXIV
3YY		CCV			I*	-	-	-	MCF	Table XXIV
4YY		FPOV			I*	-	-	-	MCF	Table XXIV
5YY		OPOV			I*	-	-	-	MCF	Table XXIV
600		Hydraulic Pressure (3.2.3:2.3.4)			I*	-	-	-	MCF	Sensor Value
YY is the step number in Table XXIV										

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE	COMP DISQ	RESPONSE IN ENGINE PHASE				ESW SELF TEST	FAILURE PARAMETER
					C/O	SP	ST/MS	S/D		
037		Power Recovery (3.2.1:2.2.3, 3.2.1:9.3.1)								
001		In-Channel Power Recovery				R	R	R	R	None
002		Cross-Channel Power Recovery				R	R	R	R	Transient Duration (msec)
042		Command Voting Failures (3.2.2:1.2, Table III)								
101		Command Ch A failed		(N/A)						
102		Command Ch B failed								
103		Command Ch C failed								
		Start Enable or Start commands			R	I	R	R	R	Failed command
		All other Commands			R	R	R	R	R	Failed command
043		Sensor Checkout, Ch A (Table XXVI) (3.2.3:2.3.1)								
		Simulated Conditions								
0ZZ		Substep 2 (Sensor Test)		(N/A)	I*					Table XXVI Part A, Note 4
1ZZ		Ambient Conditions								
		Substep 5 (Sensor Test)			I*					Table XXVI Part A, Note 4
2ZZ		Substep 8 (Group Switch Test)			I*					Table XXVI Part A, Note 4
3ZZ		Substep 10 (Group Switch Test)			I*					Table XXVI Part A, Note 4
		ZZ is the sensor identifier								
044		Sensor Checkout, Ch B (Table XXVI) (3.2.3:2.3.1)								
		Simulated Conditions								
0ZZ		Substep 2 (Sensor Test)		(N/A)	I*					Table XXVI Part A, Note 4
1ZZ		Ambient Conditions								
		Substep 5 (Sensor Test)			I*					Table XXVI Part A, Note 4
2ZZ		Substep 8 (Group Switch Test)			I*					Table XXVI Part A, Note 4
3ZZ		Substep 10 (Group Switch Test)			I*					Table XXVI Part A, Note 4
		ZZ is the sensor identifier								

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	COMP DISQ	RESPONSE			ESW TEST	FAILURE PARAMETER
				C/O	SP	ST/MS		
045		Pneumatic Checkout Ch A (Table XXV) (3.2.3:2.3.3)						
1YY		Fuel System Purge Control Valve	(N/A)	I*	-	-	MCF	Table XXV
2YY		HPOP IMSL Purge Control Valve		I*	-	-	MCF	Table XXV
3YY		Bleed Valve Control Valve		I*	-	-	MCF	Table XXV
4YY		Emergency Shutdown Control Valve		R	-	-	MCF	Table XXV
5YY		Pogo Precharge Control Valve		I*	-	-	MCF	Table XXV
6YY		Preburner S/D Purge Control Valve		I*	-	-	MCF	Table XXV
		YY is the step number in Table XXV						
046		Pneumatic Checkout Ch B (Table XXV) (3.2.3:2.3.3)						
1YY		Fuel System Purge Control Valve	(N/A)	I*	-	-	MCF	Table XXV
2YY		HPOP IMSL Purge Control Valve		I*	-	-	MCF	Table XXV
3YY		Bleed Valve Control Valve		I*	-	-	MCF	Table XXV
4YY		Emergency Shutdown Control Valve		R	-	-	MCF	Table XXV
5YY		Pogo Precharge Control Valve		I*	-	-	MCF	Table XXV
6YY		Preburner S/D Purge Control Valve		I*	-	-	MCF	Table XXV
		YY is the step number in Table XXV						
047		Pneumatic Checkout Ch A & B (Table XXV) (3.2.3:2.3.3)						
1YY		Fuel System Purge Control Valve	(N/A)	I*	-	-	MCF	Table XXV
2YY		HPOP IMSL Purge Control Valve		I*	-	-	MCF	Table XXV
3YY		Bleed Valve Control Valve		I*	-	-	MCF	Table XXV
4YY		Emergency Shutdown Control Valve		R	-	-	MCF	Table XXV
5YY		Pogo Precharge Control Valve		I*	-	-	MCF	Table XXV
6YY		Preburner S/D Purge Control Valve		I*	-	-	MCF	Table XXV
		YY is the step number in Table XXV						

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE OR CHANNEL	COMP DISQ (N/A)	R E S P O N S E			E S W	FAILURE PARAMETER
					C/O	SP	ST/MS		
051		Controller Checkout Ch A	(3.2.3:2.3.5:x)						
001		SCP Comparator		(:1)	I	-	-	MCF	See Table II
002		SCP Interrupt		(:2)	I	-	-	MCF	See Table II
003		DTACK Monitor/Bus Error Generator		(:3)	-	-	-	-	See Table II
004		VRC DPM Write/Read		(:4)	I	-	-	MCF	See Table II
005		VRC Output		(:5)	I	-	-	MCF	See Table II
006		IE DPM Write/Read		(:6)	I	-	-	MCF	See Table II
007		IE Address Counter		(:7)	I	-	-	MCF	See Table II
010		IE Range Counter		(:8)	I	-	-	MCF	See Table II
011		IE Terminate Sequence		(:9)	I	-	-	MCF	See Table II
012		IE Pulse Rate Converter Control Bit		(:10)	I	-	-	MCF	See Table II
013		IE Pulse Rate Converter		(:11)	I	-	-	MCF	See Table II
014		OE Storage Registers		(:12)	I	-	-	MCF	See Table II
015		N/A							
016		Watchdog Timer Counter/Time Ref Int		(:14)	I	-	-	MCF	See Table II
017		Watchdog Timer Interrupt		(:15)	I	-	-	MCF	See Table II
020		Watchdog Timer OE Data Switch		(:16)	I	-	-	MCF	See Table II
021		Watchdog Timer IE Data Switch		(:17)	I	-	-	MCF	See Table II
022		Watchdog Timer VRC Data Switch		(:18)	I	-	-	MCF	See Table II
		OE Power Safety Switch							
023		DCU Control		(:19)	I	-	-	MCF	See Table II
024		Power Down Matrix		(:20)	I	-	-	MCF	See Table II
025		Voltage Monitor/Power Up Reset		(:21)	I	-	-	MCF	See Table II
026		PSE Power Off Indicator		(:22)	I	-	-	MCF	See Table II
027		Cross-Channel Power		(:23)	I	-	-	MCF	See Table II
030		RVDT/LVDT Excit. Power Supply Source		(:24)	I	-	-	MCF	See Table II
031		Pneumatic Solenoid		(:25)	I	-	-	MCF	See Table II
032		Servoact. Error Indication Interrupt		(:26)	I	-	-	MCF	See Table II
033		N/A							
034		Failure Data Recorder		(:28)	I	-	-	MCF	See Table II
040		Protocol Procedures (3.2.3:2.3.5(d))			I	-	-	MCF	See Table II
041		N/A							
042		Engine/Controller On/Off Devices (3.2.3:2.3.5(j))			I	-	-	MCF	See Table II
043		Commanded Bit Failed ON			I	-	-	MCF	See Table II
		Commanded Bit Failed OFF			I	-	-	MCF	See Table II

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE TYPE FUNCTION, DEVICE OR CHANNEL	COMP DISQ (N/A)	R E S P O N S E				ESW SELF TEST	FAILURE PARAMETER
				E N G I N E	S P	S T / M S	I N P H A S E S / D		
052		Controller Checkout, Ch B (3.2.3:2.3.5:x)							
001		SCP Comparator	(:1)	I	-	-	-	MCF	See Table II
002		SCP Interrupt	(:2)	I	-	-	-	MCF	See Table II
003		DTACK Monitor/Bus Error Generator	(:3)	-	-	-	-	-	See Table II
004		VRC DPM Write/Read	(:4)	I	-	-	-	MCF	See Table II
005		VRC Output	(:5)	I	-	-	-	MCF	See Table II
006		IE DPM Write/Read	(:6)	I	-	-	-	MCF	See Table II
007		IE Address Counter	(:7)	I	-	-	-	MCF	See Table II
010		IE Range Counter	(:8)	I	-	-	-	MCF	See Table II
011		IE Terminate Sequence	(:9)	I	-	-	-	MCF	See Table II
012		N/A							See Table II
013		N/A							
014		OE Storage Registers	(:12)	I	-	-	-	MCF	See Table II
015		N/A							
016		Watchdog Timer Counter/Time Ref Int	(:14)	I	-	-	-	MCF	See Table II
017		Watchdog Timer Interrupt	(:15)	I	-	-	-	MCF	See Table II
020		Watchdog Timer OE Data Switch	(:16)	I	-	-	-	MCF	See Table II
021		Watchdog Timer IE Data Switch		I	-	-	-	MCF	See Table II
022		Watchdog Timer VRC Data Switch	(:18)	I	-	-	-	MCF	See Table II
023		OE Power Safety Switch							
024		Switch DCU Control	(:19)	I	-	-	-	MCF	See Table II
025		Power Down Matrix	(:20)	I	-	-	-	MCF	See Table II
026		Voltage Monitor/Power Up Reset	(:21)	I	-	-	-	MCF	See Table II
027		PSE Power Off Indicator	(:22)	I	-	-	-	MCF	See Table II
027		Cross-Channel Power	(:23)	I	-	-	-	MCF	See Table II
030		N/A							
031		N/A							
032		Servoact. Error Indication Interrupt	(:26)	I	-	-	-	MCF	See Table II
033		N/A							
034		Failure Data Recorder	(:28)	I	-	-	-	MCF	See Table II
040		Protocol Procedures (3.2.3:2.3.5(d))		I	-	-	-	MCF	See Table II
041		N/A							
042		Engine/Controller On/Off Devices (3.2.3:2.3.5(j))		I	-	-	-	MCF	See Table II
043		Commanded Bit Failed ON		I	-	-	-	MCF	See Table II
043		Commanded Bit Failed OFF		I	-	-	-	MCF	See Table II

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE	COMP DISQ	RESPONSE IN ENGINE PHASE				ESW SELF TEST	FAILURE PARAMETER
					C/O	SP	ST/MS	S/D		
071		PROM tests, Ch A (See Honeywell DSCP 34053988, Table III)		(N/A)	-	-	-	-	-	-
072		PROM tests, Ch B (See Honeywell DSCP 34053988, Table III)		(N/A)	-	-	-	-	-	-

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE	COMP DISQ	RESPONSE ENGINE		IN PHASE	ESW SELF TEST	FAILURE PARAMETER
					C/O	SP			
075		DCU/CIE Self-disqualification Ch A (3.2.1:6.1) (DCU)							
		Self-Test Failures							
001		CIE Inter-DCU Status Register (write/read fail) (3.2.3:3.1.2:1)		D	D	D	D	D	IW25 Format, Failed bits=1
010		WDT1 Status (3.2.3:3.1.8)		D	D	D	D	D	None
011		WDT2 Status (3.2.3:3.1.8)		D	D	D	D	D	None
020,021		CIE Data MUX (3.2.3:3.2.1)		D	D	D	D	D	IW9, IW23
030		Interrupt Decoder (3.2.3:3.1.5) Interrupt (not SEII), but not pending		D	D	D	D	D	IW4 Format, Failed bit=1
031		SEII, but not pending (Spare not monitored) Within OE Servoactuator		D	D	D	D	D	IW7+Polarity
032		Model/Monitor Self-Test Not within OE Servoactuator		D	D	D	D	D	IW7
033		Model/Monitor Self-Test Interrupt (not SEII)		D	D	D	D	D	IW4 Format, Failed bit=1
034		SEII pending but not enabled		D	D	D	D	D	IW7 Format, Failed bit(s)=1
040		Interrupt Pending (3.2.3:3.2.5) Interrupt (not SEII)		D	D	D	D	D	IW4 Format, Failed bit(s)=1
041		SEII pending, but not serviced		D	D	D	D	D	IW7 Format, Failed bit(s)=1
050		Real Time Clock/IE Timing (3.2.3:3.1.4)		D	D	D	D	D	IW11 (4th value)
051		IE Add. Counter mismatched values		D	D	D	D	D	Time dif (usec)
060		RTC/IE timing out of tolerance		D	D	D	D	D	IW1
061		VEEI Cmd MUX Even (3.2.3:3.1.1) VEEI Cmd MUX Odd (3.2.3:3.1.1)		D	D	D	D	D	IW8

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE		COMP DISQ	R E S P O N S E			E S W	FAILURE PARAMETER	
			F A I L U R E	T Y P E		E N G I N E	P H A S E	S / D			P S / D
075		DCU/CIE Self-disqualification Ch A (3.2.1:6.1) (Continued)									
		(DCU)									
		Self-Test Failures (Continued)									
100		IE Sequencer Initial Values (3.2.3:3.1.6)	D	D	D	D	D	D	D	D	IW11
101		IE Sequencer Final Values (3.2.3:3.1.6)	D	D	D	D	D	D	D	D	IW11
110		IE Address and Range Counters (3.2.3:3.2.2) Case 1	D	D	D	D	D	D	D	D	IW11
111		Case 2	D	D	D	D	D	D	D	D	IW11
114		IE Address and Data Bus (3.2.3:3.3.1) Loaded data does not verify TW1A or TW1B	D	D	D	D	D	D	D	D	Either TW1A or TW1B
115		TW2A or TW2B	D	D	D	D	D	D	D	D	Either TW2A or TW2B
116		RC15 or RC14	D	D	D	D	D	D	D	D	Either RC15 or RC14
117		RC19 or RC18	D	D	D	D	D	D	D	D	Either RC19 or RC18
120		Parameter pair failure TW1A/TW1B	D	D	D	D	D	D	D	D	TW1A .OR. TW1B Failed bits=1
121		TW2A/TW2B	D	D	D	D	D	D	D	D	TW2A .OR. TW2B Failed bits=1
122		RC15/RC14	D	D	D	D	D	D	D	D	RC15 .OR. RC14 Failed bits=1
123		RC19/RC18	D	D	D	D	D	D	D	D	RC19 .OR. RC18 Failed bits=1
130		OE Servoactuator Model/Monitor (3.2.3:3.2.4) No SEII	D	D	D	D	D	D	D	D	IW7+Polarity
131		Not all SEIs pending on Ch A & B	D	D	D	D	D	D	D	D	IW7+Polarity
140		PSE Internal Voltages (3.2.3:3.3.6)	D	D	D	D	D	D	D	D	P/S+5A
300		POT Exceeded bit for DCU B failed Off (3.2.3:3.2.3)	D	D	D	D	D	D	D	D	IW15



FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE OR CHANNEL	COMP DISQ	RESPONSE ENGINE PHASE				ESW SELF TEST	FAILURE PARAMETER
					C/O	SP	ST/MS	S/D		
075		DCU/CIE Self-disqualification Ch A (3.2.1:6.1) (Continued)								
		Checkout Standby Mode Test, DCU Exception Processing (3.2.3:2.2.1) (DCU)								
400		Address Error		D	-	-	-	-	-	None
401		Execute Illegal Instruction		D	-	-	-	-	-	None
402		Perform Zero Divide		D	-	-	-	-	-	None
403		CHK Instruction		D	-	-	-	-	-	None
404		TRAPV Instruction		D	-	-	-	-	-	None
405		Illegal Exception A		D	-	-	-	-	-	None
406		Illegal Exception F		D	-	-	-	-	-	None
407		TRAP Instruction		D	-	-	-	-	-	None
410		ANDI with Status Register		D	-	-	-	-	-	None
411		EORI with Status Register		D	-	-	-	-	-	None
412		MOVE to Status Register		D	-	-	-	-	-	None
413		MOVE to User Stack Pointer		D	-	-	-	-	-	None
414		ORI with Status Register		D	-	-	-	-	-	None
415		Reset		D	-	-	-	-	-	None
417		RTE/Stop		D	-	-	-	-	-	None
		Executive major failures								
500		All required functions in major cycle not complete (3.2.1:2.1)		D	D	D	D	D	D	None
503		WDT1 & WDT2 not timed-out (3.2.1:2.2(a))		D	D	D	D	D	D	IW4
504		POT Exceeded for DCU A (3.2.1:2.2.1(f))		D	D	D	D	D	D	None
505		POT Exceeded for DCU A (3.2.1:2.2.2(e))		D	D	D	D	D	D	None
510		Simulated DCU/OE Failure (3.2.3:2.4.3:1)		D	D	D	D	D	D	None

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE OR CHANNEL	COMP		R E S P O N S E			E S W	FAILURE PARAMETER	
				DISQ	DISQ	C/O	SP	ST/MS			S/D
075		DCU/CIE Self-disqualification Ch A (3.2.1:6.1) (Continued)									
		Interrupts or Exceptions									
601		Reset Exception Vector (RAM) (3.2.1:5.2)			D		D	D	D	D	None
602		Bus Error Exception (3.2.1:5.3)			D		D	D	D	D	None
603		Address Error Exception (3.2.1:5.4)			D		D	D	D	D	None
604		Illegal Instruction Exception (3.2.1:5.5)			D		D	D	D	D	None
605		Zero Divide Exception (3.2.1:5.6)			D		D	D	D	D	None
606		CHK Instruction Exception(3.2.1:5.7)			D		D	D	D	D	None
607		TRAPV Instruction Exception (3.2.1:5.8)			D		D	D	D	D	None
610		Privilege Violation Exception (3.2.1:5.9)			D		D	D	D	D	None
611		Trace Exception (3.2.1:5.10)			D		D	D	D	D	None
612		Illegal Exception Vector (3.2.1:5.11)			D		D	D	D	D	None
613		Spurious Interrupt Exception (3.2.1:5.12)			D		D	D	D	D	None
614		TRAP Instruction Exception (3.2.1:5.13)			D		D	D	D	D	None
		Power Recovery Interrupt									
630		Prev PRI/PFI in 440 msec (3.2.1:2.2.2)			-		D	D	D	D	Delta Time (MC)
631		PRI in Major Cycle Init (3.2.1:1.6(f))			-		D	D	D	D	None
632		PRI in disqualified DCU (3.2.1:1.6(c))			D		D	D	D	D	None
633		PRI in Checkout Phase(3.2.1:1.6(e))			D		-	-	-	-	None
640		Self-Checking Pair Interrupt (3.2.1:5.16)			D		D	D	D	D	IW4
650		WDTH1 Interrupt (3.2.1:3(f))			D		D	D	D	D	None
651		WDTH2 Interrupt (3.2.1:3(f))			D		D	D	D	D	None
660		CIE Erroneous Acknowledge			D		D	D	D	D	None
		Level Interrupt (3.2.1:5.22)									
661		Spurious CIE Interrupt(3.2.1:5.23)			D		D	D	D	D	None
700		Stop DCU Command			D		D	D	D	D	None

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE OR CHANNEL	COMP		R E S P O N S E			E S W	FAILURE PARAMETER
				DISQ	C/O	EN G I N E	P H A S E	S E L F		
076		DCU/CIE Self-disqualification Ch B (3.2.1:6.1)								
		Self-Test Failures								
001		CIE Inter-DCU Status Register (write/read fail) (3.2.3:3.1.2:1)		D	D	D	D	D	D	IW26 Format, Failed bits=1
002		CIE Inter-DCU Status Register (Update Timeout) (3.2.3:3.1.2)		D	D	D	D	D	D	None
010		WDT1 Status (3.2.3:3.1.8)		D	D	D	D	D	D	None
011		WDT2 Status (3.2.3:3.1.8)		D	D	D	D	D	D	None
020,021		CIE Data MUX (3.2.3:3.2.1)		D	D	D	D	D	D	IW10, IW24
030		Interrupt Decoder (3.2.3:3.1.5)		D	D	D	D	D	D	IW4 Format, Failed bit=1
031		SEII, but not pending (Spare not monitored)								
032		Within OE Servoactuator Model/Monitor Self-Test		D	D	D	D	D	D	IW7+Polarity
033		Not within OE Servoactuator Model/Monitor Self-Test		D	D	D	D	D	D	IW7
034		Interrupt (not SEII) pending but not enabled		D	D	D	D	D	D	IW4 Format, Failed bit=1
040		Interrupt Pending (3.2.3:3.2.5)		D	D	D	D	D	D	IW7 Format, Failed bit(s)=1
041		Interrupt (not SEII) pending, but not serviced		D	D	D	D	D	D	IW4 Format, Failed bit(s)=1
050		SEII pending, but not serviced		D	D	D	D	D	D	IW7 Format, Failed bit(s)=1
060		Real Time Clock/IE Timing (3.2.3:3.1.4)		D	D	D	D	D	D	IW12 (4th value)
061		IE Add. Counter mismatched values		D	D	D	D	D	D	Time dif (usec)
		RTC/IE timing out of tolerance		D	D	D	D	D	D	IW1
		VEEI Cmd MUX Even (3.2.3:3.1.1)		D	D	D	D	D	D	IW8
		VEEI Cmd MUX Odd (3.2.3:3.1.1)		D	D	D	D	D	D	

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE OR CHANNEL	COMP DISQ	R E S P O N S E I N				FAILURE PARAMETER
					C/O	SP	ST/MS	S/D	
076		DCU/CIE Self-disqualification Ch B (3.2.1:6.1) (Continued)							
Self-Test Failures (Continued)									
100		IE Sequencer Initial Values (3.2.3:3.1.6)	D	D	D	D	D	D	IW12
101		IE Sequencer Final Values (3.2.3:3.1.6)	D	D	D	D	D	D	IW12
110		IE Address and Range Counters (3.2.3:3.2.2)	D	D	D	D	D	D	IW12
111		Case 1	D	D	D	D	D	D	IW12
		Case 2	D	D	D	D	D	D	IW12
114		IE Address and Data Bus (3.2.3:3.3.1)	D	D	D	D	D	D	Either TW1A or TW1B
		Loaded data does not verify	D	D	D	D	D	D	Either TW2A or TW2B
115		TW1A or TW1B	D	D	D	D	D	D	Either RC15 or RC14
116		TW2A or TW2B	D	D	D	D	D	D	or RC14
117		RC15 or RC14	D	D	D	D	D	D	Either RC19 or RC18
		RC19 or RC18	D	D	D	D	D	D	Parameter pair failure
120		TW1A/TW1B	D	D	D	D	D	D	TW1A .OR. TW1B
121		TW2A/TW2B	D	D	D	D	D	D	Failed bits=1
122		RC15/RC14	D	D	D	D	D	D	TW2A .OR. TW2B
123		RC19/RC18	D	D	D	D	D	D	Failed bits=1
130		OE Servoactuator Model/Monitor (3.2.3:3.2.4)	D	D	D	D	D	D	RC15 .OR. RC14
140		No SEII	D	D	D	D	D	D	Failed bits=1
		PSE Internal Voltages (3.2.3:3.3.6)	D	D	D	D	D	D	RC19 .OR. RC18
300		POT Exceeded bit for DCU A failed Off (3.2.3:3.2.3)	D	D	D	D	D	D	Failed bits=1

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE OR CHANNEL	COMP DISQ	R E S P O N S E E N G I N E P H A S E				ESW SELF TEST	FAILURE PARAMETER
					C/O	SP	ST/MS	S/D		
076		DCU/CIE Self-disqualification Ch B (3.2.1:6.1) (Continued)								
		Checkout Standby Mode Test, DCU Exception Processing (3.2.3:2.2.1)								
400		Address Error		D	-	-	-	-	-	None
401		Execute Illegal Instruction		D	-	-	-	-	-	None
402		Perform Zero Divide		D	-	-	-	-	-	None
403		CHK Instruction		D	-	-	-	-	-	None
404		TRAPV Instruction		D	-	-	-	-	-	None
405		Illegal Exception A		D	-	-	-	-	-	None
406		Illegal Exception F		D	-	-	-	-	-	None
407		TRAP Instruction		D	-	-	-	-	-	None
410		ANDI with Status Register		D	-	-	-	-	-	None
411		EORI with Status Register		D	-	-	-	-	-	None
412		MOVE to Status Register		D	-	-	-	-	-	None
413		MOVE to User Stack Pointer		D	-	-	-	-	-	None
414		ORI with Status Register		D	-	-	-	-	-	None
415		Reset		D	-	-	-	-	-	None
417		RTE/Stop		D	-	-	-	-	-	None
		Executive major failures								
500		All required functions in major cycle not complete (3.2.1:2.1)		D	D	D	D	D	D	None
503		WDT1 & WDT2 not timed-out (3.2.1:2.2(a))		D	D	D	D	D	D	IW4
504		POT Exceeded for DCU A (3.2.1:2.2.1(f))		D	D	D	D	D	D	None
505		POT Exceeded for DCU A (3.2.1:2.2.2(e))		D	D	D	D	D	D	None
510		Simulated DCU/OE Failure (3.2.3:2.4.3:1)		D	D	D	D	D	D	None
		Tracking Response of the Standby DCU								
520		No acceptable IDSR codes (3.2.1:8.1(g))		-	D	-	-	-	-	IDSR EDW
		Non-commanded transition into: (3.2.1:8.1(h))								
521		a Start Prep Mode		D	D	D	D	D	D	IDSR EDW
522		Start Phase		D	D	D	D	D	D	IDSR EDW
523		a configuration		D	D	D	D	D	D	IDSR EDW

FAIL. ID (OCTAL)	FAILURE DELIM. (OCTAL)	FAILURE FUNCTION, DEVICE OR CHANNEL	TYPE OR CHANNEL	COMP DISQ	R E S P O N S E			E S W	FAILURE PARAMETER	
					E N G I N E	P H A S E	I N			
DCU/CIE Self-disqualification Ch B (3.2.1:6.1) (Continued)					C/O	SP	ST/MS	S/D	PS/D	
Interrupts or Exceptions										
601		Reset Exception Vector (RAM)	(3.2.1:5.2)		D	D	D	D	D	None
602		Bus Error Exception	(3.2.1:5.3)		D	D	D	D	D	None
603		Address Error Exception	(3.2.1:5.4)		D	D	D	D	D	None
604		Illegal Instruction Exception	(3.2.1:5.5)		D	D	D	D	D	None
605		Zero Divide Exception	(3.2.1:5.6)		D	D	D	D	D	None
606		CHK Instruction Exception	(3.2.1:5.7)		D	D	D	D	D	None
607		TRAPV Instruction Exception	(3.2.1:5.8)		D	D	D	D	D	None
610		Privilege Violation Exception	(3.2.1:5.9)		D	D	D	D	D	None
611		Trace Exception	(3.2.1:5.10)		D	D	D	D	D	None
612		Illegal Exception Vector	(3.2.1:5.11)		D	D	D	D	D	None
613		Spurious Interrupt Exception	(3.2.1:5.12)		D	D	D	D	D	None
614		TRAP Instruction Exception	(3.2.1:5.13)		D	D	D	D	D	None
Power Recovery Interrupt										
630		Prev PRI/PFI in 440 msec	(3.2.1:2.2.2)	-	D	D	D	D	D	Delta Time (MC)
631		PRI in Major Cycle Init	(3.2.1:1.6(f))	-	D	D	D	D	D	None
632		PRI in disqualified DCU	(3.2.1:1.6(c))	D	D	D	D	D	D	None
633		PRI in Checkout Phase	(3.2.1:1.6(e))	D	-	-	-	-	-	None
640		Self-Checking Pair Interrupt	(3.2.1:5.16)	D	D	D	D	D	D	IW4
650		WDTH1 Interrupt	(3.2.1:3(f))	D	D	D	D	D	D	None
651		WDTH2 Interrupt	(3.2.1:3(f))	D	D	D	D	D	D	None
660		CIE Erroneous Acknowledge		D	D	D	D	D	D	None
661		Level Interrupt	(3.2.1:5.22)	D	D	D	D	D	D	None
		Spurious CIE Interrupt	(3.2.1:5.23)	D	D	D	D	D	D	None
700		Stop DCU Command		D	D	D	D	D	D	None

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INSTRUMENTATION  
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 SORTED ON DATA WORD

DATA WORD	PID	MSID ME-1 (2032)	MSID ME-2 (2033)	MSID ME-3 (2027)	NOMENCLATURE	DATA STREAM		
						128 KB	60 KB	ORBITER
1	291	E41M10001P	E41M20001P	E41M30001P	ID WORD 1	X	X	X
2	292	E41M10002P	E41M20002P	E41M30002P	ID WORD 2	X	X	X
3	293	E41M10003P	E41M20003P	E41M30003P	ENGINE STATUS WD	X	X	X
4	286	E41W10004D	E41W20004D	E41W30004D	TIME REFERENCE	X	X	X
5	4	E41M10005P	E41M20005P	E41M30005P	HARD FAIL ID	X	X	X
6	63	E41P10233D	E41P20233D	E41P30233D	MCC PC AVG	X	X	X
7	100	E41R10211D	E41R20211D	E41R30211D	FUEL FLOW AVG	X	X	X
8	86	E41R10222D	E41R20222D	E41R30222D	LOX FLOW AVG	X	X	X
9	15	E41P10188D	E41P20188D	E41P30188D	HPFP IN PR AVG	X	X	X
10	93	E41T10199D	E41T20199D	E41T30199D	HPFP IN TMP AVG	X	X	X
11	91	E41T11244D	E41T21244D	E41T31244D	PBP DS TMP CH A	X	X	X
12	92	E41P10511D	E41P20511D	E41P30511D	HPOT S/C PR A	X	X	X
13	92	E41P10533D	E41P20533D	E41P30533D	HPOT S/C PR B	X	X	X
14	53	E41P10088D	E41P20088D	E41P30088D	HPFP CLNT LNR A	X	X	X
15	54	E41T10109D	E41T20109D	E41T30109D	HPFP CLNT LNR B	X	X	X
16	231	E41T10110D	E41T20110D	E41T30110D	HPFT DS TMP A	X	X	X
17	232	E41T10112D	E41T20112D	E41T30112D	HPFT DS TMP B	X	X	X
18	233	E41T10123D	E41T20123D	E41T30123D	HPOT DS TMP A	X	X	X
19	234	E41T10134D	E41T20134D	E41T30134D	HPOT DS TMP B	X	X	X
20	211	E41P10144D	E41P20144D	E41P30144D	HPOT ISP PR A	X	X	X
21	212	E41P10155D	E41P20155D	E41P30155D	HPOT ISP PR B	X	X	X
22	200	E41P10166D	E41P20166D	E41P30166D	MCC PC A AVG	X	X	X
23	201	E41P10177D	E41P20177D	E41P30177D	MCC PC B AVG	X	X	X
24	36	E41H10244D	E41H20244D	E41H30244D	MFV ACT POS A	X	X	X
25	38	E41H10255D	E41H20255D	E41H30255D	MOV ACT POS A	X	X	X
26	45	E41H10266D	E41H20266D	E41H30266D	CCV ACT POS A	X	X	X
27	42	E41H10277D	E41H20277D	E41H30277D	FPOV ACT POS A	X	X	X
28	40	E41H10288D	E41H20288D	E41H30288D	OPOV ACT POS A	X	X	X
29	52	E41P10299D	E41P20299D	E41P30299D	HPFP DS PR A	X	X	X
30	58	E41P10300D	E41P20300D	E41P30300D	HPFP DS PR B	X	X	X
31	90	E41P10311D	E41P20311D	E41P30311D	FPB PC A PR A	X	X	X
32	214	E41P10544D	E41P20544D	E41P30544D	HYD SYS PR B	X	X	X
33	59	E41P10333D	E41P20333D	E41P30333D	PBP DS PR B	X	X	X
34	258	E41R10344D	E41R20344D	E41R30344D	FUEL FLOW A1	X	X	X
35	129	E41P10355D	E41P20355D	E41P30355D	MCC PC A2	X	X	X
36	130	E41P10366D	E41P20366D	E41P30366D	MCC PC A1	X	X	X
37	131	E41R10377D	E41R20377D	E41R30377D	FUEL FLOW AVG	X	X	X
38	163	E41P10399D	E41P20399D	E41P30399D	MFV SERVOCURRENT A	X	X	X
39	136	E41H10400D	E41H20400D	E41H30400D	MCC PC AVG	X	X	X
40	137	E41H10411D	E41H20411D	E41H30411D	MFV ACT POS A	X	X	X
41	138	E41H10422D	E41H20422D	E41H30422D	MOV ACT POS A	X	X	X

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DATA WORD	PID	MSID ME-1 (2032)	MSID ME-2 (2033)	MSID ME-3 (2027)	NOMENCLATURE	DATA STREAM		
						128 KB	60 KB	ORBITER
42	145	E41H1042D	E41H2042D	E41H3042D	CCV ACT POS A		X	
43	142	E41H1043D	E41H2043D	E41H3043D	FPOV ACT POS A		X	
44	140	E41H1044D	E41H2044D	E41H3044D	OPOV ACT POS A		X	
45	152	E41P1045D	E41P2045D	E41P3045D	HPPF DS PR A		X	
46	190	E41P1046D	E41P2046D	E41P3046D	HPOP DS PR A		X	
47	158	E41P1047D	E41P2047D	E41P3047D	FPB PC A		X	
48	147	E41P1048D	E41P2048D	E41P3048D	HYD SYS PR B		X	
49	159	E41R1049D	E41R2049D	E41R3049D	FBP DS PR B		X	
50	133	E41P1050D	E41P2050D	E41R3050D	FUEL FLOW A1		X	
51	161	E41P1124D	E41P2124D	E41P3124D	MCC PC B2		X	
52	162	E41P1052D	E41P2052D	E41P3052D	MCC PC B1		X	
53	219	E41P1057D	E41P2057D	E41P3057D	FUEL PRG PR A		X	
54	220	E41P1058D	E41P2058D	E41P3058D	FUEL PRG PR B		X	
55	94	E41T1125D	E41T2125D	E41T3125D	PBP DS TMP B		X	
56	72	E41C1722D	E41C1722D	E41C1722D	MOV SERVOCURRENT A		X	
57	221	E41P1055D	E41P2055D	E41P3055D	POGO PRCHG PR A		X	
58	222	E41P1056D	E41P2056D	E41P3056D	POGO PRCHG PR B		X	
59	239	E41T1109D	E41T2109D	E41T3109D	MOV HYD TMP A		X	
60	240	E41T1110D	E41T2110D	E41T3110D	MOV HYD TMP B		X	
61	238	E41T1112D	E41T2112D	E41T3112D	MFV HYD TMP B		X	
62	237	E41T1111D	E41T2111D	E41T3111D	MFV HYD TMP A		X	
63	266	E41H1063D	E41H2063D	E41H3063D	POGO RIV POS A		X	
64	47	E41H1061D	E41H2061D	E41H3061D	FUEL BLD VLV POS B		X	
65	46	E41H1062D	E41H2062D	E41H3062D	LOX BLD VLV POS B		X	
66	50	E41V1074D	E41V2074D	E41V3074D	CON BUS 1 VOLTAGE		X	
67	51	E41V1075D	E41V2075D	E41V3075D	CON BUS 2 VOLTAGE		X	
68	268	E41H1104D	E41H2104D	E41H3104D	AFV POS A		X	
69	269	E41H1105D	E41H2105D	E41H3105D	AFV POS B		X	
70	209	E41P1064D	E41P2064D	E41P3064D	HPOP INLET PR A		X	
71	210	E41P1065D	E41P2065D	E41P3065D	HPOP INLET PR B		X	
72	223	E41P1107D	E41P2107D	E41P3107D	EM SHTDN PR A		X	
73	224	E41P1108D	E41P2108D	E41P3108D	EM SHTDN PR B		X	
74	148	E41P1106D	E41P2106D	E41P3106D	FPB PRG PR A		X	
75	149	E41P1059D	E41P2059D	E41P3059D	OPB PRG PR B		X	
76	34	E41P1068D	E41P2068D	E41P3068D	HX DS PR B		X	
77	34	E41P1066D	E41P2066D	E41P3066D	MCC HG INJ PR A		X	
78	17	E41P1067D	E41P2067D	E41P3067D	MCC CLNT DS PR A		X	
79	48	E41P1069D	E41P2069D	E41P3069D	CON INT PR A/B		X	
80	48	E41T1071D	E41T2071D	E41T3071D	CON INT TMP A/B		X	
81	19	E41T1070D	E41T2070D	E41T3070D	MCC CLNT DS TMP B		X	
82	32	E41R1072D	E41R2072D	E41R3072D	LPFP SPEED A		X	



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DATA WORD	PID	MSID ME-1 (2032)	MSID ME-2 (2033)	MSID ME-3 (2027)	NOMENCLATURE	DATA STREAM		
						128 KB	60 KB	ORBITER
83	30	E41R1073D	E41R2073D	E41R3073D	LPOP SPEED B		X	
84	172	E41H1060D	E41H2060D	E41H3060D	MFV COMMAND		X	
85	173	E41H1113D	E41H2113D	E41H3113D	MOV COMMAND		X	
86	174	E41H1114D	E41H2114D	E41H3114D	CCV COMMAND		X	
87	175	E41H1115D	E41H2115D	E41H3115D	FPOV COMMAND		X	
88	176	E41H1116D	E41H2116D	E41H3116D	OPOV COMMAND		X	
89	301	E41R1089D	E41R2089D	E41R3089D	FUEL FLOW B1		X	
90	288	E41J1090D	E41J2090D	E41J3090D	INHIBIT COUNT		X	
91	289	E41J1091D	E41J2091D	E41J3091D	FID COUNT		X	
92	203	E41P1092D	E41P2092D	E41P3092D	HPFP INLET PR A		X	
93	225	E41T1093D	E41T2093D	E41T3093D	HPFP INLET TMP A		X	
94	287	E41P1094D	E41P2094D	E41P3094D	PC CNTL REF		X	
95	8	E41U1095D	E41U2095D	E41U3095D	MIX RATIO		X	
96	260	E41R1006D	E41R2006D	E41R3006D	HPFP SPEED A		X	
97	261	E41R1007D	E41R2007D	E41R3007D	HPFP SPEED B		X	
98	280	E41M1076D	E41M2076D	E41M3076D	VEH CMD 1		X	
99	281	E41M1077D	E41M2077D	E41M3077D	VEH CMD 2		X	
100	5	E41M1078P	E41M2078P	E41M3078P	HARD FAIL		X	
101	6	E41M1079P	E41M2079P	E41M3079P	HARD FAIL	TST NO1	X	
102	7	E41M1080P	E41M2080P	E41M3080P	HARD FAIL	TST NO2	X	
103	294	E41M1081D	E41M2081D	E41M3081D	HARD FAIL	TST NO3	X	
104	264	E41M1082D	E41M2082D	E41M3082D	HARD FAIL	PARVAL1	X	
105	137	E41M1083D	E41M2083D	E41M3083D	HARD FAIL	PARVAL2	X	
106	143	E41H1084D	E41H2084D	E41H3084D	HARD FAIL	PARVAL3	X	
107	139	E41H1085D	E41H2085D	E41H3085D	MFV ACT POS B		X	
108	146	E41H1086D	E41H2086D	E41H3086D	MOV ACT POS B		X	
109	143	E41H1087D	E41H2087D	E41H3087D	CCV ACT POS B		X	
110	141	E41H1088D	E41H2088D	E41H3088D	FPOV ACT POS B		X	
111	156	E41M1096P	E41M2096P	E41M3096P	OPOV ACT POS B		X	
112	154	E41M1097P	E41M2097P	E41M3097P	DST REG 1A		X	
113	157	E41M1098P	E41M2098P	E41M3098P	DST REG 2A		X	
114	155	E41M1099P	E41M2099P	E41M3099P	DST REG 1B		X	
115	273	E41Q1100D	E41Q2100D	E41Q3100D	DST REG 2B		X	
116	271	E41Q1101D	E41Q2101D	E41Q3101D	CALC C2		X	
117	1	E41H1117D	E41H2117D	E41H3117D	CALCULATED KF		X	
118	176	E41V1815D	E41V2815D	E41V3815D	OPOV CMD LIMIT		X	
119	77	E41V1816D	E41V2816D	E41V3816D	MEM/PROCESSOR 5V CH A		X	
120	21	E41T1120D	E41T2120D	E41T3120D	MEM/PROCESSOR 5V CH B		X	
121	85	E41D1140D	E41D2140D	E41D3140D	MCC OXID INJ TEMP		X	
121	82	E41D1141D	E41D2141D	E41D3141D	FASCOS HPFP 186 1C		X	
121	104	E41M1121P	E41M2121P	E41M3121P	FASCOS PBP 135-2 2C		X	
121	104	E41M1121P	E41M2121P	E41M3121P	FASCOS STATUS WD		X	

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DATA WORD	PID	MSID ME-1 (2032)	MSID ME-2 (2033)	MSID ME-3 (2027)	NOMENCLATURE	DATA STREAM		
						128 KB	60 KB	ORBITER
122	75	E41C1723D	E41C1723D	E41C1723D	CCV SERVOCURRENT A			X
123	73	E41C1724D	E41C1724D	E41C1724D	FPOV SERVOCURRENT A			X
124	251	E41R1102D	E41R2102D	E41R3102D	FUEL FLOW A2		X	X
125	253	E41R1103D	E41R2103D	E41R3103D	FUEL FLOW B2		X	X
126	74	E41C1725D	E41C1725D	E41C1725D	OPOV SERVOCURRENT A		X	X
127	204	E41P1127D	E41T2127D	E41P3127D	HPFP INLET PR B		X	X
128	226	E41T1128D	E41T2128D	E41T3128D	HPFP INLET TMP B		X	X
	7046	V41T1527A	V41T1527A	V41T1527A	LOX MANIFOLD T A			
	7028	V41P1605A	V41P1605A	V41P1605A	PNEU VLV HE RG OUT			
	1421	E41T1156A	E41T2156A	E41T3156A	AFV DS SKIN TEMP 2			
	1420	E41T1155A	E41T2155A	E41T3155A	AFV DS SKIN TEMP 1			
	1021	V41T1101C	V41T1201C	V41T1301C	ENG FL IN T			
	7000	**CNTDWNCLK	**CNTDWNCLK	**CNTDWNCLK	COUNTDOWN CLOCK			
	1132	GGNC1015A	GGNC1016A	GGNC1017A	MFV HEATER DRV CUR			
	7010	V41X1104X	V41X1204X	V41X1304X	LH2 PREVALVE OPEN			
	7008	TRANSERR-CN	TRANSERR-CN	TRANSERR-CN	TRANS ERROR COUNT			
	7053	V41T1601A	V41T1601A	V41T1601A	PNEU VLV HE SUP T			
	553	E41T1153A	E41T2153A	E41T3153A	MFV DS SKIN TEMP 1			
	7038	V95L0191C	V95L0191C	V95L0191C	SHUTTLE VEL Y-COMP			
	1896	E41T1151A	E41T2151A	E41T3151A	OPOV GOX S L SK T1			
	7037	V95L0190C	V95L0190C	V95L0190C	SHUTTLE VEL X-COMP			
	7039	V95L0192C	V95L0192C	V95L0192C	SHUTTLE VEL Z-COMP			
	858	V41P1130C	V41P1230C	V41P1330C	ENG OX IN PR 1			
	7027	V41P1600A	V41P1600A	V41P1600A	PNEU VLV HE SUPPLY			
	7097	V41P1150C	V41P1250C	V41P1350C	HE SUPPLY BOTL PR			
	7031	T41P1751C	T41P1751C	T41P1751C	LO2 ULLAGE PRES 2			
	7021	V41R1115A	V41R1215A	V41R1315A	LH2 RECIRC PUMP S			
	1145	V58T1131A	V58T1231A	V58T1331A	HYD SYS IF RT LN T			
	7052	V41T1152A	V41T1252A	V41T1352A	MID FSLG HE SPLY T			
	7062	V58T0186A	V58T0286A	V58T0386A	HYD LH2 ET R ACT T			
	1035	V41T1161A	V41T1261A	V41T1361A	GH2 PRESS INT T			
	7070	V58P0616A	V58P0626A	V58P0636A	HYD ACM SYS RTN PR			
	879	T41T1171A	T41T1271A	T41T1371A	GOX ULLAGE PRES 2			
	7094	V41P1701C	T41P1701C	V41P1701C	ENG OX IN T			
	1058	V41T1131C	V41T1231C	V41T1331C	LH2 SYS DELTA P			
	7041	V41P1564A	V41P1564A	V41P1564A	GN2 PRG HTR TMP			
	1157	GGNT1005A	GGNT1005A	GGNT1005A	GN2 DISCONNECT PR			
	7023	V41P1490A	V41P1490A	V41P1490A	GN2 PRG OUT TMP			
	1158	GGNT1104A	GGNT1104A	GGNT1104A	HYD SYS SUP PR C			
	7066	V58P0116C	V58P0216C	V58P0316C	MFV HEATR PWR IND			
	7015	GGNX1013E	GGNX1023E	GGNX1043E				X

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DATA WORD	PID	MSID ME-1 (2032)	MSID ME-2 (2033)	MSID ME-3 (2027)	NOMENCLATURE	DATA STREAM		
						128 KB	60 KB	ORBITER
7033		V58P0137A	V58P0237A	V58P0337A	HYD SYS CRC PMP PR			X
937		V41P1154A	V41P1254A	V41P1354A	HELIUM REGA OUT PR			X
7075		V58P0115A	V58P0215A	V58P0315A	HYD SYS SUP PR B			X
7081		GLHQ1009A	GLHQ1009A	GLHQ1009A	LH2 STORAGE TK LVL			X
7047		V41T1528A	V41T1528A	V41T1528A	LOX MANIFOLD T B			X
1558		V58H1150A	V58H1250A	V58H1350A	GIM ACT Z POS			X
7016		GCNX1112E	GCNX1113E	GCNX1114E	MFV HEATR PWR ON			X
7003		V41X1661E	V41X1662E	V41X1663E	GH2 PRESS 1 ON/OFF			X
7051		V41T1151A	V41T1251A	V41T1351A	AFT FSLG HE SPLY T			X
7004		V41X1596E	V41X1598E	V41X1603E	GO2 PRESS 1 ON/OFF			X
7057		V09T1724A	V09T1724A	V09T1724A	LH AFT FSLG SIDE T			X
7011		V41X1134X	V41X1234X	V41X1334X	LOX PREVALVE OPEN			X
7060		V58T2140A	V58T2240A	V58T2340A	H ACCUM SYS RTN T			X
7001		V41X1109E	V41X1209E	V41X1309E	LH2 RECRC VLV OPEN			X
7045		V41T1428A	V41T1428A	V41T1428A	LH2 MANIFOLD T			X
554		E41T1154A	E41T2154A	E41T3154A	MFV DS SKIN TEMP 2			X
821		V41P1100C	V41P1200C	V41P1300C	ENG FL IN PR 1			X
1912		E41T1150A	E41T2150A	E41T3150A	CONTROLLER PS TEMP			X
957		GGNP1034A	GGNP1034A	GGNP1034A	GN2 PRG OUT PR			X
7098		T41P1752C	T41P1752C	T41P1752C	LO2 ULLAGE PRES 3			X
7086		GECT2310A	GECT2310A	GECT2310A	GN2 AFT INTF T			X
1147		V58T1130A	V58T1230A	V58T1330A	HYD SYS IF PR LN T			X
7035		V95U0163C	V95U0163C	V95U0163C	TOTAL LOAD FACTOR			X
7095		T41P1702C	T41P1702C	T41P1702C	LH2 ULLAGE PRES 3			X
7085		GEC2300A	GEC2300A	GEC2300A	GN2 AFT INTF PR			X
7044		V41P1533C	V41P1533C	V41P1533C	LOX MANIFOLD PR			X
7029		V41P1650A	V41P1650A	V41P1650A	PNEU ACCUM PRESS			X
7065		V58P0114C	V58P0214C	V58P0314C	HYD SYS SUP PR A			X
7092		T41T1755A	T41T1755A	T41T1755A	LO2 ULLAGE TEMP			X
7007		V41X1614E	V41X1614E	V41X1614E	PNEU CROSSOVR OPEN			X
7093		T41P1700C	T41P1700C	T41P1700C	LH2 ULLAGE PRES 1			X
7002		V41X1110E	V41X1210E	V41X1310E	LH2 RECRC VLV CLOS			X
7082		GLQQ0229A	GLQQ0229A	GLQQ0229A	LOX TANK SUP FLOW			X
1895		E41T1152A	E41T2152A	E41T3152A	OPOV GOX S L SK T2			X
938		V41P1153A	V41P1253A	V41P1353A	HELIUM REGB OUT PR			X
7096		T41P1750C	T41P1750C	T41P1750C	LH2 ULLAGE PRES 1			X
7091		T41T1705A	T41T1705A	T41T1705A	LOX ULLAGE TEMP			X
7024		V41P1590A	V41P1590A	V41P1590A	GOX DISCONNECT PR			X
7042		V41P1464A	V41P1464A	V41P1464A	LOX SYS DELTA P			X
1552		V58H1100A	V58H1200A	V58H1300A	GIM ACT Y POS			X
7056		V09T1720A	V09T1720A	V09T1720A	RH AFT FSLG SIDE T			X

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INSTRUMENTATION  
 MASTER LIST CROSS-REFERENCE  
 SORTED ON DATA WORD

DATA WORD	PID	MSID ME-1 (2032)	MSID ME-2 (2033)	MSID ME-3 (2027)	NOMENCLATURE	DATA STREAM		
						128 KB	60 KB	ORBITER
	7005	V41X1105E	V41X1205E	V41X1305E	LH2 PREVALV CLOSED			X
	7055	V09T1702A	V09T1702A	V09T1702A	AFT FSLG FLR BTM T			X
	7061	V58T0183A	V58T0283A	V58T0383A	HYD LOX ET R ACT T			X
	7043	V41P1433C	V41P1433C	V41P1433C	LH2 MANIFOLD PR			X
	7006	V41X1135E	V41X1235E	V41X1335E	LOX PREVALV CLOSED			X
	7036	V95H0175C	V95H0175C	V95H0175C	ORBITER ALTIITUDE			X
	958	GCNP1139A	GCNP1139A	GCNP1139A	GN2 PRG OUT PR			X
	835	V41P1160A	V41P1260A	V41P1360A	FL PRESS INT PR			X

ATLANTIS STS-46

INSTRUMENTATION  
 MASTER LIST CROSS-REFERENCE  
 SORTED ON MSID NUMBER

MSID ME-1 (2032)	MSID ME-2 (2033)	MSID ME-3 (2027)	DATA WORD	PID	NOMENCLATURE	DATA STREAM		
						128 KB	60 KB	ORBITER
E41C1721D	E41C1721D	E41C1721D	38	71	MFV SERVOCURRENT A		X	
E41C1722D	E41C1722D	E41C1722D	56	72	MOV SERVOCURRENT A		X	
E41C1723D	E41C1723D	E41C1723D	122	73	CCV SERVOCURRENT A		X	
E41C1724D	E41C1724D	E41C1724D	123	74	FPOV SERVOCURRENT A		X	
E41C1725D	E41D2140D	E41D3140D	126	74	OPOV SERVOCURRENT A		X	
E41D1140D	E41D2141D	E41D3141D	121	82	FASCOS HPFP 186 1C		X	
E41H1025D	E41H2024D	E41H3024D	121	85	FASCOS PBP 135-2 2C		X	
E41H1026D	E41H2025D	E41H3025D	24	36	MFV ACT POS A		X	
E41H1027D	E41H2026D	E41H3026D	25	38	MOV ACT POS A		X	
E41H1028D	E41H2027D	E41H3027D	26	42	CCV ACT POS A		X	
E41H1040D	E41H2028D	E41H3028D	27	45	FPOV ACT POS A		X	
E41H1041D	E41H2040D	E41H3040D	28	40	OPOV ACT POS A		X	
E41H1042D	E41H2041D	E41H3041D	40	40	MFV ACT POS A		X	
E41H1043D	E41H2042D	E41H3042D	41	136	OPOV ACT POS A		X	
E41H1044D	E41H2043D	E41H3043D	42	138	MOV ACT POS A		X	
E41H1060D	E41H2044D	E41H3044D	43	145	CCV ACT POS A		X	
E41H1061D	E41H2060D	E41H3060D	44	142	FPOV ACT POS A		X	
E41H1062D	E41H2061D	E41H3061D	84	140	OPOV ACT POS A		X	
E41H1063D	E41H2062D	E41H3062D	64	172	MFV COMMAND		X	
E41H1084D	E41H2063D	E41H3063D	65	47	FUEL BLD VLV POS		X	
E41H1085D	E41H2084D	E41H3084D	63	46	LOX BLD VLV POS B		X	
E41H1086D	E41H2085D	E41H3085D	107	266	POGO RIV POS A		X	
E41H1087D	E41H2086D	E41H3086D	108	46	MFV ACT POS B		X	
E41H1088D	E41H2087D	E41H3087D	109	137	MOV ACT POS B		X	
E41H1104D	E41H2088D	E41H3088D	110	146	CCV ACT POS B		X	
E41H1105D	E41H2104D	E41H3104D	68	143	FPOV ACT POS B		X	
E41H1113D	E41H2105D	E41H3105D	89	268	OPOV ACT POS B		X	
E41H1114D	E41H2113D	E41H3113D	85	141	AFV POS A		X	
E41H1115D	E41H2114D	E41H3114D	87	269	AFV POS B		X	
E41H1116D	E41H2115D	E41H3115D	86	173	MOV COMMAND		X	
E41H1117D	E41H2116D	E41H3116D	88	174	CCV COMMAND		X	
E41J1090D	E41H2117D	E41H3117D	117	175	FPOV COMMAND		X	
E41J1091D	E41J2090D	E41J3090D	119	176	OPOV COMMAND		X	
E41M1001P	E41J2091D	E41J3091D	91	171	OPOV CMD LIMIT		X	
E41M1002P	E41M2001P	E41M3001P	1	289	INHIBIT COUNT		X	
E41M1003P	E41M2002P	E41M3002P	2	289	FID COUNT		X	
E41M1005P	E41M2003P	E41M3003P	3	291	ID WORD 1		X	
E41M1076D	E41M2005P	E41M3005P	5	292	ID WORD 2		X	
E41M1077D	E41M2076D	E41M3076D	98	293	ENGINE STATUS WD		X	
	E41M2077D	E41M3077D	99	4	HARD FAIL ID		X	
				280	VEH CMD 1		X	
				281	VEH CMD 2		X	

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 SORTED ON MSID NUMBER

MSID ME-1 (2032)	MSID ME-2 (2033)	MSID ME-3 (2027)	DATA WORD	PID	NOMENCLATURE	DATA STREAM		
						128 KB	60 KB	ORBITER
E41M1078P	E41M2078P	E41M3078P	100	5	HARD FAIL			
E41M1079P	E41M2079P	E41M3079P	101	6	HARD FAIL			
E41M1080P	E41M2080P	E41M3080P	102	7	HARD FAIL			
E41M1081D	E41M2081D	E41M3081D	103	294	HARD FAIL			
E41M1082D	E41M2082D	E41M3082D	104	264	HARD FAIL			
E41M1083D	E41M2083D	E41M3083D	105	265	HARD FAIL			
E41M1096P	E41M2096P	E41M3096P	111	156	HARD FAIL			
E41M1097P	E41M2097P	E41M3097P	112	154	DST REG 1A			
E41M1098P	E41M2098P	E41M3098P	113	157	DST REG 2A			
E41M1099P	E41M2099P	E41M3099P	114	155	DST REG 1B			
E41M1108D	E41M2108D	E41M3108D	121	104	DST REG 2B			
E41P1008D	E41P2008D	E41P3008D	14	53	FASCOS STATUS WD			
E41P1009D	E41P2009D	E41P3009D	15	54	HPFP CLNT LNR A			
E41P1014D	E41P2014D	E41P3014D	20	211	HPFP CLNT LNR B			
E41P1015D	E41P2015D	E41P3015D	21	212	HPOP ISP PR A			
E41P1016D	E41P2016D	E41P3016D	22	200	HPOP ISP PR B			
E41P1017D	E41P2017D	E41P3017D	23	201	MCC PC A AVG			
E41P1018D	E41P2018D	E41P3018D	9	86	MCC PC B AVG			
E41P1029D	E41P2029D	E41P3029D	6	63	HPFP IN PR AVG			
E41P1033D	E41P2033D	E41P3033D	30	52	MCC PC AVG			
E41P1035D	E41P2035D	E41P3035D	33	90	HPFP DS PR A			
E41P1036D	E41P2036D	E41P3036D	36	92	HPFP DS PR A			
E41P1039D	E41P2039D	E41P3039D	39	58	FPB PC A			
E41P1045D	E41P2045D	E41P3045D	45	129	PBP DS PR B			
E41P1046D	E41P2046D	E41P3046D	46	130	MCC PC A2			
E41P1047D	E41P2047D	E41P3047D	47	163	MCC PC A1			
E41P1048D	E41P2048D	E41P3048D	48	152	MCC PC AVG			
E41P1049D	E41P2049D	E41P3049D	49	150	HPFP DS PR A			
E41P1052D	E41P2052D	E41P3052D	52	158	FPB PC A			
E41P1053D	E41P2053D	E41P3053D	53	147	HYD SYS PR B			
E41P1054D	E41P2054D	E41P3054D	57	159	PBP DS PR B			
E41P1055D	E41P2055D	E41P3055D	58	162	HPOT S/C PR A			
E41P1056D	E41P2056D	E41P3056D	58	91	MCC PC B1			
E41P1057D	E41P2057D	E41P3057D	54	162	HPOT S/C PR B			
E41P1058D	E41P2058D	E41P3058D	54	92	HYD SYS PR B			
E41P1059D	E41P2059D	E41P3059D	75	214	POGO PRCHG PR A			
E41P1064D	E41P2064D	E41P3064D	70	221	POGO PRCHG PR B			
				222	FUEL PRG PR A			
				219	FUEL PRG PR B			
				149	OPB PRG PR B			
				209	HPOP INLET PR A			

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MSID ME-1 (2032)	MSID ME-2 (2033)	MSID ME-3 (2027)	DATA WORD	PID	NOMENCLATURE	DATA STREAM		
						128 KB	60 KB	ORBITER
E41P11065D	E41P2065D	E41P3065D	71	210	HPOP INLET PR B			X
E41P11066D	E41P2066D	E41P3066D	77	24	MCC HG INJ PR A			X
E41P11067D	E41P2067D	E41P3067D	78	17	MCC CLNT DS PR A			X
E41P11068D	E41P2068D	E41P3068D	76	34	HX DS PR B			X
E41P11069D	E41P2069D	E41P3069D	79	48	CON INT PR A/B			X
E41P1094D	E41P2094D	E41P3094D	92	203	HPFP INLET PR A			X
E41P1106D	E41P2106D	E41P3106D	94	287	PC CNTL REF			X
E41P1107D	E41P2107D	E41P3107D	74	148	FPB PRG PR A			X
E41P1108D	E41P2108D	E41P3108D	72	223	EM SHTDN PR A			X
E41P1124D	E41P2124D	E41P3124D	73	224	EM SHTDN PR B			X
E41P1127D	E41P2127D	E41P3127D	51	161	MCC PC B2			X
E41Q1100D	E41Q2100D	E41Q3100D	127	204	HPFP INLET PR B			X
E41Q1101D	E41Q2101D	E41Q3101D	115	273	CALC C2			X
E41R1006D	E41R2006D	E41R3006D	116	271	CALCULATED KF			X
E41R1007D	E41R2007D	E41R3007D	97	260	HPFP SPEED A			X
E41R1021D	E41R2021D	E41R3021D	7	261	HPFP SPEED B			X
E41R1022D	E41R2022D	E41R3022D	8	100	LOX FLOW AVG		X X	X
E41R1034D	E41R2034D	E41R3034D	34	258	FUEL FLOW A1			X
E41R1037D	E41R2037D	E41R3037D	37	131	FUEL FLOW AVG			X
E41R1050D	E41R2050D	E41R3050D	50	133	FUEL FLOW A1			X
E41R1072D	E41R2072D	E41R3072D	82	30	LPFP SPEED A			X
E41R1073D	E41R2073D	E41R3073D	83	30	LPFP SPEED B			X
E41R1089D	E41R2089D	E41R3089D	89	301	FUEL FLOW B1			X
E41R1102D	E41R2102D	E41R3102D	125	251	FUEL FLOW A2			X
E41R1103D	E41R2103D	E41R3103D	16	253	FUEL FLOW B2			X
E41T1010D	E41T2010D	E41T3010D	17	231	HPFT DS TMP A			X
E41T1011D	E41T2011D	E41T3011D	18	232	HPFT DS TMP B			X
E41T1013D	E41T2013D	E41T3013D	19	233	HPOT DS TMP A			X
E41T1019D	E41T2019D	E41T3019D	10	234	HPFP IN TMP AVG			X
E41T1070D	E41T2070D	E41T3070D	81	15	MCC CLNT DS TMP B			X
E41T1093D	E41T2093D	E41T3093D	80	18	CON INT TMP A/B			X
E41T1109D	E41T2109D	E41T3109D	93	49	HPFP INLET TMP A			X
E41T1110D	E41T2110D	E41T3110D	59	239	MOV HYD TMP A			X
E41T1111D	E41T2111D	E41T3111D	60	237	MOV HYD TMP B			X
E41T1112D	E41T2112D	E41T3112D	62	240	MFV HYD TMP A			X
E41T1120D	E41T2120D	E41T3120D	61	238	MFV HYD TMP B			X
E41T1124D	E41T2124D	E41T3124D	120	21	MCC OXID INJ TEMP			X
E41T1125D	E41T2125D	E41T3125D	11	93	PBP DS TMP CH A			X
E41T1125D	E41T2125D	E41T3125D	55	94	PBP DS TMP B			X

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INSTRUMENTATION  
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SORTED ON MSID NUMBER

MSID ME-1 (2032)	MSID ME-2 (2033)	MSID ME-3 (2027)	DATA WORD	PID	NOMENCLATURE	DATA STREAM		
						128 KB	60 KB	ORBITER
E41T11128D	E41T21128D	E41T31128D	128	226	HPFP INLET TMP B	X	X	X
E41T11150A	E41T21150A	E41T31150A			CONTROLER PS TEMP			
E41T11151A	E41T21151A	E41T31151A		1912	OPOV GOX S L SK T1			X
E41T11152A	E41T21152A	E41T31152A		1896	OPOV GOX S L SK T2			X
E41T11153A	E41T21153A	E41T31153A		1895	MFV DS SKIN TEMP 1			X
E41T11154A	E41T21154A	E41T31154A		553	MFV DS SKIN TEMP 2			X
E41T11155A	E41T21155A	E41T31155A		554	AFV DS SKIN TEMP 1			X
E41T11156A	E41T21156A	E41T31156A		1420	AFV DS SKIN TEMP 2			X
E41U1095D	E41U2095D	E41U3095D	95	8	MIX RATIO			X
E41V1074D	E41V2074D	E41V3074D	66	50	CON BUS 1 VOLTAGE		X	X
E41V1075D	E41V2075D	E41V3075D	67	51	CON BUS 2 VOLTAGE		X	X
E41V1815D	E41V2815D	E41V3815D	118	76	MEM/PROCESSOR 5V CH A		X	X
E41V1816D	E41V2816D	E41V3816D	119	77	MEM/PROCESSOR 5V CH B		X	X
E41W1004D	E41W2004D	E41W3004D	4	286	TIME REFERENCE		X	X
GECP2300A	GECP2300A	GECP2300A		7085	GN2 AFT INTF PR			X
GGNC1015A	GGNC1016A	GGNC1017A		7086	GN2 AFT INTF T			X
GGNP1034A	GGNP1034A	GGNP1034A		1132	MFV HEATER DRV CUR			X
GGNP1139A	GGNP1139A	GGNP1139A		958	GN2 PRG OUT PR			X
GGNT11005A	GGNT11005A	GGNT11005A		1157	GN2 PRG OUT PR			X
GGNX1104A	GGNX1104A	GGNX1104A		1158	GN2 PRG HTR TMP			X
GGNX1023E	GGNX1023E	GGNX1043E		7015	MFV HEATR PWR IND			X
GGNX1112E	GGNX1113E	GGNX1114E		7016	MFV HEATR PWR ON			X
GLHQ1009A	GLHQ1009A	GLHQ1009A		7081	LH2 STORAGE TK LVL			X
GLOO0229A	GLOO0229A	GLOO0229A		7082	LH2 TANK SUP FLOW			X
T41P1700C	T41P1700C	T41P1700C		7093	LH2 ULLAGE PRES 1			X
T41P1701C	T41P1701C	T41P1701C		7094	LH2 ULLAGE PRES 2			X
T41P1702C	T41P1702C	T41P1702C		7095	LH2 ULLAGE PRES 3			X
T41P1750C	T41P1750C	T41P1750C		7097	LO2 ULLAGE PRES 1			X
T41P1751C	T41P1751C	T41P1751C		7098	LO2 ULLAGE PRES 2			X
T41P1752C	T41P1752C	T41P1752C		7091	LO2 ULLAGE PRES 3			X
T41P1705A	T41P1705A	T41P1705A		7092	LO2 ULLAGE TEMP			X
T41T1755A	T41T1755A	T41T1755A		7008	TRANS ERROR COUNT			X
TRANSERR-CN	TRANSERR-CN	TRANSERR-CN		7055	AFT FSLG FLR BTM T			X
V09T1702A	V09T1702A	V09T1702A		7056	RH AFT FSLG SIDE T			X
V09T1720A	V09T1720A	V09T1720A		821	ENG FL IN PR 1			X
V09T1724A	V09T1724A	V09T1724A		858	ENG OX IN PR 1			X
V41P1100C	V41P1200C	V41P1300C		7031	HE SUPPLY BOTL PR			X
V41P1130C	V41P1230C	V41P1330C		938	HELLIUM REGB OUT PR			X
V41P1150C	V41P1250C	V41P1350C						X
V41P1153A	V41P1253A	V41P1353A						X



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INSTRUMENTATION  
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 SORTED ON MSID NUMBER

MSID ME-1 (2032)	MSID ME-2 (2033)	MSID ME-3 (2027)	DATA WORD	PID	NOMENCLATURE	DATA STREAM	
						128 KB	60 KB ORBITER
V41P11154A	V41P11254A	V41P11354A		937	HELIUM REGA OUT PR		X
V41P11160A	V41P11260A	V41P11360A		835	FL PRESS INT PR		X
V41P11433C	V41P11433C	V41P11433C		7043	LH2 MANIFOLD PR		X
V41P11464A	V41P11464A	V41P11464A		7042	LOX SYS DELTA P		X
V41P11490A	V41P11490A	V41P11490A		7023	GH2 DISCONNECT PR		X
V41P1533C	V41P1533C	V41P1533C		7044	LOX MANIFOLD PR		X
V41P1564A	V41P1564A	V41P1564A		7041	LH2 SYS DELTA P		X
V41P1590A	V41P1590A	V41P1590A		7024	GOX DISCONNECT PR		X
V41P1600A	V41P1600A	V41P1600A		7027	PNEU VLV HE SUPPLY		X
V41P1605A	V41P1605A	V41P1605A		7028	PNEU VLV HE RG OUT		X
V41P1650A	V41P1650A	V41P1650A		7029	PNEU ACCUM PRESS		X
V41R1115A	V41R1115A	V41R1115A		7021	LH2 RECIRC PUMP S		X
V41T1101C	V41T1101C	V41T1101C		1021	ENG FL IN T		X
V41T1131C	V41T1131C	V41T1131C		1058	ENG OX IN T		X
V41T1151A	V41T1151A	V41T1151A		7051	AFT FSLG HE SPLY T		X
V41T1152A	V41T1152A	V41T1152A		7052	MID FSLG HE SPLY T		X
V41T11261A	V41T11261A	V41T11261A		1035	GH2 PRESS INT T		X
V41T11271A	V41T11271A	V41T11271A		1879	GH2 PRESS OUT T		X
V41T11428A	V41T11428A	V41T11428A		7045	LH2 MANIFOLD T A		X
V41T1527A	V41T1527A	V41T1527A		7046	LOX MANIFOLD T B		X
V41T1528A	V41T1528A	V41T1528A		7047	LOX MANIFOLD T A		X
V41T1601A	V41T1601A	V41T1601A		7053	PNEU VLV HE SUP T		X
V41X1104X	V41X1104X	V41X1104X		7010	LH2 PREVALVE OPEN		X
V41X1105E	V41X1105E	V41X1105E		7005	LH2 PREVALVE CLOSED		X
V41X1109E	V41X1109E	V41X1109E		7001	LH2 RECRC VLV OPEN		X
V41X1110E	V41X1110E	V41X1110E		7002	LH2 RECRC VLV CLOS		X
V41X11134X	V41X11134X	V41X11134X		7011	LOX PREVALVE OPEN		X
V41X11135E	V41X11135E	V41X11135E		7006	LOX PREVALVE CLOSED		X
V41X11596E	V41X11596E	V41X11596E		7004	GO2 PRESS 1 ON/OFF		X
V41X11614E	V41X11614E	V41X11614E		7007	PNEU CROSSOVR OPEN		X
V41X11662E	V41X11662E	V41X11662E		7003	GH2 PRESS 1 ON/OFF		X
V58H11200A	V58H11200A	V58H11200A		1552	GIM ACT Y POS		X
V58H1150A	V58H1150A	V58H1150A		1558	GIM ACT Z POS		X
V58P0114C	V58P0214C	V58P0314C		7065	HYD SYS SUP PR A		X
V58P0115A	V58P0215A	V58P0315A		7075	HYD SYS SUP PR B		X
V58P0116C	V58P0216C	V58P0316C		7066	HYD SYS SUP PR C		X
V58P01137A	V58P0237A	V58P0337A		7033	HYD SYS CRC PMP PR		X
V58P0616A	V58P0626A	V58P0636A		7070	HYD ACM SYS RTN PR		X
V58T0183A	V58T0283A	V58T0383A		7061	HYD LOX ET R ACT T		X
V58T0186A	V58T0286A	V58T0386A		7062	HYD LH2 ET R ACT T		X
V58T11130A	V58T11230A	V58T11330A		1147	HYD SYS IF PR IN		X

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INSTRUMENTATION  
 MASTER LIST CROSS-REFERENCE  
 SORTED ON MSID NUMBER

MSID ME-1 (2032)	MSID ME-2 (2033)	MSID ME-3 (2027)	DATA WORD	PID	NOMENCLATURE	DATA STREAM		
						128 KB	60 KB	ORBITER
V58T1131A V58T2140A V95H0175C V95L0190C V95L0191C V95L0192C V95U0163C **CNTDWNCLK	V58T1231A V58T2240A V95H0175C V95L0190C V95L0191C V95L0192C V95U0163C **CNTDWNCLK	V58T1331A V58T2340A V95H0175C V95L0190C V95L0191C V95L0192C V95U0163C **CNTDWNCLK		1145 7060 7037 7038 7039 7035 7000	HYD SYS IF RT LN T H ACCUM SYS RTN T ORBITER ALTITUDE SHUTTLE VEL X-COMP SHUTTLE VEL Y-COMP SHUTTLE VEL Z-COMP TOTAL LOAD FACTOR COUNTDOWN CLOCK			X X X X X X X X

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INSTRUMENTATION  
 MASTER LIST CROSS-REFERENCE  
 SORTED ON PID NUMBER

PID	DATA WORD	MSID ME-1 (2033)	MSID ME-2 (2032)	MSID ME-3 (2027)	NOMENCLATURE	DATA STREAM		
						128 KB	60 KB	ORBITER
4	5	E41M1005P	E41M2005P	E41M3005P	HARD FAIL ID	X		
5	100	E41M1078P	E41M2078P	E41M3078P	HARD FAIL TST NO1		X	
6	101	E41M1079P	E41M2079P	E41M3079P	HARD FAIL TST NO2		X	
7	102	E41M1080P	E41M2080P	E41M3080P	HARD FAIL TST NO3		X	
8	195	E41U1095D	E41U2095D	E41U3095D	MIX RATIO		X	
15	10	E41T1019D	E41T2019D	E41T3019D	HPFP IN TMP AVG		X	
17	78	E41T1067D	E41T2067D	E41T3067D	MCC CLNT DS PR A		X	
18	81	E41T1070D	E41T2070D	E41T3070D	MCC CLNT DS TMP B		X	
21	120	E41T1120D	E41T2120D	E41T3120D	MCC OXID INJ TEMP		X	
22	77	E41P1066D	E41P2066D	E41P3066D	MCC HG INJ PR A		X	
24	82	E41R1073D	E41R2073D	E41R3073D	LPOP SPEED B		X	
30	82	E41R1072D	E41R2072D	E41R3072D	LPFP SPEED A		X	
32	76	E41P1068D	E41P2068D	E41P3068D	HX DS PR B		X	
34	24	E41H1024D	E41H2024D	E41H3024D	MFV ACT POS A	X		
36	25	E41H1025D	E41H2025D	E41H3025D	MOV ACT POS A	X		
38	28	E41H1028D	E41H2028D	E41H3028D	OPOV ACT POS A	X		
40	27	E41H1027D	E41H2027D	E41H3027D	FPOV ACT POS A	X		
42	26	E41H1026D	E41H2026D	E41H3026D	CCV ACT POS A	X		
44	65	E41H1062D	E41H2062D	E41H3062D	LOX BLD VLV POS B	X		
46	64	E41H1061D	E41H2061D	E41H3061D	FUEL BLD VLV POS	X		
47	79	E41P1069D	E41P2069D	E41P3069D	CON INT PR A/B	X		
48	80	E41T1071D	E41T2071D	E41T3071D	CON INT TMP A/B	X		
49	66	E41V1074D	E41V2074D	E41V3074D	CON BUS 1 VOLTAGE	X		
50	66	E41V1075D	E41V2075D	E41V3075D	CON BUS 2 VOLTAGE	X		
51	29	E41P1029D	E41P2029D	E41P3029D	HPFP DS PR A	X		
52	67	E41P1008D	E41P2008D	E41P3008D	HPFP CLNT LNR B	X		
53	14	E41P1009D	E41P2009D	E41P3009D	HPFP CLNT LNR B	X		
54	15	E41P1031D	E41P2031D	E41P3031D	FPB PC A	X		
58	33	E41P1033D	E41P2033D	E41P3033D	PBP DS PR B	X		
59	33	E41P1033D	E41P2033D	E41P3033D	PBP DS PR B	X		
63	6	E41C1721D	E41C1721D	E41C1721D	MCC PC AVG	X		
71	38	E41C1722D	E41C1722D	E41C1722D	MFV SERVOCURRENT A	X		
72	56	E41C1722D	E41C1722D	E41C1722D	MOV SERVOCURRENT A	X		
73	126	E41C1724D	E41C1724D	E41C1724D	FPOV SERVOCURRENT A	X		
74	122	E41C1725D	E41C1725D	E41C1725D	OPOV SERVOCURRENT A	X		
75	122	E41C1723D	E41C1723D	E41C1723D	CCV SERVOCURRENT A	X		
76	118	E41V1815D	E41V2815D	E41V3815D	MEM/PROCESSOR 5V CH A	X		
77	119	E41V1816D	E41V2816D	E41V3816D	MEM/PROCESSOR 5V CH B	X		
82	121	E41D1140D	E41D2140D	E41D3140D	FASCOS HPFP 186 1C	X		
85	121	E41D1141D	E41D2141D	E41D3141D	FASCOS HPFP 135-2 2C	X		
86	121	E41P1018D	E41P2018D	E41P3018D	HPFP IN PR AVG	X		
90	30	E41P1030D	E41P2030D	E41P3030D	HPFP DS PR A	X		

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PID	DATA WORD	MSID ME-1 (2033)	MSID ME-2 (2032)	MSID ME-3 (2027)	NOMENCLATURE	DATA STREAM		
						128 KB	60 KB	ORBITER
91	12	E41P1051D	E41P2051D	E41P3051D	HPOT S/C PR A		X	
92	113	E41P1053D	E41P2053D	E41P3053D	HPOT S/C PR B		X	
93	115	E41T1124D	E41T2124D	E41T3124D	PBP DS TMP CH A		X	
94	8	E41T1125D	E41T2125D	E41T3125D	PBP DS TMP CH B		X	
96	7	E41R1022D	E41R2022D	E41R3022D	LOX FLOW AVG		X	
100	121	E41R1021D	E41R2021D	E41R3021D	FUEL FLOW AVG		X	
104	35	E41M1121P	E41M2121P	E41M3121P	FASCOS STATUS WD		X	
109	36	E41P1035D	E41P2035D	E41P3035D	MCC PC A2		X	
110	37	E41P1036D	E41P2036D	E41P3036D	MCC PC A1		X	
113	50	E41R1037D	E41R2037D	E41R3037D	FUEL FLOW AVG		X	
1136	40	E41R1050D	E41R2050D	E41R3050D	FUEL FLOW A1		X	
1137	106	E41H1084D	E41H2084D	E41H3084D	MFV ACT POS A		X	
1138	41	E41H1085D	E41H2085D	E41H3085D	MFV ACT POS B		X	
1139	107	E41H1041D	E41H2041D	E41H3041D	MOV ACT POS A		X	
1140	44	E41H1044D	E41H2044D	E41H3044D	MOV ACT POS B		X	
1141	110	E41H1088D	E41H2088D	E41H3088D	OPOV ACT POS A		X	
1142	103	E41H1043D	E41H2043D	E41H3043D	OPOV ACT POS B		X	
1143	109	E41H1087D	E41H2087D	E41H3087D	FPOV ACT POS A		X	
1144	42	E41H1042D	E41H2042D	E41H3042D	FPOV ACT POS B		X	
1146	108	E41H1086D	E41H2086D	E41H3086D	CCV ACT POS A		X	
1147	74	E41P1048D	E41P2048D	E41P3048D	CCV ACT POS B		X	
1148	74	E41P1106D	E41P2106D	E41P3106D	HYD SYS PR B		X	
1149	75	E41P1059D	E41P2059D	E41P3059D	FPB PRG PR A		X	
1152	45	E41P1045D	E41P2045D	E41P3045D	FPB PRG PR B		X	
1154	112	E41M1097P	E41M2097P	E41M3097P	HFFP DS PR A		X	
1155	111	E41M1099P	E41M2099P	E41M3099P	DST REG 2A		X	
1156	111	E41M1096P	E41M2096P	E41M3096P	DST REG 2B		X	
1157	113	E41M1098P	E41M2098P	E41M3098P	DST REG 1A		X	
1158	47	E41P1047D	E41P2047D	E41P3047D	DST REG 1B		X	
1159	49	E41P1049D	E41P2049D	E41P3049D	FPB PC A		X	
1161	51	E41P1124D	E41P2124D	E41P3124D	FPB DS PR B		X	
1162	52	E41P1052D	E41P2052D	E41P3052D	MCC PC B2		X	
1163	39	E41P1039D	E41P2039D	E41P3039D	MCC PC B1		X	
1171	117	E41H1117D	E41H2117D	E41H3117D	MCC PC AVG		X	
1172	84	E41H1060D	E41H2060D	E41H3060D	OPOV CMD LIMIT		X	
1173	85	E41H1113D	E41H2113D	E41H3113D	MFV COMMAND		X	
1174	86	E41H1114D	E41H2114D	E41H3114D	MOV COMMAND		X	
1175	87	E41H1115D	E41H2115D	E41H3115D	CCV COMMAND		X	
1176	88	E41H1116D	E41H2116D	E41H3116D	FPOV COMMAND		X	
1190	46	E41P1046D	E41P2046D	E41P3046D	OPOV DS PR A		X	

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INSTRUMENTATION  
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 SORTED ON PID NUMBER

PID	DATA WORD	MSID ME-1 (2033)	MSID ME-2 (2032)	MSID ME-3 (2027)	NOMENCLATURE	DATA STREAM		
						128 KB	60 KB	ORBITER
200	22	E41P1016D	E41P2016D	E41P3016D	MCC PC A AVG	X		
201	23	E41P1017D	E41P2017D	E41P3017D	MCC PC B AVG	X		
203	92	E41P1092D	E41P2092D	E41P3092D	HPFP INLET PR A			
204	127	E41P1127D	E41P2127D	E41P3127D	HPFP INLET PR B			
209	70	E41P1064D	E41P2064D	E41P3064D	HPOP INLET PR A			
210	71	E41P1065D	E41P2065D	E41P3065D	HPOP INLET PR B			
211	21	E41P1014D	E41P2014D	E41P3014D	HPOP ISP PR A			
212	20	E41P1015D	E41P2015D	E41P3015D	HPOP ISP PR B			
214	32	E41P1054D	E41P2054D	E41P3054D	HYD SYS PR B	X		
219	53	E41P1057D	E41P2057D	E41P3057D	FUEL PRG PR A	X		
220	54	E41P1058D	E41P2058D	E41P3058D	FUEL PRG PR B	X		
221	57	E41P1055D	E41P2055D	E41P3055D	POGO PRCHG PR A	X		
222	58	E41P1056D	E41P2056D	E41P3056D	POGO PRCHG PR B	X		
223	72	E41P1107D	E41P2107D	E41P3107D	EM SHTDN PR A	X		
224	73	E41P1108D	E41P2108D	E41P3108D	EM SHTDN PR B	X		
225	93	E41T1093D	E41T2093D	E41T3093D	HPFP INLET TMP A			
226	128	E41T1128D	E41T2128D	E41T3128D	HPFP INLET TMP B			
231	16	E41T1010D	E41T2010D	E41T3010D	HPFT DS TMP A			
232	17	E41T1011D	E41T2011D	E41T3011D	HPFT DS TMP B			
233	18	E41T1012D	E41T2012D	E41T3012D	HPOT DS TMP A	X		
234	19	E41T1013D	E41T2013D	E41T3013D	HPOT DS TMP B	X		
237	62	E41T1111D	E41T2111D	E41T3111D	MFV HYD TMP A	X		
238	61	E41T1112D	E41T2112D	E41T3112D	MFV HYD TMP B	X		
239	59	E41T1109D	E41T2109D	E41T3109D	MOV HYD TMP A	X		
240	60	E41T1110D	E41T2110D	E41T3110D	MOV HYD TMP B	X		
241	60	E41R1102D	E41R2102D	E41R3102D	FUEL FLOW A2	X		
251	125	E41R1103D	E41R2103D	E41R3103D	FUEL FLOW B2	X		
253	34	E41R1034D	E41R2034D	E41R3034D	FUEL FLOW A1	X		
258	96	E41R1006D	E41R2006D	E41R3006D	HPFP SPEED A	X		
260	97	E41R1007D	E41R2007D	E41R3007D	HPFP SPEED B	X		
264	104	E41M1082D	E41M2082D	E41M3082D	HARD FAIL PARVAL2	X		
265	105	E41M1083D	E41M2083D	E41M3083D	HARD FAIL PARVAL3	X		
266	63	E41H1063D	E41H2063D	E41H3063D	POGO RIV POS A	X		
268	68	E41H1104D	E41H2104D	E41H3104D	AFV POS A	X		
269	69	E41H1105D	E41H2105D	E41H3105D	AFV POS B	X		
271	116	E41Q1101D	E41Q2101D	E41Q3101D	CALCULATED KF	X		
273	115	E41Q1100D	E41Q2100D	E41Q3100D	CALC C2	X		
280	98	E41M1076D	E41M2076D	E41M3076D	VEH CMD 1	X		
281	99	E41M1077D	E41M2077D	E41M3077D	VEH CMD 2	X		
286	4	E41W1004D	E41W2004D	E41W3004D	TIME REFERENCE	X		
287	94	E41P1094D	E41P2094D	E41P3094D	PC CNTL REF			X

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INSTRUMENTATION  
 MASTER LIST CROSS-REFERENCE  
 SORTED ON PID NUMBER

PID	DATA WORD	MSID ME-1 (2033)	MSID ME-2 (2032)	MSID ME-3 (2027)	NOMENCLATURE	DATA STREAM		
						128 KB	60 KB	ORBITER
288	90	E41J1090D	E41J2090D	E41J3090D	INHIBIT COUNT			X
289	91	E41J1091D	E41J2091D	E41J3091D	FID COUNT		X	X
291	1	E41M1001P	E41M2001P	E41M3001P	ID WORD 1		X	X
292	2	E41M1002P	E41M2002P	E41M3002P	ID WORD 2		X	X
293	3	E41M1003P	E41M2003P	E41M3003P	ENGINE STATUS WD		X	X
294		E41M1081D	E41M2081D	E41M3081D	HARD FAIL PARVAL1		X	X
301		E41R1089D	E41R2089D	E41R3089D	FUEL FLOW B1		X	X
553	103	E41T1153A	E41T2153A	E41T3153A	MFV DS SKIN TEMP 1			
554		E41T1154A	E41T2154A	E41T3154A	MFV DS SKIN TEMP 2			
821		E41P1100C	V41P1200C	V41P1300C	ENG FL IN PR 1			
835		E41P1160A	V41P1260A	V41P1360A	FL PRESS INT PR			
858		E41P1130C	V41P1230C	V41P1330C	ENG OX IN PR 1			
879		E41T1171A	V41T1271A	V41T1371A	GOX PRESS OUT T			
937		E41P1154A	V41P1254A	V41P1354A	HELIUM REGA OUT PR			
938		E41P1153A	V41P1253A	V41P1353A	HELIUM REGB OUT PR			
957		GGNP1034A	GGNP1034A	GGNP1034A	GN2 PRG OUT PR			
958		GGNP1139A	GGNP1139A	GGNP1139A	GN2 PRG OUT PR			
1021		V41T1101C	V41T1201C	V41T1301C	ENG FL IN T			
1035		V41T1161A	V41T1261A	V41T1361A	GH2 PRESS INT T			
1058		V41T1131C	V41T1231C	V41T1331C	GH2 PRESS INT T			
1132		GGNC1015A	GGNC1016A	GGNC1017A	MFV HEATER DRV CUR			
1145		V58T1131A	V58T1231A	V58T1331A	HYD SYS IF RT LN T			
1147		V58T1130A	V58T1230A	V58T1330A	HYD SYS IF PR LN T			
1157		GGNT1005A	GGNT1005A	GGNT1005A	GN2 PRG HTR TMP			
1158		GGNT1104A	GGNT1104A	GGNT1104A	GN2 PRG OUT TMP			
1420		E41T1155A	E41T2155A	E41T3155A	AFV DS SKIN TEMP 1			
1421		E41T1156A	E41T2156A	E41T3156A	AFV DS SKIN TEMP 2			
1552		V58H1100A	V58H1200A	V58H1300A	GIM ACT Z POS			
1558		V58H1150A	V58H1250A	V58H1350A	GIM ACT Z POS			
1895		E41T1152A	E41T2152A	E41T3152A	OPOV GOX S L SK T2			
1896		E41T1151A	E41T2151A	E41T3151A	OPOV GOX S L SK T1			
1912		E41T1150A	E41T2150A	E41T3150A	CONTROLLER PS TEMP			
7000		**CNTDWNCLK	**CNTDWNCLK	**CNTDWNCLK	COUNTDOWN CLOCK			
7001		V41X1109E	V41X1209E	V41X1309E	LH2 RECRC VLV OPEN			
7002		V41X1110E	V41X1210E	V41X1310E	LH2 RECRC VLV CLOS			
7003		V41X11661E	V41X12661E	V41X13661E	GO2 PRESS 1 ON/OFF			
7004		V41X11596E	V41X12596E	V41X13596E	GO2 PRESS 1 ON/OFF			
7005		V41X1105E	V41X1205E	V41X1305E	LH2 PREVALV CLOSED			
7006		V41X1135E	V41X1235E	V41X1335E	LH2 PREVALV CLOSED			
7007		V41X11614E	V41X12614E	V41X13614E	PNEU CROSSOVR OPEN			
7008		TRANSERR-CN	TRANSERR-CN	TRANSERR-CN	TRANS ERROR COUNT			

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INSTRUMENTATION  
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PID	DATA WORD	MSID ME-1 (2033)	MSID ME-2 (2032)	MSID ME-3 (2027)	NOMENCLATURE	DATA STREAM		
						128 KB	60 KB	ORBITER
7010		V41X11104X	V41X11204X	V41X11304X	LH2 PREVALVE OPEN			X
7011		V41X11134X	V41X11234X	V41X11334X	LOX PREVALVE OPEN			X
7015		GGNX1013E	GGNX1023E	GGNX1043E	MFV HEATR PWR IND			X
7016		GGNX11112E	GGNX1113E	GGNX1114E	MFV HEATR PWR ON			X
7021		V41R1115A	V41R1215A	V41R1315A	LH2 RECIRC PUMP S			X
7023		V41P1490A	V41P1490A	V41P1490A	GOX DISCONNECT PR			X
7024		V41P1600A	V41P1600A	V41P1600A	GOX DISCONNECT PR			X
7027		V41P1605A	V41P1605A	V41P1605A	PNEU VLV HE SUPPLY			X
7028		V41P1650A	V41P1650A	V41P1650A	PNEU VLV HE RG OUT			X
7029		V41P1650A	V41P1650A	V41P1650A	PNEU ACCUM PRESS			X
7031		V41P1150C	V41P1250C	V41P1350C	HE SUPPLY BOTL PR			X
7033		V58P0137A	V58P0237A	V58P0337A	HYD SYS CRC PMP PR			X
7035		V95U0163C	V95U0163C	V95U0163C	TOTAL LOAD FACTOR			X
7036		V95H0175C	V95H0175C	V95H0175C	ORBITER ALTITUDE			X
7037		V95L0190C	V95L0190C	V95L0190C	SHUTTLE VEL X-COMP			X
7038		V95L0191C	V95L0191C	V95L0191C	SHUTTLE VEL Y-COMP			X
7039		V95L0192C	V95L0192C	V95L0192C	SHUTTLE VEL Z-COMP			X
7041		V41P1564A	V41P1564A	V41P1564A	LH2 SYS DELTA P			X
7042		V41P1464A	V41P1464A	V41P1464A	LOX SYS DELTA P			X
7043		V41P1433C	V41P1433C	V41P1433C	LH2 MANIFOLD PR			X
7044		V41P1533C	V41P1533C	V41P1533C	LH2 MANIFOLD PR			X
7045		V41T1428A	V41T1428A	V41T1428A	LH2 MANIFOLD T A			X
7046		V41T1527A	V41T1527A	V41T1527A	LH2 MANIFOLD T B			X
7047		V41T1528A	V41T1528A	V41T1528A	LOX MANIFOLD T A			X
7051		V41T1151A	V41T1251A	V41T1351A	AFT FSLG HE SPLY T			X
7052		V41T1152A	V41T1252A	V41T1352A	MID FSLG HE SPLY T			X
7053		V41T11601A	V41T1601A	V41T1601A	PNEU VLV HE SUP T			X
7055		V09T1702A	V09T1702A	V09T1702A	AFT FSLG FLR BTM T			X
7056		V09T1720A	V09T1720A	V09T1720A	RH AFT FSLG SIDE T			X
7057		V09T1724A	V09T1724A	V09T1724A	LH AFT FSLG SIDE T			X
7060		V58T2140A	V58T2240A	V58T2340A	H ACCUM SYS RTN T			X
7061		V58T0183A	V58T0283A	V58T0383A	HYD LH2 ET R ACT T			X
7062		V58T0186A	V58T0286A	V58T0386A	HYD LH2 ET R ACT T			X
7065		V58P0114C	V58P0214C	V58P0314C	HYD SYS SUP PR A			X
7066		V58P0116C	V58P0216C	V58P0316C	HYD SYS SUP PR C			X
7075		V58P0616A	V58P06216A	V58P06316A	HYD ACM SYS RTN PR			X
7077		V58P0115A	V58P0215A	V58P0315A	HYD SYS SUP PR B			X
7081		GLHQ1009A	GLHQ1009A	GLHQ1009A	LH2 STORAGE TK LVL			X
7082		GLQO0229A	GLQO0229A	GLQO0229A	LOX TANK SUP FLOW			X
7085		GEC2P2300A	GEC2P2300A	GEC2P2300A	GN2 AFT INTF PR			X
7086		GECT2310A	GECT2310A	GECT2310A	GN2 AFT INTF T			X

ATLANTIS STS-46

INSTRUMENTATION  
 MASTER LIST CROSS-REFERENCE  
 SORTED ON PID NUMBER

PID	DATA WORD	MSID ME-1 (2033)	MSID ME-2 (2032)	MSID ME-3 (2027)	NOMENCLATURE	DATA STREAM		
						128 KB	60 KB	ORBITER
7091		T41T11705A	T41T11705A	T41T11705A	LH2 ULLAGE TEMP			X
7092		T41T11755A	T41T11755A	T41T11755A	LO2 ULLAGE TEMP			X
7093		T41P1700C	T41P1700C	T41P1700C	LH2 ULLAGE PRES 1			X
7094		T41P1701C	T41P1701C	T41P1701C	LH2 ULLAGE PRES 2			X
7095		T41P1702C	T41P1702C	T41P1702C	LH2 ULLAGE PRES 3			X
7096		T41P1750C	T41P1750C	T41P1750C	LO2 ULLAGE PRES 1			X
7097		T41P1751C	T41P1751C	T41P1751C	LO2 ULLAGE PRES 2			X
7098		T41P1752C	T41P1752C	T41P1752C	LO2 ULLAGE PRES 3			X