INDEPENDENT ORBITER ASSESSMENT

ASSESSMENT
OF THE
GUIDANCE, NAVIGATION,
AND CONTROL SUBSYSTEM

23 JANUARY 1988

MCDONNELL DOUGLAS ASTRONAUTICS COMPANY
HOUSTON DIVISION

SPACE TRANSPORTATION SYSTEM ENGINEERING AND OPERATIONS SUPPORT

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INDEPENDENT ORBITER ASSESSMENT ASSESSMENT OF THE GUIDANCE, NAVIGATION, AND CONTROL SUBSYSTEM FMEA/CIL

23 JANUARY 1988

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1.0 EXECUTIVE SUMMARY

The McDonnell Douglas Astronautics Company (MDAC) was selected in June 1986 to perform an Independent Orbiter Assessment (IOA) of the Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL). Direction was given by the STS Orbiter and GFE Projects Office to perform the hardware analysis using the instructions and ground rules defined in NSTS 22206, Instructions for Preparation of FMEA and CIL, 10 October 1986.

The IOA effort first completed an analysis of the Guidance, Navigation, and Control System (GNC) hardware, generating draft failure modes and potential critical items. To preserve independence, this analysis was accomplished without reliance upon the results contained within the NASA FMEA/CIL documentation. The IOA results were then compared to the NASA FMEA/CIL baseline with proposed Post 51-L updates included. A resolution of each discrepancy from the comparison is provided through additional analysis as required. This report documents the results of that comparison for the Orbiter GNC hardware.

The IOA product for the GNC analysis consisted of one-hundred forty-one (141) failure mode "worksheets" that resulted in twenty-four (24) potential critical items being identified. Comparison was made to the NASA baseline (as of 4 January 1988) which consisted of one-hundred forty-eight (148) FMEAs and thirty-six (36) CIL items. The comparison determined if there were any results which had been found by the IOA but were not in the NASA baseline. This comparison produced agreement on all but fifty-six (56) FMEAs which caused differences in zero (0) CIL items. Reference Figure 1.

The issues arose due to different Interpretation of NSTS 22206, FMEA/CIL preparation instructions. IOA analyzed the components of the electrical circuits, generating fifty-six (56) worksheets more than NASA, who treated the electrical circuits as black boxes. Of these fifty-six (56) differences with the FMEA's, all were minor and did not affect criticalities assessments. In conclusion, IOA is in full agreement with the revised NASA CIL baseline.

GNC FMEA/CIL ASSESSMENT OVERVIEW

GNC ASSESSMENT SUMMARY

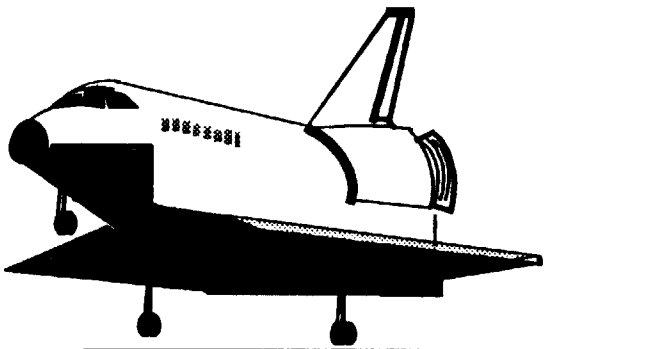
	IOA	NASA	ISSUES
FMEA	175	148	56
CIL	36	36	0

RHC

	IOA	NASA	ISSUES
FMEA	5	3	2
CIL	1	1	0

THC

	IOA	NASA	ISSUES
FMEA	3	3	0
CIL	1	1	0



RPTA

	IOA	NASA	ISSUES
FMEA	4	3	1
CIL	1	1	0

SBTC

	IOA	NASA	ISSUES
FMEA	6	4	2
CIL	2	2	0

FUNCTION SWITCHES

	IOA	NASA	ISSUES
FMEA	83	62	21
CIL	9	9	0

ADTA

	IOA	NASA	ISSUES
FMEA	2	2	0
CIL	0	0	0

POWER SWITCHES & CIRCUITS

	IOA	NASA	ISSUES
FMEA	40	49	8
CIL	12	12	0

Figure 1a - GNC FMEA/CIL ASSESSMENT OVERVIEW

GNC FMEA/CIL ASSESSMENT OVERVIEW CONTINUED

ST

	IOA	NASA	ISSUES
FMEA	5	4	1
CIL	0	0	0

IMU

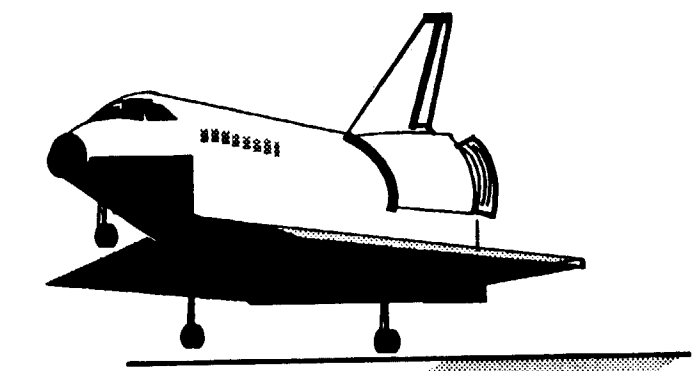
	IOA	NASA	ISSUES
FMEA	2	2	0
CIL	2	2	0

RJD

	IOA	NASA	ISSUES
FMEA	6	4	2
CIL	3	3	0

ORGA

	IOA	NASA	ISSUES
FMEA	2	2	0
CIL	1	1	0



ATVC

	IOA	NASA	ISSUES
FMEA	4	2	2
CIL	1	1	0

AA

	IOA	NASA	ISSUES
FMEA	6	2	4
CIL	1	1	0

COAS

	IOA	NASA	ISSUES
FMEA	3	2	1
CIL	0	0	0

ASA

	IOA	NASA	ISSUES
FMEA	2	2	0
CIL	1	1	0

SRGA

	IOA	NASA	ISSUES
FMEA	2	2	0
CIL	1	1	0

Figure 1b - GNC FMEA/CIL ASSESSMENT OVERVIEW - CONTINUED

2.0 INTRODUCTION

2.1 Purpose

The 51-L Challenger accident prompted the NASA to readdress safety policies, concepts, and rationale being used in the National Space Transportation System (NSTS). The NSTS Office has undertaken the task of reevaluating the FMEA/CIL for the Space Shuttle design. The MDAC is providing an independent assessment of the proposed Post 51-L Orbiter FMEA/CIL for completeness and technical accuracy.

2.2 Scope

The scope of the independent FMEA/CIL assessment activity encompasses those Shuttle Orbiter subsystems and GFE hardware identified in the Space Shuttle Independent FMEA/CIL Assessment Contractor Statement of Work. Each subsystem analysis addresses hardware, functions, internal and external interfaces, and operational requirements for all mission phases.

2.3 Analysis Approach

The independent analysis approach is a top-down analysis utilizing as-built drawings to breakdown the respective subsystem into components and low-level hardware items. Each hardware item is evaluated for failure mode, effects, and criticality. These data are documented in the respective subsystem analysis report, and are used to assess the proposed Post 51-L NASA and Prime Contractor FMEA/CIL. The IOA analysis approach is summarized in the following Steps 1.0 through 3.0. Step 4.0 summarizes the assessment of the NASA and Prime Contractor FMEA/CIL which is documented in this report.

Step 1.0 Subsystem Familiarization
- 1.1 Define subsystem functions
- 1.2 Define subsystem components
- 1.3 Define subsystem specific ground rules and assumptions

Step 2.0 Define subsystem analysis diagram
- 2.1 Define subsystem
- 2.2 Define major assemblies
- 2.3 Develop detailed subsystem representations

Step 3.0 Failure events definition
- 3.1 Construct matrix of failure modes
- 3.2 Document IOA analysis results

Step 4.0 Compare IOA analysis data to NASA FMEA/CIL
- 4.1 Resolve differences
- 4.2 Review in-house
- 4.3 Document assessment issues
- 4.4 Forward findings to Project Manager

2.4 Ground Rules and Assumptions

The GNC ground rules and assumptions used in the IOA are defined in Appendix B.

3.0 SUBSYSTEM DESCRIPTION

3.1 Design and Function

The function of the GNC hardware is to respond to guidance, navigation, and control software commands to effect vehicle control and to provide sensor and controller data to GNC software.

The functions of the GNC software can be divided into flight control, guidance, navigation, hardware data processing, and crew display. The specific tasks of each function, as well as the GNC hardware used to support them, vary with mission phase.

Figure 2 is an overview of the GNC hardware for which failure modes analysis was performed. For the analysis, the hardware was divided into the following three categories:

I. MAJOR COMPONENTS (BLACK BOXES) - This category includes the sensors, manual controllers, and effector interfaces listed below:

(1) RHC	(8) ADTA
(2) THC	(9) RGA (ORB)
(3) RPTA	(10) RGA (SRB)
(4) SBTC	(11) AA
(5) IMU	(12) ASA
(6) ST	(13) RJD
(7) COAS	(14) ATVC

Figures 3 - 16 provide a hardware breakdown of each of the above components.

FUNCTION SWITCHES AND CIRCUITS - This category consists of switches/circuits whose primary purpose is to select a particular mode of operation for the GNC software. Twelve groups were identified and are listed below:

(1) TRIM ENABLE INHIBIT SW'S	(8) ATT REF PBI
(2) TRIM SW'S	(9) ENTRY MODE SW CKT
(3) TRIM ON/OFF SW'S	(10) ABORT MODE CKT
(4) SENSE -Z/-X SW	(11) DAP PBI'S
(5) P,R/Y CSS/AUTO PBI'S	(12) FCS CHNL CNTL CKT
(6) SPD BK/THROT PBI'S	
(7) BODY FLAP CNTL CKT	

III. POWER SWITCHES AND CIRCUITS - This category consists of groups of switches/circuits that provide electrical power to the major components and Flight Control System (FCS) annunciation lamps. Thirteen groups were identified and are listed below:

(1) FLT CNTLR PWR CKT
(2) IMU PWR CKT
(3) ST PWR CKT
(4) ST DOOR PWR CKT
(5) COAS PWR CKT
(6) ADTA PWR CKT
(7) RGA (ORB) PWR CKT
(8) RGA (SRB) PWR CKT
(9) AA PWR CKT
(10) ASA PWR CKT
(11) RJD PWR CKT
(12) ATVC PWR CKT
(13) FCS SW ANNUN CKT

A brief description of the major components and function switches and circuits is provided below.

1. Three RHC's, two forward and one aft, provide manual attitude control.

2. Two THC's, one at the CDR's station and one aft, provide manual translation control with the use of the RCS system.

3. Two RPTA's, one connected to the CDR's pedals and one to the PLT's, send rudder and nose wheel steering commands to the GPCs.

4. Two SBTCs, one at the CDRs station and one at the PLTs, control the speedbrake during entry. The pilot's SBTC can also be used for main engine throttle control during ascent.

5. Three IMU's, attached to the NAV base, provide acceleration and attitude data to the GPC's.

6. Two ST's, mounted on the NAV base, are used to align the IMU's and to provide line of site vectors during rendezvous missions.

7. One COAS that can be mounted at the CDR's station or the aft station is a backup to the ST's for use in IMU alignment.

8. Four ADTA's, located in the forward avionics bay, provides pressure data to the GPC's. this data is used during entry to calculate angle of attack, relative speed, mach number, and barometric altitude.

9. Four orbiter RGA's, mounted at the bottom of the aft bulkhead, provide attitude rates about each body axis to flight control for stability augmentation during ascent and entry.The RGA's also drive the rate needles of the ADI's during ascent.

10. Four SRB RGA's, two on the left and two on the right SRB, provide pitch and yaw rates to flight control to assist in SRB TVC and to provide stability augmentation during ascent until SRB separation.

11. Four AA's, located in the forward avionics bays, measure normal and lateral body acceleration for use in flight control to provide stability augmentation during ascent and entry.

12. Four ASA's, located in the aft avionics bays, derive aerosurface actuator position error commands and perform fault detection.

13. Four RJD's, two forward and two aft, in response to flight control commands, send signals to open/close the oxidizer and fuel valves associated with each RCS jet.

14. Four ATVC's, located in the aft avionics bays, provide SRB and main engine gimbal control for slewing engine bells prior to liftoff, gimbaling engines to control trajectory during flight, positioning the main engines to a dump position, and stow position.

15. Two TRIM ENABLE/INHIBIT switches, CDR's and PLT's, allow the software to accept or reject trim commands from the panel trim switches and the RHC trim switches.

16. Six TRIM switches, a roll, pitch, yaw set at the CDR's and PLT's station, allow the crew to make small changes in the vehicles attitude via commands to the aerosurfaces.

17. Two panel TRIM ON/OFF switches, CDR's and PLT's, provide power to the associated TRIM switches when in the "ON" position.

18. One SENSE -Z/-X switch located on the aft panel A6, is used onorbit to make the aft RHC, THC, and ADI correspond to the operator's line of sight.

19. Two sets of PITCH, ROLL/YAW CSS/AUTO PBI's exist (eight switches total) that allow the CDR or PLT to select auto or manual (CSS) attitude control during ascent and entry.

20. Two SPD BK/THROT PBI's, CDR's and PLT's station, allow the crew to switch to auto from manual throttle control during ascent and to auto or manual speed brake control during entry.

21. The BODY FLAP CONTROL CIRCUIT consists of two BODY FLAP UP/DOWN switches and two BODY FLAP AUTO/MANUAL PBI's that allow manual or auto control from either the CDR's or PLT's station.

22. Three ATT REF PBI's, located at the CDR's, PLT's, and aft crew stations, allow the crew to select a reference frame from which attitude errors will be displayed on the three Attitude Direction Indicators (ADI). The ATT REF PBI is also used to take "marks" when the COAS is used for IMU alignment.

23. The ENTRY MODE SWITCH CIRCUIT provides capability for the crew to change DAP control modes during entry via the ENTRY MODE switch.

24. The ABORT MODE SWITCH CIRCUIT provides capability for the crew to select and initiate an abort mode during ascent via the ABORT MODE ROTARY switch and the ABORT push button.

25. Forty eight DAP PBI's (24 fwd and 24 aft) provide crew flexibility in selecting translational and rotational control options with the ONORBIT and TRANS DAPS.

26. Four FCS CHANNEL CONTROL CIRCUITS provide power and control to one of four ASA's and ATVC's via the four FCS CHANNEL OVERRIDE/AUTO/OFF switches on panel C3.

3.2 Interfaces and Locations

The GNC hardware is located throughout the orbiter. The precise location for each component/switch/circuit was provided on the analysis worksheets in Working Paper No. 1.0-WP-VA86001-16.

The GNC hardware is interfaced with the software via the flight critical MDM's. Switch and power status is monitored via the flight critical MDM's and operational instrumentation.

3.3 Hierarchy

Figure 2 illustrates the breakdown of the GNC into it's hardware components, and Figures 3 through 16 are the detailed systems representations.

GNC SUBSYSTEM OVERVIEW

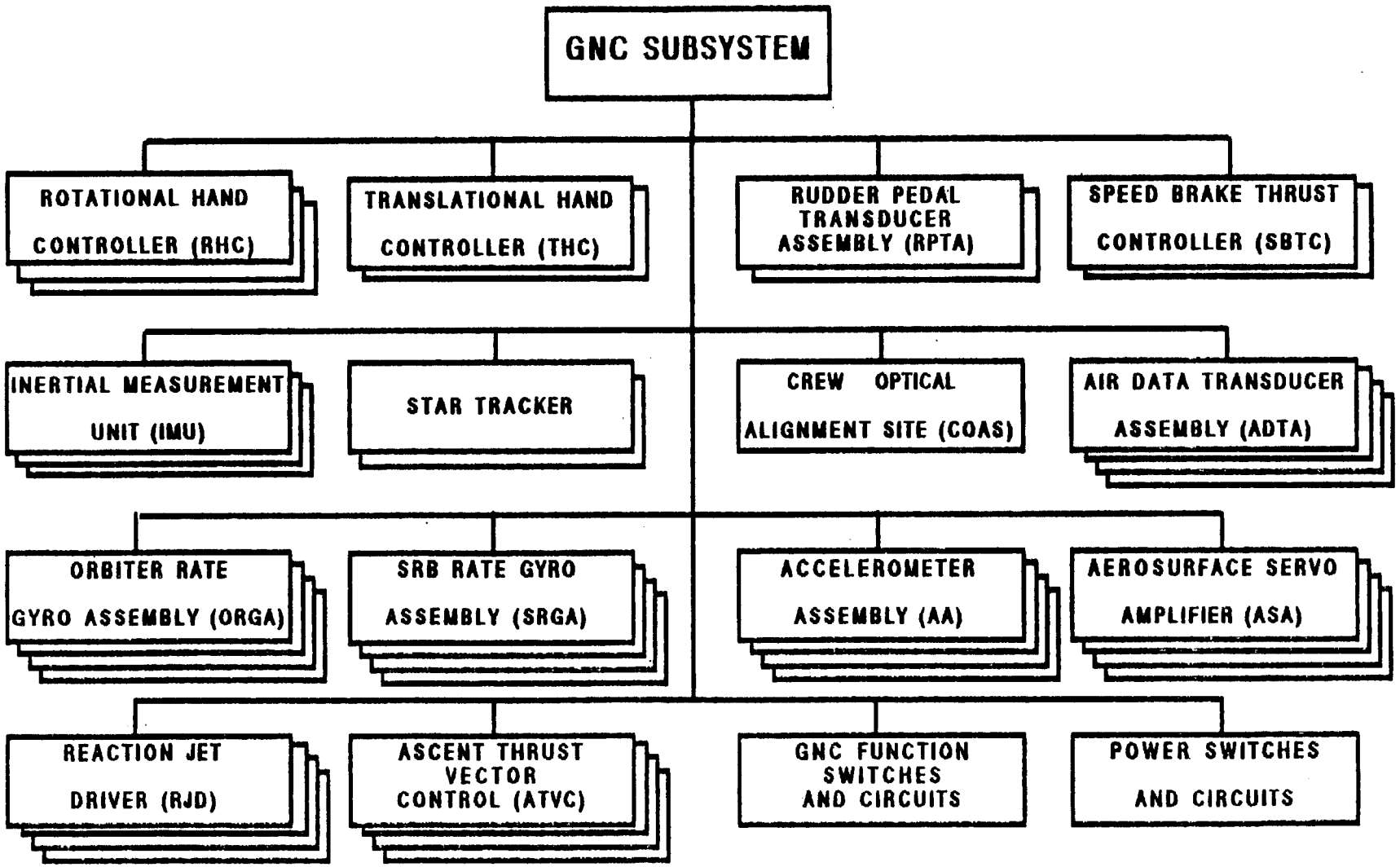


Figure 2 - GNC SUBSYSTEM OVERVIEW

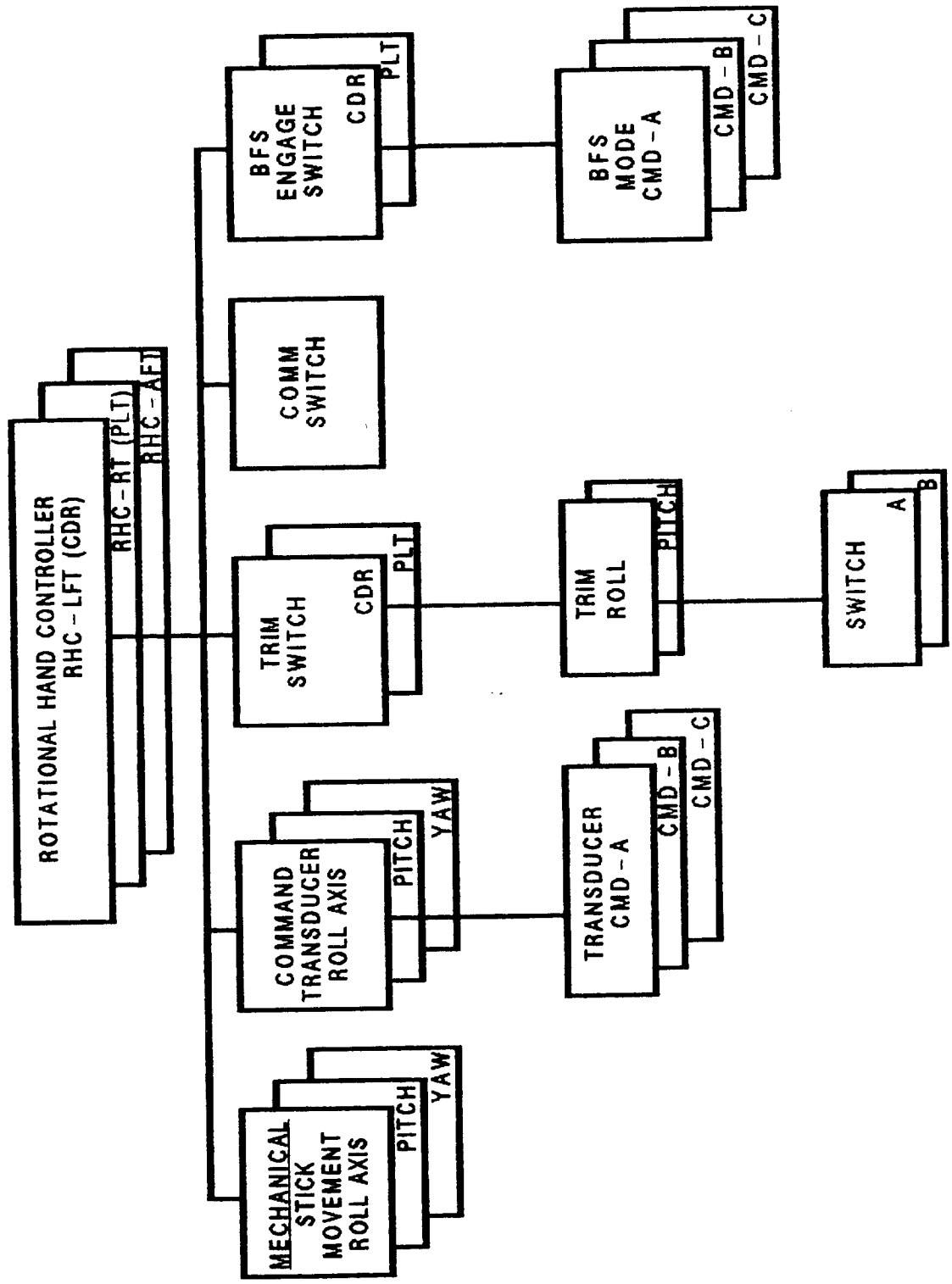


Figure 3 - GNC ROTATIONAL HAND CONTROLLER (RHC)

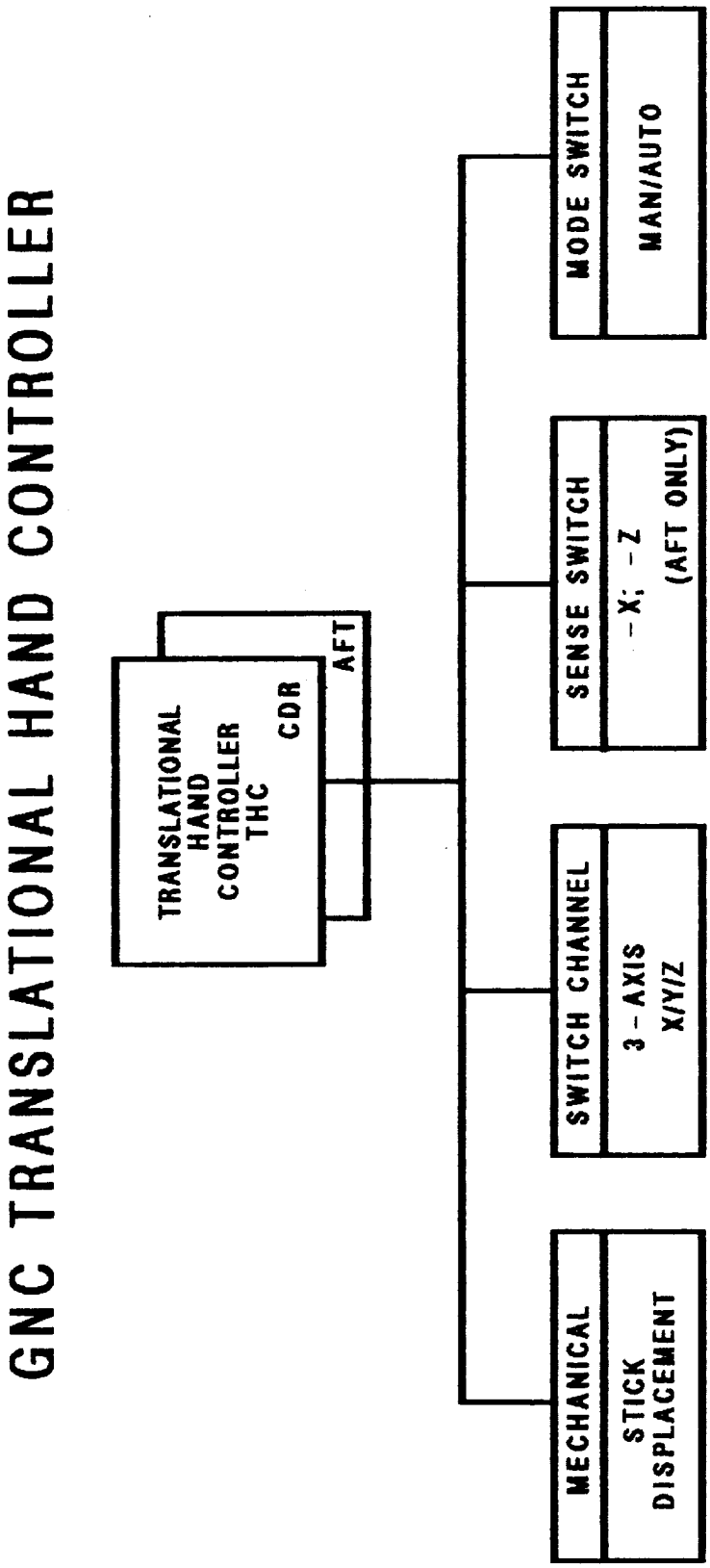


Figure 4 - GNC TRANSLATIONAL HAND CONTROLLER (THC)

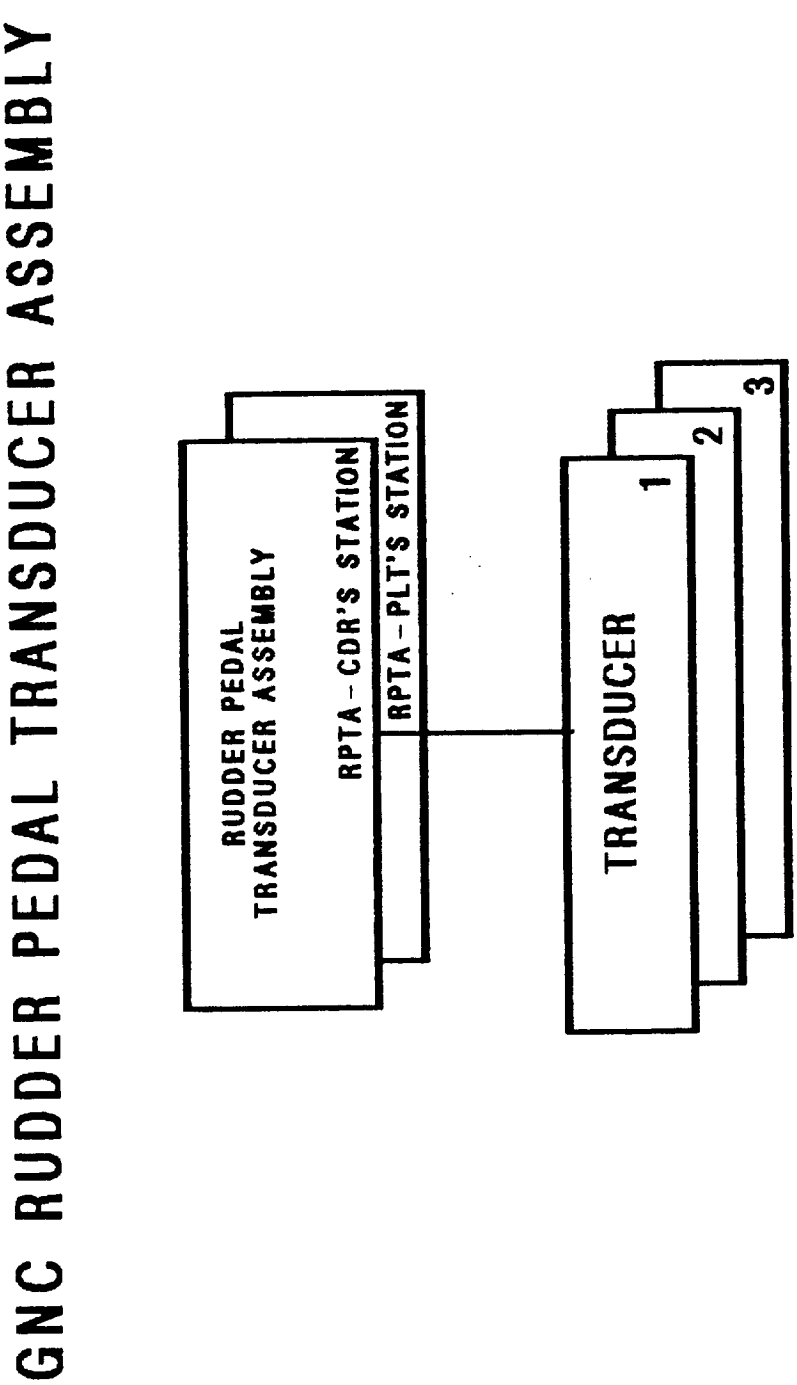


Figure 5 - GNC RUDDER PEDAL TRANSDUCER ASSEMBLY (RPTA)

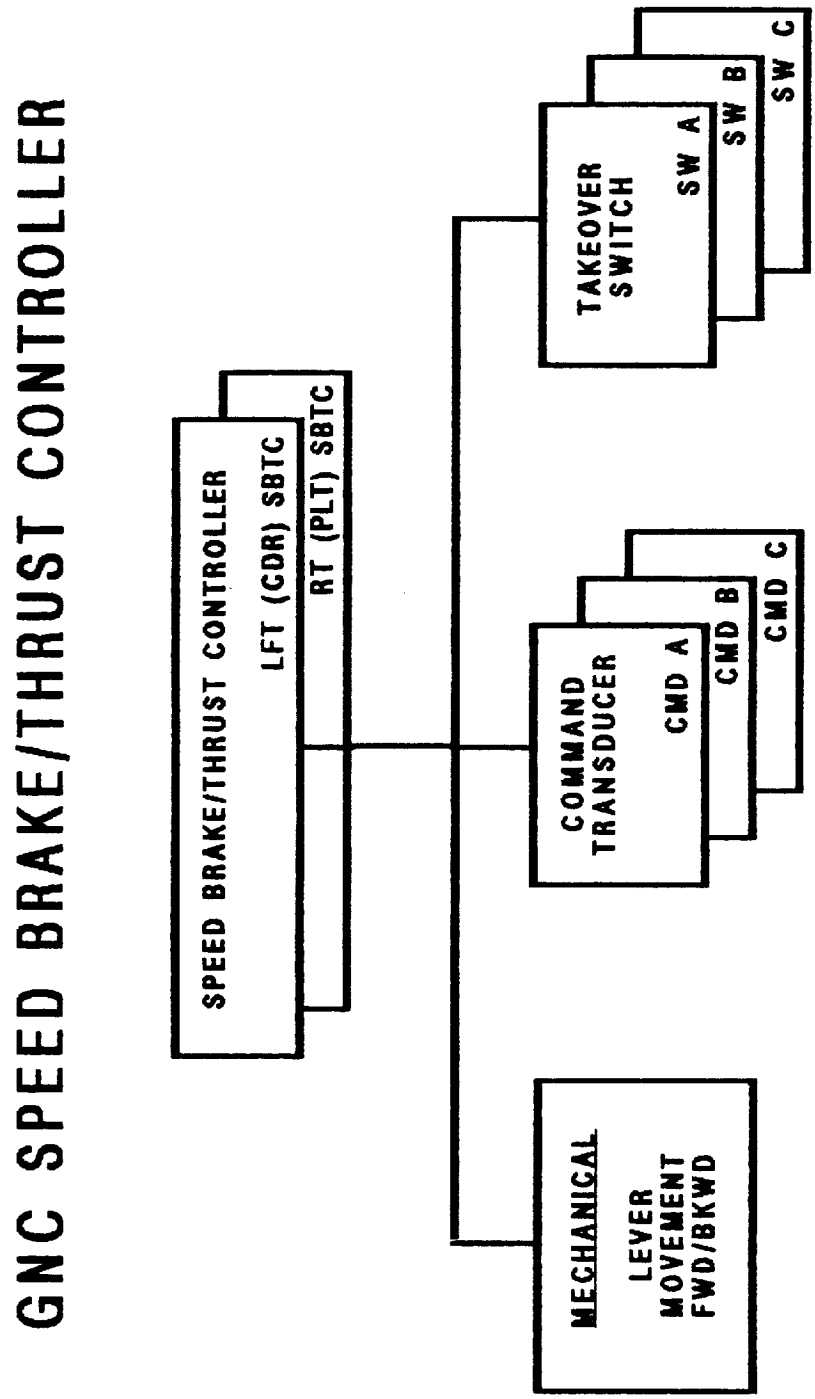


Figure 6 - GNC SPEED BRAKE THRUST CONTROLLER (SBTC)

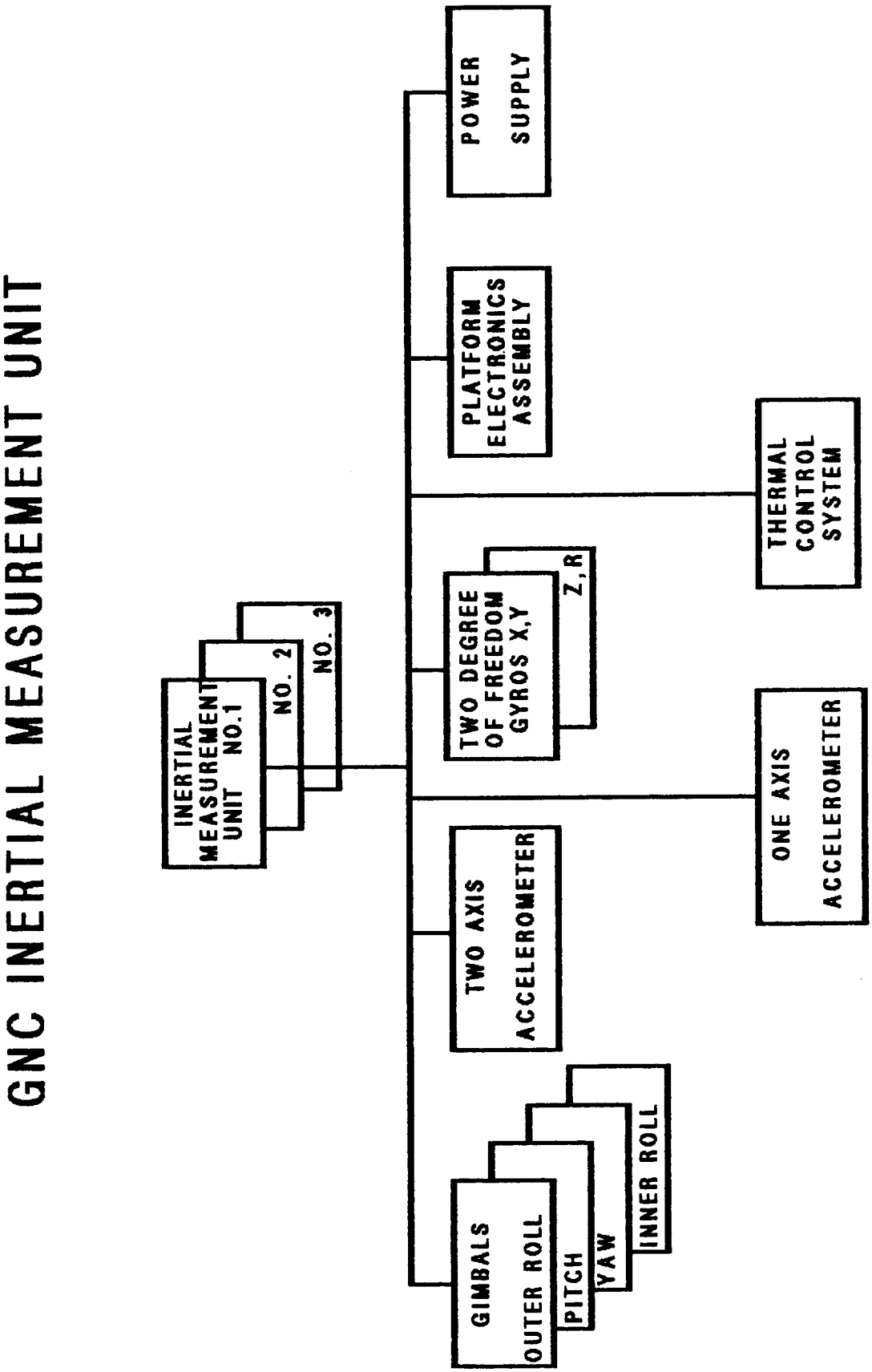


Figure 7 - GNC INERTIAL MEASUREMENT UNIT (IMU)

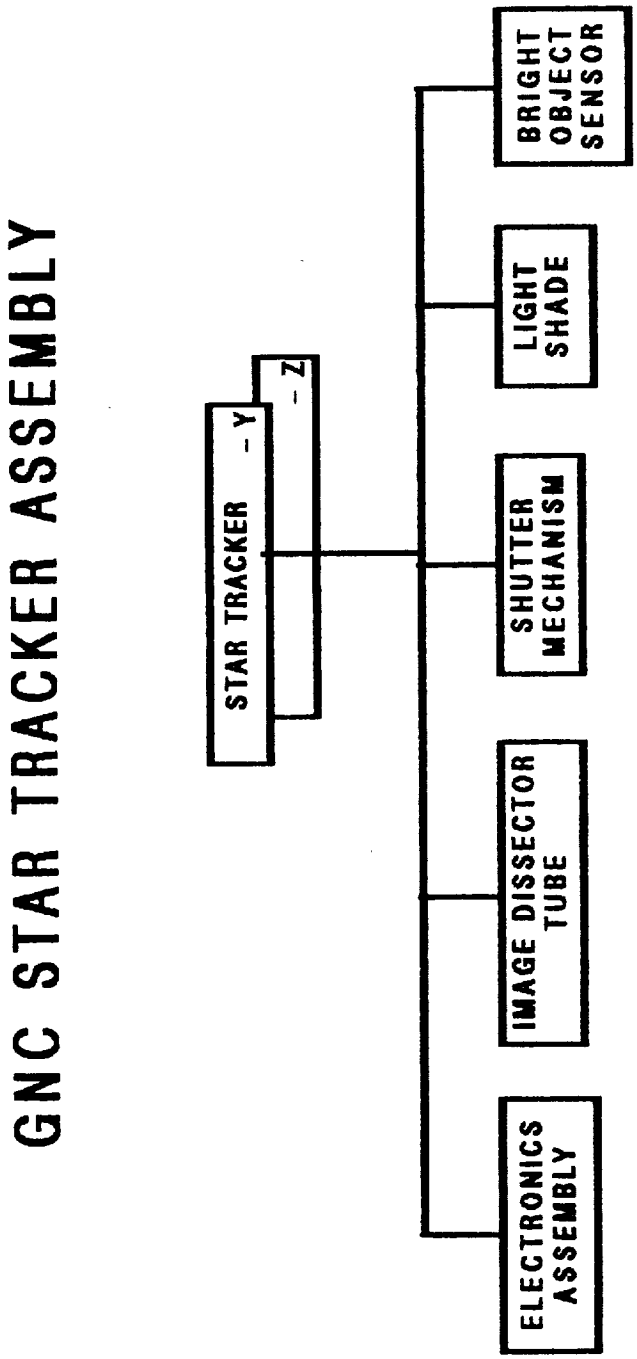


Figure 8 - GNC STAR TRACKER (ST)

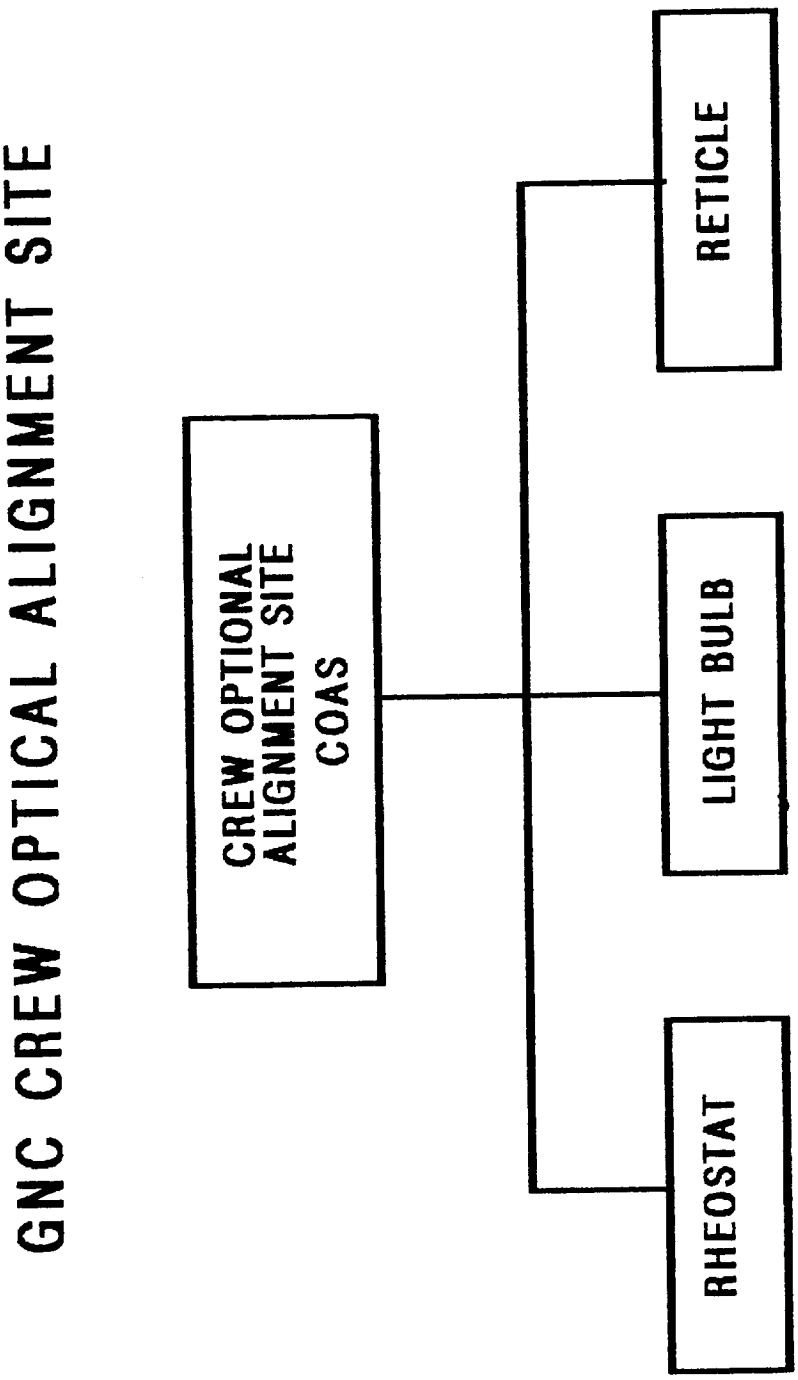


Figure 9 - GNC CREW OPTICAL ALIGNMENT SITE (COAS)

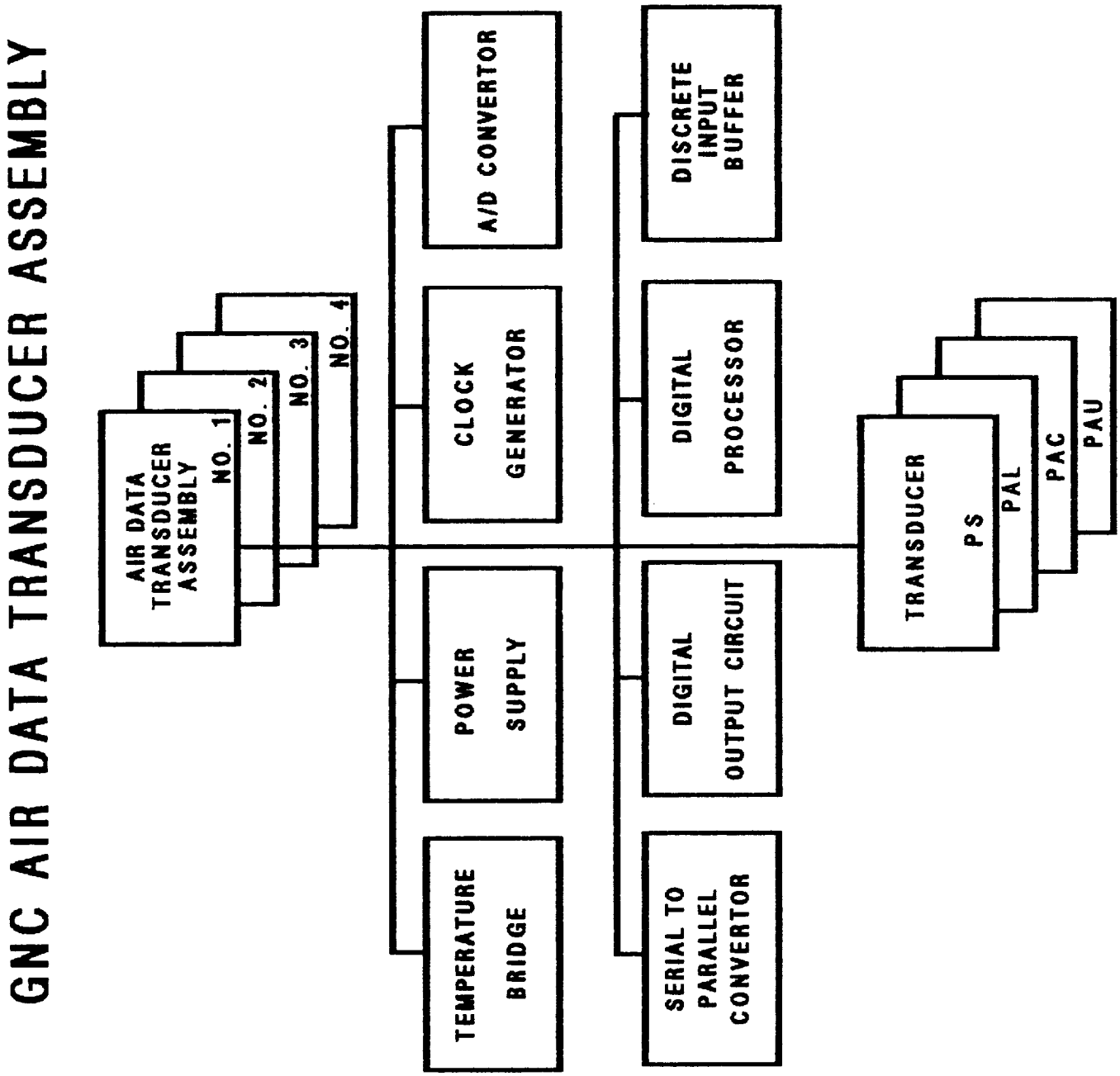


Figure 10 - GNC AIR DATA TRANSDUCER ASSEMBLY (ADTA)

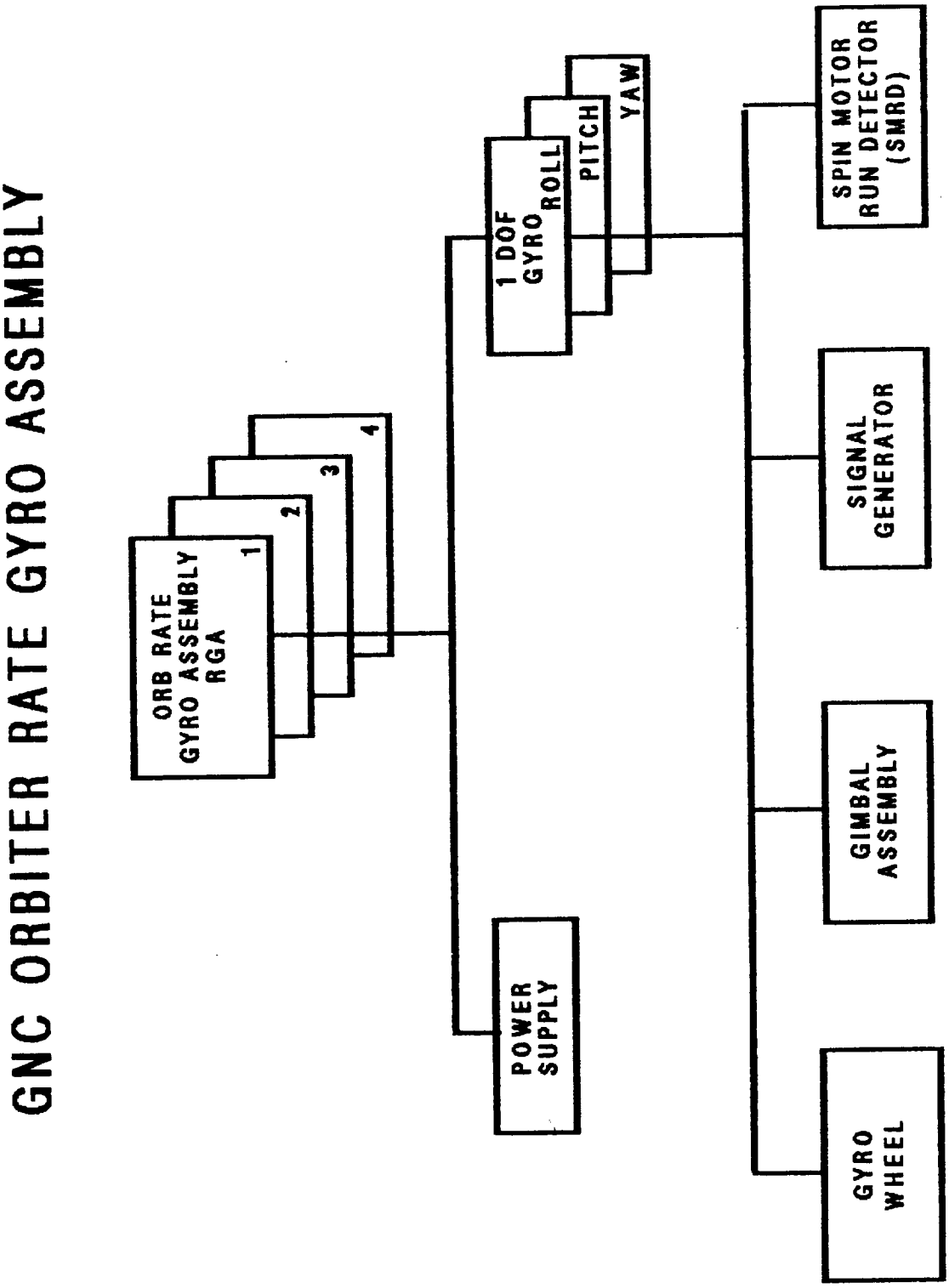


Figure 11 - GNC ORBITER RATE GYRO ASSEMBLY (ORGA)

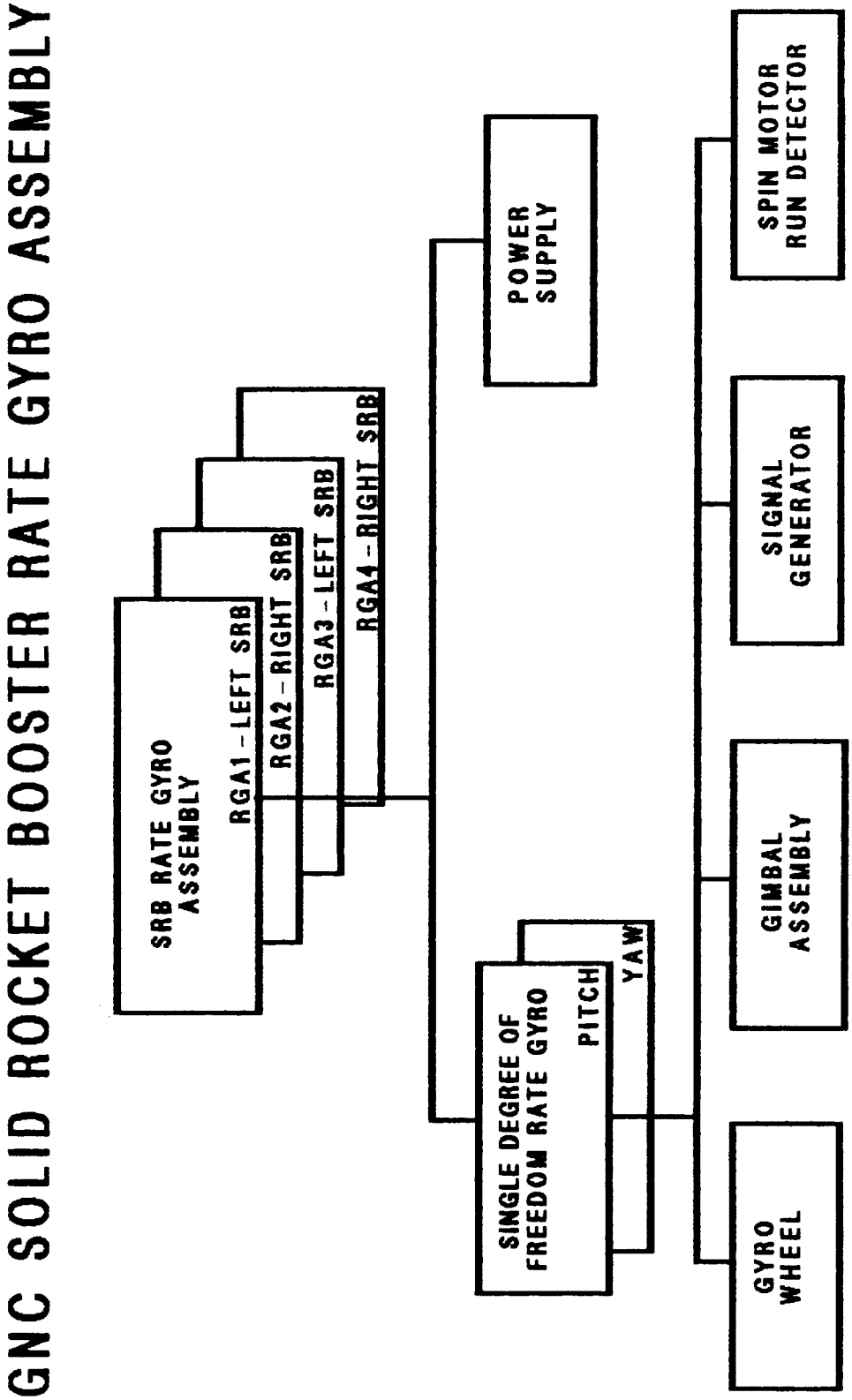


Figure 12 - GNC SRB RATE GYRO ASSEMBLY (SRGA)

GNC ACCELEROMETER ASSEMBLY

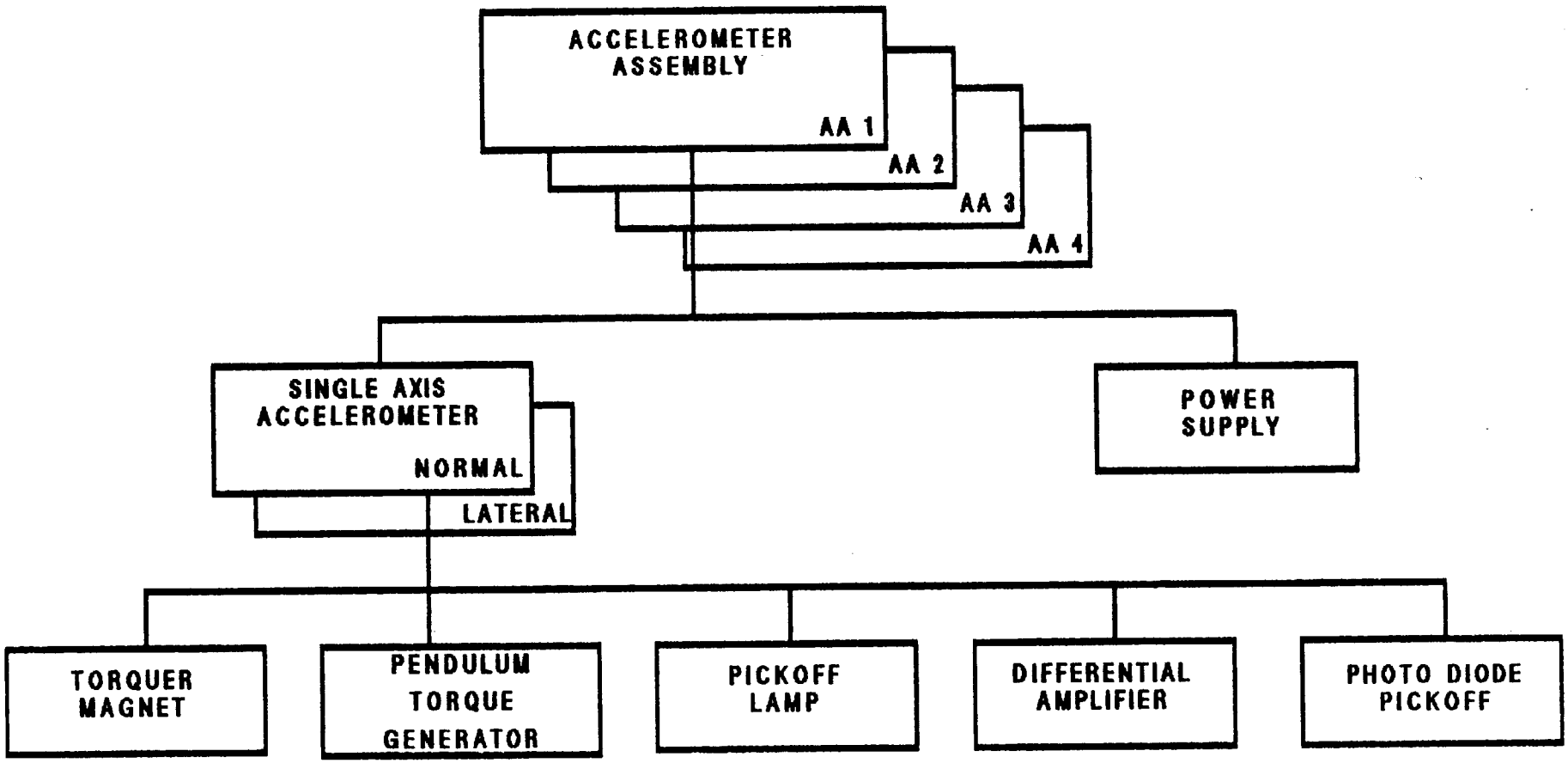


Figure 13 - GNC ACCELEROMETER ASSEMBLY (AA)

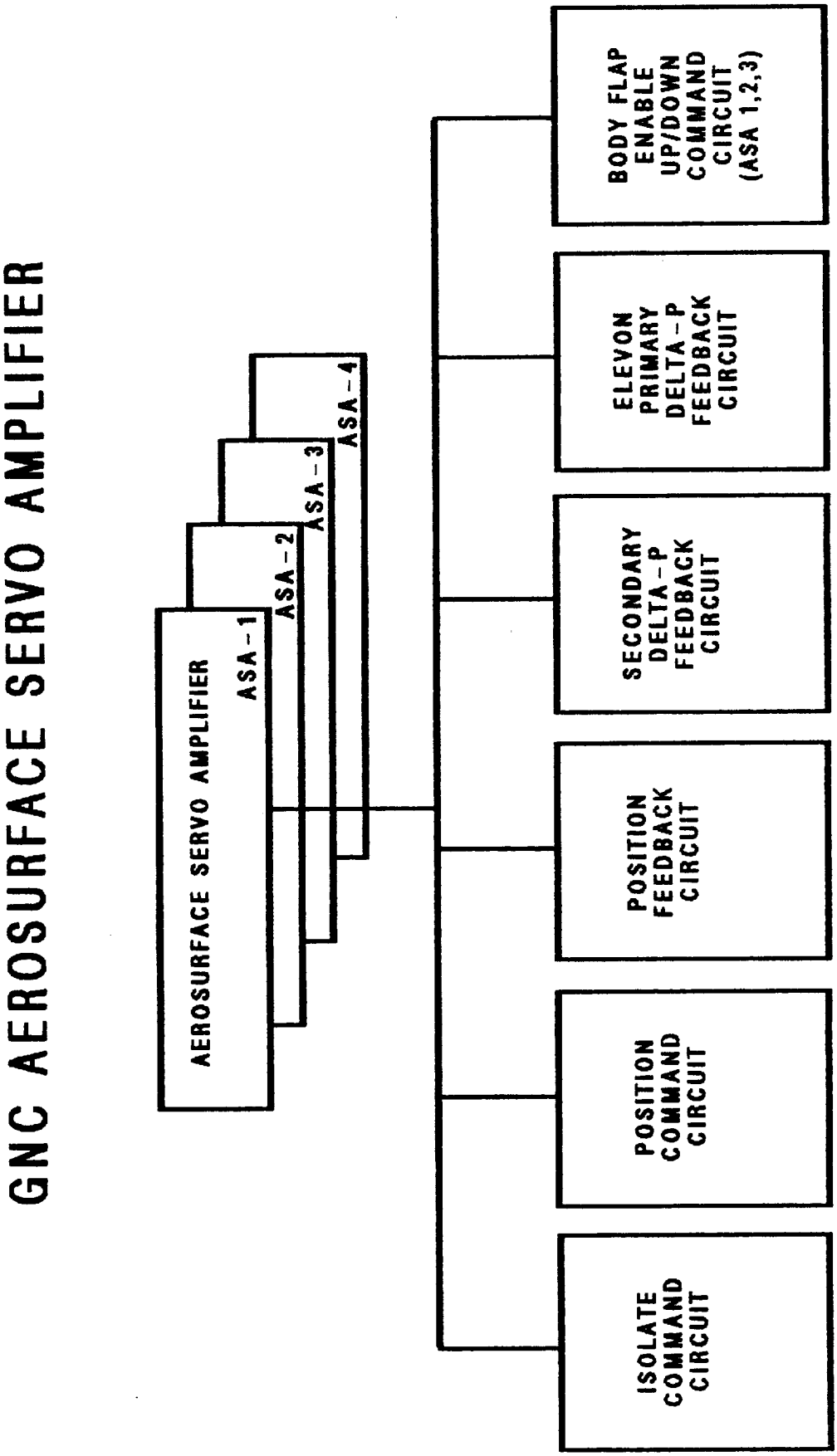


Figure 14 - GNC AEROSURFACE SERVO AMPLIFIER (ASA)

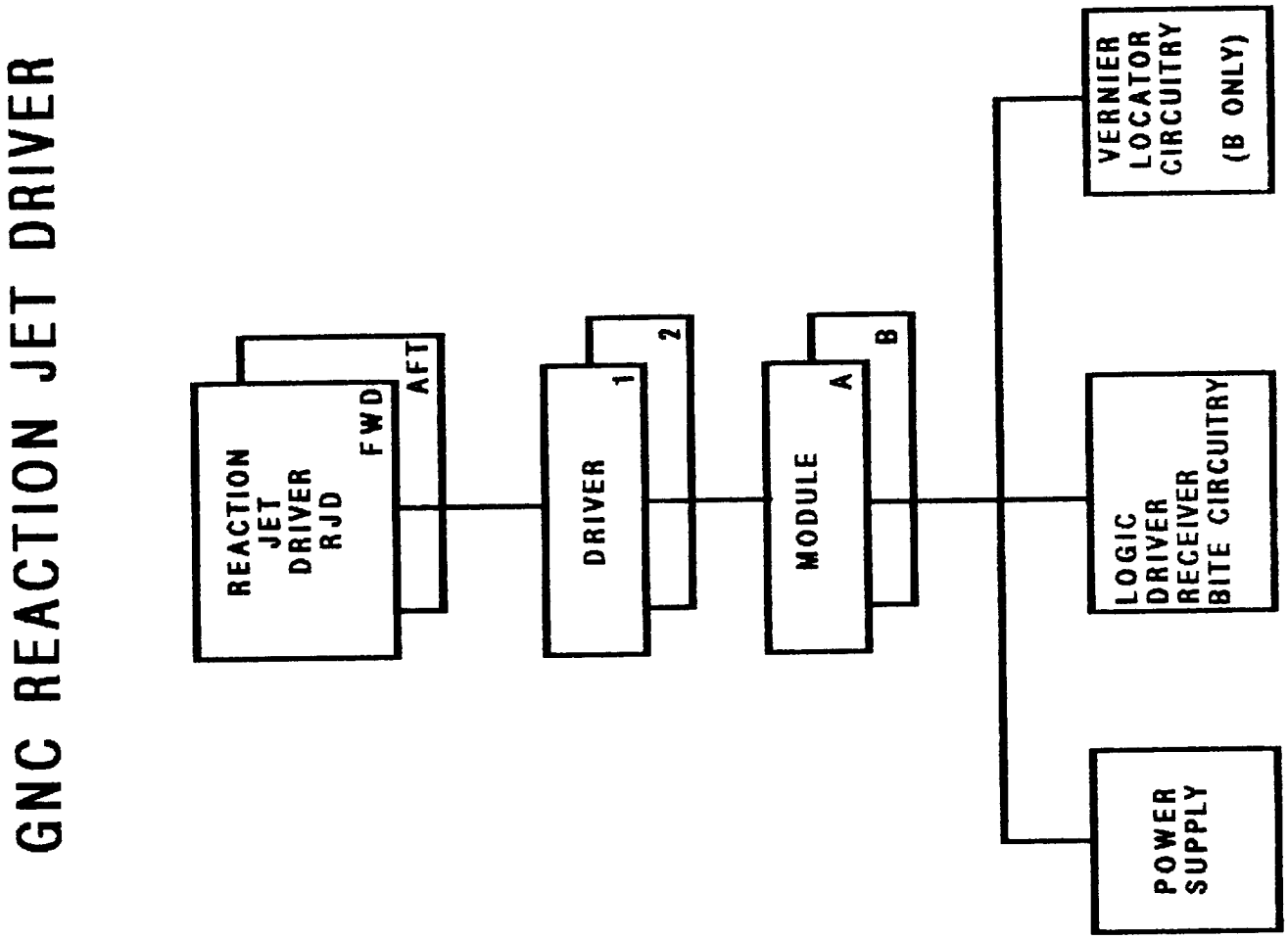


Figure 15 - GNC REACTION JET DRIVER (RJD)

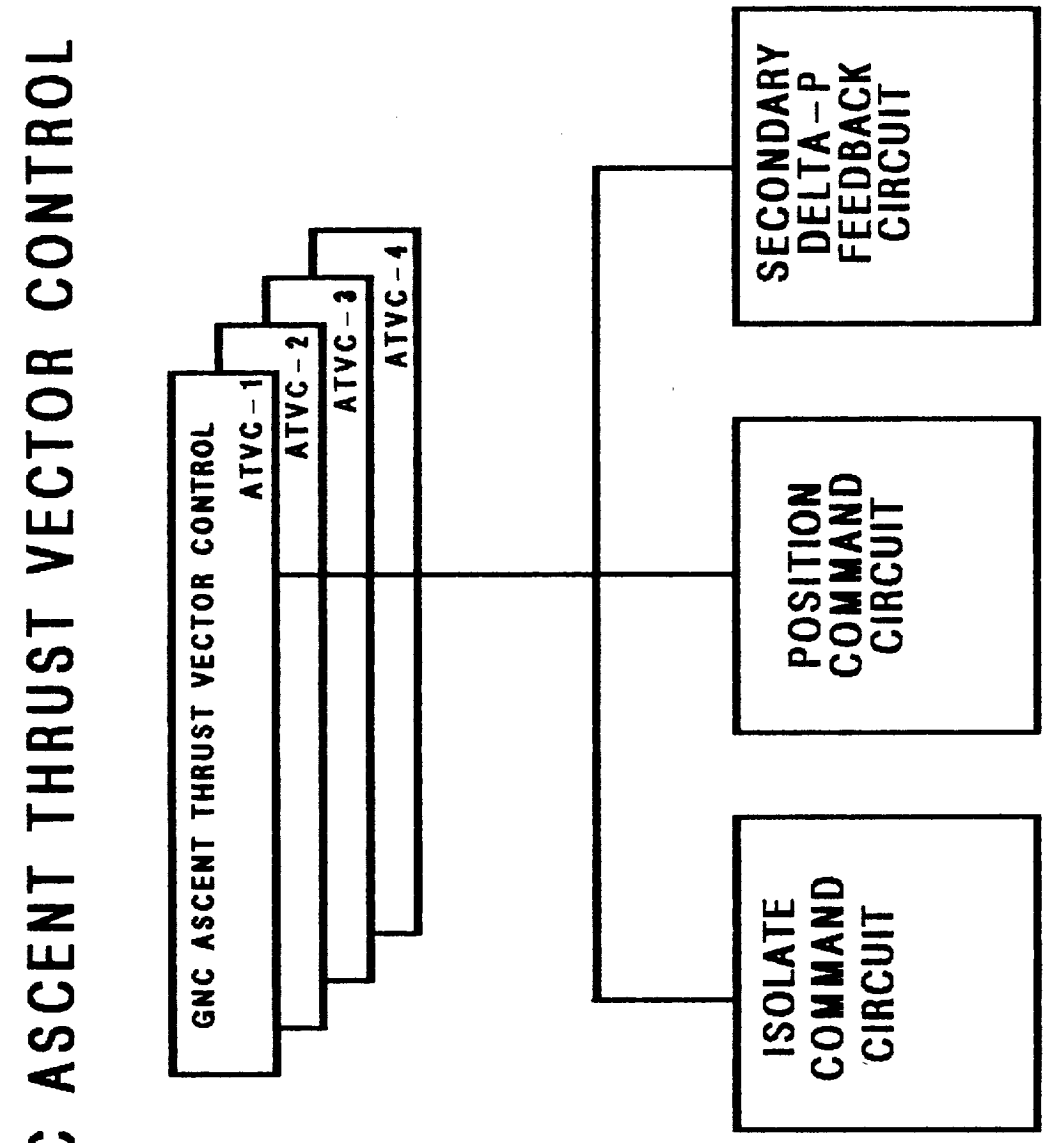


Figure 16 - GNC ASCENT THRUST VECTOR CONTROL (ATVC)

4.0 ASSESSMENT RESULTS

The IOA analysis of the GNC hardware initially generated one-hundred forty-one (141) failure mode worksheets and identified twenty-four (24) Potential Critical Items (PCIs) before starting the assessment process. In order to facilitate comparison, thirty-four (34) additional failure mode analysis worksheets were generated. These analysis results were compared to the proposed NASA Post 51-L baseline of one-hundred forty-eight (148) FMEAs and thirty-six (36) CIL items, which were generated using the NSTS-22206 FMEA/CIL instructions. Upon completion of the assessment, one-hundred forty-three (143) of the one-hundred forty-eight (148) FMEAs were in agreement. Of the five (5) that remained, two (2) had minor discrepancies that did not affect criticality. Of the remaining three (3), the issues were with FMEAs 05-1-SRB-2, 05-60-6N0804-1, 2. In summary, no drawings were available to assess the above EPD&C FMEAs.

The GNC assessment was divided into the following three categories:

I. MAJOR COMPONENTS (BLACK BOXES)

II. FUNCTION SWITCHES AND CIRCUITS - primary purpose is to select a particular mode of operation for the GNC software.

III. POWER SWITCHES AND CIRCUITS - these provide electrical power to the GNC major components and DAP annunciation lamps.

A summary of the quantity of NASA FMEAs assessed, versus the recommended IOA baseline, and any issues identified is presented in Table I.

Table I Summary of IOA FMEA Assessment

Component	NASA	IOA	Issues
ALL	148	175	56

A summary of the quantity of NASA CIL items assessed, versus the recommended IOA baseline, and any issues identified is presented in Table II.

Table II Summary of IOA CIL Assessment

Component	NASA	IOA	Issues
ALL	36	36	0

Table III presents a summary of the IOA recommended failure criticalities for the GNC subsystem for the Post 51-L FMEA baseline.

Table III Summary of IOA Recommended Failure Criticalities							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
Number :	8	16	11	86	22	32	175

Table IV presents a summary of the IOA recommended CIL items for the GNC subsystem for the Post 51-L baseline.

Table IV Summary of IOA Recommended Critical Items							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
Number :	8	16	11	2	0	0	36

Appendix C presents the detailed assessment worksheets for each failure mode identified and assessed.

Appendix D highlights the NASA Critical Items and corresponding IOA worksheet ID.

Appendix E contains new IOA analysis worksheets that cover failure modes that were not included in the original analysis. These worksheets were added in order to make a comparison with the NASA FMEAs on these failure modes.

Appendix F provides a cross reference between the NASA FMEA and corresponding IOA worksheet(s). IOA recommendations are also summarized.

The scheme for assigning IOA assessment (Appendix C) and analysis (Appendix E) worksheet numbers is shown in Table V.

Table V IOA Worksheet Numbers

Component	IOA ID Number
1. RHC	GNC-101 to 105
2. FLT CNTLR PWR CKT	GNC-110 to 111
3. TRIM ENABLE INHIBIT SW'S	GNC-120 to 121
4. TRIM SW'S	GNC-130 to 131
5. TRIM ON/OFF SW'S	GNC-140 to 141
6. SENSE -Z/-X SW	GNC-150 to 151
7. P,R/Y CSS/AUTO PBI'S	GNC-160 to 161
8. THC	GNC-201 to 203
9. RPTA	GNC-301 to 304
10 SBTC	GNC-401 to 406
11 SPD BK/THROT PBI	GNC-410 to 411
12 IMU	GNC-501 to 502
13 IMU PWR CKT	GNC-510 to 512
14 ST	GNC-601 to 604
15 ST PWR CKT	GNC-610 to 612
16. COAS	GNC-701 to 703
17. COAS PWR CKT	GNC-710 to 712
18. ADTA	GNC-801 to 802
19. ADTA PWR CKT	GNC-810 to 812
20. RGA (ORB)	GNC-901 to 902
21. RGA (ORB) PWR CKT	GNC-903 to 905
22. RGA (SRB)	GNC-950 to 951
23. RGA (SRB) PWR CKT	GNC-960 to 961
24. AA	GNC-1001 to 1002
25. AA PWR CKT	GNC-1010 to 1014
26. ASA	GNC-1101 to 1108
27. FCS CHNL CNTL CKT	GNC-1110 to 1112
28. ASA PWR CKT	GNC-1130 to 1131
29. RJD	GNC-1201 to 1208
30. RJD PWR CKT	GNC-1211 to 1214
31. ATVC	GNC-1301 to 1305
32. ATVC PWR CKT	GNC-1310 to 1311
33. BODY FLAP CNTL CKT	GNC-1400 to 1404
34. DAP PBI'S	GNC-1501 to 1586
35. FCS SW ANNUN CKT	GNC-1590 to 1593
36. ENTRY MODE SW	GNC-1601 to 1602
37. ABORT MODE CKT	GNC-1801 to 1804
38. ATT REF PB	GNC-1901 to 1902
39. MEASUREMENT ISO RESISTORS	GNC-1950

The three GNC categories are discussed in the following sections along with issues, and the IOA recommendation for the Post 51-L FMEA/CIL.

4.1 ASSESSMENT RESULTS - GNC MAJOR COMPONENTS

Fourteen components were included in this category. A summary of the quantity of NASA FMEAs assessed for the GNC major components, versus the recommended baseline, and any issues identified is presented in Table VI.

Table VI GNC Major Components Summary of IOA FMEA Assessment

Component	NASA	IOA	Issues
1. RHC	3	5	2
2. THC	3	3	0
3. RPTA	3	4	1
4. SBTC	4	6	2
5. IMU	2	2	0
6. ST	4	5	1
7. COAS	2	3	1
8. ADTA	2	2	0
9. RGA (ORB)	2	2	0
10. RGA (SRB)	2	2	0
11. AA	2	6	4
12. ASA	2	2	0
13. RJD	4	6	2
14. ATVC	2	4	2
TOTAL	37	52	15

The issues resulted from IOA analyzing failure modes not covered by NASA. These failures did not raise the criticality of the component. NASA should consider generating FMEA's for completeness.

A summary of the quantity of NASA CIL items assessed for the GNC major components, versus the recommended IOA baseline, and any issues identified is presented in Table VII.

Table VII GNC Major Components Summary of IOA CIL Assessment

Component	NASA	IOA	Issues
1. RHC	1	1	0
2. THC	1	1	0
3. RPTA	1	1	0
4. SBTC	2	2	0
5. IMU	2	2	0
6. ST	0	0	0
7. COAS	0	0	0
8. ADTA	0	0	0
9. RGA (ORB)	1	1	0
10. RGA (SRB)	1	1	0
11. AA	1	1	0
12. ASA	1	1	0
13. RJD	3	3	0
14. ATVC	1	1	0
TOTAL	15	15	0

Table VIII presents a summary of the IOA recommended failure criticalities for the GNC major components for the Post 51-L FMEA baseline.

TABLE VIII GNC Major Components
Summary of IOA Recommended Failure Criticalities

Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
1. RHC	1	-	-	2	-	2	5
2. THC	-	1	-	2	-	-	3
3. RPTA	1	-	-	3	-	-	4
4. SBTC	-	2	-	4	-	-	6
5. IMU	-	1	-	1	-	-	2
6. ST	-	-	-	5	-	-	5
7. COAS	-	-	-	3	-	-	3
8. ADTA	-	-	-	2	-	-	2
9. RGA (ORB)	-	1	-	1	-	-	2
10. RGA (SRB)	-	1	-	1	-	-	2
11. AA	-	1	-	1	-	-	2
12. ASA	-	1	-	5	-	-	6
13. RJD	2	1	-	3	-	-	6
14. ATVC	-	1	-	3	-	-	4
TOTAL	4	10	0	36	0	2	52

Table IX presents a summary of the IOA recommended CIL items for the GNC major components for the Post 51-L baseline.

TABLE IX GNC Major Components
Summary of IOA Recommended Critical Items

Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
1. RHC	1	-	-	-	-		1
2. THC	-	1	-	-	-	-	1
3. RPTA	1	-	-	-	-	-	1
4. SBTC	-	2	-	-	-	-	2
5. IMU	-	1	-	1	-	-	2
6. ST	-	-	-	-	-	-	-
7. COAS	-	-	-	-	-	-	-
8. ADTA	-	-	-	-	-	-	-
9. RGA (ORB)	-	1	-	-	-	-	1
10. RGA (SRB)	-	1	-	-	-	-	1
11. AA	-	1	-	-	-	-	1
12. ASA	-	1	-	-	-	-	1
13. RJD	2	1	-	-	-	-	3
14. ATVC	-	1	-	-	-	-	1
TOTAL	4	10	0	1	0	0	15

4.2 ASSESSMENT RESULTS - GNC FUNCTION SWITCHES AND CIRCUITS

Twelve groups of switches and circuits make up this category. A summary of the quantity of NASA FMEAs assessed for the GNC function switches and circuits, versus the recommended baseline, and any issues identified is presented in Table X.

Table X GNC Function Switches and Circuits Summary of IOA FMEA Assessment

Component	NASA	IOA	Issues
1. TRIM ENABLE INHIB SW'S	1	2	1
2. TRIM SW'S	3	6	3
3. TRIM ON/OFF SW'S	1	2	1
4. SENSE -Z/-X SW	1	2	1
5. P,R/Y CSS/ AUTO PBI'S	8	12	4
6. SPD BK/THROT PBI	2	3	1
7. BODY FLAP CNTL CKT	3	6	3
8. ATT REF PBI	0	2	2
9. ENTRY MODE SW	1	2	1
10. ABORT MODE CKT	5	8	3
11. DAP PBI'S	34	33	1
12. FCS CHNL CNTL CKT	5	5	0
TOTAL	64	83	21

The issues resulted from IOA analyzing failure modes not covered by NASA. These failures did not raise the criticality of the component. NASA should consider generating FMEA's for completeness. The DAP PBI's issues are the results of the wording in the effects field.

A summary of the quantity of NASA CIL items assessed for the GNC function switches and circuits, versus the recommended IOA baseline, and any issues identified is presented in Table XI.

Table XI GNC Function Switches and Circuits Summary of IOA CIL Assessment

Component	NASA	IOA	Issues
1. TRIM ENABLE INHIB SW'S	0	0	0
2. TRIM SW'S	0	0	0
3. TRIM ON/OFF SW'S	0	0	0
4. SENSE -Z/-X SW	0	0	0
5. P,R/Y CSS/ AUTO PBI'S	2	2	0
6. SPD BK/THROT PBI	0	0	0
7. BODY FLAP CNTL CKT	0	0	0
8. ATT REF PBI	0	0	0
9. ENTRY MODE SW	0	0	0
10. ABORT MODE CKT	3	3	0
11. DAP PBI'S	4	4	0
12. FCS CHNL CNTL CKT	0	0	0
TOTAL	9	9	0

Table XII presents a summary of the IOA recommended failure criticalities for the GNC function switches and circuits for the Post 51-L FMEA baseline.

TABLE XII GNC Function Switches and Circuits
Summary of IOA Recommended Failure Criticalities

Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
1. TRIM ENABLE INHIB SW'S	-	-	-	-	-	2	2
2. TRIM SW'S	-	-	-	-	-	6	6
3. TRIM ON/OFF SW'S	-	-	-	-	-	2	2
4. SENSE -Z/-X SW	-	-	-	-	-	2	2
5. R,P/Y CSS/ AUTO PBI'S	2	-	-	10	-	-	12
6. SPD BK/THROT PBI	-	-	-	-	-	3	3
7. BODY FLAP CNTL CKT	-	-	-	6	-	-	6
8. ATT REF PBI	-	-	-	2	-	-	2
9. ENTRY MODE SW	-	-	-	-	-	2	2
10. ABORT MODE CKT	1	2	-	5	-	-	8
11. DAP PBI'S	-	-	10	-	22	1	33
12. FCS CHNL CNTL CKT	-	-	-	3	-	2	5
TOTAL	3	2	10	26	22	20	83

Table XIII presents a summary of the IOA recommended CIL items for the GNC function switches and circuits for the Post 51-L baseline.

TABLE XIII GNC Function Switches and Circuits
Summary of IOA Recommended Critical Items

Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
1. TRIM ENABLE INHIB SW'S	-	-	-	-	-	-	0
2. TRIM SW'S	-	-	-	-	-	-	0
3. TRIM ON/OFF SW'S	-	-	-	-	-	-	0
4. SENSE -Z/-X SW	-	-	-	-	-	-	0
5. R,P/Y CSS/ AUTO PBI'S	2	-	-	-	-	-	2
6. SPD BK/THROT PBI	-	-	-	-	-	-	0
7. BODY FLAP CNTL CKT	-	-	-	-	-	-	0
8. ATT REF PBI	-	-	-	-	-	-	-
9. ENTRY MODE SW	-	-	-	-	-	-	-
10. ABORT MODE CKT	1	2	-	-	-	-	3
11. DAP PBI'S	-	-	4	-	-	-	4
12. FCS CHNL CNTL CKT	-	-	-	-	-	-	0
TOTAL	3	2	4	-	-	-	9

4.3 ASSESSMENT RESULTS - GNC POWER SWITCHES AND CIRCUITS

Twelve groups of switches and circuits make up this category. A summary of the quantity of NASA FMEAs assessed for the GNC power switches and circuits, versus the recommended baseline, and any issues identified is presented in Table XIV.

Table XIV GNC Power Switches and Circuits Summary of IOA FMEA Assessment

Component	NASA	IOA	Issues
1. FLT CNTLR PWR CKT	4	3	0
2. IMU PWR CKT	6	3	2
3. ST PWR CKT	1	2	0
4. COAS PWR CKT	1	1	0
5. ADTA PWR CKT	2	3	0
6. RGA (ORB) PWR CKT	5	4	0
7. AA PWR CKT	6	7	0
8. ASA PWR CKT	8	2	2
9. RJD PWR CKT	0	4	4
10. ATVC PWR CKT	7	7	0
11. FCS SW ANNUN CKT	7	3	0
12. RGA (SRB) PWR CKT	1	1	0
TOTAL	48	40	8

Issues resulted from Interpretation of NSTS 22206, Instruction for Preparation of FMEA and CIL. IOA treated the circuitry as black boxes, and NASA evaluated the components of the black boxes. The RJD PWR CKT was not covered by NASA. However, the failures covered by IOA did not raise the criticality of the component.

A summary of the quantity of NASA CIL items assessed for the GNC power switches and circuits, versus the recommended IOA baseline, and any issues identified is presented in Table XV.

Table XV GNC Power Switches and Circuits Summary of IOA CIL Assessment

Component	NASA	IOA	Issues
1. FLT CNTLR PWR CKT	2	2	0
2. IMU PWR CKT	1	1	0
3. ST PWR CKT	0	0	0
4. COAS PWR CKT	0	0	0
5. ADTA PWR CKT	0	0	0
6. RGA (ORB) PWR CKT	1	1	0
7. AA PWR CKT	1	1	0
8. ASA PWR CKT	3	3	0
9. RJD PWR CKT	0	0	0
10. ATVC PWR CKT	3	3	0
11. FCS SW ANNUN CKT	0	0	0
12. RGA (SRB) PWR CKT	1	1	0
TOTAL	12	12	0

Table XVI presents a summary of the IOA recommended failure criticalities for the GNC power switches and circuits for the Post 51-L FMEA baseline.

TABLE XVI GNC Power Switches and Circuits
Summary of IOA Recommended Failure Criticalities

Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
1. FLT CNTLR PWR CKT	-	1	-	1	-	1	3
2. IMU PWR CKT	-	-	-	2	-	1	3
3. ST PWR CKT	-	-	-	2	-	-	2
4. COAS PWR CKT	-	-	-	1	-	-	1
5. ADTA PWR CKT	-	-	-	1	-	2	3
6. RGA (ORB) PWR CKT	-	-	-	4	-	-	4
7. AA PWR CKT	-	-	-	5	-	2	7
8. ASA PWR CKT	-	-	-	1	-	1	2
9. RJD PWR CKT	-	-	-	2	-	2	4
10. ATVC PWR CKT	-	1	-	5	-	1	7
11. FCS SW ANNUN CKT	-	-	-	3	-	-	3
12. RGA (SRB) PWR CKT	-	-	-	1	-	-	1
TOTAL	-	2	-	28	-	10	40

Table XVII presents a summary of the IOA recommended CIL items for the GNC power switches and circuits for the Post 51-L baseline.

TABLE XVII GNC Power Switches and Circuits
Summary of IOA Recommended Critical Items

Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
1. FLT CNTLR PWR CKT	-	1	1	-	-	-	2
2. IMU PWR CKT	-	-	-	1	-	-	1
3. ST PWR CKT	-	-	-	-	-	-	-
4. COAS PWR CKT	-	-	-	-	-	-	-
5. ADTA PWR CKT	-	-	-	-	-	-	-
6. RGA (ORB) PWR CKT	-	-	-	1	-	-	1
7. AA PWR CKT	-	-	-	1	-	-	1
8. ASA PWR CKT	-	1	-	2	-	-	3
9. RJD PWR CKT	-	-	-	-	-	-	-
10. ATVC PWR CKT	-	1	-	2	-	-	3
11. FCS SW ANNUN CKT	-	-	-	-	-	-	-
12. RGA (SRB) PWR CKT	-	-	-	1	-	-	1
TOTAL	-	3	1	8	-	-	12

5.0 REFERENCES

Reference documentation available from NASA and Rockwell was used in the analysis. The documentation used included the following:

1. JSC-1886, Guidance and Control Systems Briefs, 9-30-85
2. CONT 2102, Controllers Workbook, 2-1-82
3. GNC HS OV 2102, GNC Hardware/Software Overview, 5-17-84
4. JSC-12820, STS operational Flight Rules, PCN-1, 2-14-86
5. VS70-971099, Integrated System Schematic - GNC & Data Processing, OV-099 & OV-103, 4-11-86
6. VS70-790129, Schematic Diagram - Rotational Hand Controller, 10-22-80
7. VS70-790159, Schematic Diagram - Translational Hand Controller, 1-14-81
8. VS70-790149, Schematic Diagram - Rudder Pedal Transducer Assembly, 1-12-81
9. VS70-971099, Schematic Diagram - Speed Brake Thrust Controller, 11-17-80
10. VS70-710109, Schematic Diagram, Inertial Measurement Unit, 11-12-80
11. VS70-710149, Schematic Diagram, Star Tracker, 11-18-80
12. VS70-590309, Schematic Diagram, Air Data Probe Deployment and Heater, 11-12-80
13. VS70-710152, Schematic Diagram, Orbiter Rate Gyro & Navigation Subsystem, 3-24-75
14. VS70-790119, Schematic Diagram, Accelerometer Assembly, 10-30-80
15. VS70-790229, Schematic Diagram, Aerosurface Servo Amplfier, 12-10-80
16. VS70-420109,209,309, Schematic Diagram, RCS Fwd, Aft Right, & Aft Left Modules, March 1980
17. VS70-790239, Schematic Diagram, Ascent Thrust Vector Control-Flt Control Subsystem, 3-18-81
18. STS82-0028, Orbiter Vehicle Operational Configuration Failure Mode Effects Analysis - GN&C, 1-28-83
19. STS82-0033, 05-60 GN&C/EPD&C FMEAs, 5-1-83

20. STS82-0039A, Avionics Systems Critical Items List, 6-18-84

21. Post 51-L FMEAs
    A. GN&C FMEA - Orville Littleton, Dec '86
    B. GN&C FMEA - Tom Lewis, 11-5-86
    C. GN&C FMEA - Fred McAllister, Dec '86
    D. GN&C FMEA - Andy Saulietis, 11-17-86
    E. IMU FMEA - Malcolm Jones, 1-26-87

22. NSTS 22206, Instruction for Preparation of FMEA and CIL, 10 October 1986.

APPENDIX A
ACRONYMS

AA	-	Accelerometer Assembly
ACA	-	Annunciator Control Assembly
A/D	-	Analog to Digital
ADI	-	Attitude Direction Indicator
ADTA	-	Air Data Transducer Assembly
AID	-	Analog Input Differential
ALC	-	Aft Load Controller
AOA	-	Abort Once Around
APC	-	Aft Power Controller
ASA	-	Aerosurface Servo Amplifier
ATO	-	Abort To Orbit
ATVC	-	Ascent Thrust Vector Control
BF	-	Body Flap
BFS	-	Backup Flight System
BITE	-	Built-In Test Equipment
CB	-	Circuit Breaker
CIL	-	Critical Items List
CKT	-	Circuit
CNTLR	-	Controller
COAS	-	Crew Optical Alignment Sight
CRIT	-	Criticality
CRT	-	Cathode Ray Tube
CSS	-	Control Stick Steering
C&W	-	Caution and Warning System
DAP	-	Digital Auto Pilot
DDU	-	Display Driver Unit
DEU	-	Display Electronics Unit
DISC	-	Discrete
DPS	-	Data Processing System
DU	-	Display Unit
EIU	-	Engine Interface Unit
EVA	-	Extra Vehicular Activity
FA	-	Flight Aft
FCOS	-	Flight Control Operating System
FCS	-	Flight Control System
FDIR	-	Fault Detection, Identification, Reconfiguration
FF	-	Flight Forward
FM	-	Failure Mode
FMEA	-	Failure Mode and Effects Analysis
FSM	-	Fault Summary Message
FSSR	-	Functional Subsystem Software Requirements
FSW	-	Flight Software
FUNC	-	Function
GPC	-	General Purpose Computer
GSE	-	Ground Support Equipment
H/W	-	Hardware
IMU	-	Inertial Measurement Unit
IOA	-	Independent Orbiter Assessment

LF	-	Launch Forward
LL	-	Launch Left
LPS	-	Launch Processing System
LR	-	Launch Right
LRU	-	Line Replaceable Unit
MAN	-	Manual
MC	-	Memory Configuration
MCC	-	Mission Control Center
MCDS	-	Multifunction CRT Display System
MDAC	-	McDonnell Douglas Astronautics Company
MDM	-	Multiplexer/Demultiplexer
MEC	-	Main Engine Controller
MM	-	Major Mode
MSK	-	Manual Select Keyboard
MVS	-	Mid Value Select
NA	-	Not Applicable
NASA	-	National Aeronautics and Space Administration
NORM	-	Normal
NSTS	-	National Space Transportation System
OA	-	Operational Aft
OF	-	Operational Forward
OMRSD	-	Operational Maintenance Requirements and Specifications Document
OMS	-	Orbital Maneuvering System
OPS	-	Operational Sequence
P	-	Pitch
PBI	-	Pushbutton Indicator
PCI	-	Potential Critical Item
PCM	-	Pulse Code Modulation
POS	-	Position
R	-	Roll
RCS	-	Reaction Control System
RGA	-	Rate Gyro Assembly
RHC	-	Rotational Hand Controller
RI	-	Rockwell International
RJD	-	Reaction Jet Driver
RM	-	Redundancy Management
ROT	-	Rotation
RPC	-	Remote Power Controller
RPTA	-	Rudder Pedal Transducer Assembly
RS	-	Redundant Set
RTLS	-	Return To Landing Site
SBTC	-	Speed Brake Thrust Controller
SF	-	Selection Filter
SM	-	Systems Management
SOP	-	Subsystem Operating Program
SRB	-	Solid Rocket Booster
SSME	-	Space Shuttle Main Engine
ST	-	Star Tracker
STS	-	Space Transportation System
SW	-	Switch
S/W	-	Software

TAL	-	Transatlantic Abort Landing
TD	-	Touch Down
THC	-	Translational Hand Controller
TRANS	-	Translation
TVC	-	Thrust Vector Control
VDC	-	Volts Direct Current
VERN	-	Vernier
Y	-	Yaw

APPENDIX B

DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

APPENDIX B
DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

B.1 Definitions

Definitions contained in NSTS 22206, Instructions For Preparation of FMEA/CIL, 10 October 1986, were used with the following amplifications and additions.

INTACT ABORT DEFINITIONS:

RTLS - begins at transition to OPS 6 and ends at transition to OPS 9, post-flight

TAL - begins at declaration of the abort and ends at transition to OPS 9, post-flight

AOA - begins at declaration of the abort and ends at transition to OPS 9, post-flight

ATO - begins at declaration of the abort and ends at transition to OPS 9, post-flight

CREDIBLE (CAUSE) - an event that can be predicted or expected in anticipated operational environmental conditions. Excludes an event where multiple failures must first occur to result in environmental extremes

CONTINGENCY CREW PROCEDURES - procedures that are utilized beyond the standard malfunction procedures, pocket checklists, and cue cards

EARLY MISSION TERMINATION - termination of onorbit phase prior to planned end of mission

EFFECTS/RATIONALE - description of the case which generated the highest criticality

HIGHEST CRITICALITY - the highest functional criticality determined in the phase-by-phase analysis

MAJOR MODE (MM) - major sub-mode of software operational sequence (OPS)

MC - Memory Configuration of Primary Avionics Software System (PASS)

MISSION - assigned performance of a specific Orbiter flight with payload/objective accomplishments including orbit phasing and altitude (excludes secondary payloads such as GAS cans, middeck P/L, etc.)

MULTIPLE ORDER FAILURE - describes the failure due to a single cause or event of all units which perform a necessary (critical) function

OFF-NOMINAL CREW PROCEDURES - procedures that are utilized beyond the standard malfunction procedures, pocket checklists, and cue cards

OPS - software operational sequence

PRIMARY MISSION OBJECTIVES - worst case primary mission objectives are equal to mission objectives

PHASE DEFINITIONS:

PRELAUNCH PHASE - begins at launch count-down Orbiter power-up and ends at moding to OPS Major Mode 102 (liftoff)

LIFTOFF MISSION PHASE - begins at SRB ignition (MM 102) and ends at transition out of OPS 1 (Synonymous with ASCENT)

ONORBIT PHASE - begins at transition to OPS 2 or OPS 8 and ends at transition out of OPS 2 or OPS 8

DEORBIT PHASE - begins at transition to OPS Major Mode 301 and ends at first main landing gear touchdown

LANDING/SAFING PHASE - begins at first main gear touchdown and ends with the completion of post-landing safing operations

APPENDIX B
DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

B.2 IOA Project Level Ground Rules and Assumptions

The philosophy embodied in NSTS 22206, Instructions for Preparation of FMEA/CIL, 10 October 1986, was employed with the following amplifications and additions.

1. The operational flight software is an accurate implementation of the Flight System Software Requirements (FSSRs).

   RATIONALE: Software verification is out-of-scope of this task.

2. After liftoff, any parameter which is monitored by system management (SM) or which drives any part of the Caution and Warning System (C&W) will support passage of Redundancy Screen B for its corresponding hardware item.

   RATIONALE: Analysis of on-board parameter availability and/or the actual monitoring by the crew is beyond the scope of this task.

3. Any data employed with flight software is assumed to be functional for the specific vehicle and specific mission being flown.

   RATIONALE: Mission data verification is out-of-scope of this task.

4. All hardware (including firmware) is manufactured and assembled to the design specifications/drawings.

   RATIONALE: Acceptance and verification testing is designed to detect and identify problems before the item is approved for use.

5. All Flight Data File crew procedures will be assumed performed as written, and will not include human error in their performance.

   RATIONALE: Failures caused by human operational error are out-of-scope of this task.

6. All hardware analyses will, as a minimum, be performed at the level of analysis existent within NASA/Prime Contractor Orbiter FMEA/CILs, and will be permitted to go to greater hardware detail levels but not lesser.

   RATIONALE: Comparison of IOA analysis results with other analyses requires that both analyses be performed to a comparable level of detail.

7. Verification that a telemetry parameter is actually monitored during AOS by ground-based personnel is not required.

   RATIONALE: Analysis of mission-dependent telemetry availability and/or the actual monitoring of applicable data by ground-based personnel is beyond the scope of this task.

8. The determination of criticalities per phase is based on the worst case effect of a failure for the phase being analyzed. The failure can occur in the phase being analyzed or in any previous phase, whichever produces the worst case effects for the phase of interest.

   RATIONALE: Assigning phase criticalities ensures a thorough and complete analysis.

9. Analysis of wire harnesses, cables, and electrical connectors to determine if FMEAs are warranted will not be performed nor FMEAs assessed.

   RATIONALE: Analysis was substantially complete prior to NSTS 22206 ground rule redirection.

10. Analysis of welds or brazed joints that cannot be inspected will not be performed nor FMEAs assessed.

    RATIONALE: Analysis was substantially complete prior to NSTS 22206 ground rule redirection.

11. Emergency system or hardware will include burst discs and will exclude the EMU Secondary Oxygen Pack (SOP), pressure relief valves and the landing gear pyrotechnics.

    RATIONALE: Clarify definition of emergency systems to ensure consistency throughout IOA project.

B.3 GNC - Specific Ground Rules and Assumptions

1. The failure analyses will be conducted to the black box level for components whose output serves only one function unless a lower level is required to be consistent with the existing FMEAs.

   RATIONALE: The definition credible failure modes are oriented toward the black box functional output.

2. For black boxes whose output serves more than one function, the analysis will go to a level that effects each of the different functions.

   RATIONALE: The defined credible failure modes are oriented toward the black box functional output.

3. Credible failure modes for most black boxes are defined to be

   (1) No output
   (2) Erroneous output (Output that redundancy management will detect as a failure.)
   (3) Premature output (Output occurs without command. This may not be credible for all black boxes.)

   RATIONALE: Covers worst case effects on function.

4. Credible failures for switches are defined to be

   (1) Fails on (Power cannot be shut off by switch.)
   (2) Fails off (Power cannot be turned on.)
   (3) Short to ground
   (4) Internal short (Short across switch contacts.)

   RATIONALE: Covers worst case effects on function.

5. Power circuits analysis does not include the resistors that reside between the power circuit and a MDM.

   RATIONALE: These resistors provide signal conditioning for the MDM and are not a part of the power circuit.

APPENDIX C
DETAILED ASSESSMENT

This section contains the IOA assessment worksheets generated during the Assessment of the Guidance, Navigation, and Control Subsystem. The information on these worksheets facilitates the comparison of the NASA FMEA/CIL (Pre and Post 51-L) to the IOA detailed analysis worksheets included in Appendix E. Each of these worksheets identifies the NASA FMEA being assessed, corresponding MDAC Analysis Worksheet ID (Appendix E), hardware item, criticality, redundancy screens, and recommendations. For each failure mode, the highest assessed hardware and functional criticality is compared and discrepancies noted as "N" in the compare row under the column where the discrepancy occurred.

LEGEND FOR IOA ASSESSMENT WORKSHEETS

Hardware Criticalities:

- 1 = Loss of life or vehicle
- 2 = Loss of mission or next failure of any redundant item (like or unlike) could cause loss of life/vehicle
- 3 = All others

Functional Criticalities:

- 1R = Redundant hardware items (like or unlike) all of which, if failed, could cause loss of life or vehicle
- 2R = Redundant hardware items (like or unlike) all of which, if failed, could cause loss of mission

Redundancy Screens A, B and C:

- P = Passed Screen
- F = Failed Screen
- NA = Not Applicable

NASA Data :

- Baseline = NASA FMEA/CIL
- New = Baseline with Proposed Post 51-L Changes

CIL Item :

- X = Included in CIL

Compare Row :

- N = Non compare for that column (deviation)

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-101
NASA FMEA #: 05-1-FC3042-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 101
ITEM: RHC

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[1 /1]	[NA]	[NA]	[NA]	[X] *
IOA	[2 /1R]	[P]	[P]	[P]	[X]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: PHYSICAL BINDING/JAMMING OF CNTL STICK.
FMEA FAILURE MODE: PHYSICAL JAMMING.
IOA DOES CONCUR WITH NASA'S REEVALUATION AND RATIONALE AS SHOWN IN THE NASA-JSC FMEA REVIEW COMMENTS. IF AN RHC SHOULD JAM DURING THE CRITICAL ENTRY FLIGHT PHASE OF FINAL FLARE AND LANDING APPROACH MANEUVERS, LOSS OF CONTROL COULD CAUSE LOSS OF VEHICLE. IOA DOES NOT RECOMMEND A CHANGE TO THE REVISED NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-102
NASA FMEA #: 05-1-FC3042-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 102
ITEM: RHC

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: NO XDCR OUTPUT ON A CMD CHN.
FMEA FAILURE MODE: LOSS OF A CHN-TRANSDUCER OR SWITCH.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-103
NASA FMEA #: 05-1-FC3042-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 103
ITEM: RHC

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ERRONEOUS XDCR OUTPUT ON A CMD CHN.
FMEA FAILURE MODE: ERRONEOUS OUTPUT-TRANSDUCER OR SWITCH.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-104
NASA FMEA #: 05-1-FC3042-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 104
ITEM: RHC

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: NO OUTPUT ON A TRIM SW CHN.
FMEA FAILURE MODE: LOSS OF A CHN-TRANSDUCER OR SWITCH.
THE NASA FMEA COVERS TWO FAILURES WHICH INCLUDES THIS IOA FAILURE MODE. SINCE THIS FAILURE MODE IS OF LOWER CRITICALITY THAN THE OTHER NASA FAILURE MODE, IOA DOES NOT RECOMMEND THAT A NEW FMEA BE WRITTEN.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-105
NASA FMEA #: 05-1-FC3042-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 105
ITEM: RHC

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: TRIM SW CHN FAILS ON.
FMEA FAILURE MODE: ERRONEOUS OUTPUT-TRANSDUCER OR SWITCH.
THE NASA FMEA COVERS TWO FAILURES WHICH INCLUDES THIS IOA FAILURE MODE. SINCE THIS FAILURE MODE IS OF LOWER CRITICALITY THAN THE OTHER NASA FAILURE MODE, IOA DOES NOT RECOMMEND THAT A NEW FMEA BE WRITTEN.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-110
NASA FMEA #: 05-6Q-2203-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 110
ITEM: CIRCUIT-FLT CNTLR PWR

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: CB OR SW FAILS CLOSED. FMEA FAILURE MODE: SW FLs CLOSED IN "ON" POSITION. NO DIFFERENCES. IF SWITCH FAILS ON, THE FLIGHT CONTROLLER POWER CAN BE TURNED OFF BY THE ASSOCIATED DDU CIRCUIT BREAKERS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87 NASA DATA:
ASSESSMENT ID: GNC-111 BASELINE [ ]
NASA FMEA #: 05-6Q-2103-1 NEW [X]

SUBSYSTEM: GNC
MDAC ID: 111
ITEM: CIRCUIT-FLT CNTLR PWR

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[N]	[ ]	[N]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: CB OR SW FAILS OPEN, OR SHORTED TO GROUND,
FMEA FAILURE MODE: CIRCUIT BREAKIER-LOSS OF OUTPUT, OPENS.
AFTER NASA/RI REEVALUATION OF FMEA AND FURTHER IOA EVALUATION OF SYSTEM OPERATION, IOA DOES CONCUR WITH THE REVISED FMEA. ONE REDUNDANT CIRCUIT BREAKER (CB) FL OPEN IS NOT DETECTABLE. TWO CBs FL OPEN ARE NOT DETECTABLE, BUT THE RESULTING LOSS OF THE DDU POWER SUPPLIES (A,B,C) ARE DETECTABLE. SINCE CB FL CLOSE IS A 3/3, AND DOES NOT UPGRADE OPEN FAIL MODE 3/1R, IOA DOES NOT RECOMMEND A NEW FMEA FOR THE CLOSE FL MODE. THE CIL WAS NOT AVAILABLE FOR EVALUATION OF THE RETENTION RATIONALE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-111A
NASA FMEA #: 05-6Q-2203-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 111
ITEM: CIRCUIT-FLT CNTLR PWR

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[P]	[P]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /]	[ ]	[ ]	[ ]	[N]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: CB OR SW FAILS OPEN, OR SHORTED TO GROUND. FMEA FAILURE MODE: SW FLs CLOSED IN "OFF" POSITION, SHORT TO GROUND AT "ON" POSITION CONTACTS, POLE-TO-POLE SHORT. IOA INITIALLY CONSIDERED THE SWITCH CONTACT FAIL OPEN MODE, WHICH PROVIDED THE CRITICALITY OF 3/1R. AFTER NASA/RI REEVALUATION OF FMEA AND FURTHER IOA EVALUATION OF SYSTEM OPERATION, IOA DOES CONCUR WITH THE REVISED FMEA CRITICALITY OF 2/1R FOR THE SWITCH FAILURE MODES. THE LEFT AND RIGHT FLT CNTRL SWs FAILED IN THE OFF POSITION RESULTS IN THE LOSS OF THE PLT'S AND CDR'S FLIGHT CONTROLLERS AND PROBABLE LOSS OF VEHICLE CONTROL. THE CIL WAS NOT AVAILABLE FOR EVALUATION OF THE RETENTION RATIONALE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-111B
NASA FMEA #: 05-6Q-2203-(TBD) PREL

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 111
ITEM: CIRCUIT-FLT CNTLR PWR

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /2]	[P]	[P]	[P]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[ ]	[ ]	[ ]	[N]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: CB OR SW FAILS OPEN, OR SHORTED TO GROUND.
FMEA FAILURE MODE: AFT PWR CNTLR SW FAILED CLOSED IN "OFF" POSITION, SHORT TO GROUND AT "ON" POSITION CONTACTS, POLE-TO-POLE SHORT.
NASA AND IOA INITIALLY CONSIDERED THE LEFT, RIGHT, AND AFT SWITCHES AS A GROUP WITH FAILURE OFF (OPEN) MODE OF CRIT 3/1R. AFTER FURTHER EVALUATION OF SYSTEM OPERATION, IOA DOES CONCUR WITH THE NEW FMEA FAIL OFF (OPEN) MODE FOR AFT FLT CNTLR PWR SW. THE LOSS OF THE AFT FLT CNTLR'S (RHC/THC) WOULD MAKE IT DIFFICULT TO PERFORM MISSIONS REQUIRING RENDEZVOUS AND PROX OPS. THE CIL WAS NOT AVAILABLE FOR EVALUATION OF THE RETENTION RATIONALE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-120
NASA FMEA #: 05-1-FC7241-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 120
ITEM: SWITCH-TRIM ENABLE/INHIBIT

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS CLOSED (INHIBIT POSITION).
FMEA FAILURE MODE: ALL CREDIBLE MODES.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-121
NASA FMEA #: 05-1-FC7241-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 121
ITEM: SWITCH-TRIM ENABLE/INHIBIT

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SW CONTACT OR CURRENT LIMIT RESISTOR FAILS OPEN OR SHORTED TO GROUND.
FMEA FAILURE MODE: ALL CREDIBLE MODES.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-130
NASA FMEA #: 05-1-FC7254-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 130
ITEM: SWITCH-TRIM

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS CLOSED.
FMEA FAILURE MODE: ALL CREDIBLE MODES-ROLL TRIM.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-130A
NASA FMEA #: 05-1-FC7255-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 130
ITEM: SWITCH-TRIM

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS CLOSED.
FMEA FAILURE MODE: ALL CREDIBLE MODES-PITCH TRIM.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-130B
NASA FMEA #: 05-1-FC7256-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 130
ITEM: SWITCH-TRIM

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS CLOSED.
FMEA FAILURE MODE: ALL CREDIBLE MODES-YAW TRIM.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-131
NASA FMEA #: 05-1-FC7254-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 131
ITEM: SWITCH-TRIM

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SW CONTACT FAILS OPEN, OR SHORTED TO GROUND.
FMEA FAILURE MODE: ALL CREDIBLE MODES-ROLL TRIM.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-131A
NASA FMEA #: 05-1-FC7255-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 131
ITEM: SWITCH-TRIM

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SW CONTACT FAILS OPEN, OR SHORTED TO GROUND.
FMEA FAILURE MODE: ALL CREDIBLE MODES-PITCH TRIM.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87 NASA DATA:
ASSESSMENT ID: GNC-131B BASELINE [ ]
NASA FMEA #: 05-1-FC7256-1 NEW [X]

SUBSYSTEM: GNC
MDAC ID: 131
ITEM: SWITCH-TRIM

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SW CONTACT FAILS OPEN, OR SHORTED TO GROUND.
FMEA FAILURE MODE: ALL CREDIBLE MODES-YAW TRIM.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-140
NASA FMEA #: 05-1-FC7242-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 140
ITEM: SWITCH-TRIM ON/OFF

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS CLOSED.
FMEA FAILURE MODE: ALL CREDIBLE MODES.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-141
NASA FMEA #: 05-1-FC7242-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 141
ITEM: SWITCH-TRIM ON/OFF

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SW CONTACT OR CURRENT LIMIT RESISTOR FAILS OPEN OR SHORTED TO GROUND.
FMEA FAILURE MODE: ALL CREDIBLE MODES.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-150
NASA FMEA #: 05-1-FC7262-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 150
ITEM: SWITCH-SENSE

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS CLOSED.
FMEA FAILURE MODE: ALL CREDIBLE MODES.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-151
NASA FMEA #: 05-1-FC7262-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 151
ITEM: SWITCH-SENSE

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SW CONTACT OR CURRENT LIMIT RESISTOR FAILS OPEN OR SHORTED TO GROUND.
FMEA FAILURE MODE: ALL CREDIBLE MODES.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-160
NASA FMEA #: 05-1-FC7245-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 160
ITEM: SWITCH- P, R/Y, CSS/AUTO

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[1 /1]	[NA]	[NA]	[NA]	[X] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS CLOSED. FMEA FAILURE MODE: PITCH AUTO PBI SW FAILS TO TRANSFER. FOR AUTO PBI FAILED ON (PBI FAILED TO TRANSFER OR JAMMED), THE WORST CASE CRITICALITY IS 1/1.
IF AUTO PBI SW FAILS ON, THE CREW WILL BE REQUIRED TO DEPRESS AND HOLD CSS PBI FOR MANUAL CONTROL. IN ORBIT (OPS 2/8), THE SWITCH CAN BE DESELECTED FROM REDUNDANCY MANAGEMENT. NO AUTOLAND CONSIDERED AT THIS TIME. THIS FAILURE WILL CAUSE A CHANGE IN OPERATING PROCEDURES AND WILL RESULT IN AN INCREASE IN WORKLOAD.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87 NASA DATA:
ASSESSMENT ID: GNC-160A BASELINE [ ]
NASA FMEA #: 05-1-FC7246-0001 NEW [X]

SUBSYSTEM: GNC
MDAC ID: 160
ITEM: SWITCH- P, R/Y, CSS/AUTO

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS CLOSED. FMEA FAILURE MODE: PITCH CSS PBI SW FAILS TO TRANSFER. IF CSS PBI FAILS ON, THERE IS NO MANUAL OVERRIDE CAPABILITY. WHEN IN ORBIT (OPS 2/8), THE SWITCH CAN BE DESELECTED FROM REDUNDANCY MANAGEMENT. THE MISSION CAN BE COMPLETED IN THE MANUAL CSS MODE FOR ENTRY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-160B
NASA FMEA #: 05-1-FC7248-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 160
ITEM: SWITCH- P, R/Y, CSS/AUTO

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[1 /1]	[P]	[P]	[P]	[X] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS CLOSED. FMEA FAILURE MODE: ROLL/YAW AUTO PBI SW FAILS TO TRANSFER. FOR AUTO PBI FAILED ON (PBI FAILED TO TRANSFER OR JAMMED), THE WORST CASE CRITICALITY IS 1/1.
IF AUTO PBI SW FAILS ON, THE CREW WILL BE REQUIRED TO DEPRESS AND HOLD CSS PBI FOR MANUAL CONTROL. IN ORBIT (OPS 2/8), THE SWITCH CAN BE DESELECTED FROM REDUNDANCY MANAGEMENT. NO AUTOLAND CONSIDERED AT THIS TIME. THIS FAILURE WILL CAUSE A CHANGE IN OPERATING PROCEDURES AND WILL RESULT IN AN INCREASE IN WORKLOAD.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-160C
NASA FMEA #: 05-1-FC7249-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 160
ITEM: SWITCH- P, R/Y, CSS/AUTO

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS CLOSED. FMEA FAILURE MODE: ROLL/YAW CSS PBI SW FAILS TO TRANSFER. IF CSS PBI FAILS ON, THERE IS NO MANUAL OVERRIDE CAPABILITY. WHEN IN ORBIT (OPS 2/8), THE SWITCH CAN BE DESELECTED FROM REDUNDANCY MANAGEMENT. THE MISSION CAN BE COMPLETED IN THE MANUAL CSS MODE FOR ENTRY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-160D
NASA FMEA #: 05-1-FC7245-0002

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 160
ITEM: SWITCH- P, R/Y, CSS/AUTO

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS CLOSED. FMEA FAILURE MODE: PITCH AUTO PBI SW CONTACT-INTERNAL SHORT.
THE SW CONTACT FAILURES ARE HANDLED BY THE STANDARD 3 CONTACT SW REDUNDANCY MANAGEMENT (RM). SW RM DESELECTS FIRST FAILED CONTACT AND REQUIRES THE "AND" OF TWO CONTACTS FOR AN OUTPUT. IF AUTO PBI SW FLs ON, THE CREW WILL BE REQUIRED TO DEPRESS AND HOLD CSS PBI FOR MANUAL CNTL. IN ORBIT (OPS 2/8), THE SW CAN BE DESELECTED FROM RM. NO AUTOLAND CONSIDERED. THIS FAILURE WILL CAUSE A CHANGE IN OPERATING PROCEDURES AND INCREASE IN WORKLOAD.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87 NASA DATA:
ASSESSMENT ID: GNC-160E BASELINE [ ]
NASA FMEA #: 05-1-FC7246-0002 NEW [X]

SUBSYSTEM: GNC
MDAC ID: 160
ITEM: SWITCH- P, R/Y, CSS/AUTO

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS CLOSED. FMEA FAILURE MODE: PITCH CSS PBI SW CONTACT-INTERNAL SHORT.
THE SW CONTACT FAILURES ARE HANDLED BY THE STANDARD 3 CONTACT SW REDUNDANCY MANAGEMENT (RM). SW RM DESELECTS FIRST FAILED CONTACT AND REQUIRES THE "AND" OF TWO CONTACTS FOR AN OUTPUT. IF CSS PBI FAILS ON, THERE IS NO MANUAL OVERRIDE CAPABILITY.
WHEN IN ORBIT (OPS 2/8), THE SWITCH CAN BE DESELECTED FROM RM. THE MISSION CAN BE COMPLETED IN THE MANUAL CSS MODE FOR ENTRY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-160F
NASA FMEA #: 05-1-FC7248-0002

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 160
ITEM: SWITCH- P, R/Y, CSS/AUTO

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS CLOSED. FMEA FAILURE MODE: ROLL/YAW AUTO PBI SW CONT-INTERNAL SHORT.
THE SW CONTACT FAILURES ARE HANDLED BY THE STANDARD 3 CONTACT SW REDUNDANCY MANAGEMENT (RM). SW RM DESELECTS FIRST FAILED CONTACT AND REQUIRES THE "AND" OF TWO CONTACTS FOR AN OUTPUT. IF AUTO PBI SW FLs ON, THE CREW WILL BE REQUIRED TO DEPRESS AND HOLD CSS PBI FOR MANUAL CNTL. IN ORBIT (OPS 2/8), THE SW CAN BE DESELECTED FROM RM. NO AUTOLAND CONSIDERED. THIS FAILURE WILL CAUSE A CHANGE IN OPERATING PROCEDURE AND INCREASE IN WORKLOAD.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-160G
NASA FMEA #: 05-1-FC7249-0002

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 160
ITEM: SWITCH- P, R/Y, CSS/AUTO

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS CLOSED. FMEA FAILURE MODE: ROLL/YAW CSS PBI SW CONT-INTERNAL SHORT.
THE SW CONTACT FAILURES ARE HANDLED BY THE STANDARD 3 CONTACT SW REDUNDANCY MANAGEMENT (RM). SW RM DESELECTS FIRST FAILED CONTACT AND REQUIRES THE "AND" OF TWO CONTACTS FOR AN OUTPUT. IF CSS PBI FAILS ON, THERE IS NO MANUAL OVERRIDE CAPABILITY.
WHEN IN ORBIT (OPS 2/8), THE SWITCH CAN BE DESELECTED FROM RM. THE MISSION CAN BE COMPLETED IN THE MANUAL CSS MODE FOR ENTRY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-161
NASA FMEA #: 05-1-FC7245-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 161
ITEM: SWITCH- P, R/Y, CSS/AUTO

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS OPEN. FMEA FAILURE MODE: PITCH AUTO PBI SW FAILS TO TRANSFER.
IF AUTO PBI FAILS OFF, THE OTHER CREW POSITION CAN BE USED. FCS IS INITIALIZED IN AUTO DURING ASCENT. IF NECESSARY, CSS CAN BE FLOWN DURING ASCENT. CSS MANUAL MODE CAN BE FLOWN DURING ALL ENTRY PHASES. NO AUTOLAND IS CONSIDERED AT THIS TIME.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-161A
NASA FMEA #: 05-1-FC7246-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 161
ITEM: SWITCH- P, R/Y, CSS/AUTO

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS OPEN. FMEA FAILURE MODE: PITCH CSS PBI SW FAILS TO TRANSFER.
IF CSS PBI SW FAILS OFF, USE THE OTHER CREW POSITION OR PLACE THE RHC OUT-OF-DETENT FOR MANUAL FCS CONTROL. NO AUTOLAND IS CONSIDERED AT THIS TIME.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-161B
NASA FMEA #: 05-1-FC7248-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 161
ITEM: SWITCH- P, R/Y, CSS/AUTO

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS OPEN. FMEA FAILURE MODE: ROLL/YAW AUTO PBI SW FAILS TO TRANSFER.
IF AUTO PBI FAILS OFF, THE OTHER CREW POSITION CAN BE USED. FCS IS INITIALIZED IN AUTO DURING ASCENT. CSS MANUAL MODE CAN BE FLOWN DURING ALL ENTRY PHASES. NO AUTOLAND IS CONSIDERED AT THIS TIME.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-161C
NASA FMEA #: 05-1-FC7249-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 161
ITEM: SWITCH- P, R/Y, CSS/AUTO

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS OPEN. FMEA FAILURE MODE: ROLL/YAW CSS PBI SW FAILS TO TRANSFER.
IF CSS PBI SW FAILS OFF, USE THE OTHER CREW POSITION OR PLACE THE RHC OUT-OF-DETENT FOR MANUAL FCS CONTROL. NO AUTOLAND IS CONSIDERED AT THIS TIME.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-201
NASA FMEA #: 05-1-FC3142-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 201
ITEM: THC

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: LOSS OF ONE CHANNEL.
FMEA FAILURE MODE: LOSS OF A CHANNEL-TRANSDUCER OR SWITCH FAILURE-OPEN.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-202
NASA FMEA #: 05-1-FC3142-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 202
ITEM: THC

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[P]	[P]	[X] *
IOA	[2 /1R]	[P]	[P]	[P]	[X]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: IMMOBILE THC.
FMEA FAILURE MODE: PHYSICAL JAMMING-MECHANICAL LINKAGE FAILURE.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-203
NASA FMEA #: 05-1-FC3142-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 203
ITEM: THC

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[2 /1R]	[P]	[P]	[P]	[X]
COMPARE	[N /]	[ ]	[ ]	[ ]	[N]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ERRONEOUS OUTPUT.
FMEA FAILURE MODE: ERRONEOUS OUTPUT, SHORTED SWITCH.
MANUAL ET SEP REQUIRES A MANUAL-Z TRANSLATION MANEUVER.
ADDITIONAL IOA ANALYSIS OF THIS FAILURE MODE CHANGED THE HARDWARE CRITICALITY TO 3, AGREEING WITH THE NASA FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-301
NASA FMEA #: 05-1-FC3442-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 301
ITEM: RPTA

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: NO OUTPUT ON ONE CHANNEL.
FMEA FAILURE MODE: LOSS OF OUTPUT - 1 CHANNEL.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-302
NASA FMEA #: 05-1-FC3442-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 302
ITEM: RPTA

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ERRONEOUS OUTPUT ON ONE CHANNEL.
FMEA FAILURE MODE: ERRONEOUS OUTPUT.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-303
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 303
ITEM: RPTA

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: INADVERTENT OUTPUT ON ONE CHANNEL.
NASA/RI DID NOT COVER THIS FAILURE MODE. IOA DOES RECOMMEND A FMEA BEING WRITTEN FOR COMPLETENESS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-304
NASA FMEA #: 05-1-FC3442-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 304
ITEM: RPTA

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[1 /1]	[NA]	[NA]	[NA]	[X] *
IOA	[2 /1R]	[P]	[P]	[P]	[X]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: LOSS OF ONE RPTA DUE TO MECHANICAL FAILURE
FMEA FAILURE MODE: PHYSICAL JAMMING OF TRANSDUCER DRIVE OR LINKAGE FAILURE
AFTER DISCUSSIONS WITH NASA AND FURTHER ANALYSIS, IOA AGREES WITH THE NASA CRITICALITY. SINCE RM IS PERFORMED ON EACH RPTA SEPARATELY BUT AT THE SAME TIME AND THEN THE LARGEST VALUE OF THE TWO SELECTED SIGNALS IS CHOSEN AS THE COMMAND, THE SIGNAL FROM THE JAMMED RPTA COULD BE SELECTED, IF IT IS GREATER THAN THE SIGNAL FROM THE OTHER RPTA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-401
NASA FMEA #: 05-1-FC3242-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 401
ITEM: SBTC

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[P]	[P]	[X] *
IOA	[2 /1R]	[P]	[P]	[P]	[X]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: PHYSICAL BINDING/JAMMING OF CNTL LEVER.
FMEA FAILURE MODE: PHYSICAL JAMMING.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-402
NASA FMEA #: 05-1-FC3242-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 402
ITEM: SBTC

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: NO TRANSDUCER OUTPUT ON A CMD CHANNEL.
FMEA FAILURE MODE: LOSS OF A CHANNEL-TRANSDUCER.
NO DIFFERENCES. REFERENCE MDAC ID 404 REMARKS. RECOMMEND CHANGE TO FMEA FAILURE MODE: LOSS OF A CHANNEL - TRANSDUCER OR SWITCH.

C-2

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-403
NASA FMEA #: 05-1-FC3242-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 403
ITEM: SBTC

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ERRONEOUS XDCR OUTPUT ON A CMD CHN.
FMEA FAILURE MODE: ERRONEOUS OUTPUT OF ONE CHANNEL.
NO DIFFERENCES.

REFERENCE MDAC ID 405 REMARKS. RECOMMEND CHANGE TO FMEA FAILURE MODE: ERRONEOUS OUTPUT - TRANSDUCER OR SWITCH CHANNEL.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-404
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 404
ITEM: SBTC

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: NO OUTPUT ON A TAKEOVER SW CHN.
FMEA FAILURE MODE: NONE.
NASA/RI DID NOT COVER THIS FAILURE MODE (NO OUTPUT ON A TAKEOVER SW CHN). IOA RECOMMENDS THIS FAILURE MODE BE ADDED TO FMEA 05-1-FC3242-2, CRITICALITY 3/1R. THE PRESENT FAILURE MODE COULD BE CHANGED TO "LOSS OF A CHANNEL - TRANSDUCER OR SWITCH".
NO NEW FMEA RECOMMENDED, SINCE THE CRITICALITY OF THIS FAILURE MODE DOES NOT INCREASE THE EXISTING CRITICALITY OF THE ITEM.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-405
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 405
ITEM: SBTC

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: TAKEOVER SW CHN FAILS ON.
FMEA FAILURE MODE: NONE.
NASA/RI DID NOT COVER THIS FAILURE MODE (TAKEOVER SW CHN FAILS ON).
IOA RECOMMENDS THIS FAILURE MODE BE ADDED TO FMEA 05-1-FC3242-3, CRITICALITY 3/1R. THE PRESENT FAILURE MODE COULD BE CHANGED TO "ERRONEOUS OUTPUT-TRANSDUCER OR SWITCH CHANNEL".
NO NEW FMEA RECOMMENDED, SINCE THE CRITICALITY OF THIS FAILURE MODE DOES NOT INCREASE THE EXISTING CRITICALITY OF THE ITEM.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-406X
NASA FMEA #: 05-1-FC3242-4

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 406
ITEM: SBTC

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[P]	[P]	[X] *
IOA	[2 /1R]	[P]	[P]	[P]	[X]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: PHYSICAL JAMMING OF TAKEOVER SWITCH.
FMEA FAILURE MODE: PHYSICAL JAMMING OF MANUAL TAKEOVER SWITCH.
NO DIFFERENCES.
THE IOA DID NOT COVER THIS ITEM IN THE ORIGINAL ANALYSIS. IOA DID COVER TAKEOVER SW CHN FAILS ON (ASSESSMENT ID GNC-405), AND NO OUTPUT ON A TAKEOVER SW CHN (ASSESSMENT ID GNC-404). A NEW IOA ANALYSIS WAS PERFORMED AND AN ANALYSIS WORKSHEET (ID-406) PROVIDED. IOA AGREED WITH THE NASA/RI ASSESSMENT RECOMMENDATION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-410
NASA FMEA #: 05-1-FC7251-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 410
ITEM: SWITCH-SPD BK/THROT PBI

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS CLOSED.
FMEA FAILURE MODE: FAILS TO TRANSFER-SWITCH WILL NOT CHANGE STATE.
DOWNGRADE SPD BK/THROT PBI AUTO SWITCH TO CRIT 3/3. SYSTEM NORMALLY IN AUTO UNLESS SYSTEM FAILURE REQUIRES MANUAL TAKEOVER BY THE SBTC TAKEOVER SWITCH. ONCE IN MANUAL MODE, CREW CAN REMAIN IN SBTC MANUAL CONTROL MODE WITH SOME INCREASE IN WORK LOAD. THE SBTC TAKEOVER SW MUST BE HELD IN TO MAINTAIN MANUAL MODE.
IOA DOES CONCUR WITH NASAs REEVALUATION AND RATIONALE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-410A
NASA FMEA #: 05-1-FC7251-0002

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 410
ITEM: SWITCH-SPD BK/THROT PBI

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS CLOSED.
FMEA FAILURE MODE: INTERNAL SHORTS.
DOWNGRADE SPD BK/THROT PBI AUTO SWITCH TO CRIT 3/3. SYSTEM NORMALLY IN AUTO UNLESS SYSTEM FAILURE REQUIRES MANUAL TAKEOVER BY THE SBTC TAKEOVER SWITCH. ONCE IN MANUAL MODE, CREW CAN REMAIN IN SBTC MANUAL CONTROL MODE WITH SOME INCREASE IN WORK LOAD. THE SBTC TAKEOVER SW MUST BE HELD IN TO MAINTAIN MANUAL MODE.
IOA DOES CONCUR WITH NASAs REEVALUATION AND RATIONALE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-411
NASA FMEA #: 05-1-FC7251-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 411
ITEM: SWITCH-SPD BK/THROT PBI

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT OR CURRENT LIMIT RESISTOR FAILS OPEN OR SHORTED TO GROUND.
FMEA FAILURE MODE: FAILS TO TRANSFER-SW WILL NOT CHANGE STATE.
DOWNGRADE SPD BK/THROT PBI AUTO SWITCH TO CRIT 3/3. SYSTEM NORMALLY IN AUTO UNLESS SYSTEM FAILURE REQUIRES MANUAL TAKEOVER BY THE SBTC TAKEOVER SWITCH. ONCE IN MANUAL MODE, CREW CAN REMAIN IN SBTC MANUAL CONTROL MODE WITH SOME INCREASE IN WORK LOAD.
IOA DOES CONCUR WITH NASAs REEVALUATION AND RATIONALE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-501
NASA FMEA #: 05-1-GN21-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 501
ITEM: IMU

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[P]	[F]	[X] *
IOA	[2 /1R]	[P]	[P]	[F]	[X]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ERRONEOUS OUTPUT.
FMEA FAILURE MODE: ERRONEOUS OUTPUT.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-502
NASA FMEA #: 05-1-GN21-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 502
ITEM: IMU

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[F]	[X] *
IOA	[3 /1R]	[P]	[P]	[F]	[X]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: NO OUTPUT.
FMEA FAILURE MODE: LOSS OF OUTPUT.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-510
NASA FMEA #: 05-60-200201-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 510
ITEM: IMU POWER CIRCUIT

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[N]	[ ]	[N]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[*] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ONE BRANCH OF CIRCUIT FAILED OPEN.
FMEA FAILURE MODE: FAIL OPEN, FAIL TO CONDUCT (DIODES).
FIRST FAILURE UNDETECTED BUT CURRENT STILL CONDUCTED TO THE IMU.
THE SECOND FALIURE ON THE SAME IMU IS DETECTED IN FLIGHT. THE OUTPUT FROM THIS IMU WILL BE DISCARDED AND ANNUNCIATED BY RM.
BECAUSE THE WORST CASE (2 FAILURES) PASSES ALL SCREENS, IOA RECOMMENDS ADDITIONAL CONSIDERATION BE GIVEN AS TO WEATHER OR NOT THIS IS A CIL ITEM.
* DISPOSITION AND RATIONALE NOT AVAILABLE AT THE TIME OF THE ASSESSMENT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-510A
NASA FMEA #: 05-60-IMU(03)

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 510
ITEM: IMU POWER CIRCUIT

LEAD ANALYST: W.H. TRAHAN

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ONE BRANCH OF CIRCUIT FAILED OPEN.
FMEA FAILURE MODE: OPEN, SHORT, OUT-OF-TOLERANCE (RESISTORS).
NO ACTION REQUIRED - RESULTS ARE THE SAME.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-510B
NASA FMEA #: 05-60-IMU(04)

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 510
ITEM: IMU POWER CIRCUIT

LEAD ANALYST: W.H. TRAHAN

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ONE BRANCH OF CURCUIT FAILED OPEN.
FMEA FAILURE MODE: LOSS OF OUTPUT, FAILS TO CONDUCT, OPENS, PREMATURE OPERATION (RPC).
NO ACTION REQUIRED - RESULTS ARE THE SAME.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-511
NASA FMEA #: 05-60-200200-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 511
ITEM: IMU POWER CIRCUIT

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT FAILS OPEN.
FMEA FAILURE MODE: SWITCH - OPEN, SHORTS, FAIL TO TRANSFER FROM OFF.
NO ACTION REQUIRED - RESULTS ARE THE SAME.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-512
NASA FMEA #: 05-60-200200-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 512
ITEM: IMU POWER CIRCUIT

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ONE CIRCUIT FAILED CLOSED.
FMEA FAILURE MODE: SWITCH SHORT (CONTACT TO CONTACT), PREMATURE OPERATIONS.
NO ACTION REQUIRED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-601
NASA FMEA #: 05-1-GN22-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 601
ITEM: STAR TRACKER

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: NO OUTPUT.
FMEA FAILURE MODE: LOSS OF OUTPUT.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-601A
NASA FMEA #: 05-1-GN22-4

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 601
ITEM: STAR TRACKER

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: NO OUTPUT.
FMEA FAILURE MODE: MECHANICAL SHUTTER FAILED CLOSED.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-602
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 602
ITEM: STAR TRACKER

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ERRONEOUS OUTPUT.
NASA/RI DID NOT COVER THIS FAILURE MODE. IOA DOES RECOMMEND A FMEA BEING WRITTEN FOR COMPLETENESS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE:
ASSESSMENT ID: GNC-603X
NASA FMEA #: 05-1-GN22-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 603
ITEM: STAR TRACKER

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: LOSS OF INPUT.
FMEA FAILURE MODE: LOSS OF INPUT.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE:
ASSESSMENT ID: GNC-604X
NASA FMEA #: 05-1-GN22-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 604
ITEM: STAR TRACKER

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: MECHANICAL SHUTTER FAILS OPEN.
FMEA FAILURE MODE: MECHANICAL SHUTTER FAILS OPEN.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-610
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 610
ITEM: CIRCUIT-STAR TRACKER POWER

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /3]	[NA]	[NA]	[NA]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: CIRCUIT BREAKER OR SWITCH FAILS CLOSED. NASA/RI DID NOT COVER THIS FAILURE MODE. IOA DOES RECOMMEND A FMEA BEING WRITTEN FOR COMPLETENESS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-611
NASA FMEA #: 05-60-200100-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 611
ITEM: CIRCUIT-STAR TRACKER POWER

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: FAILS OPEN.
FMEA FAILURE MODE: ALL CREDIBLE MODES (LOSS OF OUTPUT, SHORTS, PREMATURE POWER)
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-612
NASA FMEA #: 05-60-200100-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 612
ITEM: CIRCUIT-STAR TRACKER POWER

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH SHORTS TO GROUND.
FMEA FAILURE MODE: ALL CREDIBLE MODES (LOSS OF OUTPUT, SHORTS, PREMATURE POWER)
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-701
NASA FMEA #: 07-1-725101-3

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 701
ITEM: COAS

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: COAS LIGHT OUT.
FMEA FAILURE MODE: LOSS OF RETICLE ILLUMINATION (BULB FAILS TO LIGHT, DIMMER FAILS).
AFTER DISCUSSIONS WITH NASA, IOA AGREES WITH THE NASA CRITICALITY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-702
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 702
ITEM: COAS

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R] [P] [P] [P] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: RETICLE BROKEN.
NASA/RI DID NOT COVER THIS FAILURE MODE. IOA DOES RECOMMEND A FMEA BEING WRITTEN FOR COMPLETENESS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-703X
NASA FMEA #: 07-1-725101-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 703
ITEM: COAS

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: INCORRECT MOUNTING OR UNABLE TO MOUNT.
FMEA FAILURE MODE: INCORRECT MOUNTING OR UNABLE TO MOUNT.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-710
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 710
ITEM: CIRCUIT - COAS POWER

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /3]	[NA]	[NA]	[NA]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: CIRCUIT BREAKER OR SWITCH FAILS CLOSED. NASA/RI DID NOT COVER THIS FAILURE MODE. IOA DOES RECOMMEND A FMEA BEING WRITTEN FOR COMPLETENESS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-711
NASA FMEA #: 05-6Y-202000-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 711
ITEM: CIRCUIT - COAS POWER

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH FAILS OPEN.
FMEA FAILURE MODE: ALL CREDIBLE MODES (LOSS OF POWER, OPENS, SHORTS, INADVERTENT OUTPUT).
AFTER DISCUSSIONS WITH NASA AND FURTHER ANALYSIS, IOA AGREES WITH THE NASA CRITICALITY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-712
NASA FMEA #: 05-6Y-202000-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 712
ITEM: CIRCUIT - COAS POWER

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: CIRCUIT BREAKER FAILS OFF.
FMEA FAILURE MODE: ALL CREDIBLE MODES (LOSS OF POWER, OPENS, SHORTS, INADVERTENT OUTPUT).
AFTER DISCUSSIONS WITH NASA AND FURTHER ANALYSIS, IOA AGREES WITH THE NASA CRITICALITY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-801
NASA FMEA #: 05-1-GN28-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 801
ITEM: ADTA

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ERRONEOUS OUTPUT.
FMEA FAILURE MODE: ERRONEOUS OUTPUT.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-802
NASA FMEA #: 05-1-GN28-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 802
ITEM: ADTA

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: NO OUTPUT.
FMEA FAILURE MODE: LOSS OF OUTPUT.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-810
NASA FMEA #: 05-60-GN0801-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 810
ITEM: ADTA POWER CIRCUIT

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: CIRCUIT FAILED OPEN.
FMEA FAILURE MODE: CIRCUIT BREAKER-ALL CREDIBLE MODES OPENS, CLOSES, PREMATURE OPERATION, SHORTS.
NO ACTION REQUIRED - RESULTS ARE THE SAME.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/23/87
ASSESSMENT ID: GNC-811
NASA FMEA #: 05-60-GN0801-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 811
ITEM: ADTA POWER CIRCUIT

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: CIRCUIT FAILED CLOSED.
FMEA FAILURE MODE: CIRCUIT BREAKER-ALL CREDIBLE MODES, OPENS, CLOSES, PREMATURE OPERATION, SHORTS.
NO ACTION REQUIRED - FMEA DEFINES A HIGHER CRITICALITY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/23/87
ASSESSMENT ID: GNC-812
NASA FMEA #: 05-60-GN0802-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 812
ITEM: ADTA POWER CIRCUIT

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: RESISTOR (RLR07C5101GR) SHORTS TO GROUND OR OPENS.
FMEA FAILURE MODE: ALL CREDIBLE MODES - OPENS, OUT OF TOLERANCE, SHORTED TO GROUND.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-901
NASA FMEA #: 05-1-FC1042-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 901
ITEM: RGA

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: LOSS OF OUTPUT.
FMEA FAILURE MODE: LOSS OF OUTPUT.
FIRST FAILURE WILL BE DETECTED AND THE OUTPUT DISCARDED BY RM.
SECOND FAILURE MAY NOT BE ANNUNCIATED, BUT MCC CAN DETECT.
FLIGHT RULES DICTATES PRIORITY FLIGHT FOR THE LOSS OF ONE RGA.
MAY IMPACT MISSION. REDUNDANCY OF FOUR RGA'S.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-902
NASA FMEA #: 05-1-FC1042-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 902
ITEM: RGA

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /]	[ ]	[N]	[ ]	[N]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ERRONEOUS OUTPUT.
FMEA FAILURE MODE: ERRONEOUS OUTPUT.
FIRST FAILURE WILL BE DETECTED AND THE OUTPUTS DISCARDED BY RM. THE SECOND FAILURE MAY NOT BE ANNUNCIATED, BUT THE MCC CAN DETECT. FLIGHT RULES INVOKE PRIORITY FLIGHT ON THE FIRST FAILURE. MAY IMPACT MISSION. REDUNDANCY OF FOUR RGA. ADDITIONAL IOA ANALYSIS CHANGED THE HARDWARE CRITICALITY TO 2 AND FAILED THE B SCREEN. THIS RESULTS IN NO DIFFERENCE WITH NASA FMEA FOR THE WORST CASE WHERE THE ERRONEOUS OUTPUT IS BELOW THE RM TRIP LEVEL.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-903
NASA FMEA #: 05-60-FC1043-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 903
ITEM: PWR SW RGA 1,2,3,4

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: FAILS ON, FAIL OFF.
FMEA FAILURE MODE: PREMATURE OPERATION-INADVERTENTLY OPENS, SHORT TO GROUND, INTERNAL SHORT.
SWITCHES 1 AND 4 ARE REDUNDANTLY POWERED.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-904
NASA FMEA #: 05-60-200301-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 904
ITEM: DIODES & RESIST (ORB)

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[N]	[ ]	[N]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [*] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: OPEN, FAIL TO CONDUCT.
FMEA FAILURE MODE: (DIODES ONLY) OPEN (ELECTRICAL)-FAILS OPEN, FAIL TO CONDUCT.
FIRST FAILURE UNDETECTED BUT CURRENT STILL CONDUCTED TO THE RGA'S. THE SECOND FAILURE ON THE SAME RGA IS DETECTABLE IN FLIGHT. THE OUTPUT FROM THIS RGA WILL BE DISCARDED AND ANNUNCIATED BY RM. FLIGHT RULES DICTATES PRIORITY FLIGHT FOR THE LOSS OF ONE
RGA. BECAUSE THE WORST CASE (2 FAILURES) PASSES ALL SCREENS, IOA RECOMMENDS ADDITIONAL CONSIDERATION BE GIVEN AS TO WEATHER OR NOT THIS BECOMES A CIL ITEM.
* DISPOSITION AND RATIONALE NOT AVAILABLE AT THE TIME OF THE ASSESSMENT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-904A
NASA FMEA #: 05-60-FC1044-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 904
ITEM: DIODES & RESIST (ORB)

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: OPEN, FAIL TO CONDUCT.
FMEA FAILURE MODE: (RESISTOR) OPEN, SHORTS, HIGH RESISTANCE.
RGA'S 1 AND 4 ARE REDUNDANTLY POWERED.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-905
NASA FMEA #: 05-60-FC1042-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 905
ITEM: RPC'S (ORB)

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: FAILS ON, FAILS OFF. (RGA)
FMEA FAILURE MODE: LOSS OF OUTPUT-FAIL TO CONDUCT, OPENS, PREMATURE OPERATIONS. (RGA)
RGA 1 AND 4 ARE REDUNDANTLY POWERED.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-950
NASA FMEA #: 05-1-(09), PREL REF NO.

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 950
ITEM: RGA (SRB)

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: LOSS OF OUTPUT.
FMEA FAILURE MODE: LOSS OF OUTPUT.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-951
NASA FMEA #: 05-01-(10), PREL REF NO.

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 951
ITEM: RGA (SRB)

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /]	[ ]	[N]	[ ]	[N]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ERRONEOUS OUTPUT.
FMEA FAILURE MODE: ERRONEOUS OUTPUT.
AFTER DISCUSSIONS WITH NASA AND FURTHER ANALYSIS, IOA AGREES WITH THE NASA CRITICALITY. FOR MOST CASES, ERRONEOUS ERRORS WILL BE DETECTED BY FDIR. FOR A WORST CASE SCENARIO IN WHICH THE ERROR IS BELOW THE FDIR THRESHOLD VALUE, THE ERROR WILL NOT BE DETECTED AND THE ERRONEOUS DATA WILL BE SENT TO THE SELECTION FILTER WHERE IT COULD BE SELECTED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-960
NASA FMEA #:

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 960
ITEM: CIRCUIT - SRB RGA POWER

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-961
NASA FMEA #:

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 961
ITEM: CIRCUIT - SRB RGA POWER

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

RECOMMENDATIONS: (If different from NASA)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-1001
NASA FMEA #: 05-1-FC2042-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1001
ITEM: ACCELEROMETER ASSEMBLY

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: NO OUTPUT.
FMEA FAILURE MODE: LOSS OF OUTPUT.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-1002
NASA FMEA #: 05-1-FC2042-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1002
ITEM: ACCELEROMETER ASSEMBLY

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /]	[ ]	[N]	[ ]	[N]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ERRONEOUS OUTPUT.
FMEA FAILURE MODE: ERRONEOUS OUTPUT.
AFTER DISCUSSIONS WITH NASA AND FURTHER ANALYSIS, IOA AGREES WITH THE NASA CRITICALITY. FOR MOST CASES ERRONEOUS ERRORS WILL BE DETECTED BY FDIR. FOR A WORST CASE SCENARIO IN WHICH THE ERROR IS BELOW THE FDIR THRESHOLD VALUE, THE ERROR WILL NOT BE DETECTED AND THE ERRONEOUS DATA WILL BE SENT TO THE SELECTION FILTER WHERE IT COULD BE SELECTED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-1010
NASA FMEA #: 05-60-FC1045-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1010
ITEM: CIRCUIT-AA'S 1 & 2 POWER

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT (AA'S 1&2) FAILS CLOSED.
FMEA FAILURE MODE: CIRCUIT BREAKER FAILS OPEN, FAILS CLOSED.
THE FMEA COVERED TWO FAILURE MODES, BUT IOA AGREES WITH THE HIGHEST CRITICALITY WHICH IS FOR THE "FAILED OPEN" CASE. NO ADDITIONAL FMEA IS RECOMMENDED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86 NASA DATA:
ASSESSMENT ID: GNC-1011 BASELINE [ ]
NASA FMEA #: 05-60-FC1045-0001 NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1011
ITEM: CIRCUIT-AA'S 1 & 2 POWER

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT (AA'S 1&2) FAILS OPEN.
FMEA FAILURE MODE: CIRCUIT BREAKER FAILS OPEN, FAILS CLOSED.
THE FMEA COVERED TWO FAILURE MOES, BUT IOA AGREES WITH THE HIGHEST CRITICALITY WHICH IS FOR THE "FAILED OPEN" CASE. NO ADDITIONAL FMEA IS RECOMMENDED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-1012
NASA FMEA #: 05-60-(03), PREL REF NO.

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1012
ITEM: CIRCUIT-AA'S 3 & 4 POWER

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT (AA'S 3&4) FAILS OPEN.
FMEA FAILURE MODE: LIMITING RESISTORS FAIL OPEN, SHORT, HIGH RESISTANCE.
NO DIFFERENCE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86 NASA DATA:
ASSESSMENT ID: GNC-1012A BASELINE [ ]
NASA FMEA #: 05-60-(04), PREL REF NO. NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1012
ITEM: CIRCUIT-AA'S 3 & 4 POWER

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT (AA'S 3&4) FAILS OPEN.
FMEA FAILURE MODE: SWITCH FLT CONTROL (AA 3&4) - PREMATURE OPERATION, SHORTS, OPENS.
NO DIFFERENCE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-1012B
NASA FMEA #: 05-60-(05), PREL REF NO.

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1012
ITEM: CIRCUIT-AA'S 3 & 4 POWER

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT (AA'S 3&4) FAILS OPEN.
FMEA FAILURE MODE: RPC - LOSS OF OUTPUT, FAILS TO CONDUCT, OPENS, PREMATURE OPERATION.
NO DIFFERENCE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-1013
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1013
ITEM: CIRCUIT-AA'S 3 & 4 POWER

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[3 /3]	[NA]	[NA]	[NA]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT (AA'S 3&4) FAILS CLOSED. NASA/RI DID NOT COVER THIS FAILURE MODE. IOA DOES RECOMMEND A FMEA BEING WRITTEN FOR COMPLETENESS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/25/87
ASSESSMENT ID: GNC-1014X
NASA FMEA #: 05-60-200501-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1014
ITEM: DIODE - AA'S 3 & 4 POWER CIRCUITS

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /1R]	[P]	[F]	[P]	[X]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: DIODE FAILS OPEN.
FMEA FAILURE MODE: OPEN (ELECTRICAL).
AA'S 3 & 4 HAVE TWO POWER CIRCUITS. THE LOSS OF ONE DIODE REMOVES ONE POWER CIRCUIT ONLY. THE OTHER CIRCUIT CONTINUES TO SUPPLY POWER TO THE RGA. THE LOSS OF ONE DIODE CANNOT BE DETECTED, THEREFORE SCREEN B IS FAILED.
NO CIL RETENTION RATIONALE WAS AVAILABLE AT THE TIME OF THIS ASSESSMENT.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1101
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1101
ITEM: ASA

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R] [P] [P] [P] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ISOL CMD FL OFF IN ONE CHN.
FMEA FAILURE MODE: NONE.
IT IS NOT CLEAR THAT NASA/RI COVERED THIS FAILURE MODE IN FMEA 05-1-FC6042-2 (ERRONEOUS OUTPUT) CRIT 3/1R. RECOMMEND NASA/RI PROVIDE ADDITIONAL INFORMATION IN FMEA TO CLARIFY FAILURE MODES ANALYZED. IOA DOES RECOMMEND THAT A NEW FMEA BE WRITTEN FOR COMPLETENESS. THE ISOL CMD FL OFF WILL INHIBIT THE ISOLATION OF THE CHN IF AN ASA SYSTEM FAILURE IS DETECTED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1102
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1102
ITEM: ASA

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ISOL CMD FL ON FOR ONE CHN.
FMEA FAILURE MODE: NONE.
IT IS NOT CLEAR THAT NASA/RI COVERED THIS FAILURE MODE IN FMEA 05-1-FC6042-2 (ERRONEOUS OUTPUT) CRIT 3/1R. RECOMMEND NASA/RI PROVIDE ADDITIONAL INFORMATION IN FMEA TO CLARIFY FAILURE MODES ANALYZED. IOA DOES RECOMMEND THAT A NEW FMEA BE WRITTEN FOR, COMPLETENESS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1103
NASA FMEA #: 05-1-FC6042-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1103
ITEM: ASA

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[F]	[P]	[X] *
IOA	[2 /1R]	[P]	[P]	[P]	[X]
COMPARE	[/]	[ ]	[N]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: NO POSITION ERR CMD TO ACTR CHN (NULL OUTPUT).
FMEA FAILURE MODE: LOSS OF OUTPUT.
IOA DOES CONCUR WITH NASA's REEVALUATION AND RATIONALE AS SHOWN IN THE NASA-JSC FMEA REVIEW COMMENTS. DUAL NULL (ASA LOSS OF OUTPUT) FAILURES OF AEROSURFACE RATE COMMANDS WILL BE UNDETECTED BY THE ASA DELTA P FAULT DETECT CIRCUIT AND MCC MONITORING SYSTEMS WHILE SURFACE POSITIONS ARE NOT CHANGING. THE TWO UNDETECTED NULL FAILURES, DURING ATMOSPHERIC FLIGHT MANEUVERS, WILL CAUSE A 2 ON 2 CHN FORCE FIGHT AND MAY RESULT IN LOSS OF VEHICLE. AS A RESULT OF NASA REVISIONS, AND FURTHER IOA ASA FAILURE ANALYSIS, IOA DOES NOT RECOMMEND A CHANGE TO THE EXISTING FMEA REDUNDANCY SCREEN B.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1104
NASA FMEA #: 05-1-FC6042-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1104
ITEM: ASA

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ERRONEOUS POSITION ERROR CMD TO ACTR.
FMEA FAILURE MODE: ERRONEOUS OUTPUT.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1105
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1105
ITEM: ASA

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: NO OUTPUT, OR ERRONEOUS OUTPUT ON ONE POSITION. FDBK XDCR CHN.
FMEA FAILURE MODE: NONE.
IT IS NOT CLEAR THAT NASA/RI COVERED THIS FAILURE MODE IN FMEA 05-1-FC6042-2. SINCE THIS FAILURE MODE AFFECTS ERRONEOUS OUTPUT IN FMEA 05-1-FC6042-2 AND HAS THE SAME CRITICALITY (3/1R), IOA DOES RECOMMEND THAT A NEW FMEA BE WRITTEN FOR COMPLETENESS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1106
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1106
ITEM: ASA

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: NO OUTPUT/ERRONEOUS OUTPUT ON ONE SEC DELTA P FDBK XDCR CHN.
FMEA FAILURE MODE: NONE.
IT IS NOT CLEAR THAT NASA/RI COVERED THIS FAILURE MODE IN FMEA 05-1-FC6042-2. SINCE THIS FAILURE MODE AFFECTS ERRONEOUS OUTPUT IN FMEA 05-1-FC6042-2 AND HAS THE SAME CRITICALITY (3/1R), IOA DOES RECOMMEND THAT A NEW FMEA BE WRITTEN FOR COMPLETENESS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1107
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1107
ITEM: ASA

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: NO OUTPUT/ERRONEOUS OUTPUT ON 1 ELVN PR1 DELTA P FDBK XDCR CHN.
FMEA FAILURE MODE: NONE.
IT IS NOT CLEAR THAT NASA/RI COVERED THIS FAILURE MODE IN FMEA 05-1-FC6042-2. SINCE THIS FAILURE MODE AFFECTS ERRONEOUS OUTPUT IN FMEA 05-1-FC6042-2 AND HAS THE SAME CRITICALITY (3/1R), IOA DOES RECOMMEND THAT A NEW FMEA BE WRITTEN FOR COMPLETENESS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1108
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1108
ITEM: ASA

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: BDY FLP CMD CHN (1 OF 3) INOPERATIVE.
FMEA FAILURE MODE: NONE.
SINCE THIS FAILURE MODE MAY HAVE BEEN CONSIDERED DURING ANALYSIS OF FMEA 05-1-FC6042-2 WITH THE SAME CRITICALITY (3/1R), IOA DOES RECOMMEND THAT A NEW FMEA BE WRITTEN FOR COMPLETENESS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1110
NASA FMEA #: 05-1-FC7244-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1110
ITEM: CIRCUIT-FCS CHN CNTL

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[F]	[P]	[P]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[N]	[ ]	[ ]	[N]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[X] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILS CLOSED (AT TRANSFER/PREMATURE).
FMEA FAILURE MODE: FAILS TO TRANSFER.
IOA DOES NOT CONCUR WITH NASA'S REEVALUATION AND RATIONALE FOR CHANGING SCREEN "A" FROM P (PASS) TO F (FAIL). SWITCH NORMALLY REMAINS IN AUTO POSITION DURING GROUND TURNAROUND TESTING, AND IS FUNCTIONALLY CHECKED ONLY AFTER A SPECIFIC NUMBER OF FLIGHTS. THE CIL WAS NOT AVAILABLE FOR EVALUATION OF THE RETENTION RATIONALE. REDUNDANT ITEMS PASS SCREEN-A, IF THEY ARE CAPABLE OF CHECKOUT DURING NORMAL GROUND TURNAROUND.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1111
NASA FMEA #: 05-1-FC7244-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1111
ITEM: CIRCUIT-FCS CHN CNTL

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[F]	[P]	[P]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[N]	[ ]	[ ]	[N]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[X] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT OR CURRENT LIMIT RESISTOR FAILS OPEN OR SHORTED TO GROUND (AT TRANSFER/PREMATURE).
FMEA FAILURE MODE: FAILS TO TRANSFER
IOA DOES NOT CONCUR WITH NASA'S REEVALUATION AND RATIONALE FOR CHANGING SCREEN "A" FROM P (PASS) TO F (FAIL). SWITCH NORMALLY REMAINS IN AUTO POSITION DURING GROUND TURNAROUND TESTING, AND IS FUNCTIONALLY CHECKED ONLY AFTER A SPECIFIC NUMBER OF FLIGHTS. THE CIL WAS NOT AVAILABLE FOR EVALUATION OF THE RETENTION RATIONALE. REDUNDANT ITEMS PASS SCREEN-A, IF THEY ARE CAPABLE OF CHECKOUT DURING NORMAL GROUND TURNAROUND.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1111A
NASA FMEA #: 05-1-FC7244-0002

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1111
ITEM: CIRCUIT-FCS CHN CNTL

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[F]	[P]	[P]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[N]	[ ]	[ ]	[N]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[X] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT OR CURRENT LIMIT RESISTOR FAILS OPEN OR SHORTED TO GROUND (AT TRANSFER/PREMATURE).
FMEA FAILURE MODE: SHORTED TO GROUND, OPEN, PREMATURE OPERATION.
IOA DOES NOT CONCUR WITH NASA'S REEVALUATION AND RATIONALE FOR CHANGING SCREEN "A" FROM P (PASS) TO F (FAIL). SWITCH NORMALLY REMAINS IN AUTO POSITION DURING GROUND TURNAROUND TESTING, AND IS FUNCTIONALLY CHECKED ONLY AFTER A SPECIFIC NUMBER OF FLIGHTS. THE CIL WAS NOT AVAILABLE FOR EVALUATION OF THE RETENTION RATIONALE. REDUNDANT ITEMS PASS SCREE-A, IF THEY ARE CAPABLE OF CHECKOUT DURING NORMAL GROUND TURNAROUND.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1111B
NASA FMEA #: 05-60-(06), PREL REF NO.

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1111
ITEM: CIRCUIT-FCS CHN CNTL

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT OR CURRENT LIMIT RESISTOR FAILS OPEN OR SHORTED TO GROUND (AT TRANSFER/PREMATURE).
FMEA FAILURE MODE: 1.2K CURRENT LIMITING RESISTOR (FOR ATVC AND ASA PWR SUPPLY) FAILS OPEN, OUT-OF-TOLERANCE, OR SHORTED.
NO DIFFERENCES: THE OUT-OF-TOLERANCE AND SHORTED (ZERO RESISTANCE) FAILURE MODES WERE NOT CONSIDERED BY IOA SINCE THESE FAILURE MODES WOULD ALWAYS REFLECT A CRITICALITY OF 3/3. THE "OPEN" FAILURE REFLECTS THE WORST CASE CRITICALITY OF THE RESISTOR.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1111C
NASA FMEA #: 05-60-(08), PREL REF NO.

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1111
ITEM: CIRCUIT-FCS CHN CNTL

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT OR CURRENT LIMIT RESISTOR FAILS OPEN OR SHORTED TO GROUND (AT TRANSFER/PREMATURE).
FMEA FAILURE MODE: 1.2K CURRENT LIMITING RESISTOR (FOR OVERRIDE SIGNAL TO GPC) FAILS OPEN, OUT-OF-TOLERANCE, OR SHORTED.
THE OUT-OF-TOLERANCE AND SHORTED (ZERO RESISTANCE) FAILURE MODES WERE NOT CONSIDERED BY IOA SINCE THESE FAILURE MODES WOULD ALWAYS REFLECT A CRITICALITY OF 3/3. THE "OPEN" FAILURE REFLECTS THE WORST CASE CRITICALITY OF THE RESISTOR.
IOA FAILURE MODE INCLUDED ALL SWITCH CONTACTS OR RESISTORS FAILED OPEN WITH WORST CASE CRITICALITY OF 3/1R FOR PREL FMEA NO 05-60-(06). IOA AGREES WITH A CRITICALITY OF 3/3 FOR THE CURRENT LIMITING RESISTOR IN THE OVERRIDE CHN. OVERRIDE POSITION ONLY REQUIRED IF PREVIOUS FAILURES EXIST IN THE ASA/ATVC SYSTEM.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1112
NASA FMEA #: 05-60-(13), PREL REF NO.

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1112
ITEM: CIRCUIT-FCS CHN CNTL

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: DIODE FAILS OPEN.
FMEA FAILURE MODE: DIODE OPEN BETWEEN FCS SWITCH OVERRIDE AND AUTO POSITIONS.
AFTER NASA/RI REEVALUATION OF FMEA AND FURTHER IOA EVALUATION OF SYSTEM OERATION, IOA DOES CONCUR WITH THE NEW FMEA. IF DIODES FAIL OPEN, THE FCS CHN SWITCH IN OVERRIDE WILL REMOVE POWER FROM ASA/ATVC PWR SUPPLY AND ISSOLATE CHN FROM SYSTEM. OVERRIDE POSITION ONLY REQUIRED IF PREVIOUS FAILURES EXIST IN THE ASA/ATVC SYSTEM. FCS CHN SWITCH IN AUTO WILL RESTORE POWER TO THE RESPECTIVE ASA/ATVC.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1130
NASA FMEA #: 05-60-200701-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1130
ITEM: CIRCUIT-ASA'S 1,2,3,4 POWER

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[N]	[ ]	[N]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT FAILS OPEN (OFF), DURING POWER TRANSFER OR PREMATURELY.
FMEA FAILURE MODE: OPEN - 12/35 AMP DIODE (TO PWR SUPPLY).
AFTER NASA/RI REEVALUATION OF FMEA AND FURTHER IOA EVALUATION OF SYSTEM OPERATION, IOA DOES CONCUR WITH THE REVISED FMEA. ONE REDUNDANT DIODE FL OPN IS NOT DETECTABLE. TWO REDUNDANT DIODES FL OPN ARE DETECTABLE BY LOSS OF PWR TO CHN, AND RESULTS IN CONTROL CHANNEL ISOLATION. THE CIL WAS NOT AVAILABLE FOR EVALUATION OF THE RETENTION RATIONALE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1130A
NASA FMEA #: 05-60-200703-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1130
ITEM: CIRCUIT-ASA'S 1,2,3,4 POWER

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT FAILS OPEN (OFF), DURING POWER TRANSFER OR PREMATURELY.
FMEA FAILURE MODE: OPEN - 12/35 AMP DIODE (TO ISOL VLV DRIVER). AFTER NASA/RI REEVALUATION OF FMEA AND FURTHER IOA EVALUATION OF SYSTEM OPERATION, IOA DOES CONCUR WITH THE REVISED FMEA. THE DIODES FAILING OPEN WILL CAUSE THE ISOL VALVE DRIVER TO FAIL OFF AND INHIBIT THE ASA FROM ISOLATING THE CHN IF AN ASA SYSTEM FAILURE IS DETECTED. ASA-4 (CHN-4) ISOL VLV DRIVERS NOT REDUNDANTLY POWERED LIKE ASA-1, 2, AND 3.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1130B
NASA FMEA #: 05-60-200706-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1130
ITEM: CIRCUIT-ASA'S 1,2,3,4 POWER

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT FAILS OPEN (OFF), DURING POWER TRANSFER OR PREMATURELY.
FMEA FAILURE MODE: FAILS OPEN, SHORTS TO GROUND (RPC TO ISOL VLV DRIVER).
AFTER NASA/RI REEVALUATION OF FMEA AND FURTHER IOA EVALUATION OF SYSTEM OPERATION, IOA DOES CONCUR WITH THE REVISED FMEA. THE RPC'S FAILING OPEN WILL CAUSE THE ISOL VALVE DRIVER TO FAIL OFF AND INHIBIT THE ASA FROM ISOLATING THE CHN IF AN ASA SYSTEM FAILURE IS DETECTED. ASA-4 (CHN-4) ISOL VLV DRIVERS NOT REDUNDANTLY POWERED LIKE ASA-1, 2, AND 3.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1130C
NASA FMEA #: 05-60-(14), PREL REF NO.

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1130
ITEM: CIRCUIT-ASA'S 1,2,3,4 POWER

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /]	[ ]	[N]	[ ]	[N]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT FAILS OPEN (OFF), DURING POWER TRANSFER OR PREMATURELY.
FMEA FAILURE MODE: ASA POWER SW FAILS TO TRANSFER (OPEN).
AFTER NASA/RI REEVALUATION OF FMEA AND FURTHER IOA EVALUATION OF SYSTEM OPERATION, IOA DOES CONCUR WITH THE NEW FMEA. WITH 2 ASA PWR SWITCHES FAILED TO TRANSFER (OPEN), THERE WILL EXIST A 2 ON 2 ASA CHN FORCE FIGHT WHICH COULD RESULT IN LOSS OF VEHICLE CONTROL. LOSS OF SWITCH IS NOT READILLY DETECTABLE, BUT THE RESULTING LOSS OF RPC PWR AND ASA CHN IS DETECTABLE. LOSS OF ISOL VLV DRIVER PWR NOT DETECTABLE. THE CIL WAS NOT AVAILABLE FOR EVALUATION OF THE RETENTION RATIONALE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1130D
NASA FMEA #: 05-60-(15), PREL REF NO.

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1130
ITEM: CIRCUIT-ASA'S 1,2,3,4 POWER

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[N]	[ ]	[N]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT FAILS OPEN (OFF), DURING POWER TRANSFER OR PREMATURELY.
FMEA FAILURE MODE: ASA POWER SW POLE (CONTACT) FAILS OPEN, SHORT, PREMATURE OPERATION.
AFTER NASA/RI REEVALUATION OF FMEA AND FURTHER IOA EVALUATION OF SYSTEM OPERATION, IOA DOES CONCUR WITH THE NEW FMEA. FOR PWR SW WORST CASE, 2 CONTACT FAIL OPEN (LOSS OF ISOL DRIVER), 2 CONT FAIL OPEN (LOSS OF PWR SUPPLY/CHN), 3 CONT FAIL OPEN (LOSS OF PWR SUPPLY WITHOUT CHN ISOLATION). LOSS OF CONTACTS ARE NOT READILY DETECTABLE, BUT THE RESULTING LOSS OF RPC PWR AND ASA CHN IS DETECTABLE. ASA CHN-4 ISOL VALVE DRIVERS NOT REDUNDANTLY POWERED LIKE CHN 1, 2, 3. LOSS OF ISOL VLV DRIVER PWR NOT DETECTABLE. THE CIL WAS NOT AVAILABLE FOR EVALUATION OF THE RETENTION RATIONALE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1130E
NASA FMEA #: 05-60-(16), PREL REF NO.

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1130
ITEM: CIRCUIT-ASA'S 1,2,3,4 POWER

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT FAILS OPEN (OFF), DURING POWER TRANSFER OR PREMATURELY.
FMEA FAILURE MODE: 1.2K CURRENT LIMITING RESISTOR (FOR ASA ISOL VALVE DRIVER PWR) FAILS OPEN, OUT-OF-TOLERANCE, OR SHORTED. THE OUT-OF-TOLERANCE AND SHORTED (ZERO RESISTANCE) FAILURE MODES WERE NOT CONSIDERED BY IOA SINCE THESE FAILURE MODES WOULD ALWAYS REFLECT A CRITICALITY OF 3/3. THE "OPEN" FAILURE REFLECTS THE WORST CASE CRITICALITY OF THE RESISTOR. IOA FALIURE MODE WAS POWER CIRCUIT FAILS OPEN (RPC'S, DIODES, AND SWITCH CIRCUIT) WITH WORST CASE CRITICALITY OF 3/1R. AFTER FURTHER EVALUATION OF SYSTEM OPERATION, IOA DOES CONCUR WITH THE CRITICALITY OF 3/3 FOR THE RESISTOR FAILING OPEN, AND LOSS OF ISOL VALVE DRIVER POWER.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1130F
NASA FMEA #: 05-60-(17), PREL REF NO.

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1130
ITEM: CIRCUIT-ASA'S 1,2,3,4 POWER

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT FAILS OPEN (OFF), DURING POWER TRANSFER OR PREMATURELY.
FMEA FAILURE MODE: RPC FAILS OPEN OR PREMATURE OPERATION (TO ASA PWR SUPPLY).
NO DIFFERENCES IN NASA/IOA ASSESSMENT OF NEW FMEA. ONE REDUNDANT RPC FL OPEN IS DETECTABLE ON INSTRUMENTATION. TWO REDUNDANT RPC'S FAIL OPEN ARE DETECTABLE, AND RESULTS IN CONTROL CHANNEL ISOLATION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE:
ASSESSMENT ID: GNC-1131
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1131
ITEM: CIRCUIT-ASA'S 1,2,3,4 POWER

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[3 /3]	[NA]	[NA]	[NA]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT FAILS CLOSED (ON), DURING POWER TRANSFER OR PREMATURELY.
FMEA FAILURE MODE: NA
AFTER THE FMEA REVIEW, NASA/RI DID NOT COVER THIS FAILURE MODE. IOA DOES RECOMMEND WRITING A NEW FMEA FOR COMPLETENESS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-1201
NASA FMEA #: 05-1-FC6242-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1201
ITEM: RJDF

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[P]	[P]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /]	[ ]	[ ]	[ ]	[N]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: NO OUTPUT TO JET.
FMEA FAILURE MODE: LOSS OF OUTPUT TO ONE OR MORE JETS.
FAILURE WILL BE DETECTED BY RM. JET WILL NOT BE SELECTED. OTHER JETS CAN PERFORM THE DESIRED FUNCTION.
ADDITIONAL IOA ANALYSIS CHANGED THE HARDWARE CRITICALITY TO 2 AGREEING WITH THE NASA FMEA FOR THE WORST CASE LOSS OF FWD RCS DUMP CAPABILITY.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-1203
NASA FMEA #: 05-1-FC6342-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1203
ITEM: RJDA

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: NO OUTPUT.
FMEA FAILURE MODE: LOSS OF OUTPUT TO ONE OR MORE JETS.
FAILURE WILL BE DETECTED BY RM. THE JET WILL NOT BE SELECTED BY THE SOFTWARE. OTHER JETS CAN PERFORM THE FUNCTION.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-1205
NASA FMEA #: 05-1-FC6342-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1205
ITEM: RJDA

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[1 /1]	[P]	[P]	[P]	[X] *
IOA	[1 /1]	[P]	[P]	[P]	[X]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: INADVERTENT JET FIRING.
FMEA FAILURE MODE: ERRONEOUS OUTPUT.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-1206
NASA FMEA #: 05-1-FC6242-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1206
ITEM: RJDF

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[1 /1]	[P]	[P]	[P]	[X] *
IOA	[1 /1]	[P]	[P]	[P]	[X]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: INADVERTENT JET FIRING.
FMEA FAILURE MODE: ERRONEOUS OUTPUT.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-1207
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1207
ITEM: PC FEEDBACK

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ERRONEOUS OUTPUT. (RJDF)
FAILURE WILL BE DETECTED BY RM. JET WILL NOT BE SELECTED. OTHER JETS CAN PERFORM THE DESIRED FUNCTION. IOA RECOMMENDS A FMEA BE WRITTEN FOR COMPLETENESS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-1208
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1208
ITEM: PC FEEDBACK

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ERRONEOUS OUTPUT. (RJDA)
FAILURE WILL BE DETECTED BY RM. JET WILL NOT BE SELECTED OTHER JETS CAN PERFORM THE DESIRED FUNCTION. IOA RECOMMENDS A FMEA BE WRITTEN FOR COMPLETENESS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-1211
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1211
ITEM: POWER CIRCUIT

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /3]	[NA]	[NA]	[NA]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: CIRCUIT FAIL CLOSE (INADVERTENT OUTPUT) RJDF.
IOA DOES RECOMMEND WRITING A FMEA FOR COMPLETENESS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-1212
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1212
ITEM: POWER CIRCUIT

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /3]	[NA]	[NA]	[NA]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: CIRCUIT FAIL CLOSE (INADVERTENT OUTPUT) RJDA.
IOA DOES RECOMMEND WRITING A FMEA FOR COMPLETENESS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-1213
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1213
ITEM: POWER CIRCUIT

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: CIRCUIT FAIL OPEN (NO OUTPUT) RJDA.
THIS ASSESSMENT ID BEING COVERED BY THE OMS/RCS SUBSYSTEM GROUP.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-1214
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1214
ITEM: POWER CIRCUIT

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: CIRCUIT FAIL OPEN (NO OUTPUT) RJDF.
THIS ASSESSMENT IS BEING COVERED BY THE OMS/RCS SUBSYSTEM GROUP.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1301
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1301
ITEM: ATVC

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R] [P] [P] [P] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ISOL CMD FL OFF IN ONE CHN.
FMEA FAILURE MODE: NONE.
IT IS NOT CLEAR THAT NASA/RI COVERED THIS FAILURE MODE IN FMEA 05-1-FC6542-2 (ERRONEOUS OUTPUT) CRIT - 3/1R.
RECOMMEND NASA/RI PROVIDE ADDITIONAL INFORMATION IN FMEA TO CLARIFY FAILURE MODES ANALYZED. IOA DOES RECOMMEND THAT A NEW FMEA BE WRITTEN FOR COMPLETENESS. THE ISOL CMD FL OFF WILL INHIBIT THE ISOLATION OF THE CHN IF AN ATVC SYSTEM FAILURE IS DETECTED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1302
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1302
ITEM: ATVC

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ISOL CMD FL ON FOR ONE CHN.
FMEA FAILURE MODE: NONE.
IT IS NOT CLEAR THAT NASA/RI COVERED THIS FAILURE MODE IN FMEA 05-1-FC6542-2 (ERRONEOUS OUTPUT) CRIT - 3/1R.
RECOMMEND NASA/RI PROVIDE ADDITIONAL INFORMATION IN FMEA TO CLARIFY FAILURE MODES ANALYZED. IOA DOES RECOMMEND THAT A NEW FMEA BE WRITTEN FOR COMPLETENESS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1303
NASA FMEA #: 05-1-FC6542-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1303
ITEM: ATVC

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[F]	[P]	[X] *
IOA	[2 /1R]	[P]	[P]	[P]	[X]
COMPARE	[/]	[ ]	[N]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: NO POSITION CMD TO ACTR CHN (NULL OUTPUT).
FMEA FAILURE MODE: LOSS OF OUTPUT.
IOA DOES CONCUR WITH NASA's REEVALUATION AND RATIONALE AS SHOWN IN THE NASA/JSC FMEA REVIEW COMMENTS. DUAL NULL FAILURES (ASA LOSS OF OUTPUT) OF ACTUATOR POSITION COMMANDS WILL BE UNDETECTED BY THE ATVC DELTA P FAULT DETECT CIRCUIT AND MCC MONITORING SYSTEMS WHILE ENGINES ARE NEAR ZERO ENGINE GIMBAL POSITION. THE TWO UNDETECTED NULL FAILURES, DURING ASCENT, WILL CAUSE A 2 ON 2 CHANNEL FORCE FIGHT AND MAY RESULT IN LOSS OF VEHICLE.
IOA DOES NOT RECOMMEND A CHANGE TO THE EXISTING FMEA REDUNDANCY SCREEN B.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1304
NASA FMEA #: 05-1-FC6542-2

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1304
ITEM: ATVC

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[2 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ERRONEOUS POSITION CMD TO ACTR.
FMEA FAILURE MODE: ERRONEOUS OUTPUT.
IOA DOES CONCUR WITH NASA's REEVALUATION AND RATIONALE AS SHOWN IN THE FMEA REVISIONS. IF FAILURES ARE PRESENT DURING PRELAUNCH, WHEN ATVC FAULT DETECT IS INHIBITED, LAUNCH HOLD WILL BE INITIATED PRIOR TO SRB IGNITION. AS A RESULT OF NASA's REVISIONS AND FURTHER IOA ATVC FAILURE ANALYSIS, IOA DOES NOT RECOMMEND A CHANGE TO THE EXISTING FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1305
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1305
ITEM: ATVC

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: NO OUTPUT/ERRONEOUS OUTPUT ON ONE SEC DELTA P FDBK XDCR CHN.
FMEA FAILURE MODE: NONE.
IT IS NOT CLEAR THAT NASA/RI COVERED THIS FAILURE MODE IN FMEA 05-1-FC6542-2, CRIT - 3/1R. THE IOA DOES RECOMMEND THAT A NEW FMEA BE WRITTEN FOR COMPLETENESS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1310
NASA FMEA #: 05-60-200601-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1310
ITEM: CIRCUIT- ATVC'S 1,2,3,4 POWER

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[N]	[ ]	[N]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT FAILS OPEN (OFF), DURING POWER TRANSFER OR PREMATURELY.
FMEA FAILURE MODE: OPEN - 12 AMP DIODE (TO POWER SUPPLY).
AFTER NASA/RI REEVALUATION OF FMEA AND FURTHER IOA EVALUATION OF SYSTEM OPERATION, IOA DOES CONCUR WITH THE REVISED FMEA. ONE REDUNDANT DIODE FL OPN IS NOT DETECTABLE. TWO REDUNDANT DIODES FL OPN ARE DETECTABLE BY LOSS OF PWR TO CHN, AND RESULTS IN CONTROL CHANNEL ISOLATION. THE CIL WAS NOT AVAILABLE FOR EVALUATION OF THE RETENTION RATIONALE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1310A
NASA FMEA #: 05-60-200602-1

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1310
ITEM: CIRCUIT- ATVC'S 1,2,3,4 POWER

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT FAILS OPEN (OFF), DURING POWER TRANSFER OR PREMATURELY.
FMEA FAILURE MODE: LOSS OF OUTPUT - RPC (TO ISOL VLV DRIVER). AFTER NASA/RI REEVALUATION OF FMEA AND FURTHER IOA EVALUATION OF SYSTEM OPERATION, IOA DOES CONCUR WITH THE REVISED FMEA. THE RPC'S FAILING OPEN WILL CAUSE THE ISOL VALVE DRIVER TO FAIL OFF AND INHIBIT THE MPS ATVC FROM ISOLATING THE CHN IF AN MPS ATVC SYSTEM FAILURE IS DETECTED. ISOL VALVE DRIVERS NOT REDUNDANTLY POWERED IN EACH ATVC (CHN).

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1310B
NASA FMEA #: 05-60-(07), PREL REF NO.

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1310
ITEM: CIRCUIT- ATVC'S 1,2,3,4 POWER

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT FAILS OPEN (OFF) DURING POWER TRANSFER OR PREMATURELY.
FMEA FAILURE MODE: 1.2K CURRENT LIMITING RESISTOR (FOR MPS ATVC ISOL VALVE DRIVER PWR) FAILS OPEN, OUT-OF-TOLERANCE, OR SHORTED. THE OUT-OF-TOLERANCE AND SHORTED (ZERO RESISTANCE) FAILURE MODES WERE NOT CONSIDERED BY IOA SINCE THESE FAILURE MODES WOULD ALWAYS REFLECT A CRITICALITY OF 3/3. THE "OPEN" FAILURE REFLECTS THE WORST CASE CRITICALITY OF THE RESISTOR. IOA FAILURE MODE WAS POWER CIRCUIT FAILS OPEN (RPC'S, DIODES, AND SWITCH CIRCUIT) WITH WORST CASE CRITICALITY OF 3/1R. AFTER FURTHER EVALUATION OF SYSTEM OPERATION, IOA DOES CONCUR WITH THE CRITICALITY OF 3/3 FOR THE RESISTOR FAILING OPEN, AND LOSS OF ISOL VALVE DRIVER POWER. THE ISOL CMD FL OFF WILL INHIBIT THE ISOLATION OF THE CHN IF AN ATVC SYSTEM FAILURE IS DETECTED.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87 NASA DATA:
ASSESSMENT ID: GNC-1310C BASELINE [ ]
NASA FMEA #: 05-60-(10), PREL REF NO. NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1310
ITEM: CIRCUIT- ATVC'S 1,2,3,4 POWER

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /]	[ ]	[N]	[ ]	[N]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT FAILS OPEN (OFF) DURING POWER TRANSFER OR PREMATURELY.
FMEA FAILURE MODE: ATVC POWER SW FAILS TO TRANSFER (OPEN)
AFTER NASA/RI REEVALUATION OF FMEA AND FURTHER IOA EVALUATION OF SYSTEM OPERATION, IOA DOES CONCUR WITH THE NEW FMEA. WITH 2 ATVC PWR SWITCHES FAILED TO TRANSFER (OPEN), THERE WILL EXIST A 2 ON 2 ATVC CHN FORCE FIGHT WHICH COULD RESULT IN LOSS OF VEHICLE CONTROL. LOSS OF SWITCH IS NOT READILY DETECTABLE, BUT THE RESULTING LOSS OF RPC PWR AND ATVC CHN IS DETECTABLE. LOSS OF ISOL VLV DRIVER PWR NOT DETECTABLE. THE CIL WAS NOT AVAILABLE FOR EVALUATION OF THE RETENTION RATIONALE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1310D
NASA FMEA #: 05-60-(11), PREL REF NO.

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1310
ITEM: CIRCUIT- ATVC'S 1,2,3,4 POWER

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[F]	[P]	[X] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[N]	[ ]	[N]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT FAILS OPEN (OFF) DURING POWER TRANSFER OR PREMATURELY.
FMEA FAILURE MODE: ATVC POWER SW POLE (CONTACT) FAILS OPEN, SHORTED, PREMATURE OPERATION.
AFTER NASA/RI REEVALUATION OF FMEA AND FURTHER IOA EVALUATION OF SYSTEM OPERATION, IOA DOES CONCUR WITH THE NEW FMEA. FOR PWR SW WORST CASE, 1 CONTACT FAIL OPEN (LOSS OF ISOL DRIVER), 2 CONT FAIL OPEN (LOSS OF PWR SUPPLY/CHN), 3 CONT FAIL OPEN (LOSS OF PWR SUPPLY WITHOUT CHN ISOLATION). LOSS OF CONTACTS ARE NOT READILY DETECTABLE, BUT THE RESULTING LOSS OF RPC PWR AND ATVC CHN IS DETECTABLE. ISOL VLV DRIVERS ARE REDUNDANTLY POWERED IN A CHN. LOSS OF ISOL VLV DRIVER PWR NOT DETECTABLE. THE CIL WAS NOT AVAILABLE FOR EVALUATION OF THE RETENTION RATIONALE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87 NASA DATA:
ASSESSMENT ID: GNC-1310E BASELINE [ ]
NASA FMEA #: 05-60-(12), PREL REF NO. NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1310
ITEM: CIRCUIT- ATVC'S 1,2,3,4 POWER

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[P]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT FAILS OPEN (OFF) DURING POWER TRANSFER OR PREMATURELY.
FMEA FAILURE MODE: RPC FAILS OPEN TO ATVC PWR SUPPLY.
NO DIFFERENCES IN NASA/IOA ASSESSEMENT OF NEW FMEA. ONE REDUNDANT RPC FL OPN IS DETECTABLE ON INSTRUMENTATION. TWO REDUNDANT RPC'S FL OPEN ARE DETECTABLE, AND RESULTS IN CONTROL CHANNEL ISOLATION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1311
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1311
ITEM: CIRCUIT- ATVC'S 1,2,3,4 POWER

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /3]	[NA]	[NA]	[NA]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: POWER CIRCUIT FAILS CLOSED (ON), DURING POWER TRANSFER OR PREMATURELY.
FMEA FAILURE MODE: NA
AFTER THE FMEA REVIEW, NASA/RI DID NOT COVER THIS FAILURE MODE.
IOA DOES RECOMMEND WRITING A NEW FMEA FOR COMPLETENESS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1400
NASA FMEA #: 05-1-FC7252-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1400
ITEM: CIRCUIT-BODY FLAP CNTL

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: BODY FLAP UP/DOWN SWITCH CONTACT OR CURRENT LIMIT RESISTOR FAILS OPEN OR SHORTED TO GROUND.
FMEA FAILURE MODE: SWITCH FAILS TO TRANSFER, OPEN, SHORTED TO GROUND, INTERNAL SHORTS.
THE BODY FLAP IS CONTROLLED BY THE AUTO/MAN MODE (PBI SW'S) AND THE MANUAL UP/DOWN TOGGLE SWITCHES. VEHICLE ATTITUDE CAN BE MAINTAINED WITH BODY FLAP IN AUTO OR MANUAL MODE.
WITH BODY FLAP SWITCH FAILED OPEN, USE SWITCH IN OTHER CREW STATION OR SWITCH TO BODY FLAP AUTO MODE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1401
NASA FMEA #: 05-1-FC7252-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1401
ITEM: CIRCUIT-BODY FLAP CNTL

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: BODY FLAP UP/DOWN SWITCH CONTACT FAILS CLOSED.
FMEA FAILURE MODE: SWITCH FAILS TO TRANSFER, OPEN, SHORTED TO GROUND, INTERNAL SHORTS.
THE BODY FLAP IS CONTROLLED BY THE AUTO/MAN MODE (PBI SW'S) AND THE MANUAL UP/DOWN TOGGLE SWITCHES. VEHICLE ATTITUDE CAN BE MAINTAINED WITH BODY FLAP IN AUTO OR MANUAL MODE.
WITH BODY FLAP SWITCH FAILED IN UP POSITION, ATTITUDE CONTROL MAY BE LOST IN BODY FLAP MANUAL MODE. IF BODY FLAP SWITCH FAILS IN THE DOWN POSITION, THE OTHER CREW POSITION CAN BE USED TO DRIVE THE BODY FLAP UP, BUT MAY LOSE ATTITUDE
CONTROL WITH AN INCREASE IN WORK LOAD.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1402
NASA FMEA #: 05-1-FC7253-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1402
ITEM: CIRCUIT-BODY FLAP CNTL

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: BODY FLAP AUTO/MAN PBI SWITCH CONTACT OR CURRENT LIMIT RESISTOR FAILS OPEN OR SHORTED TO GROUND.
FMEA FAILURE MODE: SWITCH FAILS TO TRANSFER, OPEN, PREMATURE OPERATION.
THE BODY FLAP IS CONTROLLED BY THE AUTO/MANUAL MODE (PBI SW'S) AND THE MANUAL UP/DOWN TOGGLE SWITCHES. VEHICLE ATTITUDE CAN BE MAINTAINED WITH BODY FLAP IN AUTO OR MANUAL MODE.
WITH BODY FLAP PBI SW FAILED OPEN, USE PBI IN OTHER CREW STATION.
IF BOTH PBIs FAIL OPEN, THE BODY FLAP WILL REMAIN IN THE LAST COMMANDED POSITION (AUTO OR MANUAL).

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1403
NASA FMEA #: 05-1-FC7253-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1403
ITEM: CIRCUIT-BODY FLAP CNTL

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: BODY FLAP AUTO/MAN PBI SWITCH CONTACT FAILS CLOSED.
FMEA FAILURE MODE: SWITCH FAILS TO TRANSFER, OPEN, PREMATURE OPERATION.
THE BODY FLAP IS CONTROLLED BY THE AUTO/MANUAL MODE (PBI SW'S) AND THE MANUAL UP/DOWN TOGGLE SWITCHES. VEHICLE ATTITUDE CAN BE MAINTAINED WITH BODY FLAP IN AUTO OR MANUAL MODE.
THE SW CONTACT FAILURES ARE HANDLED BY THE STANDARD 3 CONTACT SW REDUNDANCY MANAGEMENT (RM). SW RM DESELECTS FIRST FAILED CONTACT AND REQUIRES THE "AND" OF TWO CONTACTS FOR AN OUTPUT. IF SW FAILS ON (CONTACTS SHORTED), THE BODY FLAP CONTROL CIRCUITS WILL REMAIN IN THE LAST COMMANDED POSITION (AUTO OR MAN). THE PBI FAILURE IN MANUAL MODE WILL CAUSE AN INCREASE IN CREW WORKLOAD.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1403A
NASA FMEA #: 05-1-FC7253-0002

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1403
ITEM: CIRCUIT-BODY FLAP CNTL

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: BODY FALP AUTO/MAN PBI SWITCH CONTACT FAILS CLOSED.
FMEA FAILURE MODE: INTERNAL SHORTS.
THE BODY FLAP IS CONTROLLED BY THE AUTO/MAN MODE (PBI SW'S) AND THE MANUAL UP/DOWN TOGGLE SWITCHES. VEHIICLE ATTITUDE CAN BE MAINTAINED WITH BODY FLAP IN AUTO OR MANUAL MODE.
WITH BODY FLAP PBI SW FAILED CLOSED, THE BODY FLAP CONTROL CIRCUIT WILL REMAIN IN THE LAST COMMANDED POSITION (AUTO OR MAN). THE PBI FAILURE IN MANUAL MODE WILL CAUSE AN INCREASE IN CREW WORKLOAD.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1404
NASA FMEA #: 05-1-FC7252-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1404
ITEM: CIRCUIT-BODY FLAP CNTL

LEAD ANALYST: ROBERT O'DONNELL

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[2 /1R]	[P]	[P]	[P]	[X]
COMPARE	[N /N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: BODY FLAP UP/DOWN CMD SWITCH JAMMED.
NASA FAILURE MODE: FAILS TO TRANSFER, OPEN, SHORTED TO GROUND, INTERNAL SHORTS.
THE BODY FLAP IS CONTROLLED BY THE AUTO/MAN MODE (PBI SW'S) AND THE MANUAL UP/DOWN TOGGLE SWITCHES. VEHICLE ATTITUDE CAN BE MAINTAINED WITH BODY FLAP IN AUTO OR MANUAL MODE.
WITH BODY FLAP SWITCH JAMMED IN UP POSITION, ATTITUDE CONTROL MAY BE LOST IN BODY FLAP MANUAL MODE. WITH BODY FLAP SWITCH JAMMED IN DOWN POSITION, THE OTHER CREW POSITION CAN BE USED TO DRIVE THE BODY FLAP UP, BUT MAY LOSE ATTITUDE CONTROL WITH AN INCREASE IN WORK LOAD.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1501
NASA FMEA #: 05-1-FC7257-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1501
ITEM: A/B DAP PBI'S (FWD & AFT)

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED CLOSED.
FMEA FAILURE MODE: FAILS TO TRANSFER, OPEN, INTERNAL SHORT, PREMATURE OPERATION.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD CAUSE LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1502
NASA FMEA #: 05-1-FC7257-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1502
ITEM: A/B DAP PBI'S (FWD & AFT)

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED OPEN.
FMEA FAILURE MODE: FAILS TO TRANSFER, OPEN, INTERNAL SHORT, PREMATURE OPERATION.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD CAUSE LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1510
NASA FMEA #: 05-1-FC7258-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1510
ITEM: FWD AUTO/MAN PBI'S

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED CLOSED.
FMEA FAILURE MODE: FAILS TO TRANSFER OUT OF AUTO MODE, FAILS TO DEPRESS, OPEN, INTERNAL SHORTS, PREMATURE OPERATION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1511
NASA FMEA #: 05-1-FC7258-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1511
ITEM: FWD AUTO/MAN PBI'S

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED OPEN.
FMEA FAILURE MODE: FAILS TO TRANSFER OUT OF AUTO MODE, FAILS TO DEPRESS, OPEN, INTERNAL SHORTS, PREMATURE OPERATION.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD RESULT IN LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1515
NASA FMEA #: 05-1-FC7258-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1515
ITEM: AFT AUTO/MAN PBI'S

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED CLOSED.
FMEA FAILURE MODE: FAILS TO TRANSFER OUT OF AUTO MODE, FAILS TO DEPRESS, OPEN INTERNAL SHORTS, PREMATURE OPERATION.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD RESULT IN LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1516
NASA FMEA #: 05-1-FC7258-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1516
ITEM: AFT AUTO/MAN PBI'S

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED OPEN.
FMEA FAILURE MODE: FAILS TO TRANSFER OUT OF AUTO MODE, FAILS TO DEPRESS, OPEN, INTERNAL SHORTS, PREMATURE OPERATION.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD RESULT IN LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1520
NASA FMEA #: 05-1-FC7259-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1520
ITEM: NORM/VERN PBI'S (FWD & AFT)

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED CLOSED.
FMEA FAILURE MODE: FAILS TO TRANSFER OUT OF VENIER MODE, FAILS TO DEPRESS, OPEN, INTERNAL SHORT, PREMATURE OPERATION.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD CAUSE LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1521
NASA FMEA #: 05-1-FC7259-0001

NASA DATA:
BASELINE [ ]
NEW [A]

SUBSYSTEM: GNC
MDAC ID: 1521
ITEM: NORM/VERN PBI'S (FWD & AFT)

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED OPEN.
FMEA FAILURE MODE: FAILS TO TRANSFER OUT OF VERNIER MODE, FAILS TO DEPRESS, OPEN, INTERNAL SHORT, PREMATURE OPERATION.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD CAUSE LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1530
NASA FMEA #: 05-1-FC7261-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1530
ITEM: FWD DISC RATE ROT PBI'S

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED CLOSED.
FMEA FAILURE MODE: FAILS TO TRANSFER, OPEN, INTERNAL SHORT, PREMATURE OPERATION.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD RESULT IN LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1531
NASA FMEA #: 05-1-FC7261-0001A

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1531
ITEM: FWD DISC RATE ROT PBI'S

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED OPEN.
FMEA FAILURE MODE: FAILS TO TRANSFER, OPEN, INTERNAL SHORT, PREMATURE OPERATION.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD RESULT IN LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1535
NASA FMEA #: 05-1-FC7261-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1535
ITEM: FWD PULSE ROT PBI'S

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED CLOSED.
FMEA FAILURE MODE: FAILS TO TRANSFER, OPEN, INTERNAL SHORT, PREMATURE OPERATION.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD RESULT IN LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1536
NASA FMEA #: 05-1-FC7261-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1536
ITEM: FWD PULSE ROT PBI'S

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED OPEN.
FMEA FAILURE MODE: FAILS TO TRANSFER, OPEN, INTERNAL SHORT, PREMATURE OPERATION.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD RESULT IN LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1540
NASA FMEA #: 05-1-FC7261-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1540
ITEM: AFT DISC RATE ROT PBI'S

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILE CLOSED.
FMEA FAILURE MODE: FAILS TO TRANSFER, OPEN, INTERNAL SHORT, PREMATURE OPERATION.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD RESULT IN LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1541
NASA FMEA #: 05-1-FC7261-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1541
ITEM: AFT DISC RATE ROT PBI'S

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED OPEN.
FMEA FAILURE MODE: FAILS TO TRANSFER, OPEN, INTERNAL SHORT, PREMATURE OPERATION.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD RESULT IN LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1545
NASA FMEA #: 05-1-FC7261-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1545
ITEM: AFT PULSE ROT PBI'S

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED CLOSED.
FMEA FAILURE MODE: FAILS TO TRANSFER, OPEN, INTERNAL SHORT, PREMATAURE OPERATION.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD RESULT IN LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1546
NASA FMEA #: 05-1-FC7261-0001

NASA DATA:
BASELINE [ ]
NEW [x]

SUBSYSTEM: GNC
MDAC ID: 1546
ITEM: AFT PULSE ROT PBI'S

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED OPEN.
FMEA FAILURE MODE: FAILS TO TRANSFER, OPEN, INTERNAL SHORT, PREMATURE OPERATION.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD RESULT IN LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1550
NASA FMEA #: 05-1-FC7261-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1550
ITEM: ACCEL ROT PBI'S (FWD & AFT)

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED CLOSED.
FMEA FAILURE MODE: FAILS TO TRANSFER, OPEN, INTERNAL SHORT, PREMATURE OPERATION.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD RESULT IN LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1551
NASA FMEA #: 05-1-FC7261-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1551
ITEM: ACCEL ROT PBI'S (FWD & AFT)

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED OPEN.
FMEA FAILURE MODE: FAILS TO TRANSFER, OPEN, INTERNAL SHORT, PREMATURE OPERATION.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD RESULT IN LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87 NASA DATA:
ASSESSMENT ID: GNC-1560 BASELINE [ ]
NASA FMEA #: 05-1-FC7260-0001 NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1560
ITEM: TRANSLATION PBI'S (FWD & AFT)

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED CLOSED.
FMEA FAILURE MODE: FAILS TO TRANSFER, OPEN, INTERNAL SHORT, PREMATURE OPERATION.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD CAUSE LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1561
NASA FMEA #: 05-1-FC7260-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1561
ITEM: TRANSLATION PBI'S (FWD & AFT)

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED OPEN.
FMEA FAILURE MODE: FAILS TO TRANSFER, OPEN, INTERNAL SHORT, PREMATURE OPERATION; FAILS TO TRANSFER INTO LVLH, FAILS TO TRANSFER INTO LOW Z.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD RESULT IN LOSS OF MISSION. NASA RATES ONLY "FAILS TO TRANSFER INTO LOW Z AS 3/2R.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1561B
NASA FMEA #: 05-1-(TBD06)

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1561
ITEM: TRANSLATION PBI'S (FWD & AFT)

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED OPEN.
FMEA FAILURE MODE: SW MAN MODE LVLH: FAILS TO TRANSFER TO THE LVLH MODE, OPEN.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD RESULT IN LOSS OF MISSION. NASA RATES ONLY "FAILS TO TRANSFER INTO LOW Z AS 3/2R.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1561A
NASA FMEA #: 05-1-(TBD03)

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1561
ITEM: TRANSLATION PBI'S (FWD & AFT)

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /2R]	[P]	[P]	[P]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: SWITCH CONTACT FAILED OPEN.
FMEA FAILURE MODE: SW MAN MODE LOW Z TRANSLATION: FAILS TO TRANSFER INTO LOW Z, OPEN, INTERNAL SHORTS.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD RESULT IN LOSS OF MISSION. NASA RATES ONLY "FAILS TO TRANSFER INTO LOW Z AS 3/2R.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1570
NASA FMEA #: 05-1-FC7257-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1570
ITEM: A/B PBI'S (FWD & AFT)

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /2R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: PBI STUCK IN DEPRESSED POSITION.
FMEA FAILURE MODE: FAILS TO TRANFER, OPEN, INTERNAL SHORT, PREMATURE OPERATION.
IOA BELIEVES THAT LOSS OF ABILITY TO CHANGE MODES COULD CAUSE LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1575
NASA FMEA #: 05-1-FC7258-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1575
ITEM: FWD AUTO PBI

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[2 /2]	[P]	[P]	[P]	[X]
COMPARE	[N /N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: PBI STUCK IN DEPRESSED POSITION.
FMEA FAILURE MODE: FAILS TO TRANSFER OUT OF AUTO MODE, FAILS TO DEPRESS, OPEN, PREMATURE OPERATION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/16/87
ASSESSMENT ID: GNC-1576
NASA FMEA #: 05-1-(TBDO1)

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1576
ITEM: FWD MAN PBI

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /2]	[NA]	[NA]	[NA]	[X] *
IOA	[2 /2]	[P]	[P]	[P]	[X]
COMPARE	[/]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: PBI STUCK IN DEPRESSED POSITION.
FMEA FAILURE MODE: FAILS TO TRANSFER OUT OF MANUAL MODE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/17/87
ASSESSMENT ID: GNC-1577
NASA FMEA #: 05-1-FC7258-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1577
ITEM: AFT AUTO/MAN PBI'S

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[2 /2]	[P]	[P]	[P]	[X]
COMPARE	[N /N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

	[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: PBI STUCK IN DEPRESSED POSITION.
FMEA FAILURE MODES: FAILS TO TRANSFER OUT OF AUTO MODE, FAILS TO DEPRESSION, INTERNAL SHORTS, PREMAUTRE OPERATION, FAILS TO TRANSFER OUT OF MAN.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/17/87
ASSESSMENT ID: GNC-1580
NASA FMEA #: 05-1-(TB002)

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1580
ITEM: NORM/VERN PBI'S (FWD & AFT)

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /2]	[NA]	[NA]	[NA]	[X] *
IOA	[2 /2]	[P]	[P]	[P]	[X]
COMPARE	[/]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [X]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: PBI STUCK IN DEPRESSED POSITION.
FMEA FAILURE MODE: FAILS TO TRANSFER OUT OF NORMAL.
NOT EXACT MATCH: IOA BELIEVES THAT LOSS OF EITHER NORMAL OR VERN COULD CAUSE LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/17/87
ASSESSMENT ID: GNC-1581
NASA FMEA #: 05-1-FC7261-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1581
ITEM: FWD PULSE & D RATE ROT PBI'S

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[2 /2]	[P]	[P]	[P]	[X]
COMPARE	[N /N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

[3 /2R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: PBI STUCK IN DEPRESSED POSITION.
FMEA FAILURE MODE: FAILS TO TRANSFER, OPEN, INTERNAL SHORT, PREMATURE OPERATION.
IOA BELIEVES THAT HAVING ONE MODE PERMANTENTLY SELECTED COULD CAUSE LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/17/87
ASSESSMENT ID: GNC-1582
NASA FMEA #: 05-1-FC7261-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1582
ITEM: AFT PULSE & D RATE ROT PBI'S

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[2 /2]	[P]	[P]	[P]	[X]
COMPARE	[N /N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

[2 /2]	[NA]	[NA]	[NA]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: PBI STUCK IN DEPRESSED POSITION.
FMEA FAILURE MODE: FAILS TO TRANSFER, OPEN, INTERNAL SHORT, PREMAUTRE OPERATION.
IOA BELIEVES THAT HAVING ONE MODE PREMANENTLY SELECTED COULD CAUSE LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/17/87
ASSESSMENT ID: GNC-1585
NASA FMEA #: 05-1-FC7261-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1585
ITEM: ACCEL ROT PBI'S (FWD & AFT)

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[2 /2]	[P]	[P]	[P]	[X]
COMPARE	[N /N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

[2 /2]	[NA]	[NA]	[NA]	[A] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: PBI STUCK IN DEPRESSED POSITION.
FMEA FAILURE MODE: FAILS TO TRANSFER, OPEN, INTERNAL SHORT, PREMATURE OPERATION.
IOA BELIEVES THAT HAVING ONE MODE PERMANENTLY SELECTED COULD CAUSE LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/17/87
ASSESSMENT ID: GNC-1586
NASA FMEA #: 05-1-FC7260-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1586
ITEM: TRANSLATION PBI'S (FWD & AFT)

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[2 /2]	[P]	[P]	[P]	[X]
COMPARE	[N /N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

[2 /2]	[NA]	[NA]	[NA]	[X] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: PBI STUCK IN DEPRESSED POSITION.
FMEA FAILURE MODE: FAILS TO TRANSFER, OPEN, INTERNAL SHORT, PREMATURE OPERATION, FAILS TO TRANSFER OUT OF LVLH, FAILS TO TRANSFER OUT OF LOW Z.
NASA FINDS ONLY "FAILS TO TRANSFER OUT OF LVLH" TO BE 2/2. IOA BELIEVES THAT HAVING ANY POSITION PERMANENTLY SELECTED COULD CAUSE LOSS OF MISSION.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/17/87
ASSESSMENT ID: GNC-1586A
NASA FMEA #: 05-1-(TBD04)

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1586
ITEM: TRANSLATION PBI'S (FWD & AFT)

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[2 /2]	[P]	[P]	[P]	[X]
COMPARE	[N /N]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

	[2 /2]	[NA]	[NA]	[NA]	[X] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: PBI STUCK IN DEPRESSED POSITION.
FMEA FAILURE MODE: SW MAN MODE LOW Z TRANSLATION: FAILS TO TRANSFER OUT OF LOW Z, PREMATURE OPERATION, SHOCK.
NASA FINDS ONLY "FAILS TO TRANSFER OUT OF LVLH" TO BE 2/2. IOA BELIEVES THAT HAVING ANY POSITION PERMANENTLY SELECTED COULD CAUSE LOSS OF MISSION./

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/17/87
ASSESSMENT ID: GNC-1586B
NASA FMEA #: 05-1-(TBD05)

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1586
ITEM: TRANSLATION PBI'S (FWD & AFT)

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /2]	[NA]	[NA]	[NA]	[ ] *
IOA	[2 /2]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: PBI STUCK IN DEPRESSED POSITION.
FMEA FAILURE MODE: SW, MAN MODE LVLH: FAILS TO TRANSFER OUT OF LVLH MODE, PREMATURE OPERATION, SHORT.
NASA FINDS ONLY "FAILS TO TRANSFER OUT OF LVLH" TO BE 2/2. IOA BELIEVES THAT HAVING ANY POSITION PERMANENTLY SELECTED COULD CAUSE LOSS OF MISSION./

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-1590
NASA FMEA #: 05-60-200800-0001

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1590
ITEM: FC ANNUNCIATOR CIRCUIT

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE "NO OUTPUT" IS INCLUDED IN NASA FAILURE MODE "ALL CREDIBLE MODES". NO OTHER DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-1591
NASA FMEA #: 05-60-200800-0001

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1591
ITEM: FC ANNUNCIATOR CIRCUIT

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE "INADVERTENT OUTPUT" IS INCLUDED IN NASA FAILURE MODE "ALL CREDIBLE MODES". NO OTHER DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 12/23/86
ASSESSMENT ID: GNC-1593
NASA FMEA #: 05-60-200800-0001

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1593
ITEM: FC ANNUNCIATOR CIRCUIT

LEAD ANALYST: K. PIETZ

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
NASA DID NOT DIRECTLY ADDRESS THIS FAILURE MODE. LOSS OF FUNCTION OF ONE ACA (ANNUNCIATOR CONTROL ASSEMBLY) WOULD NOT BE CRITICAL, BUT LOSS OF FUNCTION OF ALL FIVE ACAs COULD JEOPARDIZE CREW/VEHICLE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/23/87
ASSESSMENT ID: GNC-1601
NASA FMEA #: 05-1-FC7250-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1601
ITEM: ENTRY MODE SWITCH CIRCUIT

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ERRONEOUS OUTPUT (INCORRECT NUMBER OF CONTACTS ENERGIZED).
FMEA FAILURE MODE: ALL CREDIBLE MODES - FAILURE TO TRANSFER, SHORTED.
NO ACTION REQUIRED - RESULTS ARE THE SAME.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/23/87
ASSESSMENT ID: GNC-1602
NASA FMEA #: 05-1-FC7250-0001

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1602
ITEM: ENTRY MODE SWITCH CIRCUIT

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: JAMMED SWITCH.
FMEA FAILURE MODE: ALL CREDIBLE MODES - FAILURE TO TRANSFER, SHORTED.
NO ACTION REQUIRED - RESULTS ARE THE SAME.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1801
NASA FMEA #: 05-6-2659-2

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1801
ITEM: ABORT MODE SWITCH CIRCUIT

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ABORT MODE PUSHBUTTON OR ABORT MODE ROTARY SWITCH CONTACT FAILED OPEN OR RESISTOR A1R1, A1R2, A1R3 SHORTED TO GROUND.
FMEA FAILURE MODE: PUSHBUTTON SWITCH OPENS.
NO ACTION REQUIRED - RESULTS ARE THE SAME.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1801A
NASA FMEA #: 05-6-200400-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1801
ITEM: ABORT MODE SWITCH CIRCUIT

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[NA]	[P]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[/]	[ ]	[N]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ABORT MODE PUSHBUTTON OR ABORT MODE ROTARY SWITCH CONTACT FAILED OPEN OR RESISTOR A1R1, A1R2, A1R3 SHORTED TO GROUND.
FMEA FAILURE MODE: ALL CREDIBLE MODES - LOSS OF PWR, OPENS, SHORTS, CLOSES, INADVERTENT OPERATION.
NO ACTION REQUIRED - RESULTS ARE THE SAME.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1802
NASA FMEA #: 05-6-2659-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1802
ITEM: ABORT MODE SWITCH CIRCUIT

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[F]	[F]	[X] *
IOA	[2 /1R]	[P]	[P]	[P]	[X]
COMPARE	[/]	[ ]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/] [ ] [ ] [ ] [ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ABORT MODE PUSHBUTTON SWITCH OR ABORT MODE ROTARY SWITCH CONTACT FAILED CLOSED.
FMEA FAILURE MODE: INADVERTENT OPERATION - INADVERTENTLY CONDUCTS, INTERNALLY FAILED CLOSED (MULTIPOLES).
NO ACTION REQUIRED - RESULTS ARE THE SAME.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1802A
NASA FMEA #: 05-6-200400-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1802
ITEM: ABORT MODE SWITCH CIRCUIT

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[NA]	[F]	[ ] *
IOA	[2 /1R]	[P]	[P]	[P]	[X]
COMPARE	[/]	[ ]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

[2 /1R]	[NA]	[NA]	[NA]	[X] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ABORT MODE PUSHBUTTON SWITCH OR ABORT MODE ROTARY SWITCH CONTACT FAILED CLOSED.
FMEA FAILURE MODE: ALL CREDIBLE MODES - LOSS OF PWR, OPENS, CLOSES, INADVERTENT OPERATION.
ACTION REQUIRED - UPDATE FMEA CRITICALITY TO 2/1R - ADD TO CIL.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1803
NASA FMEA #: 05-6-2659-2

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1803
ITEM: ABORT MODE SWITCH CIRCUIT

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[NA]	[NA]	[NA]	[ ] *
IOA	[2 /1R]	[P]	[P]	[P]	[X]
COMPARE	[N /]	[N]	[N]	[N]	[N]

RECOMMENDATIONS: (If different from NASA)

[2 /1R]	[P]	[P]	[P]	[X] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ABORT MODE PUSHBUTTON SWITCH FAILED OPEN OR ROTARY SWITCH FAILED OPEN IN THE POSITION REQUIRED FOR A SELECTED ABORT.
FMEA FAILURE MODE: PUSHBUTTON SWITCH OPENS - FAILS TO CLOSE, FAILS TO CONDUCT (MULTI-CONTACTS).
ACTION REQUIRED - UPDATE FMEA CRITICALITY - ADD TO CIL.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1803A
NASA FMEA #: 05-6-200400-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1803
ITEM: ABORT MODE SWITCH CIRCUIT

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[NA]	[P]	[ ] *
IOA	[2 /1R]	[P]	[P]	[P]	[X]
COMPARE	[N /]	[ ]	[N]	[ ]	[N]

RECOMMENDATIONS: (If different from NASA)

[2 /1R]	[P]	[P]	[P]	[X] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ABORT MODE PUSHBUTTON SWITCH FAILED OPEN OR ROTARY SWITCH FAILED OPEN IN THE POSITION REQUIRED FOR ABORT.
FMEA FAILURE MODE: ALL CREDIBLE MODES - LOSS OF PWR, OPENS, CLOSES, INADVERTENT OPERATION.
ACTION REQUIRED - UPDATE FMEA CRITICALITY TO 2/1R - ADD TO CIL.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1804
NASA FMEA #: 05-6-2659-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1804
ITEM: ABORT MODE SWITCH CIRCUIT

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[2 /1R]	[P]	[F]	[F]	[X] *
IOA	[1 /1]	[P]	[P]	[F]	[X]
COMPARE	[N /N]	[ ]	[N]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[1 /1]	[NA]	[NA]	[NA]	[X] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ABORT MODE PUSHBUTTON FAILED CLOSED OR ROTARY SWITCH FAILED CLOSED IN A POSITION OTHER THAN THE REQUIRED ABORT MODE.
FMEA FAILURE MODE: PUSHBUTTON INADVERTENT OPERATION - INADVERTENTLY CONDUCTS, INTERNALLY FAILED CLOSED (MULTIPOLES).
ACTION REQUIRED - UPDATE FMEA CRITICALITY TO 1/1.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 1/23/87
ASSESSMENT ID: GNC-1804A
NASA FMEA #: 05-6-200400-1

NASA DATA:
BASELINE [X]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1804
ITEM: ABORT MODE SWITCH CIRCUIT

LEAD ANALYST: J.M. HIOTT

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /1R]	[P]	[NA]	[P]	[ ] *
IOA	[1 /1]	[P]	[P]	[F]	[X]
COMPARE	[N /N]	[ ]	[N]	[N]	[N]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: ABORT MODE PUSHBUTTON FAILED CLOSED OR ROTARY SWITCH FAILED CLOSED IN A POSITION OTHER THAN THE REQUIRED ABORT MODE.
FMEA FAILURE MODE: ALL CREDIBLE MODES, LOSS OF PWR, OPENS, SHORTS, CLOSES, INADVERTENT OPERATION.
ACTION REQUIRED - NONE ACTION COVERED IN GNC-1802A, GNC1803A.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-1901
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1901
ITEM: ATT REF PB

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: CIRCUIT FAIL OPEN.
IOA DOES RECOMMEND A FMEA FOR THIS FAILURE MODE SINCE THE CRITICALITY IS 3/1R AND PASSES ALL SCREENS. THE OTHER PUSHBUTTON IS AVAILABLE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-1902
NASA FMEA #: NONE

NASA DATA:
BASELINE [ ]
NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1902
ITEM: ATT REF PB

LEAD ANALYST: TRAHAN, W. H.

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[/]	[ ]	[ ]	[ ]	[ ] *
IOA	[3 /1R]	[P]	[P]	[P]	[ ]
COMPARE	[N /N]	[N]	[N]	[N]	[ ]

RECOMMENDATIONS: (If different from NASA)

[3 /1R]	[P]	[P]	[P]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: CIRCUIT FAIL CLOSED.
IOA DOES RECOMMEND A FMEA FOR THIS FAILURE MODE SINCE THE CRITICALITY IS 3/1R AND PASSES ALL REDUNDANCY SCREENS.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE:
ASSESSMENT ID: GNC-1950X
NASA FMEA #: 05-60-02, PREL REF NO.

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1950
ITEM: MEASUREMENT ISOLATION RESISTORS

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: OPENS, OUT OF TOLERANCE, SHORTS.
FMEA FAILURE MODE: ACCELEROMETER ASSEMBLY MEASUREMENT ISOLATION RESISTORS-OPENS, OUT OF TOLERANCE, SHORTED TO GROUND.
NO DIFFERENCE.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-1951X
NASA FMEA #: 05-60-(01), PREL REF NO.

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1951
ITEM: MEASUREMENT ISOLATION RESISTORS

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: RGA (12 RESISTORS) OPENS, OUT OF TOLERANCE, SHORTS
FMEA FAILURE MODE: RGA (12 RESISTORS) OPENS, OUT OF TOLERANCE, SHORTED.
NO DIFFERENCES.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-1952X
NASA FMEA #: 05-60-(18), PREL REF NO.

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1952
ITEM: MEASUREMENT ISOLATION RESISTORS

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: OPENS, OUT-OF-TOLERANCE, SHORTS.
FMEA FAILURE MODE: ASA MEASUREMENT ISOLATION RESISTORS FAIL OPEN, OUT-OF-TOLERANCE, SHORTED.
NO DIFFERENCES: THE INSTRUMENTATION DATA IS USED TO MONITOR CIRCUIT OPERATION, AND NOT REQUIRED FOR VEHICLE CONTROL OR OPERATION.
DURING THE ORIGINAL ANALYSIS, IOA DID NOT DOCUMENT THE FAILURE OF MEASUREMENT ISOLATION RESISTORS IN MONITORING CIRCUITS. A NEW ANALYSIS WORKSHEET (MDAC ID-1950) WAS PROVIDED. IOA DOES CONCUR WITH THE NEW FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87
ASSESSMENT ID: GNC-1953X
NASA FMEA #: 05-60-(09), PREL REF NO.

NASA DATA:
BASELINE [ ]
NEW [X]

SUBSYSTEM: GNC
MDAC ID: 1953
ITEM: MEASUREMENT ISOLATION RESISTORS

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]

RECOMMENDATIONS: (If different from NASA)

[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)

ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: OPENS, OUT-OF-TOLERANCE, SHORTS.
FMEA FAILURE MODE: ATVC MEASUREMENT ISOLATION RESISTORS FAIL OPEN, OUT-OF-TOLERANCE, SHORTED.
NO DIFFERENCES: THE INSTRUMENTATION DATA IS USED TO MONITOR CIRCUIT OPERATION, AND NOT REQUIRED FOR VEHICLE CONTROL OR OPERATION.
DURING THE ORIGINAL ANALYSIS, IOA DID NOT DOCUMENT THE FAILURE OF MEASUREMENT ISOLATION RESISTORS IN MONITORING CIRCUITS. A NEW ANALYSIS WORKSHEET (MDAC ID-1950) WAS PROVIDED. IOA DOES CONCUR WITH THE NEW FMEA.

APPENDIX C
ASSESSMENT WORKSHEET

ASSESSMENT DATE: 3/20/87 NASA DATA:
ASSESSMENT ID: GNC-1954X BASELINE [ ]
NASA FMEA #: 05-60-IMU(05) NEW [ ]

SUBSYSTEM: GNC
MDAC ID: 1954
ITEM: MEASUREMENT ISOLATION RESISTORS

LEAD ANALYST: LES DRAPELA

ASSESSMENT:

	CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCREENS A	B	C	CIL ITEM
NASA	[3 /3]	[NA]	[NA]	[NA]	[ ] *
IOA	[3 /3]	[NA]	[NA]	[NA]	[ ]
COMPARE	[/]	[ ]	[ ]	[ ]	[ ]
RECOMMENDATIONS: (If different from NASA)					
	[/]	[ ]	[ ]	[ ]	[ ] (ADD/DELETE)

* CIL RETENTION RATIONALE: (If applicable)
ADEQUATE [ ]
INADEQUATE [ ]

REMARKS:
IOA FAILURE MODE: IMU (15 RESISTORS) OPENS, OUT OF TOLERANCE.
FMEA FAILURE MODE: IMU (15 RESISTORS) OPENS, OUT OF TOLERANCE.
NO ACTION REQUIRED - RESULTS ARE THE SAME.

APPENDIX D

CRITICAL ITEMS

APPENDIX D

CRITICAL ITEMS

NASA FMEA	IOA ID	ITEM NAME	FAILURE MODE
05-1-FC3042-1	101	RHC	PHY JAMMING/BINDING
05-1-FC3142-1	202	THC	IMMOBLE (JAM/BIND)
05-1-FC3442-3	304	RPTA	LOSS OF ONE RPTA
05-1-FC3242-1 05-1-FC3242-4	401 406	SBTC SBTC	PHY JAMMING/BINDING SW CONTACT FAIL CLOSE
05-1-GN21-2 05-60-200200-2 O5-1-GN21-1 05-60-200201-1	501 501 502 510	IMU IMU IMU IMU DIODE	ERRONEOUS OUTPUT ERRONEOUS OUTPUT NO OUTPUT FAILED OPEN
05-1-FC1042-2 05-60-200301-1,-2 05-1 - SRB -2 05-60-GN0804-1,-2 05-60-FC1042-1	902 904 951 960 906	RGA (ORB) RGA (ORB) DIODE RGA (SRB) RGA (SRB) DIODE RGA (ORB) RPC	ERRONEOUS OUTPUT FAILED OPEN ERRONEOUS OUTPUT FAILED OPEN FAILED OPEN
05-1-FC2042-2 05-60-200501-1,-2	1002 1014	AA AA DIODE	ERRONEOUS OUTPUT FAILED OPEN
05-1-FC6042-1 05-60-200700-1 05-60-200701-1,-2 05-60-200708-1 05-60-200709-1	1103 1130 1130 1130 1130	ASA ASA PWR CKT " " " " " " " " "	NULL OUTPUT FAILED OPEN " " " " " "
05-1-FC6242-1 05-1-FC6342-2 O5-1-FC6242-2	1201 1205 1206	RJDF RJDA RJDF	NO OUTPUT TO JET INADVERT JET FIRING INADVERT JET FIRING
05-1-FC6542-1 05-60-200600-1 05-60-200601-1,-2 05-60-200602-1 05-60-200606-1	1303 1310 1310 1310 1310	ATVC ATVC PWR CKT " " " " " " " " "	NULL OUTPUT FAILED OPEN " " " " " "
05-1-FC7258-2 05-1-FC7259-2	1576 1580	ORB DAP MAN PB ORB DAP NOR/VER PB	FAILED CLOSED FAILED CLOSED

APPENDIX E
DETAILED ANALYSIS

This appendix contains the IOA analysis worksheets supplementing previous results reported in STSEOS Working Paper 1.0-WP-VA86001-16, Analysis of the Guidance, Navigation, and Control Subsystem FMEA/CIL (16 December 1986). Prior results were obtained independently and documented before starting the FMEA/CIL assessment activity. Supplemental analysis was performed to address failure modes not previously considered by the IOA. Each sheet identifies the hardware item being analyzed, parent assembly and function performed. For each failure mode possible causes are identified, and hardware and functional criticality for each mission phase are determined as described in NSTS 22206, Instructions for Preparation of FMEA and CIL, 10 October 1986. Failure mode effects are described at the bottom of each sheet and worst case criticality is identified at the top.

LEGEND FOR IOA ANALYSIS WORKSHEETS

Hardware Criticalities:

- 1 = Loss of life or vehicle
- 2 = Loss of mission or next failure of any redundant item (like or unlike) could cause loss of life/vehicle
- 3 = All others

Functional Criticalities:

- 1R = Redundant hardware items (like or unlike) all of which, if failed, could cause loss of life or vehicle.
- 2R = Redundant hardware items (like or unlike) all of which, if failed, could cause loss of mission.

Redundancy Screen A:

- 1 = Is Checked Out PreFlight
- 2 = Is Capable of Check Out PreFlight
- 3 = Not Capable of Check Out PreFlight
- NA = Not Applicable

Redundancy Screens B and C:

- P = Passed Screen
- F = Failed Screen
- NA = Not Applicable

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: GNC FLIGHT: 2/1R
MDAC ID: 406 ABORT: 1/1

ITEM: SBTC
FAILURE MODE: PHYSICAL JAMMING OF TAKEOVER SWITCH

LEAD ANALYST: ROBERT O'DONNELL SUBSYS LEAD: LESTER DRAPELA

BREAKDOWN HIERARCHY:
1) GNC
2) SBTC
3)
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	1/1
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	3/1R	ATO:	2/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: PNL L2 (31V73A2A2), C3 (35V73A3A3)
PART NUMBER: MC621-0043-3240

CAUSES: VIBRATION, MECHANICAL SHOCK, CONTAMINATION, MISHANDLING, PIECE PART STRUCTURAL FAILURE.

EFFECTS/RATIONALE:
FOR PLT MAN THRUST TAKEOVER, 1ST FAILURE IS THE NEED FOR DOWNMODE FROM AUTO TO MANUAL. DURING ASCENT, THE PLTs TAKEOVER SWITCH JAMMED ON OR OFF WILL RESULT IN EITHER MANUAL OR AUTO THRUST CAPABILITY. TAL ABORT REQUIRES MANUAL THRUST CAPABILITY.
BOTH CDRs AND PLTs SBTC CONTROLS SPD BRK CMDS DURING ENTRY. IF ONE TAKEOVER SWITCH JAMS OPEN, OTHER POSITION PERFORMS FUNCTION. IF TAKEOVER SWITCH JAMS ON, ONLY MANUAL CONTROL OF SPD BRK EXISTS. SPD BRK IS NORMALLY FLOWN IN AUTO DURING ENTRY.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/09/87
SUBSYSTEM: GNC
MDAC ID: 603

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/3

ITEM: STAR TRACKER
FAILURE MODE: LOSS OF INPUT

LEAD ANALYST: LES DRAPELA SUBSYS LEAD: LES DRAPELA

BREAKDOWN HIERARCHY:
1) GNC
2) STAR TRACKER
3)
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/1R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: 10V71A7(-Y), A6(-Z)
PART NUMBER: MC431-0128-0012

CAUSES: INPUT CIRCUITRY FAILED DUE TO MECHANICAL SHOCK, VIBRATION, TEMPERATURE

EFFECTS/RATIONALE:
CREW CANNOT ISSUE COMMANDS - THE OTHER ST AND COAS SERVE AS BACKUP.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/09/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: GNC FLIGHT: 3/1R
MDAC ID: 604 ABORT: 3/3

ITEM: STAR TRACKER
FAILURE MODE: MECHANICAL SHUTTER FAILS OPEN

LEAD ANALYST: LES DRAPELA SUBSYS LEAD: LES DRAPELA

BREAKDOWN HIERARCHY:
1) GNC
2) STAR TRACKER
3)
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/1R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: 10V71A7(-Y), A6(-Z)
PART NUMBER: MC431-0128-0012

CAUSES: VIBRATION, JAMMING, MECHANICAL SHOCK

EFFECTS/RATIONALE:
POSSIBLE LOSS OF THE ST DUE TO SUN DAMAGE. THE OTHER ST AND COAS SERVE AS BACKUP.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 1/07/87
SUBSYSTEM: GNC
MDAC ID: 703

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/1R
ABORT: 3/3

ITEM: COAS
FAILURE MODE: INCORRECT MOUNTING OR UNABLE TO MOUNT

LEAD ANALYST: LES DRAPELA SUBSYS LEAD: LES DRAPELA

BREAKDOWN HIERARCHY:
1) GNC
2) COAS
3)
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/1R	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [2] B [P] C [P]

LOCATION: PANEL 01 (CMD'S STATION),OVERHEAD WINDOW W7 (AFT STATION)
PART NUMBER: V620-660-810

CAUSES: VIBRATION,SHOCK

EFFECTS/RATIONALE:
LOSS OF COAS - 2 ST'S AVAILABLE

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 3/25/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: GNC FLIGHT: 3/1R
MDAC ID: 1014 ABORT: 3/1R

ITEM: DIODE - AA'S 3 & 4 POWER CIRCUITS
FAILURE MODE: FAILS OPEN

LEAD ANALYST: LES DRAPELA SUBSYS LEAD: LES DRAPELA

BREAKDOWN HIERARCHY:
1) GNC
2) ACCELEROMETER ASSEMBLY
3) AA'S 3 & 4 POWER CIRCUIT
4) DIODE
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	3/1R		

REDUNDANCY SCREENS: A [2] B [F] C [P]

LOCATION: 83V76A24
PART NUMBER: JANTXIN1204RA

CAUSES: SHORT TO GROUND, PIECE PART STRUCTURAL FAILURE, VIBRATION

EFFECTS/RATIONALE:
AA'S 3 & 4 HAVE TWO POWER CIRCUITS. THE LOSS OF ONE DIODE REMOVES ONE POWER CIRCUIT ONLY, THE OTHER CIRCUIT CONTINUES TO SUPPLY POWER TO THE RGA. THE LOSS OF ONE DIODE CANNOT BE DETECTED, THEREFORE SCREEN B IS FAILED.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 3/03/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: GNC FLIGHT: 3/3
MDAC ID: 1950 ABORT: 3/3

ITEM: MEASUREMENT ISOLATION RESISTORS
FAILURE MODE: OPENS, OUT OF TOLERANCE, SHORTS

LEAD ANALYST: LES DRAPELA SUBSYS LEAD: LES DRAPELA

BREAKDOWN HIERARCHY:
1) GNC
2)
3)
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: THROUGHOUT GNC SUBSYSTEM
PART NUMBER:

CAUSES: SHOCK, VIBRATION, TEMPERATURE

EFFECTS/RATIONALE:
NONE. ONLY USED TO MONITOR CIRCUITS, NOT REQUIRED FOR VEHICLE OPERATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 3/03/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: GNC FLIGHT: 3/3
MDAC ID: 1951 ABORT: 3/3

ITEM: MEASUREMENT ISOLATION RESISTORS
FAILURE MODE: OPENS, OUT OF TOLERANCE, SHORTS

LEAD ANALYST: LES DRAPELA SUBSYS LEAD: LES DRAPELA

BREAKDOWN HIERARCHY:
1) GNC
2)
3)
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: THROUGHOUT GNC SUBSYSTEM
PART NUMBER:

CAUSES: SHOCK, VIBRATION, TEMPERATURE

EFFECTS/RATIONALE:
NONE. ONLY USED TO MONITOR CIRCUITS, NOT REQUIRED FOR VEHICLE OPERATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 3/03/87
SUBSYSTEM: GNC
MDAC ID: 1952

HIGHEST CRITICALITY HDW/FUNC
FLIGHT: 3/3
ABORT: 3/3

ITEM: MEASUREMENT ISOLATION RESISTORS
FAILURE MODE: OPENS, OUT OF TOLERANCE, SHORTS

LEAD ANALYST: LES DRAPELA SUBSYS LEAD: LES DRAPELA

BREAKDOWN HIERARCHY:
1) GNC
2)
3)
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: THROUGHOUT GNC SUBSYSTEM
PART NUMBER:

CAUSES: SHOCK, VIBRATION, TEMPERATURE

EFFECTS/RATIONALE:
NONE. ONLY USED TO MONITOR CIRCUITS, NOT REQUIRED FOR VEHICLE OPERATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 3/03/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: GNC FLIGHT: 3/3
MDAC ID: 1953 ABORT: 3/3

ITEM: MEASUREMENT ISOLATION RESISTORS
FAILURE MODE: OPENS, OUT OF TOLERANCE, SHORTS

LEAD ANALYST: LES DRAPELA SUBSYS LEAD: LES DRAPELA

BREAKDOWN HIERARCHY:
1) GNC
2)
3)
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: THROUGHOUT GNC SUBSYSTEM
PART NUMBER:

CAUSES: SHOCK, VIBRATION, TEMPERATURE

EFFECTS/RATIONALE:
NONE. ONLY USED TO MONITOR CIRCUITS, NOT REQUIRED FOR VEHICLE OPERATION.

REFERENCES:

INDEPENDENT ORBITER ASSESSMENT
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 3/03/87 HIGHEST CRITICALITY HDW/FUNC
SUBSYSTEM: GNC FLIGHT: 3/3
MDAC ID: 1954 ABORT: 3/3

ITEM: MEASUREMENT ISOLATION RESISTORS
FAILURE MODE: OPENS, OUT OF TOLERANCE, SHORTS

LEAD ANALYST: LES DRAPELA SUBSYS LEAD: LES DRAPELA

BREAKDOWN HIERARCHY:
1) GNC
2)
3)
4)
5)
6)
7)
8)
9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	3/3	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	3/3	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	3/3		

REDUNDANCY SCREENS: A [NA] B [NA] C [NA]

LOCATION: THROUGHOUT GNC SUBSYSTEM
PART NUMBER:

CAUSES: SHOCK, VIBRATION, TEMPERATURE

EFFECTS/RATIONALE:
NONE. ONLY USED TO MONITOR CIRCUITS, NOT REQUIRED FOR VEHICLE OPERATION.

REFERENCES:

APPENDIX F

NASA FMEA TO IOA WORKSHEET CROSS REFERENCE/RECOMMENDATIONS

This section provides a cross reference between the NASA FMEA and corresponding IOA analysis worksheet(s) included in Appendix E. The Appendix F identifies: NASA FMEA Number, IOA Assessment Number, NASA criticality and redundancy screen data, and IOA recommendations.

Appendix F Legend

Code	Definition
None.	

APPENDIX F

NASA FMEA TO IOA WORKSHEET CROSS REFERENCE / RECOMMENDATIONS

IDENTIFIERS		NASA				IOA RECOMMENDATIONS #				
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A	B	C	CRIT HW/F	SCREENS A	B	C	OTHER (SEE LEGEND CODE)	ISSUE
	GNC-960	/				/					
	GNC-961	/				/					
05-01-(10), PREL REF	GNC-951	2/1R	P	F	P	/					
05-1-(09), PREL REF	GNC-950	3/1R	P	P	P	/					
05-1-(TBD02)	GNC-1580	2/2	NA	NA	NA	/					
05-1-(TBD03)	GNC-1581A	3/2R	P	P	P	/					
05-1-(TBD04)	GNC-1586A	3/3	NA	NA	NA	2/2	NA	NA	NA		
05-1-(TBD05)	GNC-1586B	2/2	NA	NA	NA	/					
05-1-(TBD06)	GNC-1581B	3/3	NA	NA	NA	3/2R	P	P	P		
05-1-(TBD01)	GNC-1576	2/2	NA	NA	NA	/					
05-1-FC1042-1	GNC-901	3/1R	P	P	P	/					
05-1-FC1042-2	GNC-902	2/1R	P	F	P	/					
05-1-FC2042-1	GNC-1001	3/1R	P	P	P	/					
05-1-FC2042-2	GNC-1002	2/1R	P	F	P	/					
05-1-FC3042-1	GNC-101	1/1	NA	NA	NA	/					
05-1-FC3042-2	GNC-102	3/1R	P	P	P	/					
	GNC-104	3/1R	P	P	P	/					
05-1-FC3042-3	GNC-103	3/1R	P	P	P	/					
	GNC-105	3/1R	P	P	P	/					
05-1-FC3142-1	GNC-202	2/1R	P	P	P	/					
05-1-FC3142-2	GNC-201	3/1R	P	P	P	/					
05-1-FC3142-3	GNC-203	3/1R	P	P	P	/					
05-1-FC3242-1	GNC-401	2/1R	P	P	P	/					
05-1-FC3242-2	GNC-402	3/1R	P	P	P	/					
05-1-FC3242-3	GNC-403	3/1R	P	P	P	/					
05-1-FC3242-4	GNC-406X	2/1R	P	P	P	/					
05-1-FC3442-1	GNC-301	3/1R	P	P	P	/					
05-1-FC3442-2	GNC-302	3/1R	P	P	P	/					
05-1-FC3442-3	GNC-304	1/1	NA	NA	NA	/					
05-1-FC6042-1	GNC-1103	2/1R	P	F	P	/					
05-1-FC6042-2	GNC-1104	3/1R	P	P	P	/					
05-1-FC6242-1	GNC-1201	2/1R	P	P	P	/					
05-1-FC6242-2	GNC-1206	1/1	P	P	P	/					
05-1-FC6342-1	GNC-1203	3/1R	P	P	P	/					
05-1-FC6342-2	GNC-1205	1/1	P	P	P	/					
05-1-FC6542-1	GNC-1303	2/1R	P	F	P	/					
05-1-FC6542-2	GNC-1304	3/1R	P	P	P	/					
05-1-FC7241-0001	GNC-120	3/3	NA	NA	NA	/					
	GNC-121	3/3	NA	NA	NA	/					
05-1-FC7242-0001	GNC-140	3/3	NA	NA	NA	/					
	GNC-141	3/3	NA	NA	NA	/					
05-1-FC7244-0001	GNC-1110	3/1R	F	P	P	3/1R	P	P	P		
	GNC-1111	3/1R	F	P	P	3/1R	P	P	P		
05-1-FC7244-0002	GNC-1111A	3/1R	F	P	P	3/1R	P	P	P		
05-1-FC7245-0001	GNC-160	3/3	NA	NA	NA	1/1	NA	NA	NA		

IDENTIFIERS		NASA				IOA RECOMMENDATIONS *					
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A	B	C	CRIT HW/F	SCREENS A	B	C	OTHER (SEE LEGEND CODE)	ISSUE
05-1-FC7245-0001	GNC-161	3/3	NA	NA	NA	3/1R	P	P	P		
05-1-FC7245-0002	GNC-160D	3/3	NA	NA	NA	3/1R	P	P	P		
05-1-FC7246-0001	GNC-160A	3/3	NA	NA	NA	3/1R	P	P	P		
	GNC-161A	3/3	NA	NA	NA	3/1R	P	P	P		
05-1-FC7246-0002	GNC-160E	3/3	NA	NA	NA	3/1R	P	P	P		
05-1-FC7248-0001	GNC-160B	3/3	NA	NA	NA	1/1	P	P	P		
	GNC-161B	3/3	NA	NA	NA	3/1R	P	P	P		
05-1-FC7248-0002	GNC-160F	3/3	NA	NA	NA	3/1R	P	P	P		
05-1-FC7249-0001	GNC-160C	3/3	NA	NA	NA	3/1R	P	P	P		
	GNC-161C	3/3	NA	NA	NA	3/1R	P	P	P		
05-1-FC7249-0002	GNC-160G	3/3	NA	NA	NA	3/1R	P	P	P		
05-1-FC7250-0001	GNC-1601	3/3	NA	NA	NA	/					
	GNC-1602	3/3	NA	NA	NA	/					
05-1-FC7251-0001	GNC-410	3/3	NA	NA	NA	/					
	GNC-411	3/3	NA	NA	NA	/					
05-1-FC7251-0002	GNC-410A	3/3	NA	NA	NA	/					
05-1-FC7252-0001	GNC-1400	3/3	NA	NA	NA	3/1R	P	P	P		
	GNC-1401	3/3	NA	NA	NA	3/1R	P	P	P		
	GNC-1404	3/3	NA	NA	NA	3/1R	P	P	P		
05-1-FC7253-0001	GNC-1402	3/3	NA	NA	NA	3/1R	P	P	P		
	GNC-1403	3/3	NA	NA	NA	3/1R	P	P	P		
05-1-FC7253-0002	GNC-1403A	3/3	NA	NA	NA	3/1R	P	P	P		
05-1-FC7254-1	GNC-130	3/3	NA	NA	NA	/					
	GNC-131	3/3	NA	NA	NA	/					
05-1-FC7255-1	GNC-130A	3/3	NA	NA	NA	/					
	GNC-131A	3/3	NA	NA	NA	/					
05-1-FC7256-1	GNC-130B	3/3	NA	NA	NA	/					
	GNC-131B	3/3	NA	NA	NA	/					
05-1-FC7257-0001	GNC-1501	3/3	NA	NA	NA	3/2R	P	P	P		
	GNC-1502	3/3	NA	NA	NA	3/2R	P	P	P		
	GNC-1570	3/3	NA	NA	NA	3/2R	P	P	P		
05-1-FC7258-0001	GNC-1510	3/3	NA	NA	NA	3/2R	P	P	P		
	GNC-1511	3/3	NA	NA	NA	3/2R	P	P	P		
	GNC-1515	3/3	NA	NA	NA	3/2R	P	P	P		
	GNC-1516	3/3	NA	NA	NA	3/2R	P	P	P		
	GNC-1575	3/3	NA	NA	NA	3/2R	P	P	P		
	GNC-1577	3/3	NA	NA	NA	3/2R	P	P	P		
05-1-FC7259-0001	GNC-1520	3/3	NA	NA	NA	3/2R	P	P	P		
	GNC-1521	3/3	NA	NA	NA	3/2R	P	P	P		
05-1-FC7260-0001	GNC-1560	3/3	NA	NA	NA	3/2R	P	P	P		
	GNC-1561	3/3	NA	NA	NA	3/2R	P	P	P		
	GNC-1586	3/3	NA	NA	NA	2/2	NA	NA	NA		
05-1-FC7261-0001	GNC-1530	3/3	NA	NA	NA	3/2R	P	P	P		
	GNC-1535	3/3	NA	NA	NA	3/2R	P	P	P		
	GNC-1536	3/3	NA	NA	NA	3/2R	P	P	P		
	GNC-1540	3/3	NA	NA	NA	3/2R	P	P	P		
	GNC-1541	3/3	NA	NA	NA	3/2R	P	P	P		
	GNC-1545	3/3	NA	NA	NA	3/2R	P	P	P		
	GNC-1546	3/3	NA	NA	NA	3/2R	P	P	P		
	GNC-1550	3/3	NA	NA	NA	3/2R	P	P	P		

IDENTIFIERS		NASA				IOA RECOMMENDATIONS *				
NASA FMEA NUMBER	IOA ASSESSMENT NUMBER	CRIT HW/F	SCREENS A	B	C	CRIT HW/F	SCREENS A	B	C	OTHER (SEE LEGEND CODE)	ISSUE
05-1-FC7261-0001	GNC-1551	3/3	NA	NA	NA	3/2R	P	P	P		
	GNC-1581	3/3	NA	NA	NA	3/2R	P	P	P		
	GNC-1582	3/3	NA	NA	NA	2/2	NA	NA	NA		
	GNC-1585	3/3	NA	NA	NA	2/2	NA	NA	NA		
05-1-FC7261-0001A	GNC-1531	3/3	NA	NA	NA	3/2R	P	P	P		
05-1-FC7262-0001	GNC-150	3/3	NA	NA	NA	/					
	GNC-151	3/3	NA	NA	NA	/					
05-1-GN21-1	GNC-502	3/1R	P	P	F	/					
05-1-GN21-2	GNC-501	2/1R	P	P	F	/					
05-1-GN22-1	GNC-601	3/1R	P	P	P	/					
05-1-GN22-2	GNC-603X	3/1R	P	P	P	/					
05-1-GN22-3	GNC-604X	3/1R	P	P	P	/					
05-1-GN22-4	GNC-601A	3/1R	P	P	P	/					
05-1-GN28-1	GNC-802	3/1R	P	P	P	/					
05-1-GN29-2	GNC-801	3/1R	P	P	P	/					
05-6-200400-1	GNC-1801A	3/1R	P	NA	P	/					
	GNC-1802A	2/1R	P	NA	F	2/1R	NA	NA	NA		
	GNC-1803A	3/1R	P	NA	P	2/1R	P	P	P		
	GNC-1804A	3/1R	P	NA	P	/					
05-6-2659-1	GNC-1802	2/1R	P	F	F	/					
	GNC-1804	2/1R	P	F	F	1/1	NA	NA	NA		
05-6-2659-2	GNC-1801	3/1R	NA	NA	NA	/					
	GNC-1803	3/1R	NA	NA	NA	2/1R	P	P	P		
05-60-(01), PREL REF	GNC-1951X	3/3	NA	NA	NA	/					
05-60-(03), PREL REF	GNC-1012	3/1R	P	P	P	/					
05-60-(04), PREL REF	GNC-1012A	3/1R	P	P	P	/					
05-60-(05), PREL REF	GNC-1012B	3/1R	P	P	P	/					
05-60-(06), PREL REF	GNC-1111B	3/1R	P	P	P	/					
05-60-(07), PREL REF	GNC-1310B	3/3	NA	NA	NA	/					
05-60-(08), PREL REF	GNC-1111C	3/3	NA	NA	NA	/					
05-60-(09), PREL REF	GNC-1953X	3/3	NA	NA	NA	/					
05-60-(10), PREL REF	GNC-1310C	2/1R	P	F	P	/					
05-60-(11), PREL REF	GNC-1310D	3/1R	P	F	P	/					
05-60-(12), PREL REF	GNC-1310E	3/1R	P	P	P	/					
05-60-(13), PREL REF	GNC-1112	3/3	NA	NA	NA	/					
05-60-(14), PREL REF	GNC-1130C	2/1R	P	F	P	/					
05-60-(15), PREL REF	GNC-1130D	3/1R	P	F	P	/					
05-60-(16), PREL REF	GNC-1130E	3/3	NA	NA	NA	/					
05-60-(17), PREL REF	GNC-1130F	3/1R	P	P	P	/					
05-60-(18), PREL REF	GNC-1952X	3/3	NA	NA	NA	/					
05-60-02, PREL REF N	GNC-1950X	3/3	NA	NA	NA	/					
05-60-200100-1	GNC-611	3/1R	P	P	P	/					
	GNC-612	3/1R	P	P	P	/					
05-60-200200-1	GNC-511	3/1R	P	P	P	/					
05-60-200200-2	GNC-512	3/3	NA	NA	NA	/					
05-60-200201-1	GNC-510	3/1R	P	F	P	/					
05-60-200301-1	GNC-904	3/1R	P	F	P	/					
05-60-200501-1	GNC-1014X	3/1R	P	F	P	/					
05-60-200601-1	GNC-1310	3/1R	P	F	P	/					
05-60-200602-1	GNC-1310A	3/3	NA	NA	NA	/					

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05-60-200701-1	GNC-1130	3/1R	P	F	P	/					
05-60-200703-1	GNC-1130A	3/3	NA	NA	NA	/					
05-60-200706-1	GNC-1130B	3/3	NA	NA	NA	/					
05-60-200800-0001	GNC-1590	3/3	NA	NA	NA	/					
	GNC-1591	3/3	NA	NA	NA	/					
	GNC-1593	3/3	NA	NA	NA	3/1R	P	P	P		
05-60-FC1042-0001	GNC-905	3/1R	P	P	P	/					
05-60-FC1043-0001	GNC-903	3/1R	P	P	P	/					
05-60-FC1044-0001	GNC-904A	3/1R	P	P	P	/					
05-60-FC1045-0001	GNC-1010	3/1R	P	P	P	/					
	GNC-1011	3/1R	P	P	P	/					
05-60-GN0801-1	GNC-810	3/1R	P	P	P	/					
	GNC-811	3/1R	P	P	P	/					
05-60-GN0802-1	GNC-812	3/3	NA	NA	NA	/					
05-60-IMU(03)	GNC-510A	3/1R	P	P	P	/					
05-60-IMU(05)	GNC-1954X	3/3	NA	NA	NA	/					
05-60-IMU(04)	GNC-510B	3/1R	P	P	P	/					
05-60-2103-1	GNC-111	3/1R	P	P	P	/					
05-60-2203-(TBD) PRE	GNC-111B	2/2	P	P	P	/					
05-60-2203-1	GNC-111A	2/1R	P	P	P	/					
05-60-2203-2	GNC-110	3/3	NA	NA	NA	/					
05-6Y-202000-1	GNC-711	3/1R	P	P	P	/					
	GNC-712	3/1R	P	P	P	/					
07-1-725101-1	GNC-703X	3/1R	P	P	P	/					
07-1-725101-3	GNC-701	3/1R	P	P	P	/					
NONE	GNC-1013	/				3/3	NA	NA	NA		
	GNC-1101	/				3/1R	P	P	P		
	GNC-1102	/				3/1R	P	P	P		
	GNC-1105	/				3/1R	P	P	P		
	GNC-1106	/				3/1R	P	P	P		
	GNC-1107	/				3/1R	P	P	P		
	GNC-1108	/				3/1R	P	P	P		
	GNC-1131	/				3/3	NA	NA	NA		
	GNC-1207	/				3/1R	P	P	P		
	GNC-1208	/				3/1R	P	P	P		
	GNC-1211	/				3/3	NA	NA	NA		
	GNC-1212	/				3/3	NA	NA	NA		
	GNC-1213	/				/					
	GNC-1214	/				/					
	GNC-1301	/				3/1R	P	P	P		
	GNC-1302	/				3/1R	P	P	P		
	GNC-1305	/				3/1R	P	P	P		
	GNC-1311	/				3/3	NA	NA	NA		
	GNC-1901	/				3/1R	P	P	P		
	GNC-1902	/				3/1R	P	P	P		
	GNC-303	/				3/1R	P	P	P		
	GNC-404	/				/					
	GNC-405	/				/					
	GNC-602	/				3/1R	P	P	P		
	GNC-610	/				3/3	NA	NA	NA		

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NONE	GNC-702	/				3/1R	P	P	P		
	GNC-710	/				3/3	NA	NA	NA		